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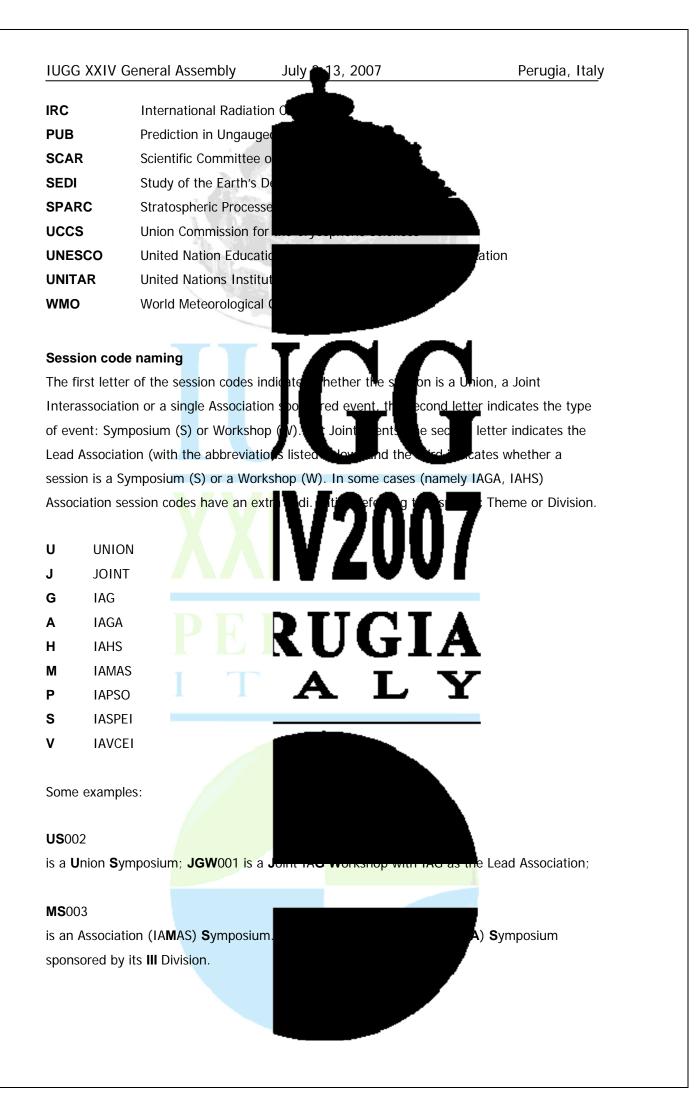
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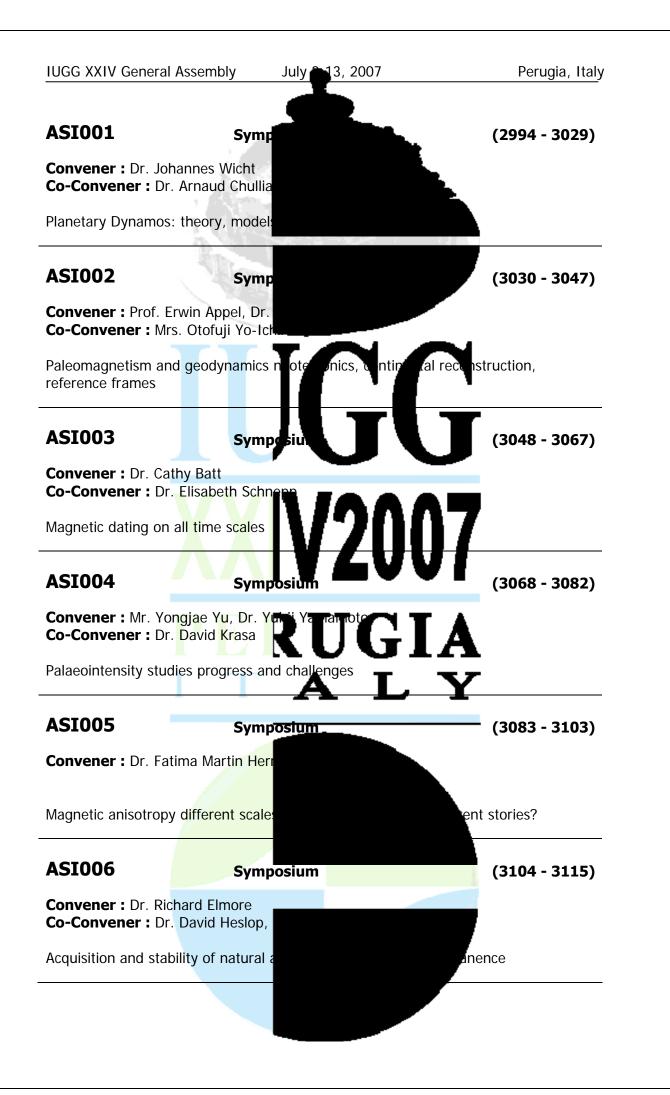
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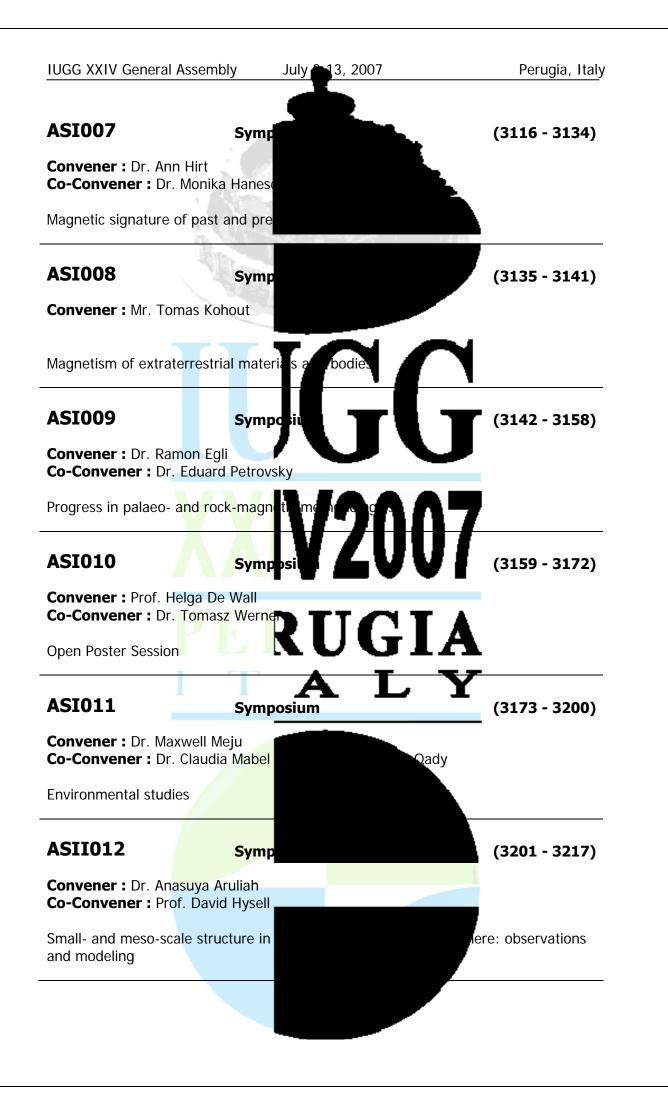
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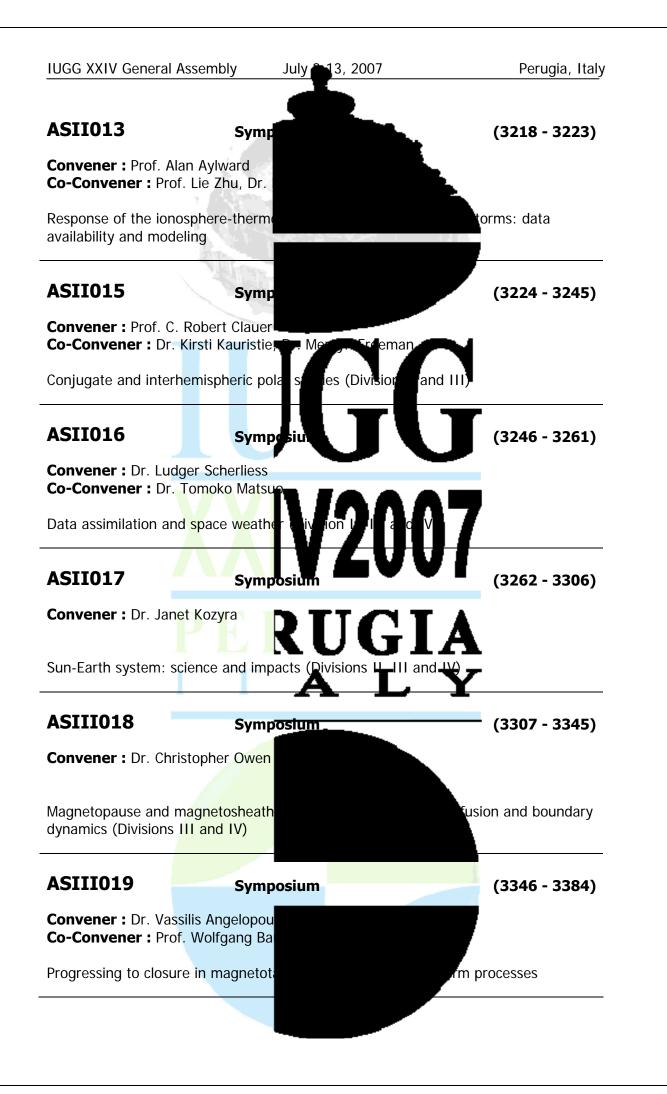
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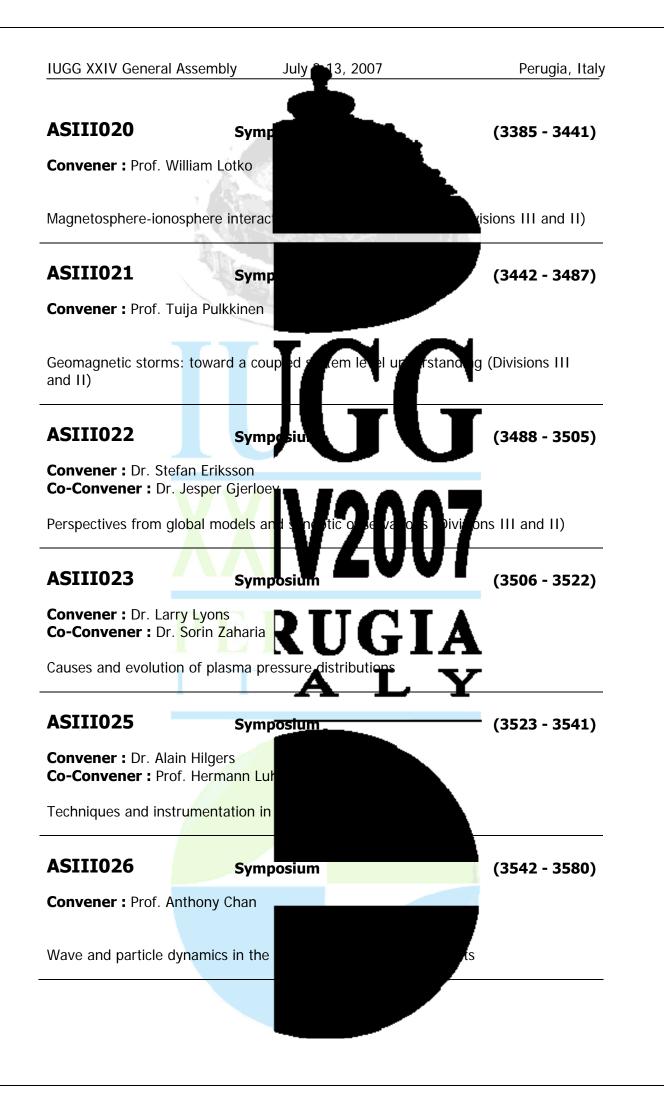
	neral Assembly July 13, 2007	Perugia, Italy
Abbreviations		
AG	International Association	
AGA	International Association	ronomy
AHS	International Association	
AMAS	International Association	Sciences
APSO	International Association	Oceans
ASPEI	International Association	the Earth's Interior
AVCEI	International Associati	stry of the Earth's Interior
CliC	Climate and Cryospher	
Ev-K2-CNR	Everest-K2 CNR Commune	$\sim$
GEWEX	Global Energy and Wate Experiment	
HKH-FRIEND	Hindu Kush-Himalayan Foveregimes from	ernational Experimental
	and Network Data	
ABO	International Association for the logic	ean raph
ACS	International Association of Cryospheric So	ciences
CACGP	International Commission All nemberic	Shemintry Global Pollution
CASVR	International Commiss on an amospheric	Sill equitation Relations
CCE	International Commission explorite intails	
CCL	International Commission & Clining 1	/VI
CCLAS	International Commission on the Coupled	Land-Atmosphere System
ССР	International Commission on yours and	ecipitation
CDM	International Commission on synamic Me	orongy 🗛
CGW	International Commission on Groundwater	
CIMOD	International Center for International Center for International Center for International Mour	ain Develop tent
СМА	International Commission on the Middle A	tmosphere
CRS	International Celestial Performance	
CSIH	International Commiss	drology
CSW	International Commiss	
СТ	International Commiss	
CWQ	International Commiss	
CWRS	International Commiss	
GAC	International Global Atmospheric Chemistr	у
GS	International Glaciological Society	
LP	International Lithosphe	
NQUA	International Union for	
	International Ocean Ne	

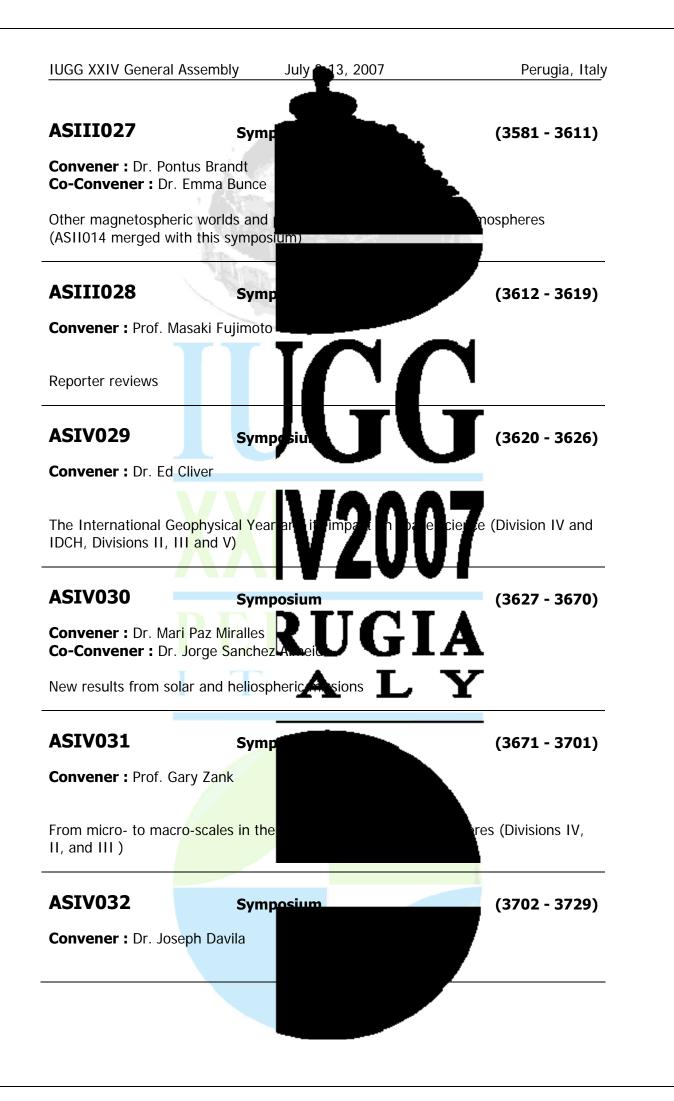


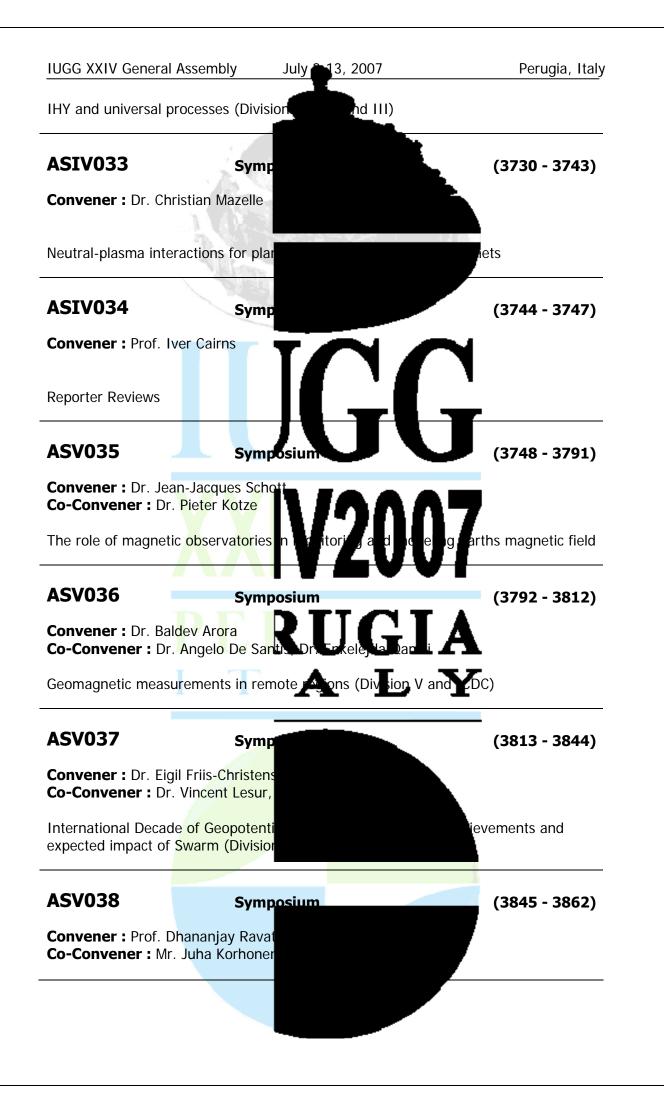


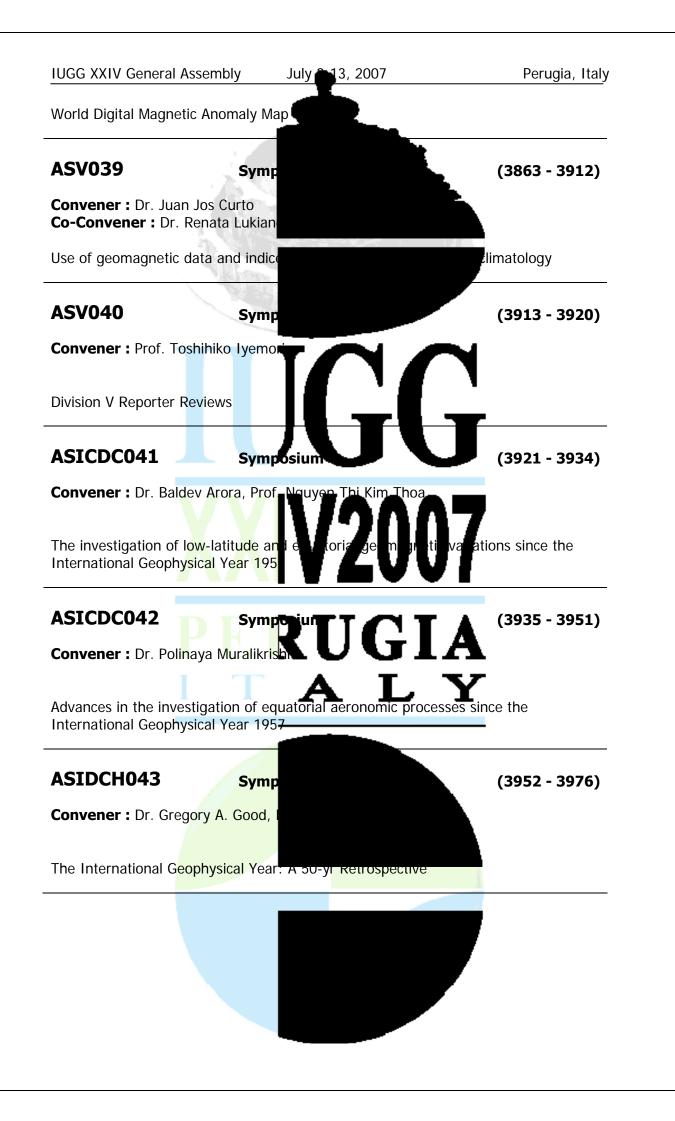












## IUGG XXIV General Assembly

(A) - IAG - International Association

## **ASI001**

## Symposium Planetary Dynamos: theory, m

Convener : Dr. Johannes Wicht Co-Convener : Dr. Arnaud Chulliat, D

The field of planetary magnetism is prese inputs. Ongoing satellite observations by re magnetic field with previously unknown geomagnetic field have been improved to explanations of core dynamics on longer timescales. Missions to other planets, such as the Galileo, Cassini and the MGS missions, have discovered and ray of ragins of field morphologies and magnetic histories within our solar syste experiments are both accessing increasin offering new ways to explain the observatio to advance our understanding of how plane invite contributions relating to this joint effor

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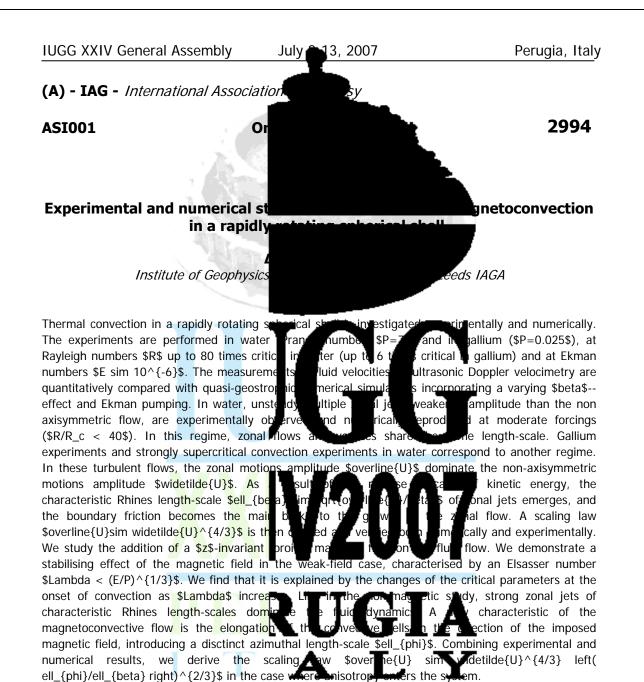
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d array of new scientific ing measurements of Earths de, new models of the historic k nearly 10,000 years in time, requiring hodels and advanced laboratory ary parameter regimes and are g efforts offer a formidable chance ields. In this session, we agn

periment



Keywords: magnetoconvection. experiments, quasi geostrophic





ible solution") but this d). Consequently, this sphere as a mode of velocity field given a such that the magnetic field is maintained by a dynamo process. Solutions to the inverse dynamo are presumably not unique, but no example seems to be known of two velocity fields producing the exact same magnetic field in the

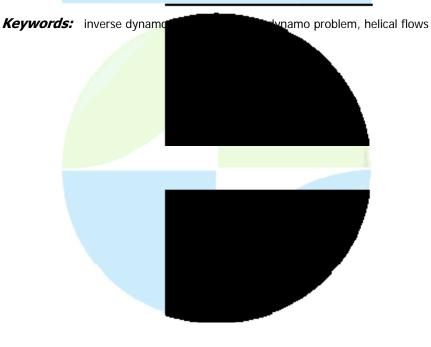
vacuum region. Looking for the such flows ernal magnetic field, is our main goal. The problem is solved again in a cyling showed at a tion exists, i.e. we have the identical external found such flows (modes of a kinematic found such flows (modes of a kinematic of amound a condition with had to the identical external magnetic fields (outside of the cylinder). Even though only a relatively small interval of occurence of ∟in ndī Γw. ch J such flows has been found, there are certainly solutions to conferent velocity profiles. nany other Nonetheless, an exterior magnetic field probable st the possible velocity fields that have adlv generated it.

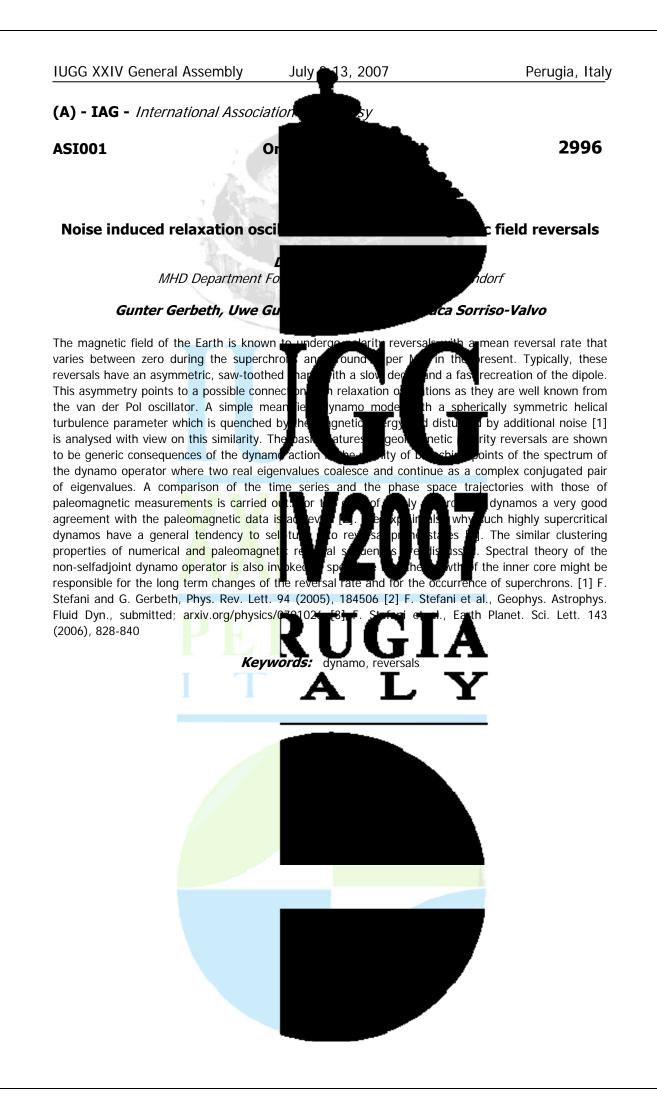
magnetic field decays - no dynamo acti

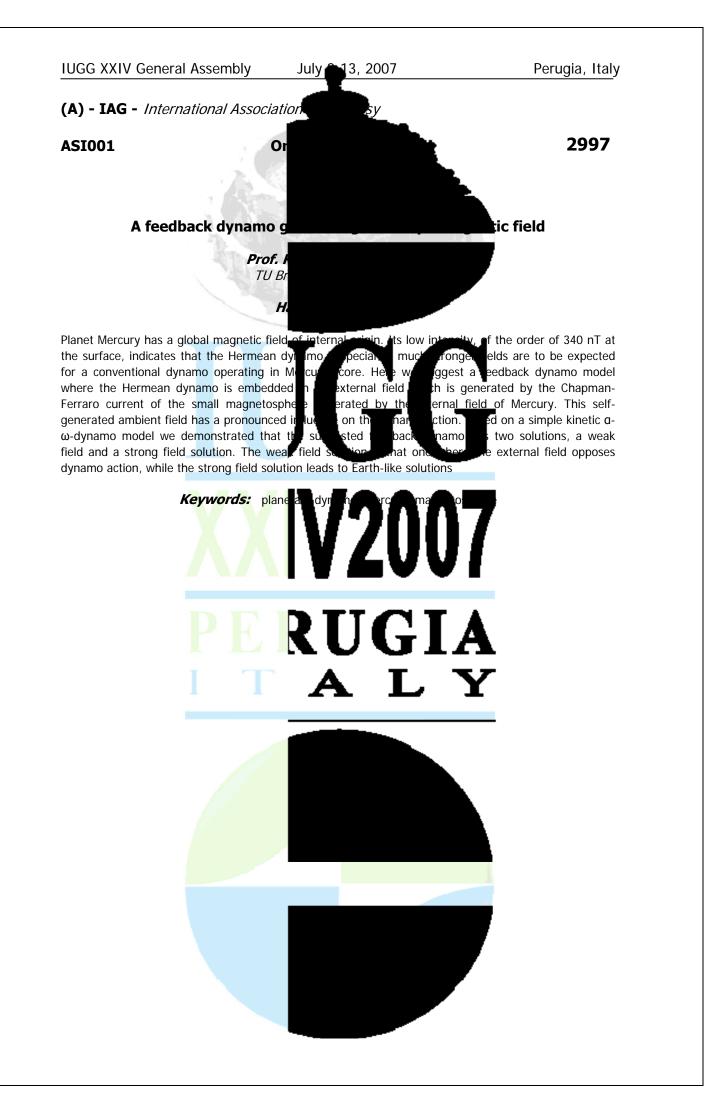
problem is still open. A working invisib

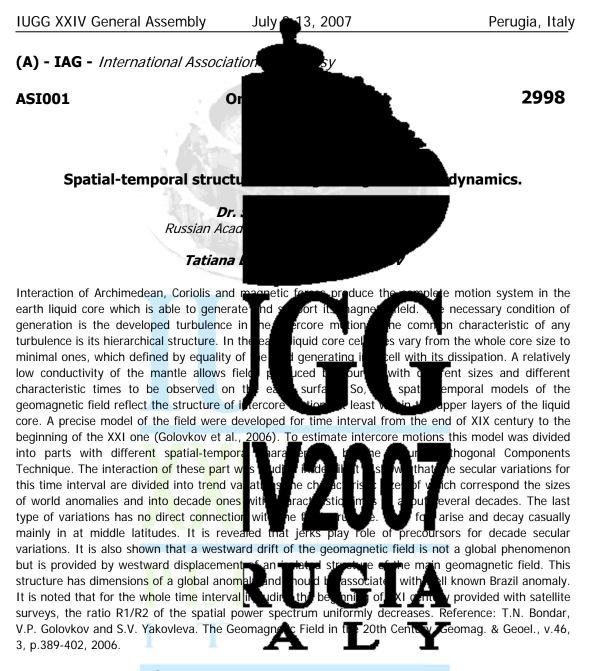
\$alpha^{2}\$ mean field dynamo. The i

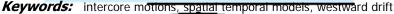
magnetic field observed in the vacuum red





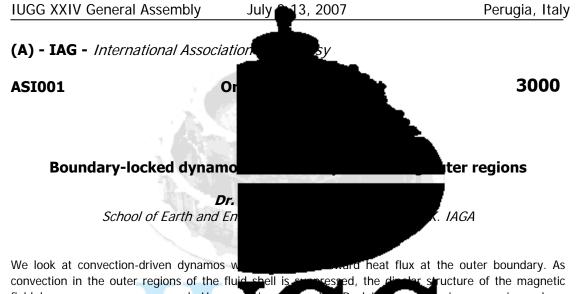










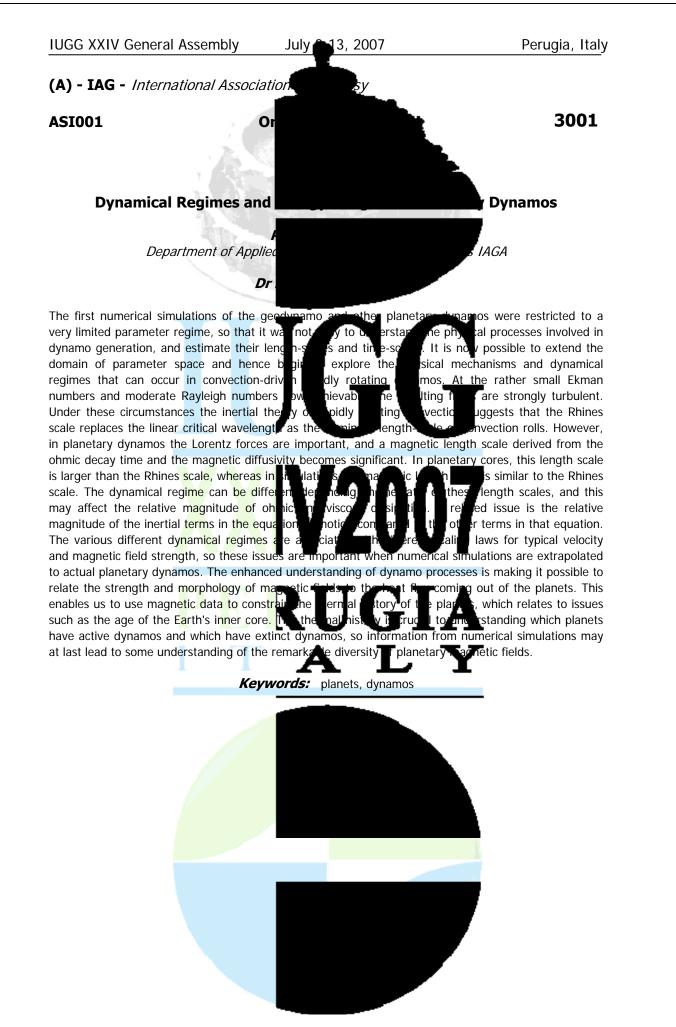


convection in the outer regions of the fluid spefield becomes more pronounced. However in convection is strong inside the tangent cynde dynamos with a weakly convecting top layers inhomogeneities at the boundary, when he magnitude. On the other hand, vigorous on detrimental effect on locking of dipolar structure to influence the core flow and produce locking.

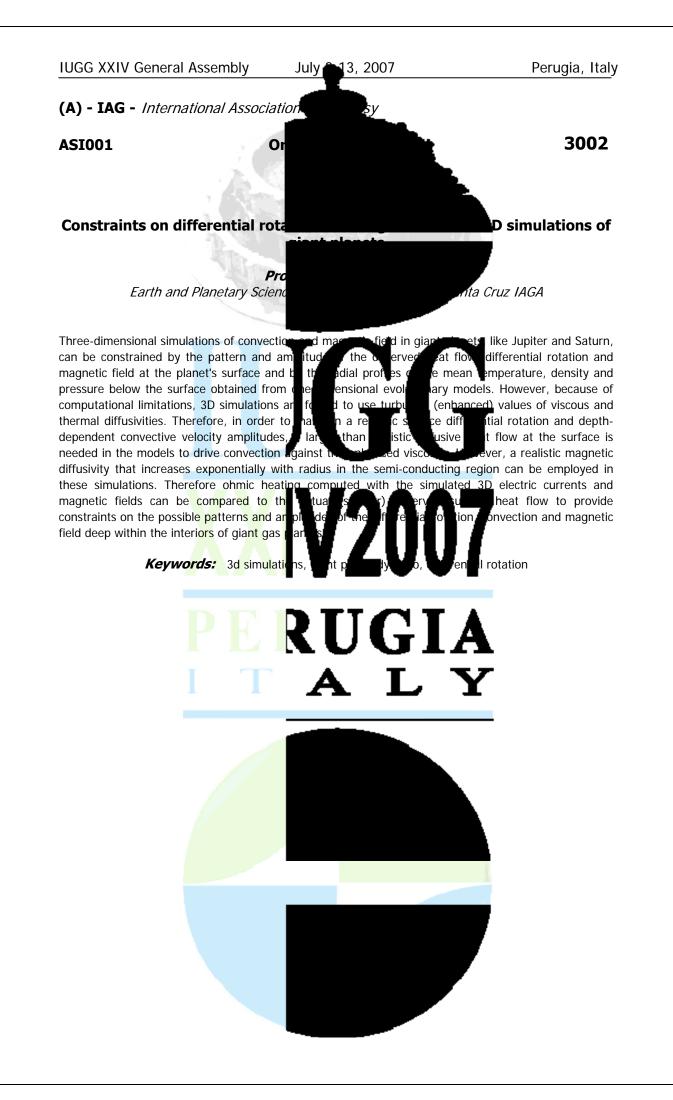
shell is supressed, the increating the Raylet nds but weak near so brt locking of ne ermal and more on tion in e o ture in such odels

director structure of the magnetic number gives a regime where e outer coundary. We show that flow and magnetic field to lateral tic diffusivities are of the same region of the fluid core has a rong region of the fluid structured

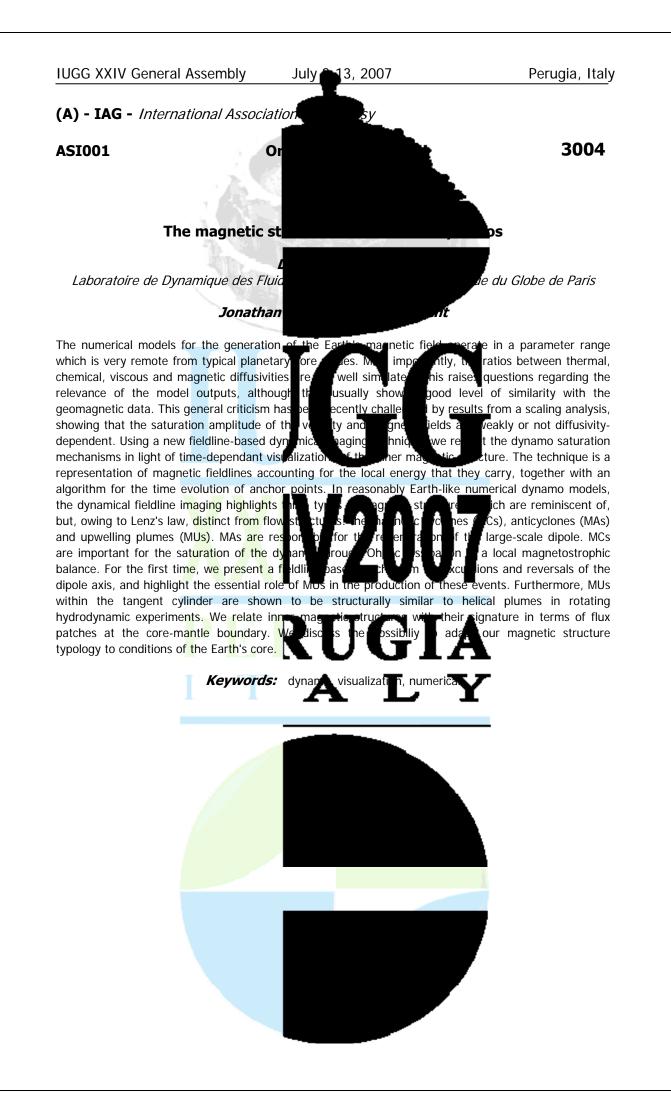




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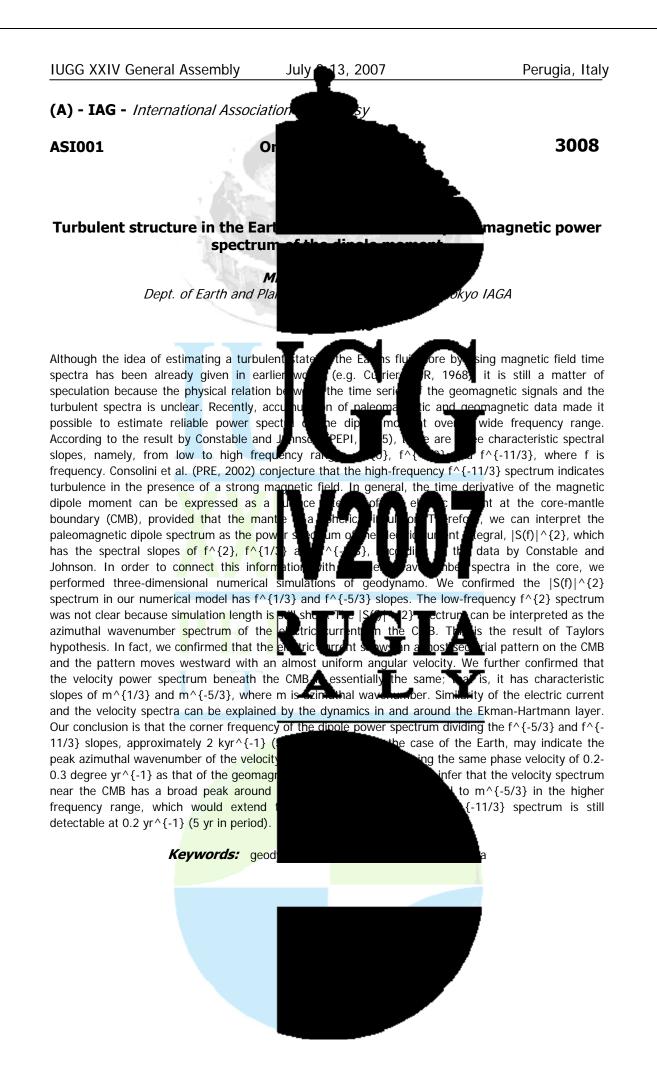






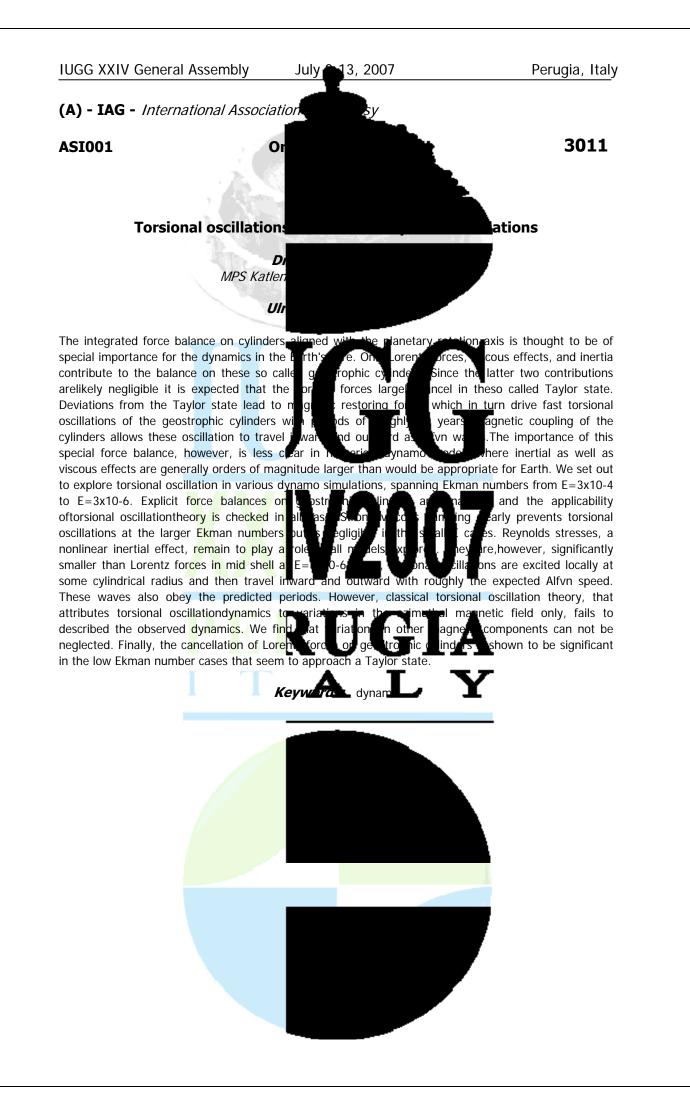






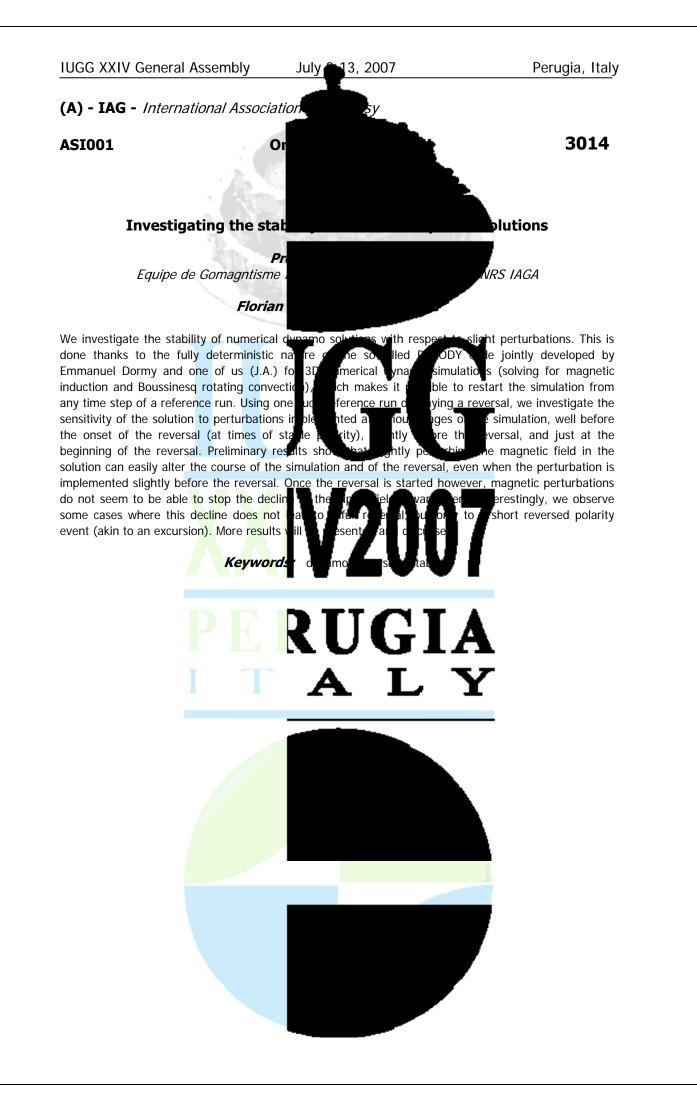


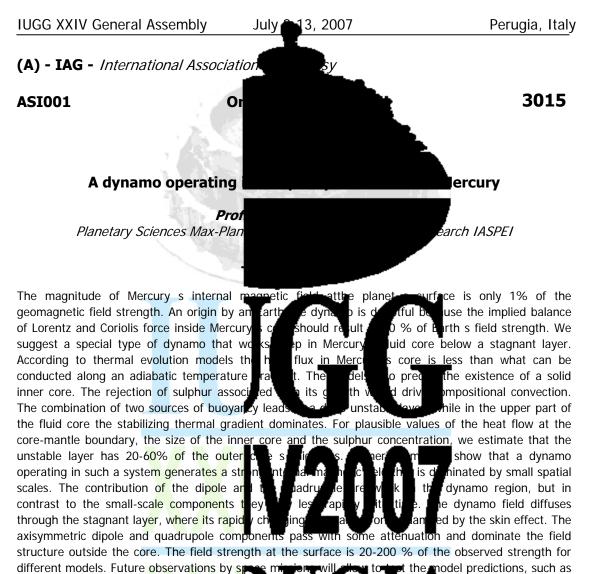










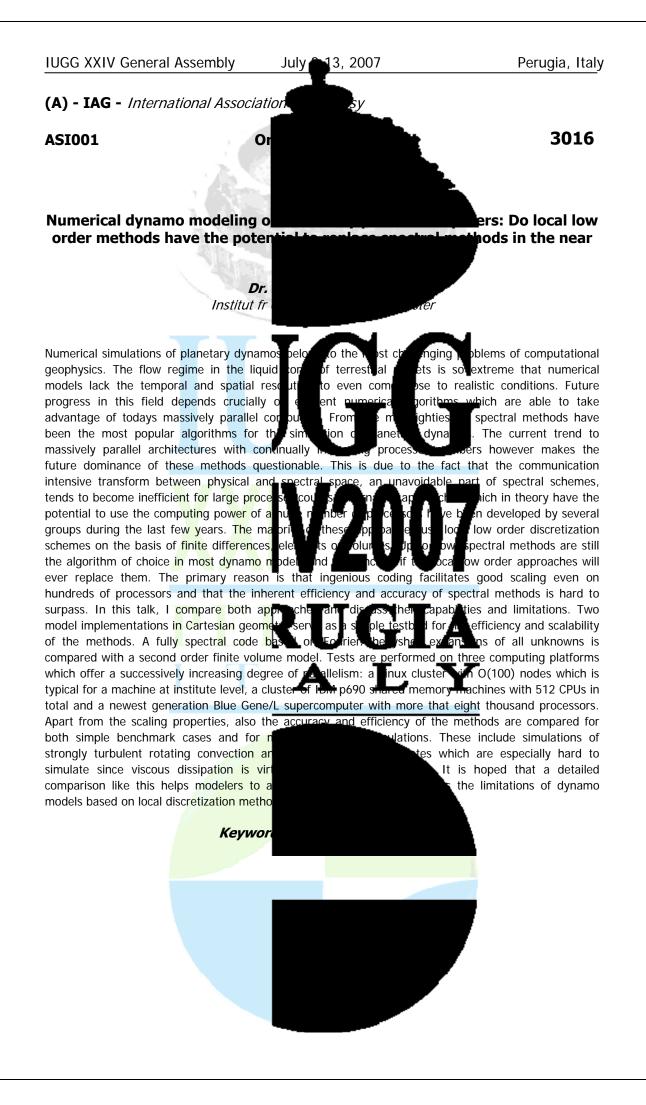


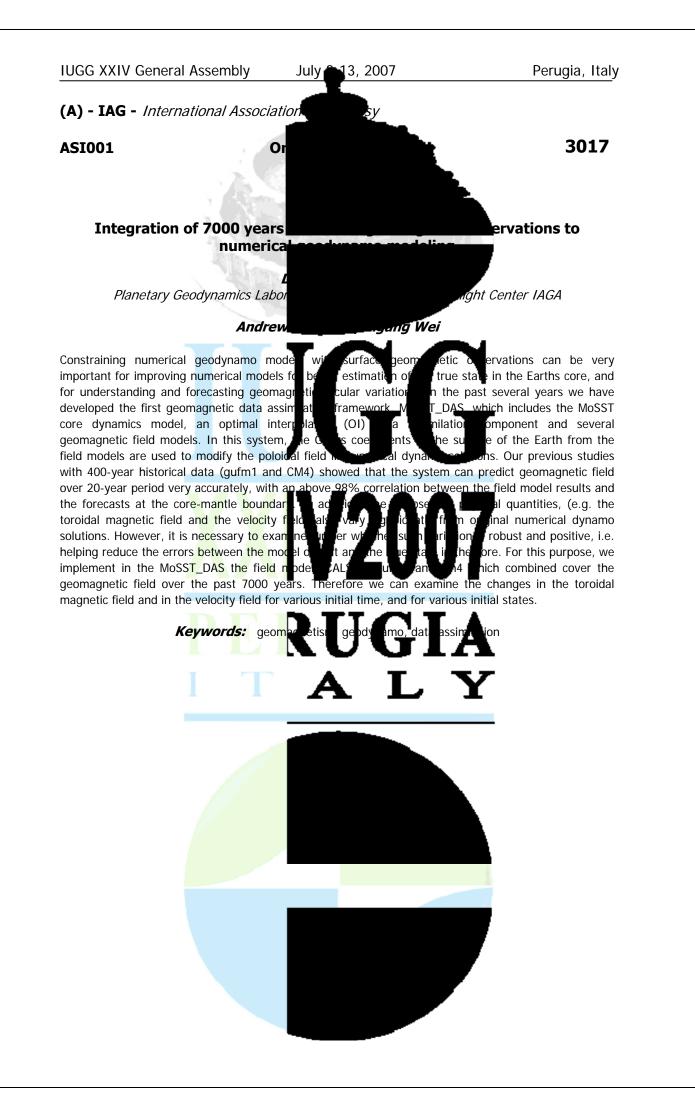
the strong dominance of axisymmetric low- der held components variation on a decadal time scale.

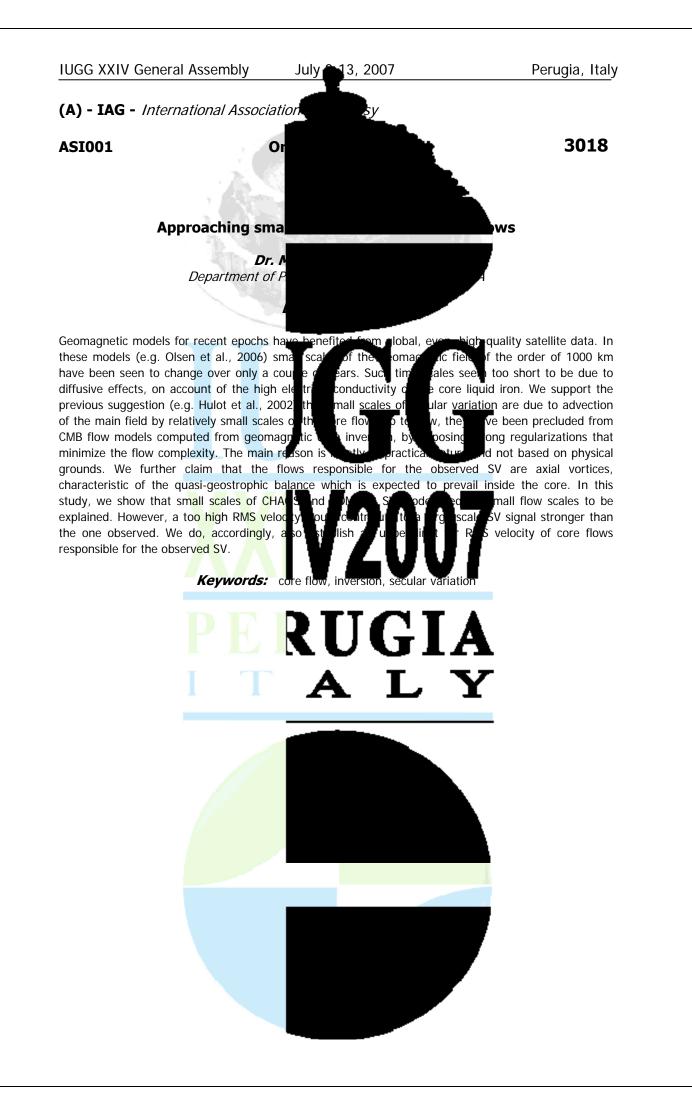
Keywords: dynamo odel, plane ary magnets m

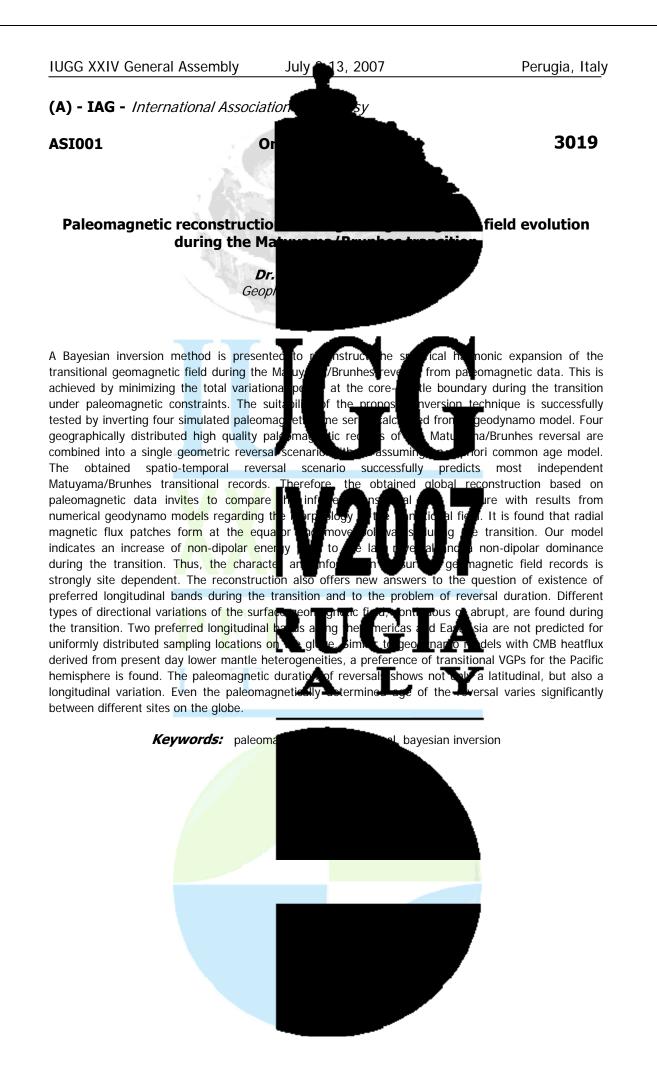
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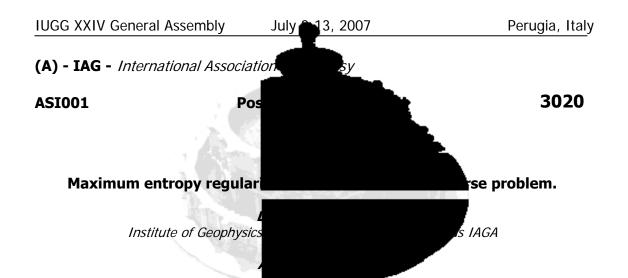
ck of detectable secular











We integrate a maximum entropy image reconstruction flow at the core-mantle boundary (CMB). model via the induction equation in the fr about the flow morphology, to reduce the unconstrained effect of the small scales. Eyr small scales of both the flow and the mag good parameterisation of this process (e. g. & Jault [AGU 2006]) is crucial in order t

respect one should avoid adding unnecessary {it a priori} information, as done by the usual quadratic regularisations. These lead to underestimate the power at large wave numbers (of importance for the core flow), and imply a loss of contrast in introduced to invert for magnetic field mo known to provide sharper pictures, with a this technique into the problem of retriev hg epoch 2002.5 (Olsen [2006]) using the t na between flow models built from maximum perspectives and implications for our method.

hnique into re i mode are ix approx ma eter space, a ulot [<u>2005] h</u>a ld can derind extrac of

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ocess of modelling the core rom a secular variation providing (i) an extra constraint i) a regularisation, to reduce the how<u>n that the interaction between</u> ation at large scales. A error of modelling, Pais from the data. In this

> at the CMB. Recently ntropy regularisation is structure. We introduce he CHAOS model at the We present comparisons regularisations, and discuss

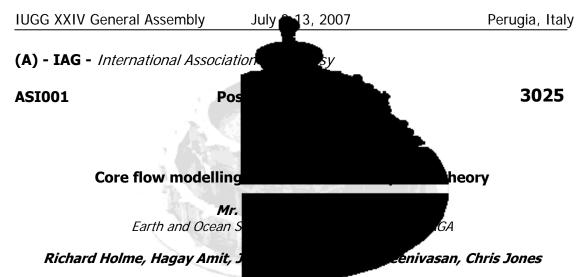






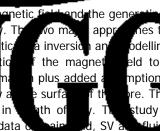






In recent history our understanding of the magnetic f in the Earths core have increased dramatica been core surface flow modelling from magnitic flow modelling involves downward continu (CMB), then adopting the frozen flux approx to reduce non-uniqueness, to obtain fluid flo of these flows has been observed change inversion more rigorously by using synthetic data

made with the true dynamo flow. Forward models of full advection and diffusion, from the dynamo data have been calculated to compare contrib cannot be modelled by the inversion, has t caused by the geostrophic assumption). The is also calculated. We have checked the va dit true properties of the dynamo flow. The he ical flows using the technique of Amit and Olsen (2004) and the helical flow assumption in the spectral domain.

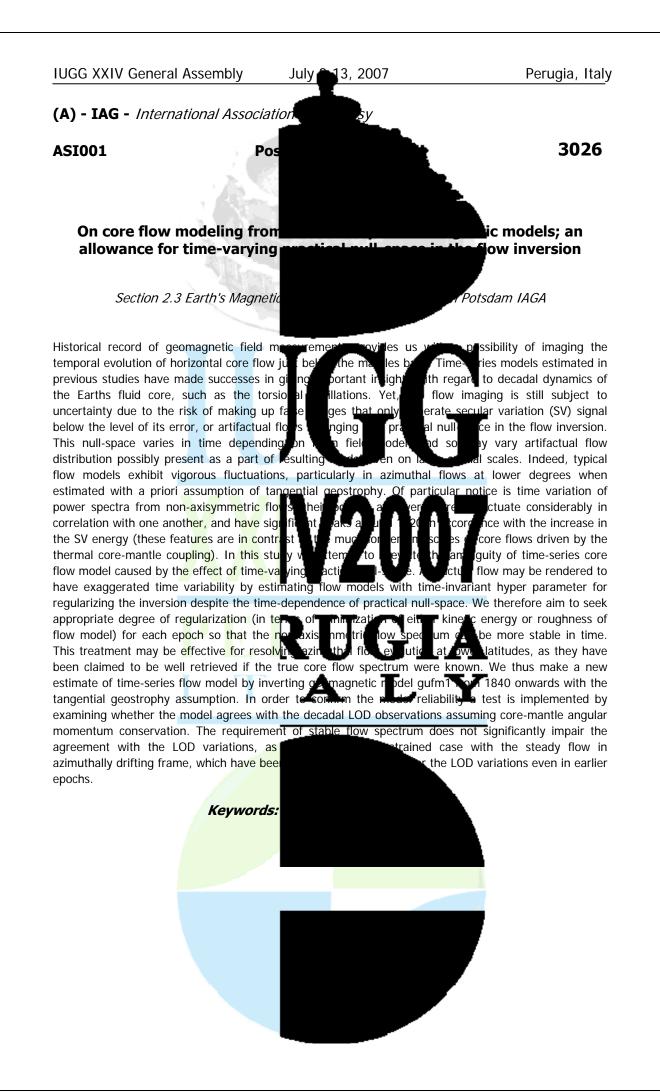


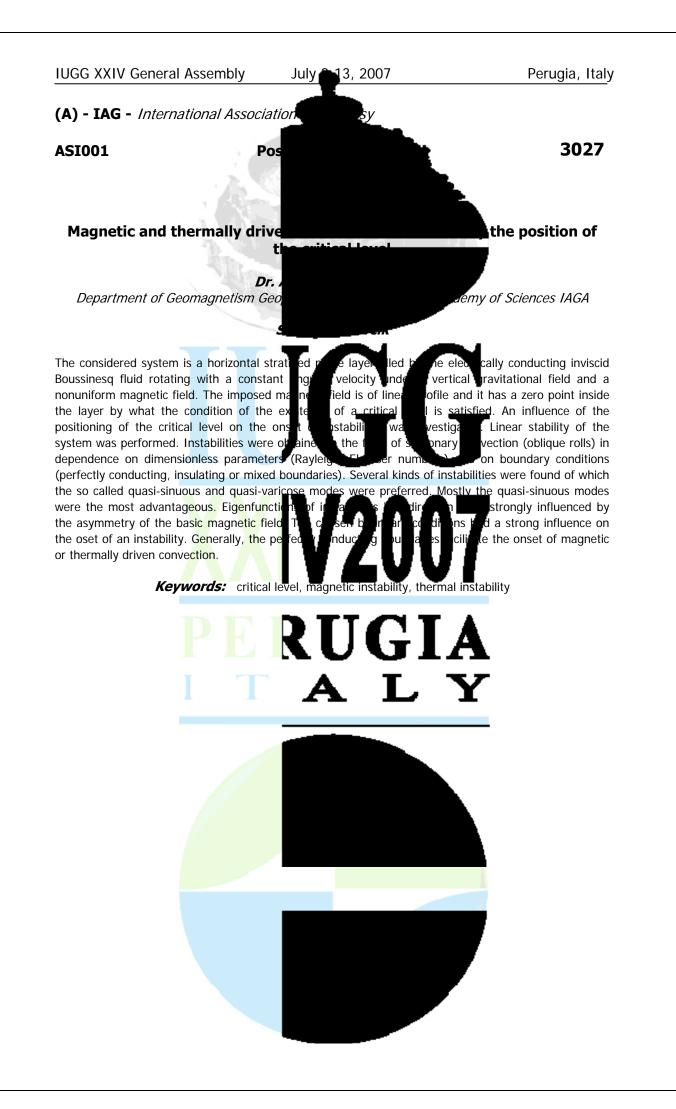
motions of the molten iron vestigate fluid flow have ies fo odelling 🖣 the dynamo itself. Core eld to the core mantle boundary mptions e.g. tangential geostrophy ain check on the validity s to test the fluid flow w from a self-consistent

convection driven dipole dominated dynamo. The dynamo magnetic data are inverted and comparisons

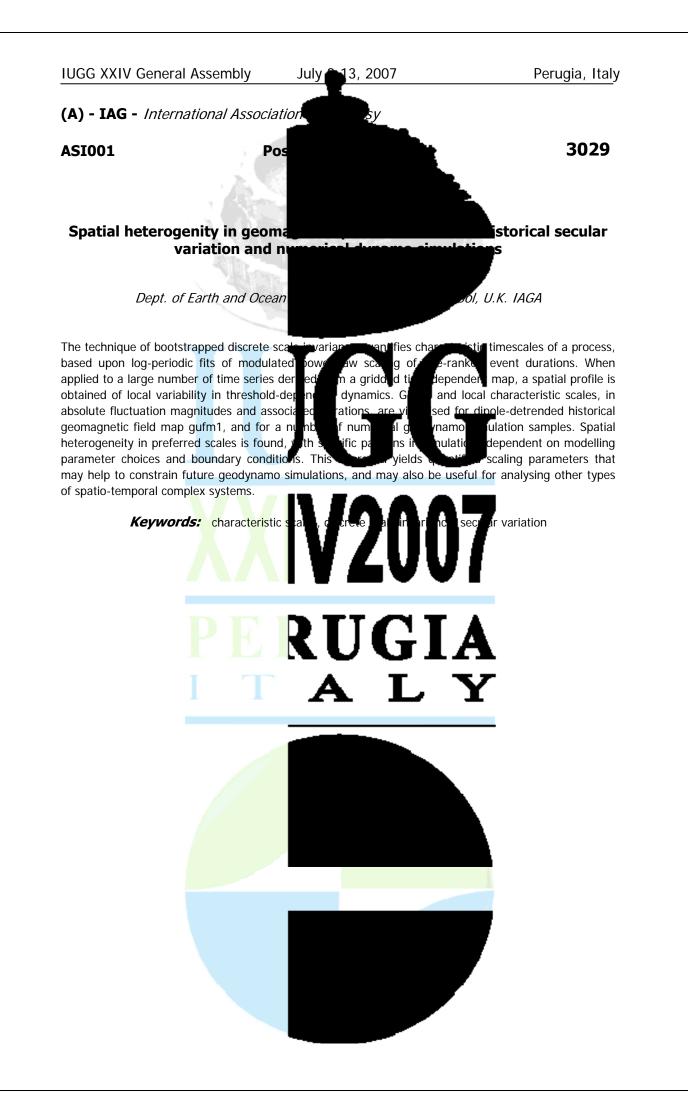
mount of flow, which (flow in the null space version in the null space lical flow by studying the used to produce inverted present a new method computing



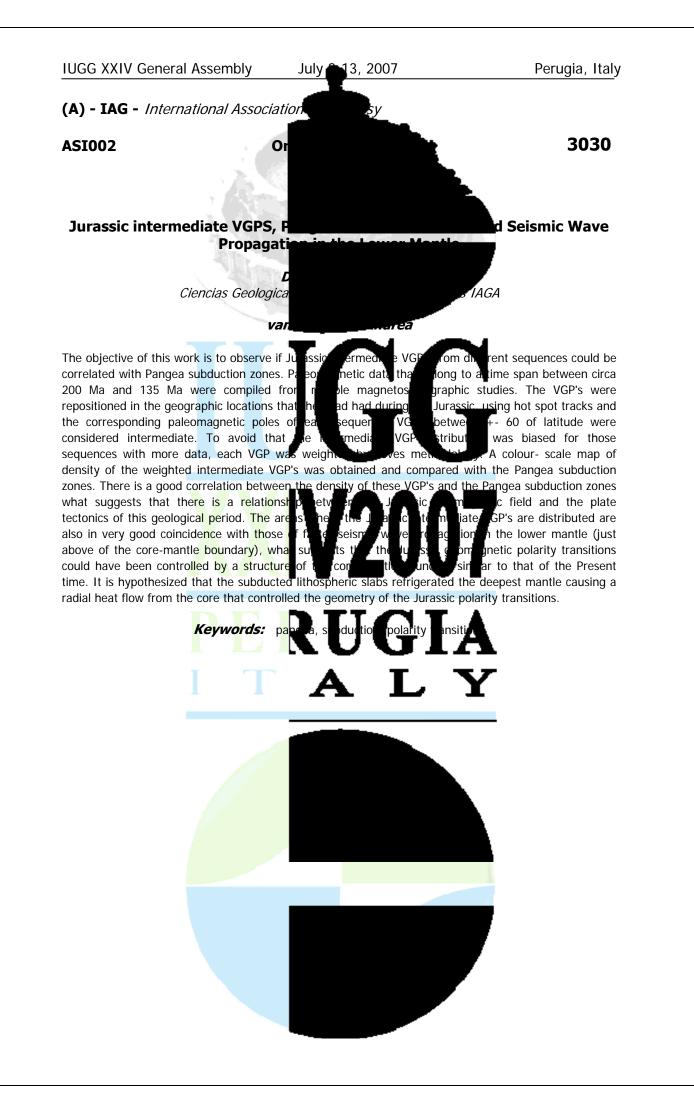




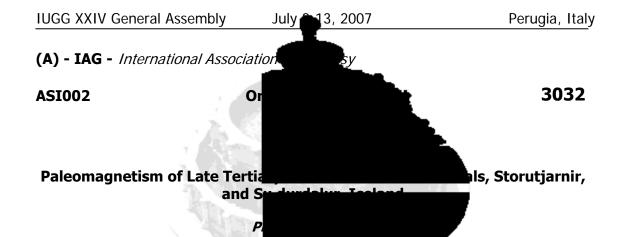












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Paleomagnetic sampling of Tertiary lava Techonology, Kochi University, University o 489 lavas were sampled. For paleomagnetic the laboratory, one specimen from each co For about 20 % of all samples, 10 steps samples, the demagnetization was done in samples, hysteresis and thermomagnetic minerals. The Curie temperatures ranged between

remanent magnetization are titanomagnetites with various degrees of oxidation. Characteristic remanence directions were determined by principal component analysis. For some of the lava flows, K-Ar dating was carried out at ISEI, Okayam years 1994--2004, but most of the measur were, however, much delayed for various r was published (Udagawa et al., Phys. Earth the evidence that the Gilsa event is, although the evidence that the Gilsa event is, although the evidence that the Gilsa event is a second the evidence that the Gilsa event is a second to be evidence the evidence that the Gilsa event is a second to be event is a second more prominent Olduvai event. In this talk, I would like to summarize the paleomagnetic results from other areas of Iceland. In Lundarhals area, which is in the western Iceland north of Reykjavik, we

collected samples from 182 lava flows belo considered to be 4--6 Ma, based on magnet by reverse polarity. Only in one section (VM) There are three other sections in which short normal period was found (VS, VT, VB). In all the other sections (VA, VC, VD, VF, VG), all the lavas sha represent relatively short period of time dominated Storutjarnir. Some of these samples were dated by K-Ar method and gave the ages of 2--4 Ma. The LT section is composed of 93 lava flows, and showed\_R-N-R-N-R-N-R-N polarity changes from bottom to top. Among them the upper two reverse p lavas) showed R-N-R-N from bottom to to the gulleys cutting the same mesa-like pl

even with the use of magnetic directions volcanic a ctivity of one center is rather li continue for several kilometers. Two sect lavas are presumed to be 4--6 Ma based of R (bottom to top) sequence was found. The

moup (Tokyo Institute of 993 and 1994. In total, ind) i res were obtained at each site. In wise alternating demagnetization. nT were employed. For the other eld of mT. For some selected ut to aracterize the magnetic esting that the carrier of

> arried out through the ublication of the results r section (38 lava flows) . In this study, we found period separate from the

The age of these lavas are

d refersed lavas are about equal.

this area are dominated

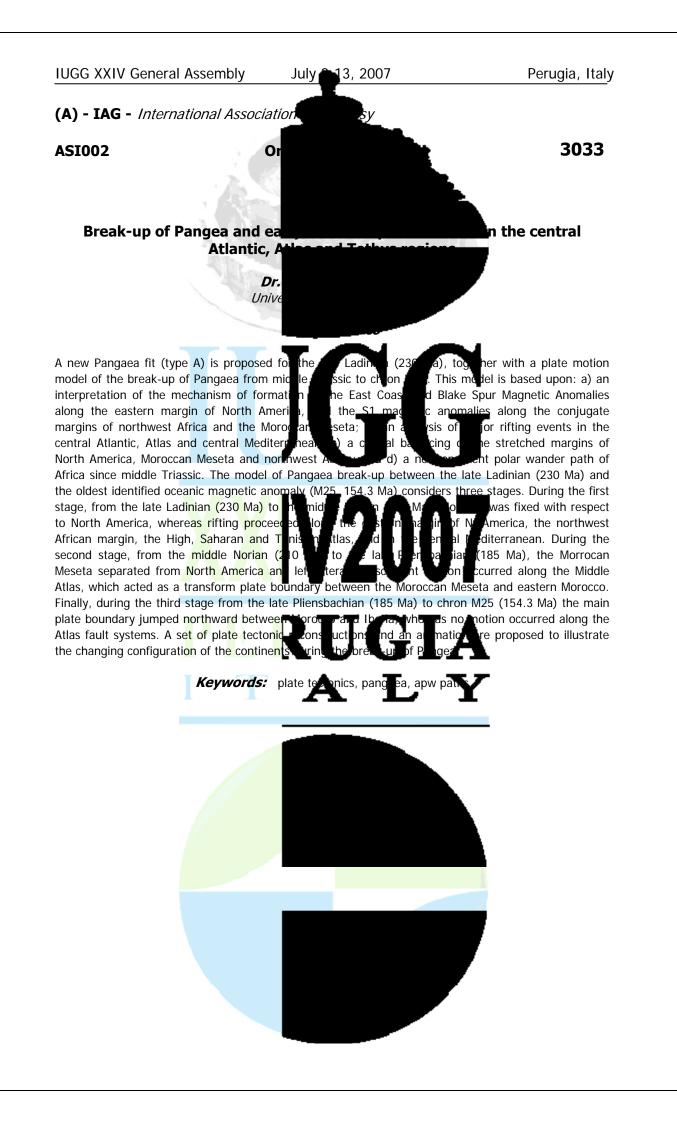
be that these sections

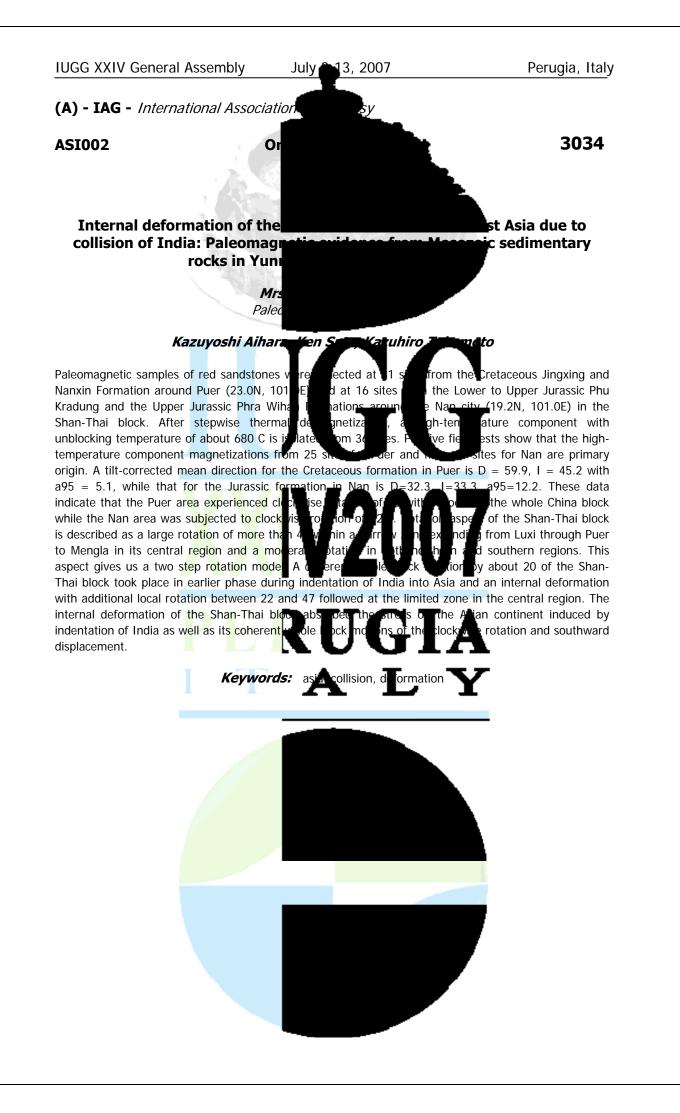
sections were sampled in

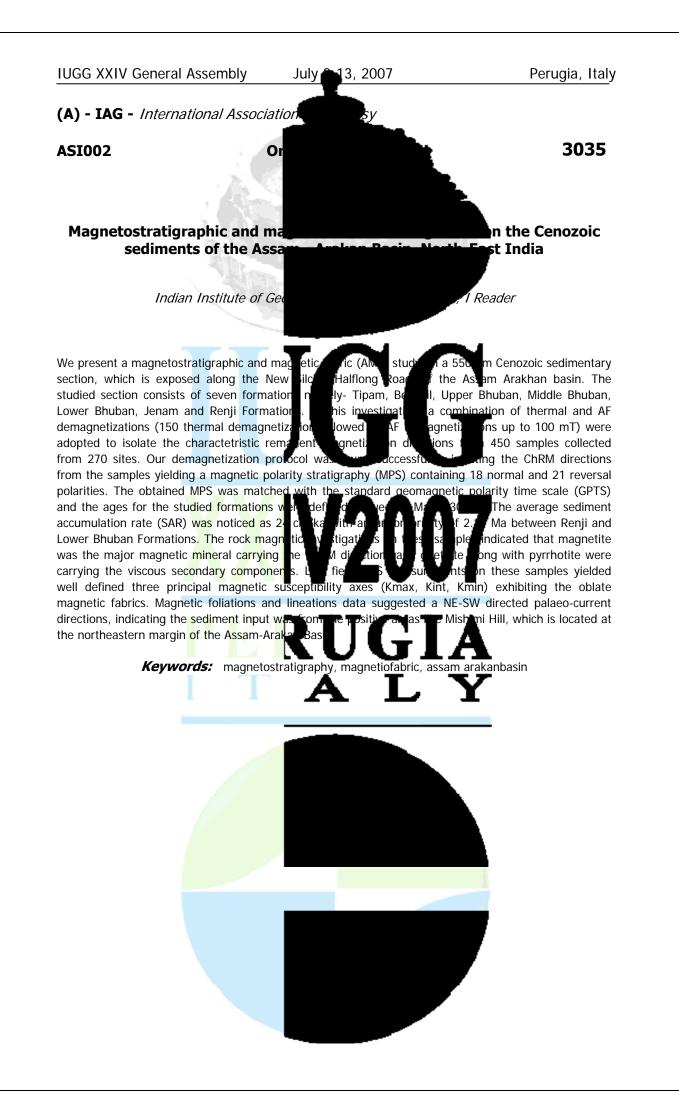
by one flow each. The SI section (77 about 3 km apart and taken from flow to flow was very difficult may be showing that the nuous and nearly flat hills ur area. The age of the (47 lavas), a R-N-R-Nically younger than the

MA section, and exhibits R-N-R-N-R section. These two sequences should overlap about 1/2 to 2/3, but exact correlation is not possible yet.

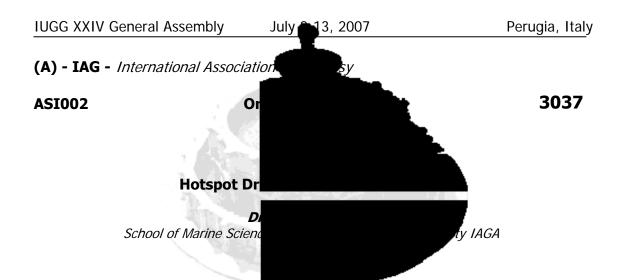
Keywords:











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Fixed hotspot is one of the first idea for the Plate T the calculating absolute plate motions and models of hotspot drifts by such as Steinbe the idea that hotspots can drift several d distribution of global hotspots for underst estimate the velocities by calculating discret is rather hard to do that. There are two re on a plate may be explainable with fixed

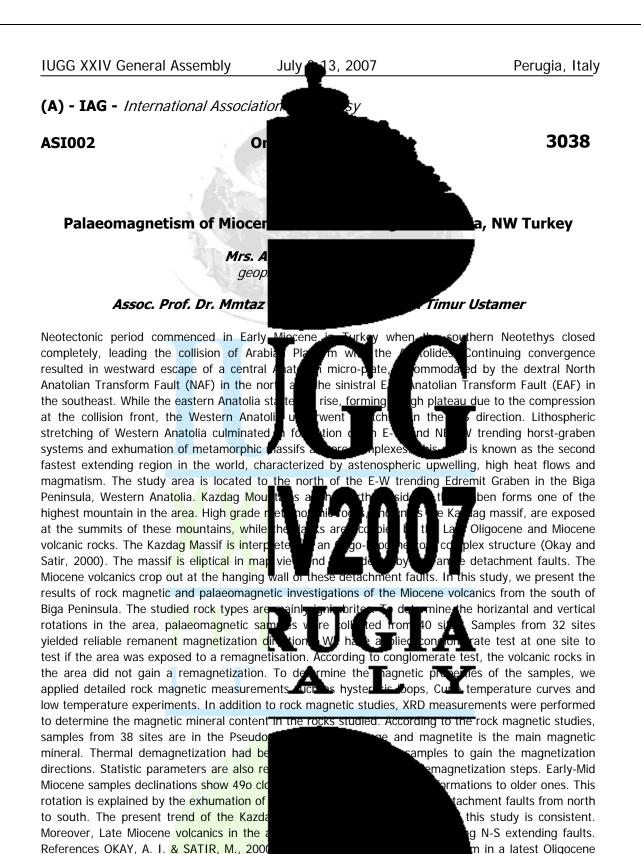
plate motion introduced. Second, southward drift of paleolatitude of Hawaii-Emperor chain (Tarduno et al.,2003) can be explain not only by hotspot drift but by true polar wander. Thus, we need to know as accurate true polar wander path as possi analysis related to the topic, and like to consistent with the idea of fixed hotspo paleolatitude of Hawaii-Emperor chain ca wander path. The true polar wander path the motion is in harmony with the model of Man

cs\_about 40 nder polar al.,2004 hve ers a year. glob<u>al mant</u>l etweer ns and e it. F pos very g hots

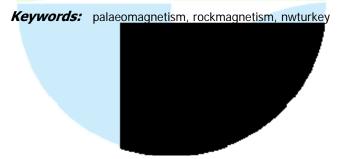
and is still useful for tly, however, simulated h. Rè ome popular, more people accept important to clarify the velocity nam<u>ics. On</u>e can regard easy to ed hotspot model, but it and s of hotspot seamounts f a proper model of the

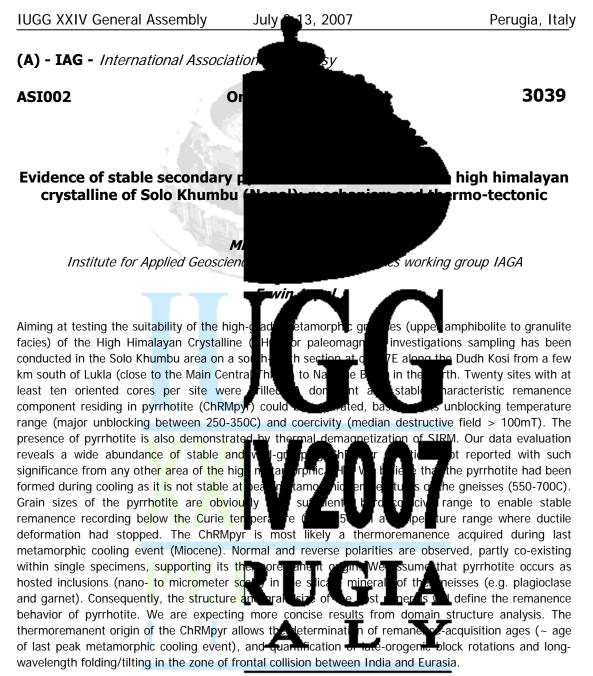
> marize results of data observed data is quite and southward drift of ed model of true polar pin axis and mantle, and

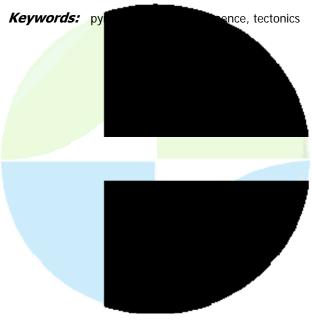


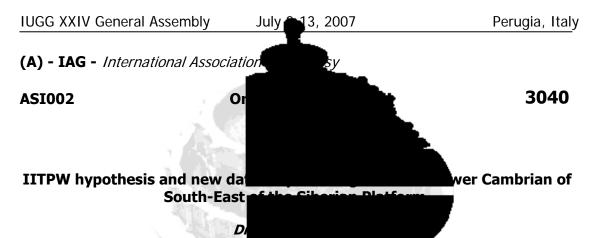


metamorphic core complex in northwest Turkey, Geol. Mag. 137 (5), pp. 495516.









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Laboratory of the Main Magnetic

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der (IIT W). This feature would

me relative to the spin axis, when

One of the most intriguing scenarios to e place close to Precambrian-Cambrian bound proposed a possible episode of inertial int correspond to a fast migration of 90 of the the maximum and the intermediate iner explanation is true, we should observe arou the apparent polar wander path from all c obtained by Kirschvink (1984) from the Pestrotsvel

of the cornerstones of IITPW hypothesis. This pole is notably different of the Middle Cambrian pole of the Siberian platform (Gallet et al, 2003) with an angular distance about 70. This difference may therefore be in agreement with an episode Cambrian, however, there are some pro problems arises from the fact that until red by Russian and West-European paleomagieto contrast, the other existing Lower Cambria Middle Cambrian pole (e.g. Pisarevsky et al., 1997). Our study was aimed at investigation of numerous

Lower Cambrian key sections of South-East of the Siberian platform with the purpose to confirm or contest the reality of Kirschvinks pole exist samples from tens distant key sections (M the fact that in all these sections the mode predominates we have managed to isolate in most part of them the ancient high temperature component with northern declinations and moderate inclinations. These p consistent with expected ones (Khramov direction Russian researchers (see Pisarevsky et al., 1997) and are in keen disagreement with Kirschvink direction.At the same time very often we observe the traces of presence of other high temperature

stable component, expressed, in particula paleomagnetic signal behavior during de succeeded to isolate this magnetization. N circles positions the normals to their plan stereogram like it was observed by Kirsd Kirschvink direction. The simplest explanation and Khramov direction is a result of a me faces difficulties among which the most

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interchange. If the Kirschvink's pid drift of about 90 in ian paleomagnetic pole, ng the Lena river, is one Lower and the Middle kirschvink. One of the

th's history, which took

d coauthors (1997) who

d by other studies made Torsvik et al., 1998). In erent and much closer to

have studied more than 1200 Air vers valleys). In spite of onent of magnetization ent/con comagnetic directions are previously obtained by rom pok circles and by some peculiarities of ption of 3-4 samples we havent lar pattern in remagnetization

and north-western parts of to confirm the reality of ection is the primary one er such the explanation significant difference

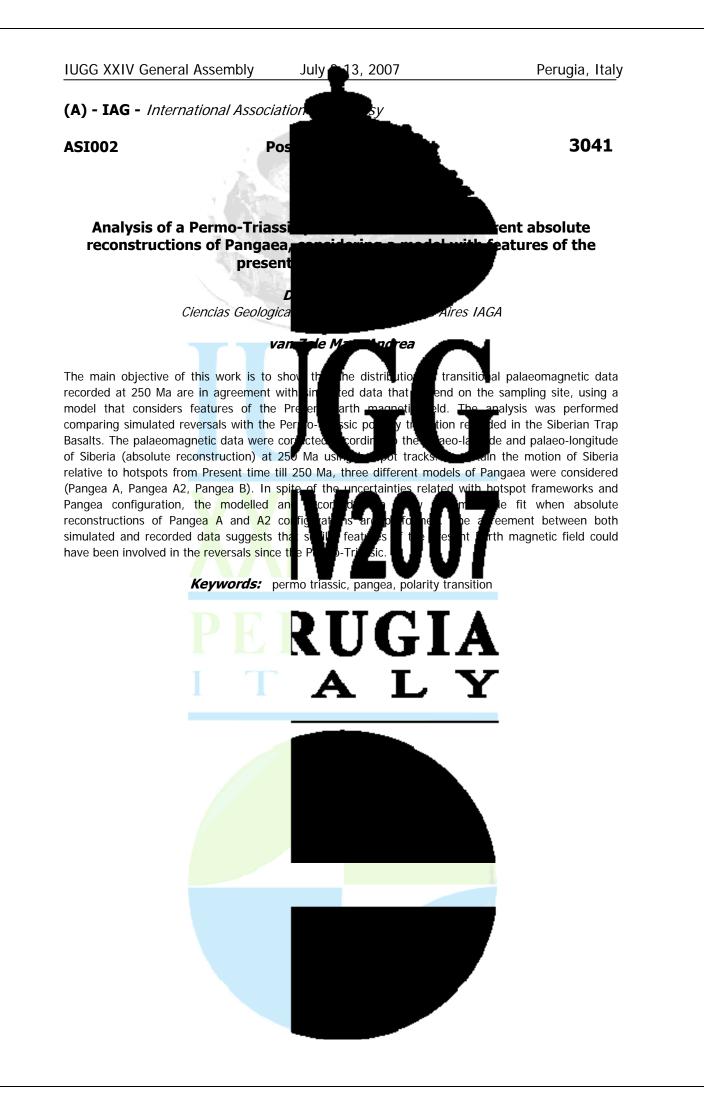
between Middle Cambrian and Khramov poles positions; 2) Khramov directions are widespread in the territory of the Siberian platform in the regions with very different geological history, while there are no signs of any event which could be the cause for all-platform remagnetization: 3) studied riphean rocks

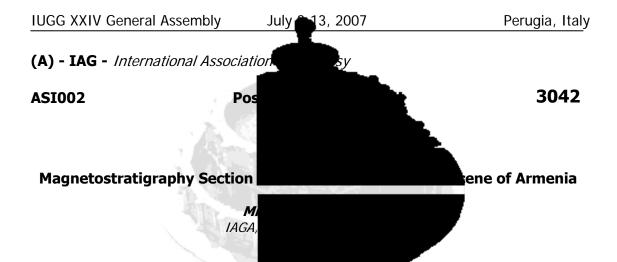
of South-East of the Siberian platform do r for another explanation of observed phe explanation in some anomalous behavior o

Keywords: lower ca

e data impel us to look should search such the an-Cambrian boundary.

lagnetism

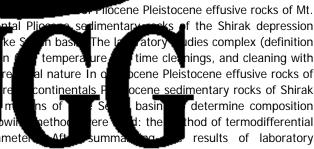




This abstract presents the results of palaed

Aragats and some adjacent regions, continental Plice and Holocene lacustrine river formations of of ferromagnetic carries primary magnetizat the variable magnetic field) proved the term Mt. Aragats massif and the orientational nat depression and Holocene lacustrine-river for and structure of the ferromagnetic fraction analysis, the method of saturation parameter

investigations made it possible to prove the palaeomagnetic usatibily of studied rocks what serve as the basis for compiling the palaeomagnetic scale of Armenia. The coordinates of virtual poles for Pleistocene era were calculated from the value D and of effusive rocks Aragats massif and som Pliocene deposits of the Shirak depression it possible to provide: 1.magnetic and Pleistocene 2.to determine the direction a the summary of Magnetostratigraphy section o directly and 6 inversely magnetized zones.

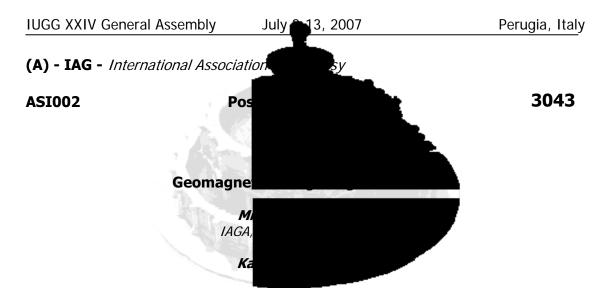


f the Shirak depression idies complex (definition time cleanings, and cleaning with cene Pleistocene effusive rocks of ocen<u>e sedim</u>entary rocks of Shirak determine composition thod of termodifferential results of laboratory

hagnetic investigations bleistocene, continental on of Lake Sevan mead subdivisions of Pliocene

etic field; 3. to make up ene. This scale which contains 7





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Ince

The Eocene Oligocene border is the time of great Cenozoic era. The analysis of geological - g out according to the data of the two section late Eocene clays pass into sandstones and magnetic susceptibility () and magnetizatio surpass the appropriate parameters of cla submitted by magnetite and titanomagnetij Late Eocene clays are magnetized inversity, and

Eocene Oligocene border, in all probability is caused with the change of sedimentation process regime. The summary Magnetostratigraphy scale magnetic field was basically reverse. Th continued to exist in early and middle Eod the direct polarity. Late Eocene is finished coincides with Eocene Oligocene border. field was again dominant. Values of palaeointensity

ole in the vic eurolites of uration (Irs) te Eo erron sand magi ies part normally magnetization. Here one zone of inverse magnetization is allocated. Such differentiation on

ogical event

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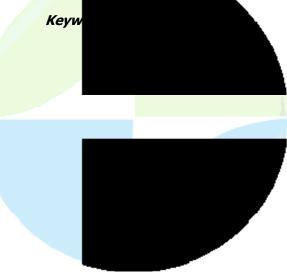
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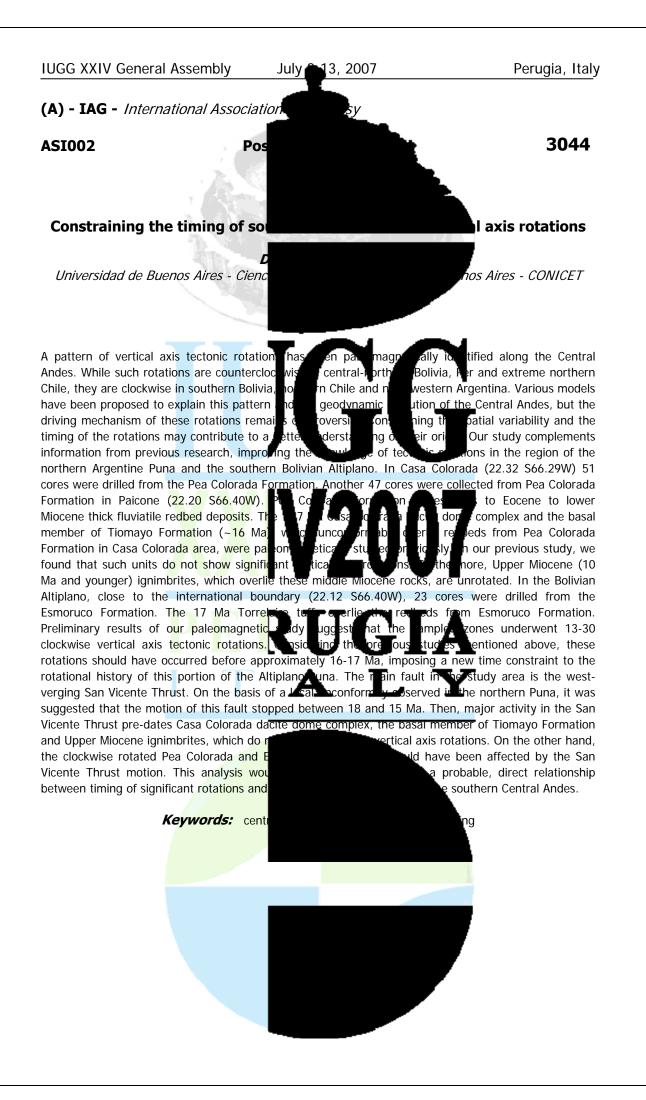
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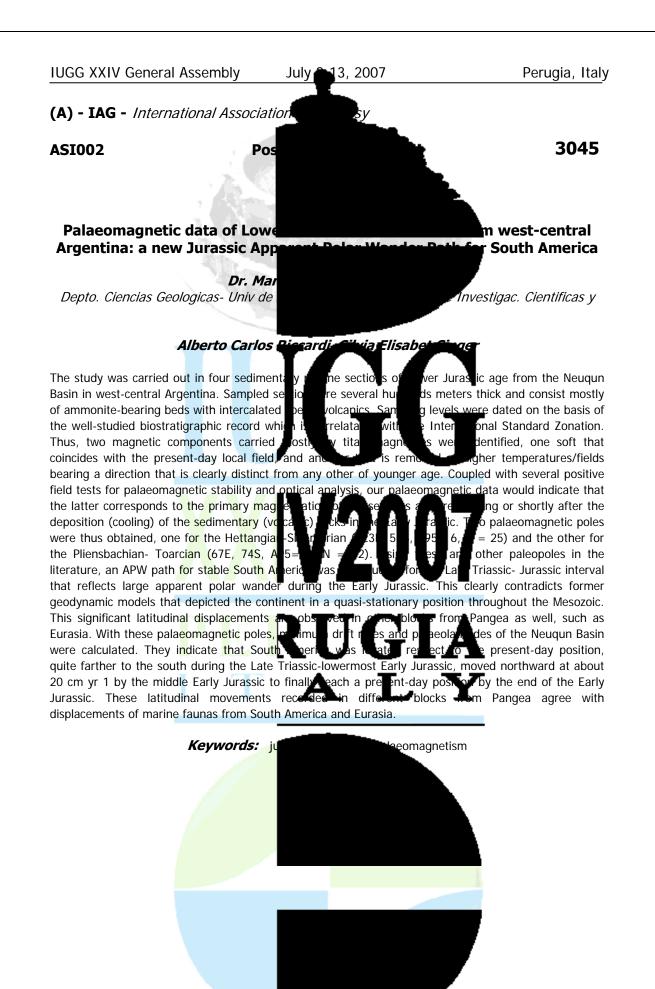
lobal scale in a history of pocene border is carried of Lanja village (Armenia). Here cene. On magnetization (In), size Istones of Oligocene on the order etic fraction of clays is e and titanomaggemite. n is characterized by a

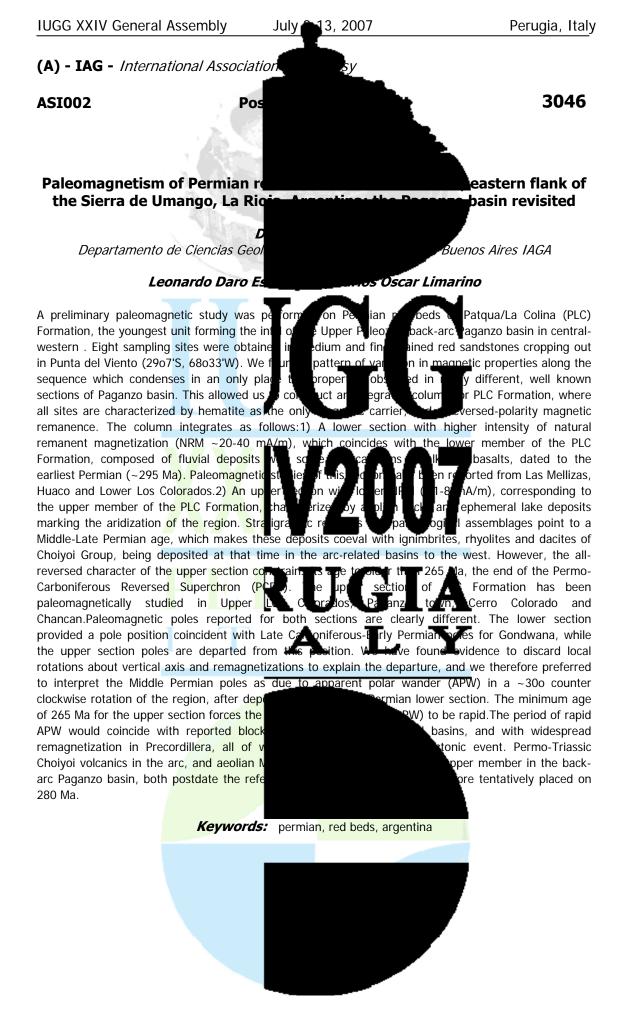
n late Paleocene the evels of direct polarity a prevailing role made plarity, the roof of which se polarity of a magnetic or a geomagnetic field (H) are divided to two

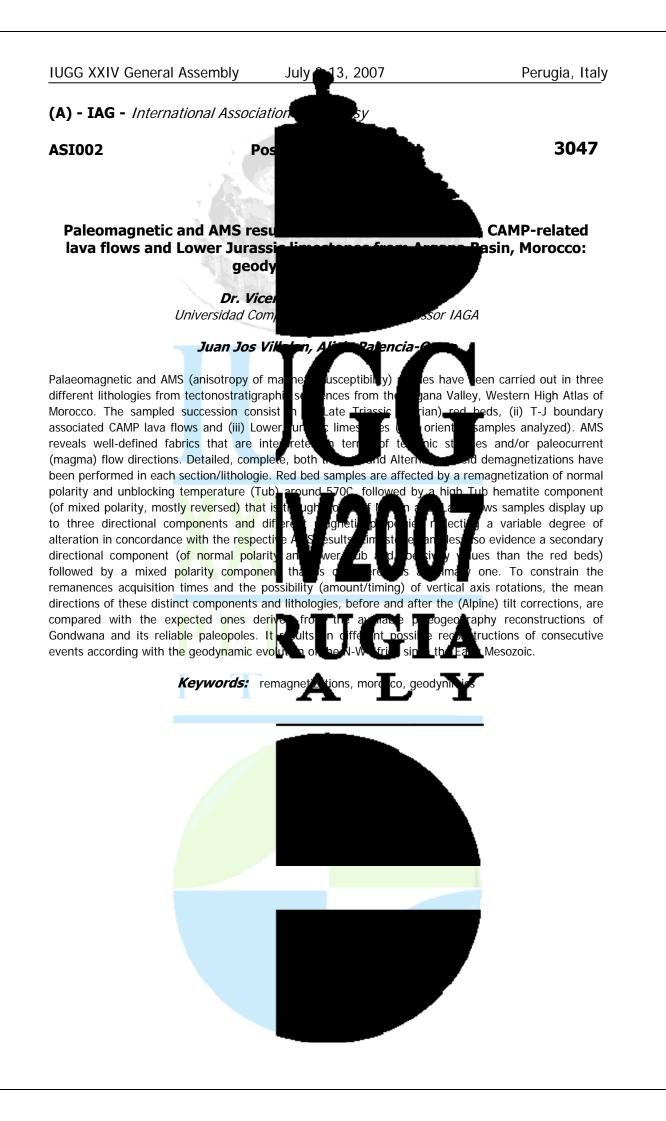
groups. In the first group (early - middle Eocene) the H are near to present values, and in the second group (late Eocene - early Oligocene) these this period in territory of Armenia there were rather sharp changes ic and ristic pups. Rough volcanism, shown in late Eocene, by the end of this th eas of the development luc 0 OCĢ is r hg. ie i volcanosity and its intensity continue to decrease. Since Oligocene Armenia enters in orogenic stage of tectonic development. In connection with transgression of the errory of the areas with a sea on the continental climate in early Eocene are reduced A nd subtropical vegetation le circula n of tropical testifies to the humid, tropical climate of early - middle Eocene. The late Eocene climate is defined as variably - damp with the tendency to aridity. In early middle Oligocene the essential fall of a thermal mode is marked. All this researches sho orizon, in which the reorganization of paleogeografical situation and biosphere of e of magnetic field of the Earth.











## IUGG XXIV General Assembly

3048 - 3067

(A) - IAG - International Association

## **ASI003**

## Symposium Magnetic dating on all time sca

Convener : Dr. Cathy Batt Co-Convener : Dr. Elisabeth Schnepp

This session will address a broad range o the Earths magnetic field provide dating to these have been widely exploited. Appare geomagnetic excursions, and secular varia

scales from millions of years to centuries and less provide useful regional age constraints, and yclic requirement for a dating tool is a variation temporal evolution of the feature or parame use of any aspect of the geomagnetic field new databases and reference curves. Prese and techniques for evaluating the reliabili correlation to existing records are particular

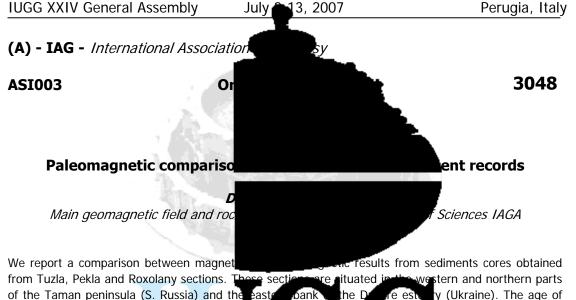
Rock magnetic pr to the elat refere e n undated ma ing on any ti on n pth ref ice

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teristic time variations of chaeological structures, and geomagnetic polarity time scale, ontensity demonstrate changes on time erties of sediments can also cal time scale. The basic ron h be used to match the that d I. Contributions are invited on the ale, including the development of for and model construction, dels a the dates attributed by



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of the Taman peninsula (S. Russia) and the the Tuzla deposits ranges between ca. 120 a d BP and the Roxolany deposits between 340 terms of magnetic mineralogy, concentratio that the rocks of these sections may be geomagnetic field variations (angle element an other. We have used wavelet and Time pectral relative paleointensity and angle elements of the geomagnetic field preserved in the Tuzla (120-70 ka), Pekla (240-130 ka) and Roxolany (300-180 ka) sequences. There is a good correlation between the behavior of angle elements of the Tuzla a years. The sharp change in the NRM dired as the record of the Mono Lake geom geomagnetic field is likely to have been section. Furthermore, two sharp swings of Incl found in a marine lagoon sequence of the Tuzla preserved in the lower part of the loess-paleosoils of the Roxolany section is seen only in two sharp

deviations of Incl at 99 ka and 106 ka. The in the Tuzla and Roxolany sections, a flin coincidence in time, suggest that we may grant no. 03-55-2310 and RFBR grant no. 06-05-

studies. Curves of the nd compared with each the periodicities of the of several thousands v section is interpreted halous behavior of the eosoil part of the Tuzla e normal polarity gap are Comparable behavior of the remanence

posits be ween ca. 240 and 60 ka

tic properties show a uniformity in

ain c<u>arrier o</u>f the NRM, suggesting

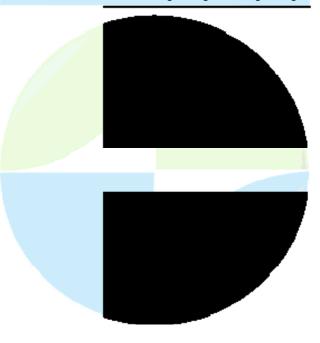
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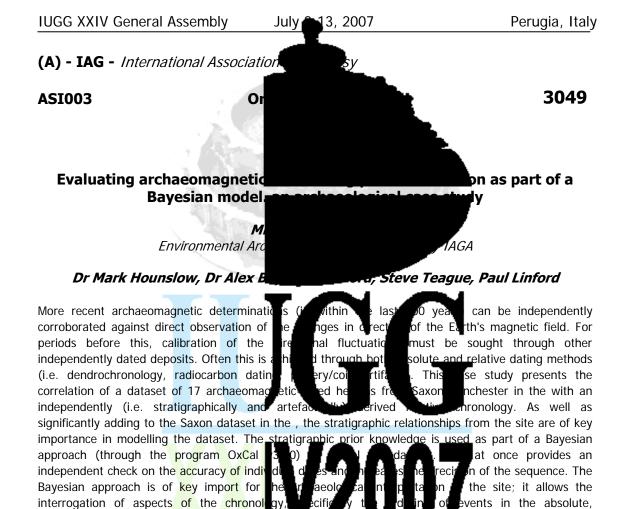
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geomagnetic reversal sequence Far magnetic field, and the directions to the Blake om; polarity event. This research was supported by the INTAS Postdoctoral Young Scientists Fellowship 200

section.

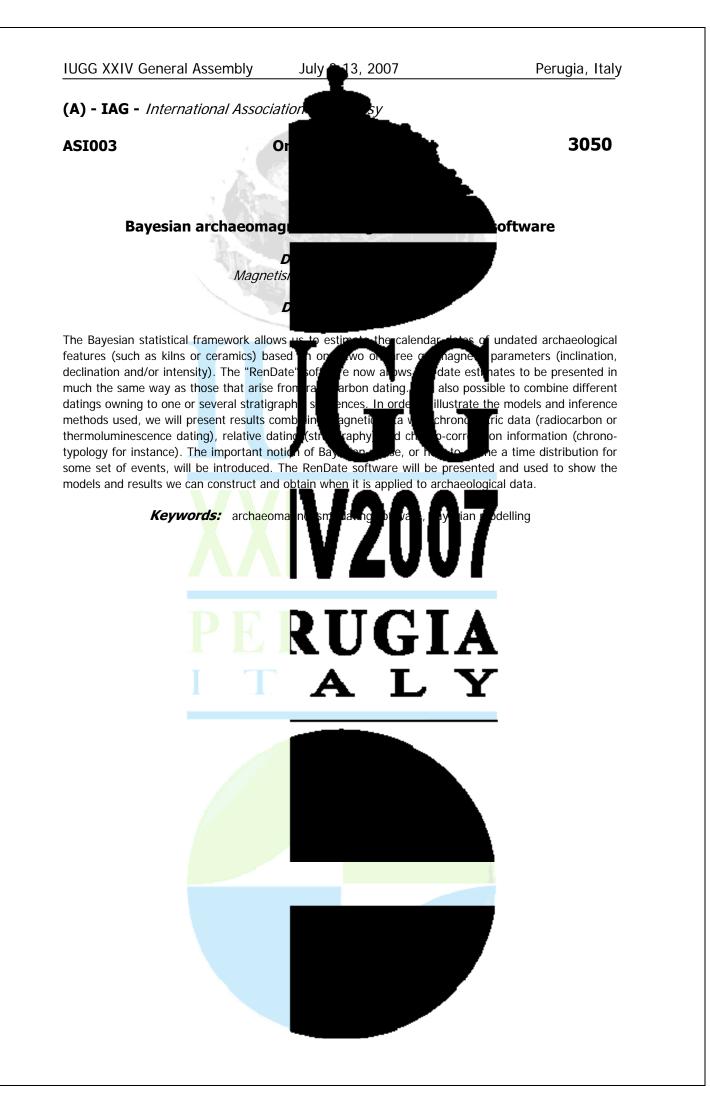
Keywords: sediments cores, curvesofthegeomagneticfie, geomagnetic excursion



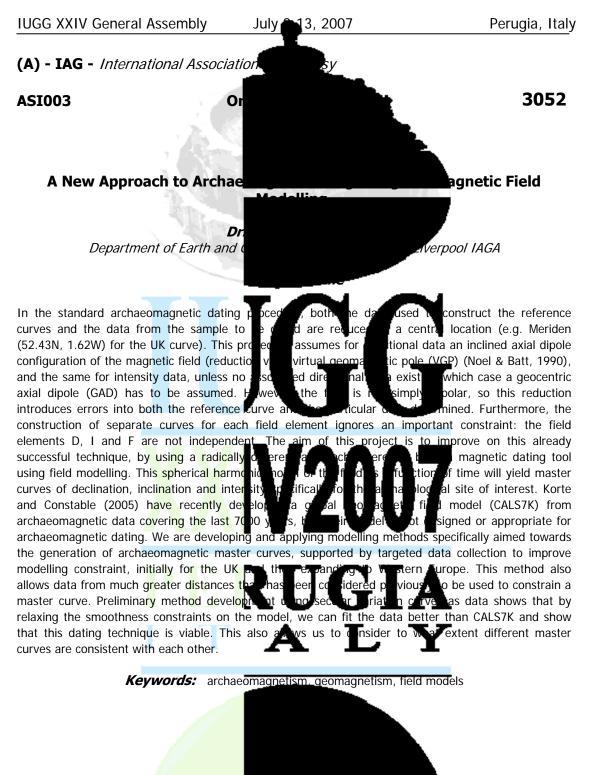


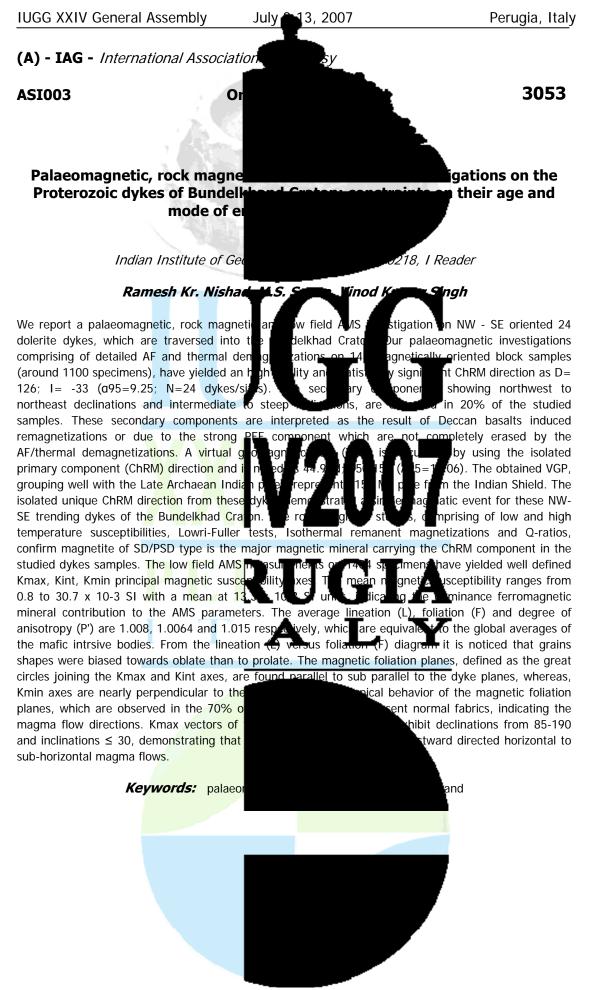
archaeomagnetic chronology of the site win reard transformed viewers. This approach allows a qualitative assessment of the archaeomagnetic-derived chronology and a move beyond approaching

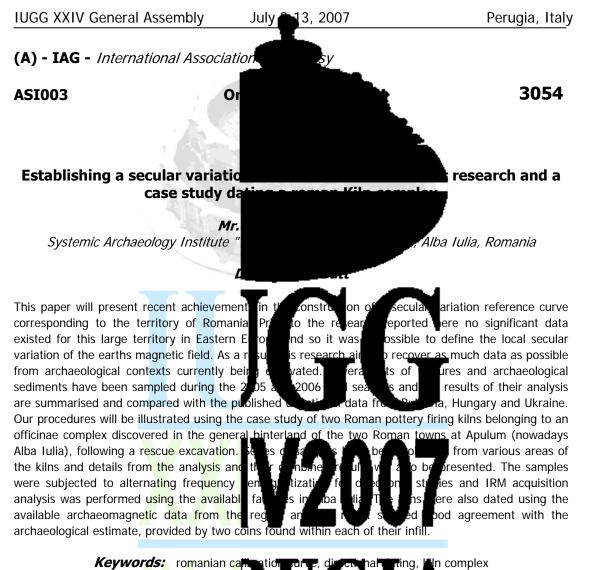




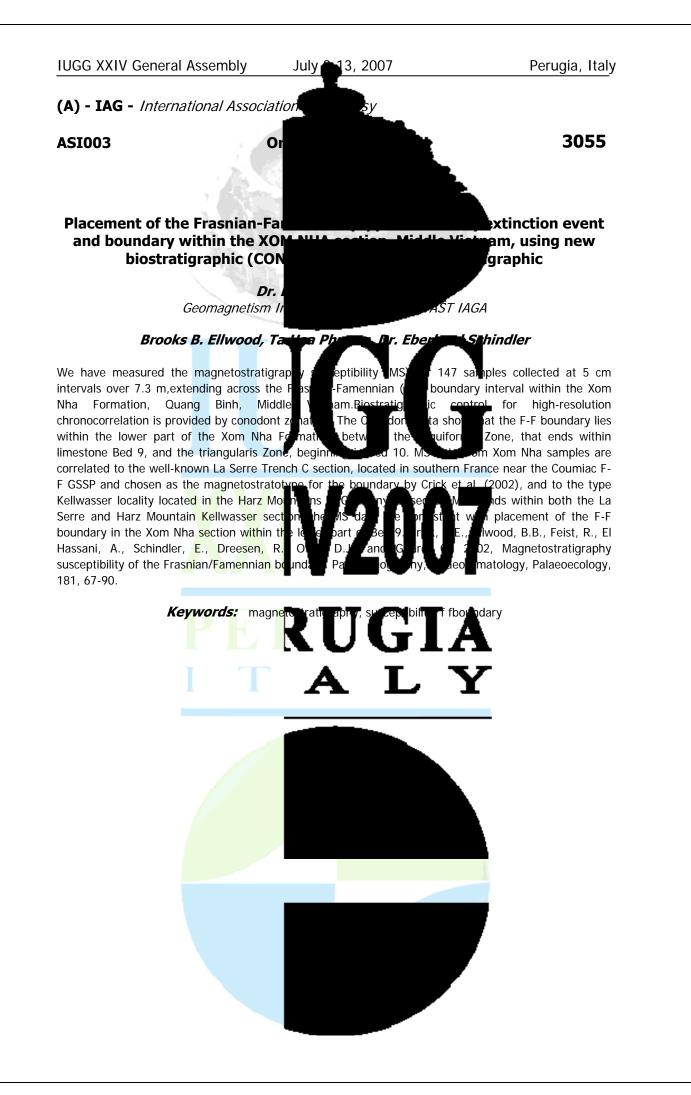


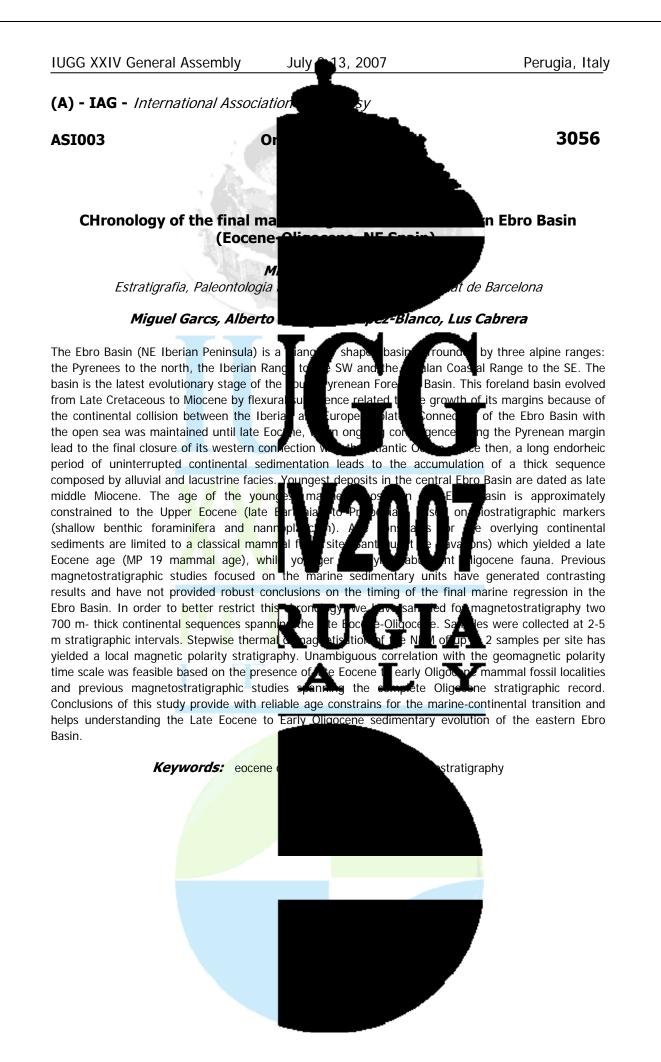


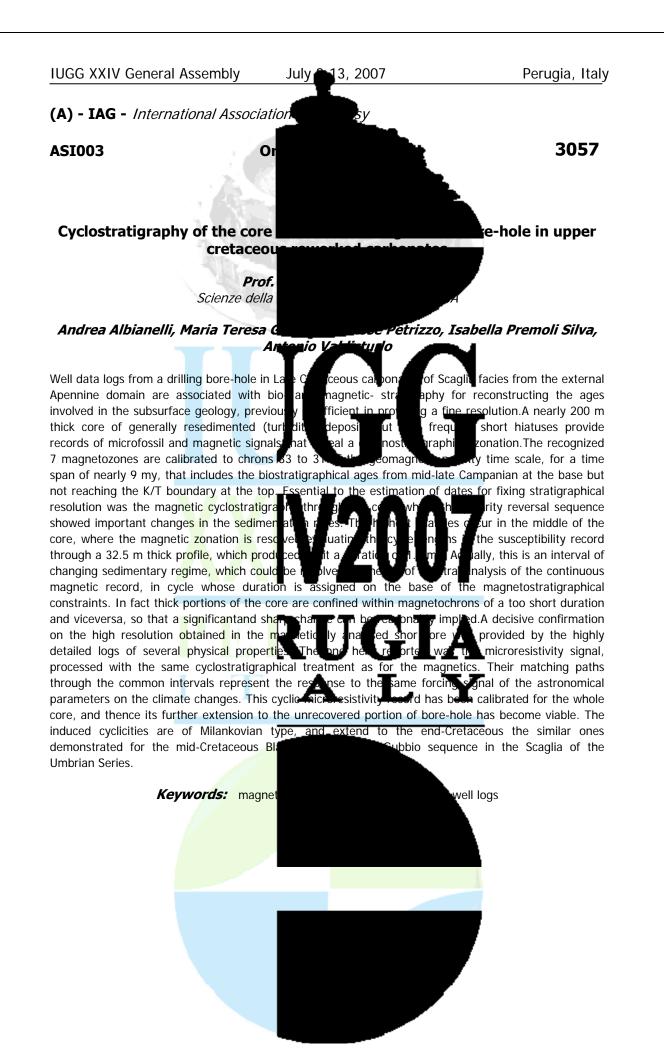


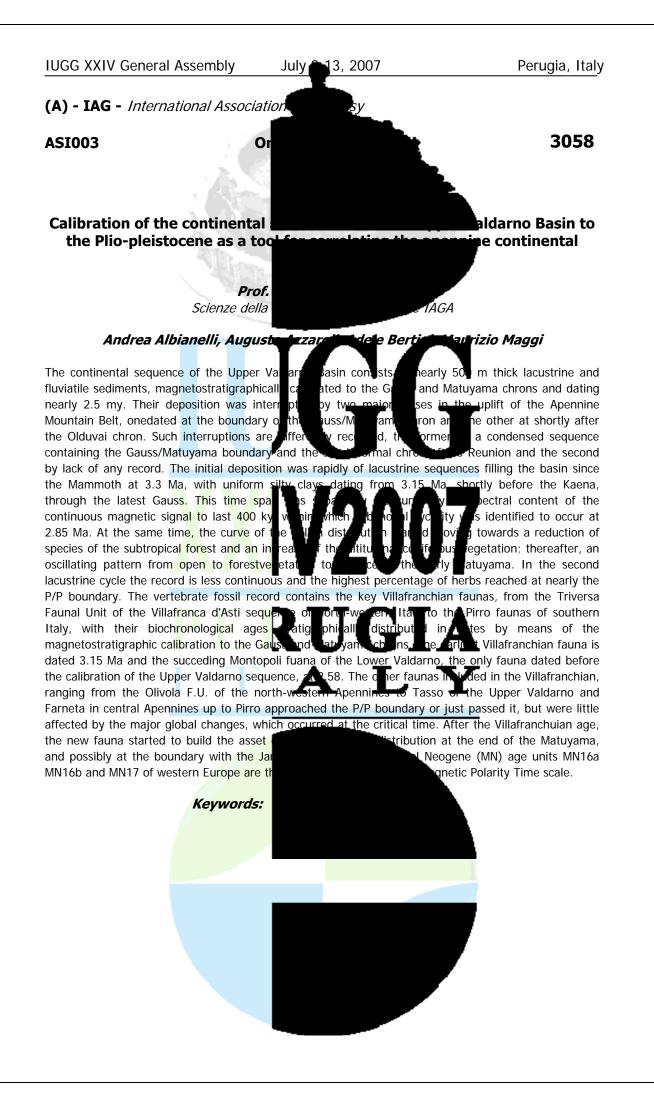


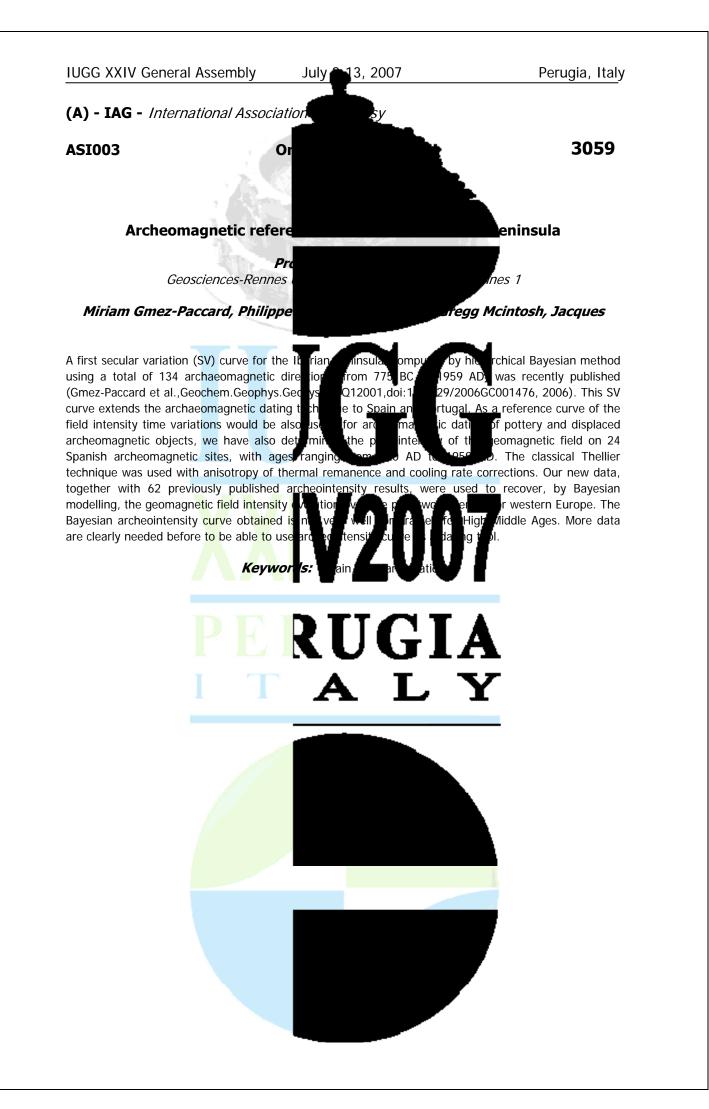


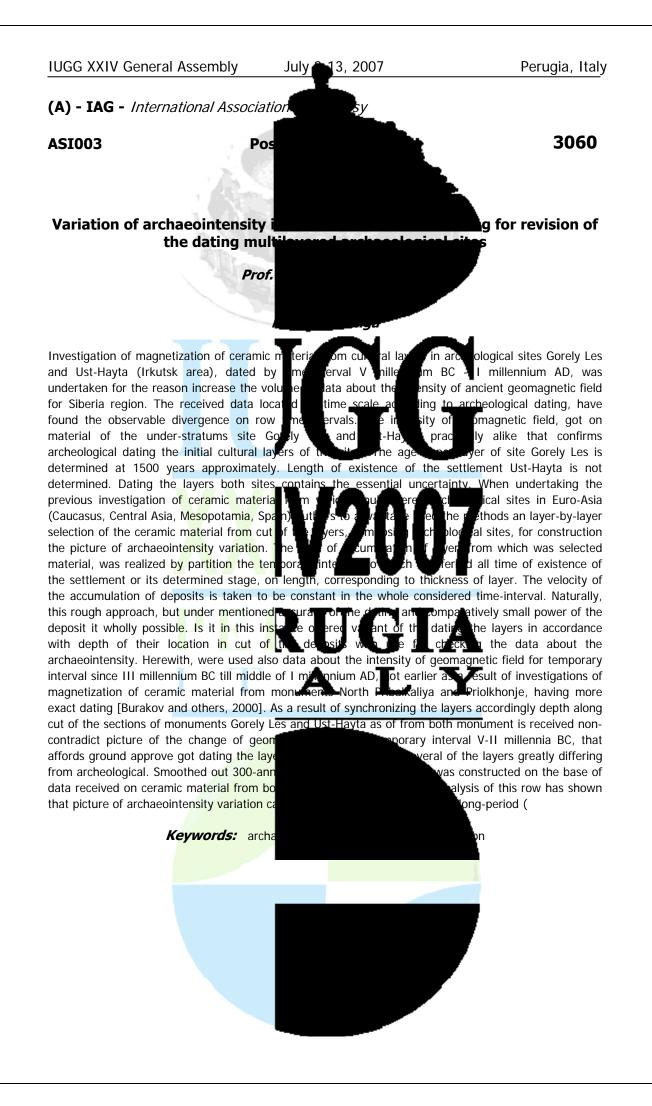


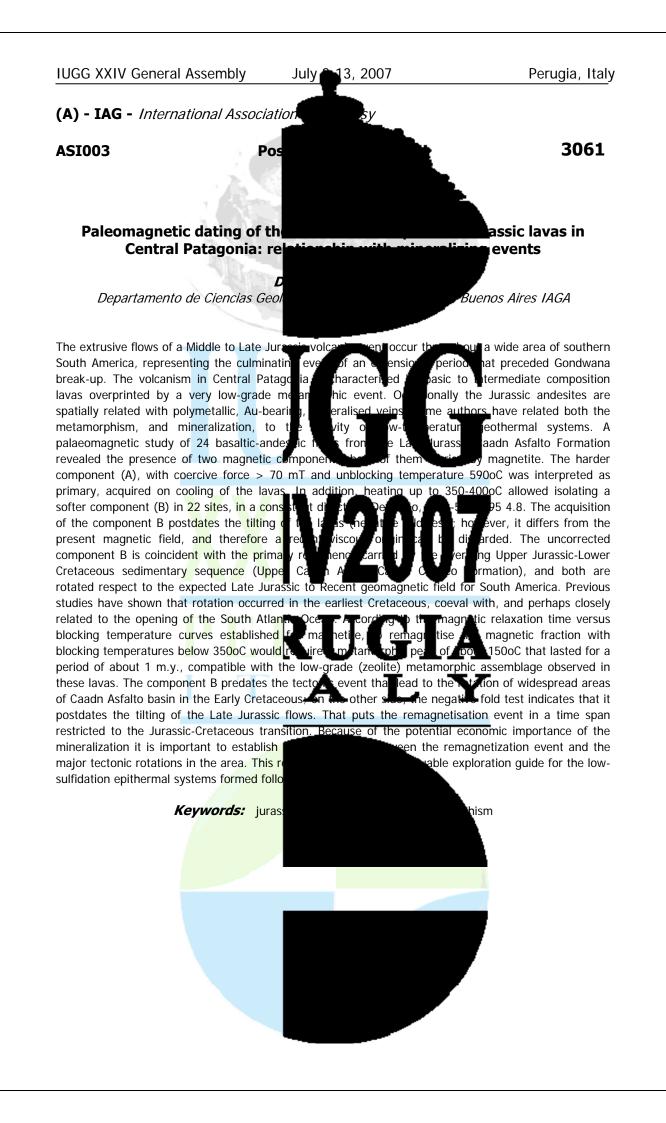




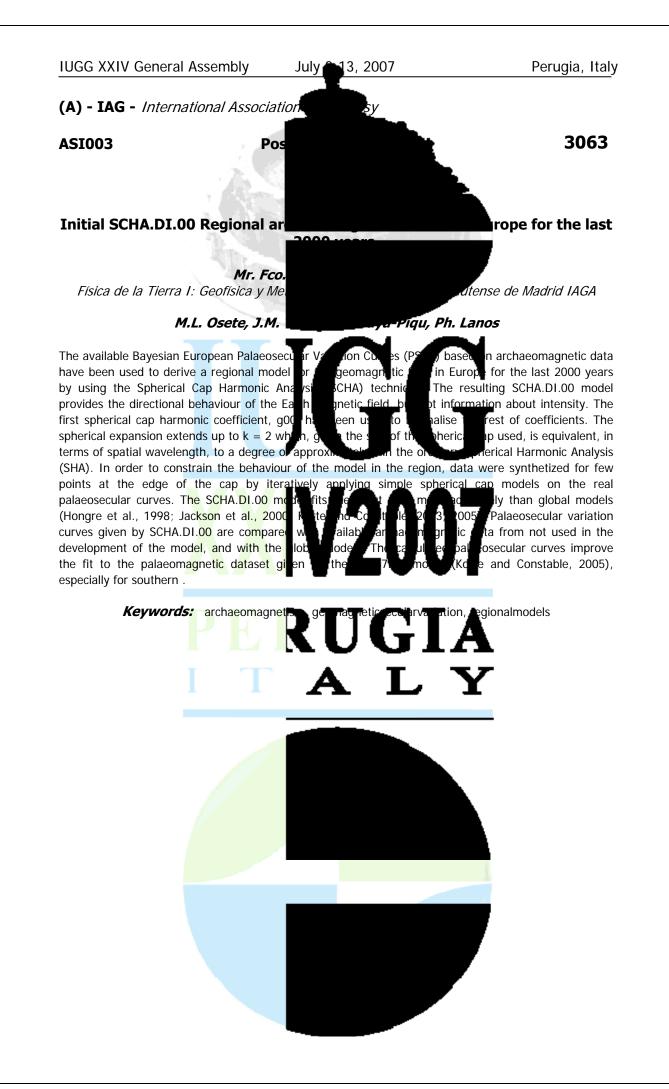


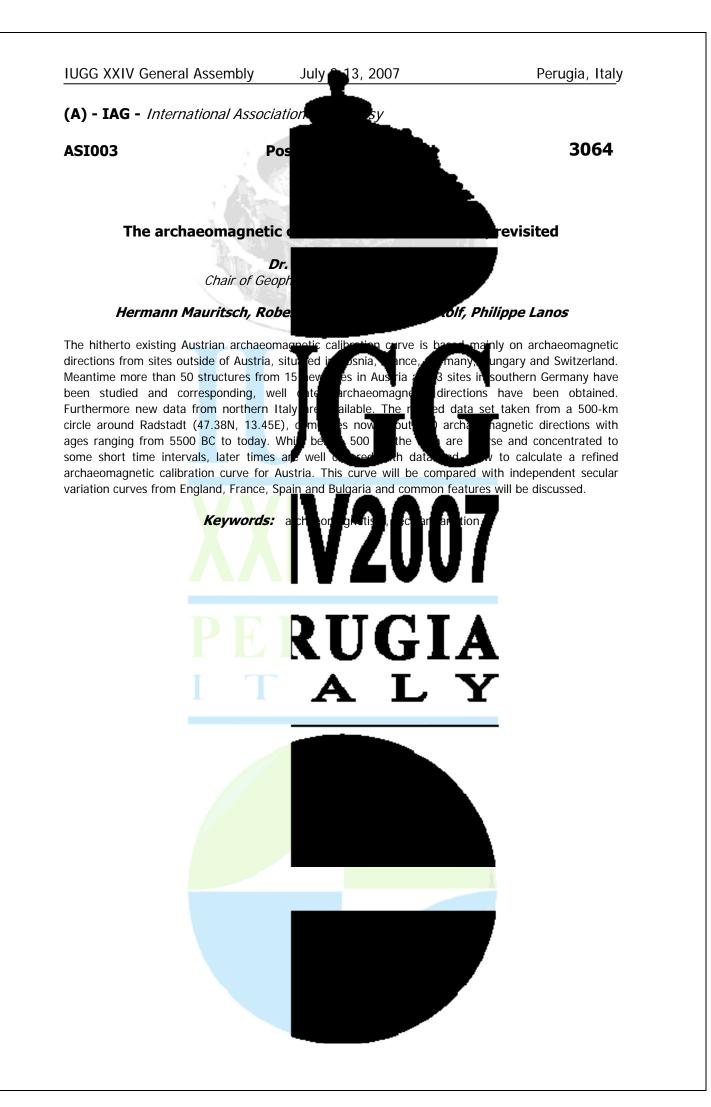


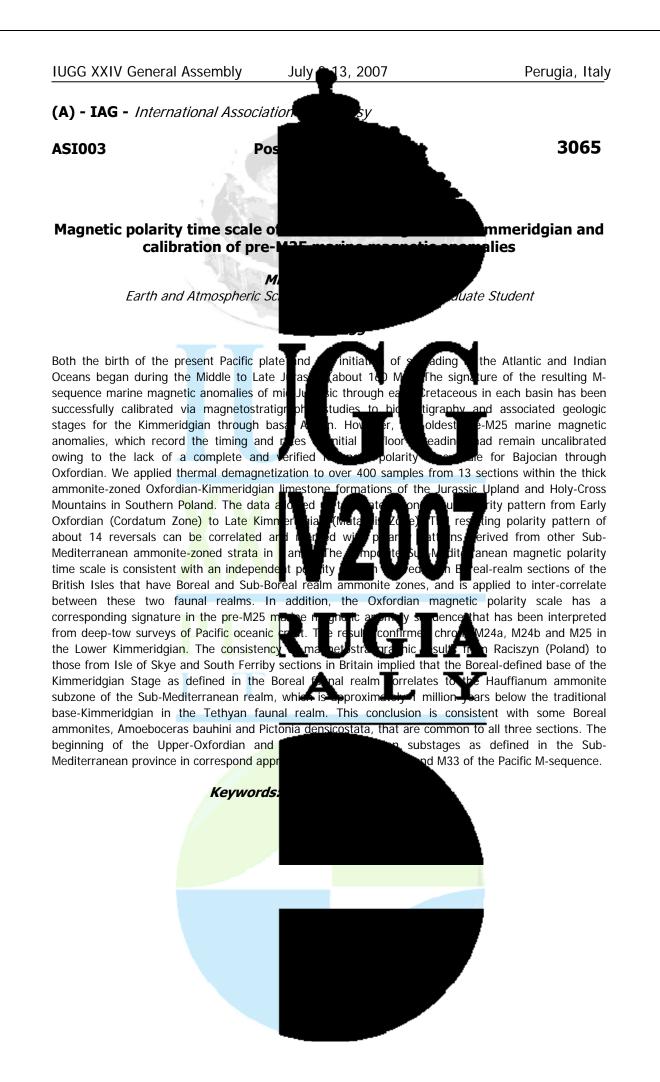
















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## IUGG XXIV General Assembly

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## **ASI004**

## Symposium Palaeointensity studies progre

Convener: Mr. Yongjae Yu, Dr. Yuhji Co-Convener : Dr. David Krasa

Paleointensity determination has broad regimes of convection in the outer core, t mantle boundary. In contrast to our know during geological and historical times, data

rock magnetic parameters required for reliable covering both absolute and relative paled interest:advances in paleointensity method high-fidelity paleointensity recorders, discus frequency, results from extraterrestrial sam timescales

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vior of the Earth's magnetic field st intensity of the field remain relatively scarce. The scarcity originates from the difficulty in finding suitable material and rather narrow range of welcoming contributions ve. lowing broad areas of h the 1

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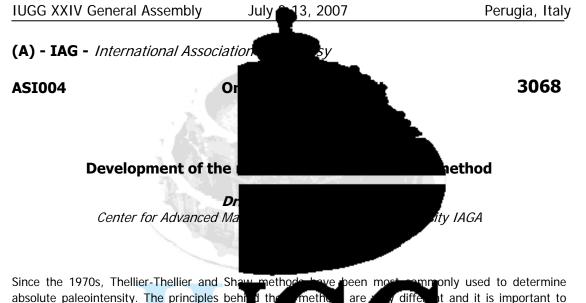
ssibly the evolution of core-

new/optimum techniques), novel etween paleointensity and reversal ution wealth of data on all





3068 - 3082



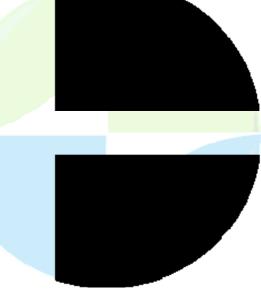
absolute paleointensity. The principles behind th develop them both. The group at the T significantly improved version of the origin method has been successfully applied to se protocol, however, uses conventional heat remanent magnetization (TRM), which corrected for. To further enhance reliability step. Three types of experiment have been performed using the 14 GHz microwave demagnetizingremagnetizing system in the Geomagnetism Laboratory, University of Liverpool. (1) Microwave LTD-DHT Shaw method on samples with laboratory 5 mm diameter mini cores of basalt. The set to 5 seconds. This TmRM is a simulate then subjected to the microwave LTD-DHT samples with laboratory TRM. TRM (25.0 n lcro

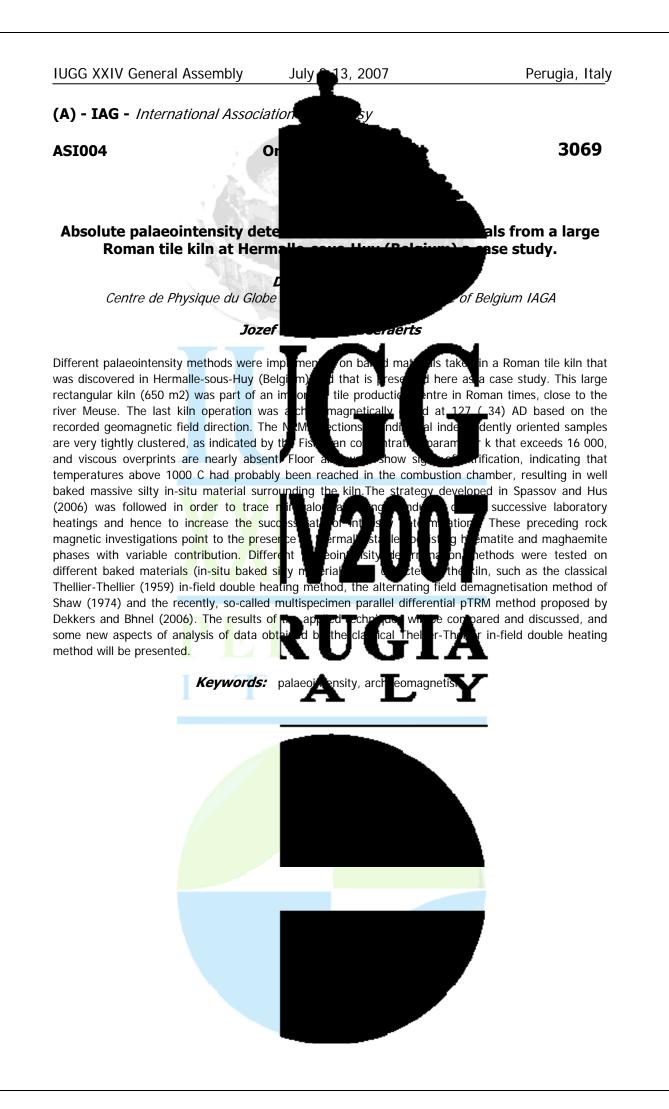
are meth Τe stitute d method, ca storic<u>al lava</u> ( electrid labor exc atory we ha the

t and it is important to blogy, Japan, have developed a the LTD-DHT Shaw method. This in Hawaii and Japan. The present acquisition of thermal eration that cannot be a microwave excitation

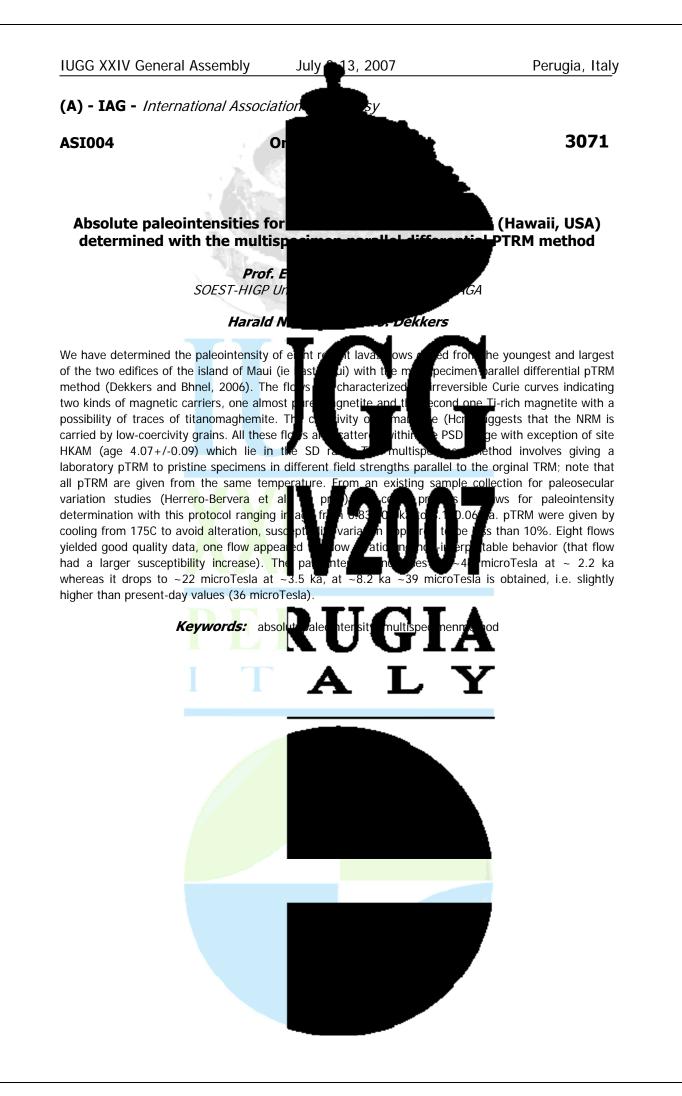
micro-T) is imparted in the application time is RM). The mini cores are D-DHT Shaw method on s of basalt. The cores are heated in an electric oven to a maximum temperature of 610 C. Hold time at the maximum temperature

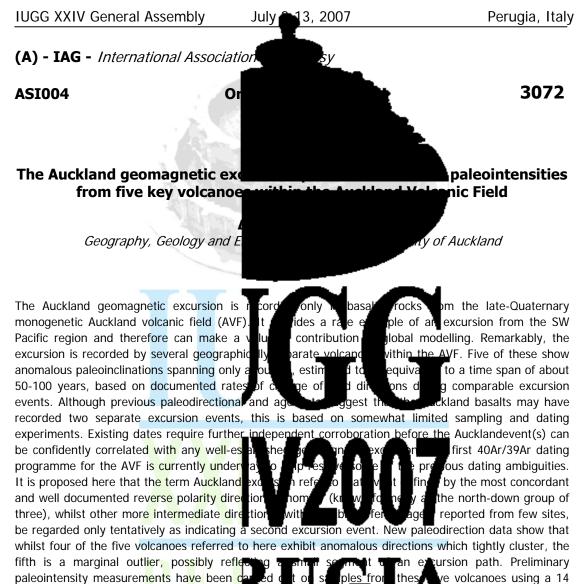
is 30 minutes and the entire heating-cooling cycle takes about two hours. This TRM is a simulated natural remanent magnetization (NRM). one inch cores, and they are subjected to the microwave LTD-DHT Sha ave -DHT Shaw method on samples from historical lava flows. Mini cor ;h g collceted from historical are ле lava flows. They are then subjected to the microwave LTD-DHT Shaw experiment. So far, we have average of 15.2+/-0.6 performed four type (1) experiments, all of which were succe sful, and give ve an average of 24.6+/micro-T. From the type (2) experiments six out on n were s cosful and 1.9 micro-T, excluding one outlier (which had local melt spot during first microwave application). These values are fairly consistent with the imparted laboratory field. Experiment (3) is still in progress and new results from the experiment will also be rep



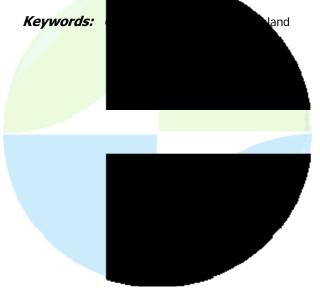


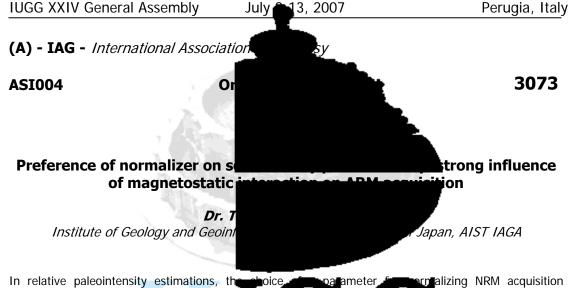






pplea did methods) and yield GHz microwave system (employing both pa lle ular bei successful results for three of the four volcanoes within the tight cluster, giving paleointensity values of Ton three of this group 9-15 µT. These results are consistent with previously reported measurem using low temperature demagnetisation methods D-DHT S method) onfirming that the dipole moment was about 20% of its normal strength. The fifth outlier volcano appears to record a slightly higher paleointensity of 21 µT, otherwise there is no apparently significant variation in paleointensity amongst the volcanoes, as might be expec ange of excursion directions recorded.





efficiency has been a matter of debate. AR has of ARM is thought to be close to that of NR that ARM is very sensitive to magnetostati North Pacific, IRM works better than ARM between the normalized intensity and the r ARM to SIRM inversely correlates with SIR interaction: a decrease of ARM acquisition efficience

study, I estimate relative strength of magnetostatic interaction among magnetic particles from a spread of FORC distribution in the direction of Hu axis. I evaluate semi-guantitatively the spread by an area of a FORC profile along a line that is paralle Pacific sediments, the relative strength of the ARM/SIRM ratio. On the other hand, there the Hc axis on the FORC diagrams are sim cluster in a PSD region on the Day plot. T the ARM/SIRM ratio. The effect of the interaction on DRM acquisition is not understood well, but if it is

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ak in Hc. In the North hversely correlates with variation; profiles along parameters show a tight ction dominantly controls similar to that on IRM, normalization by ARM may overcompensate magnetic concentration variations

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an by ARM (e.g. Tauxe

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and cause a significant coherence between number of papers using sediments of othe smaller coherence or correlation between no haliz and Shackleton, 1994; Lehman et al., 1996; Channell et al., 1998; St-Onge et al., 2003). IRM may be preferable to ARM as a normalizer for a wide range

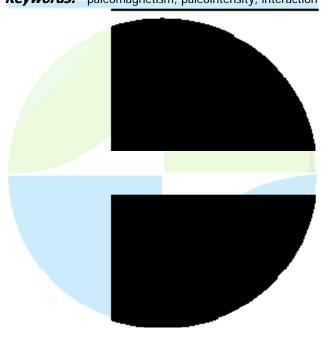
*Keywords:* paleomagnetism, paleointensity, interaction

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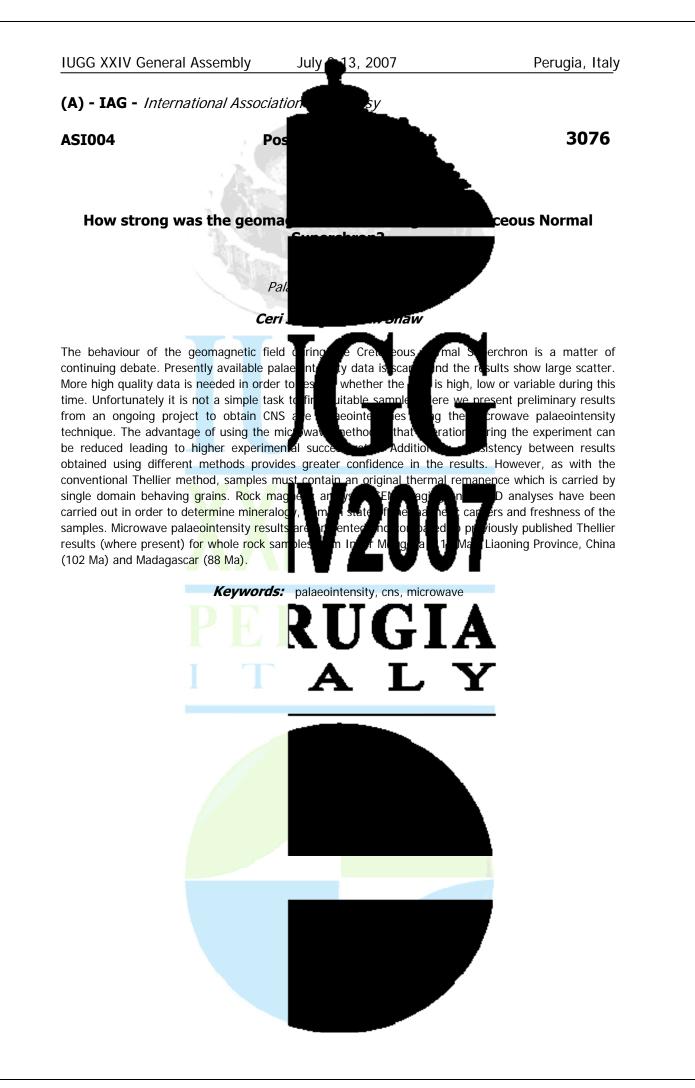
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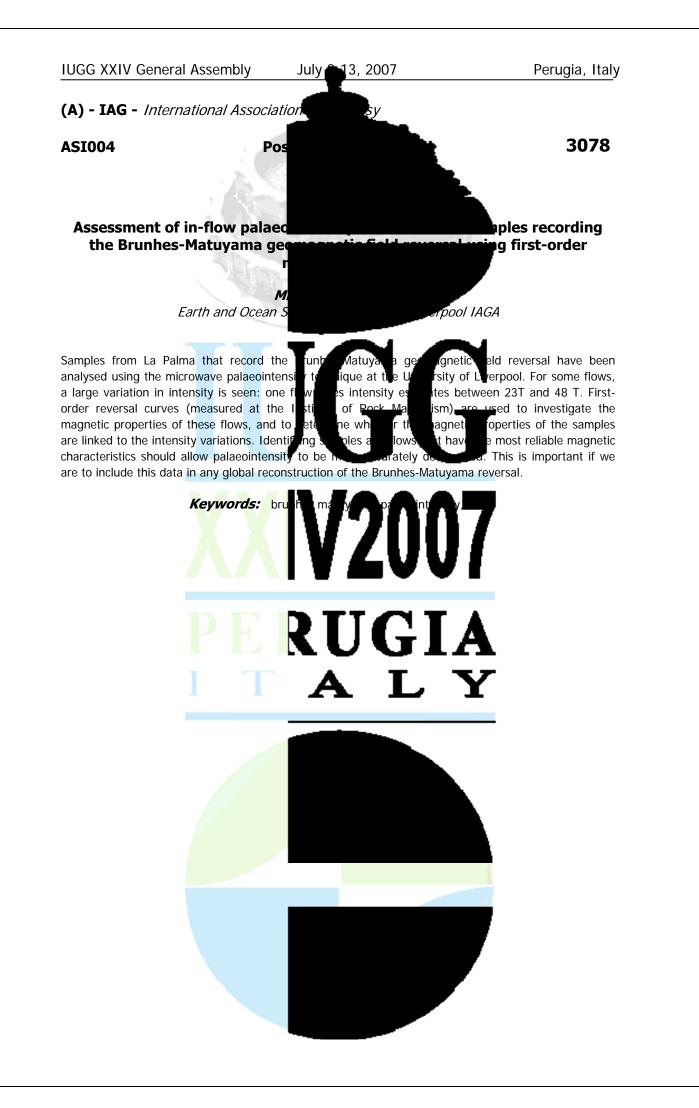


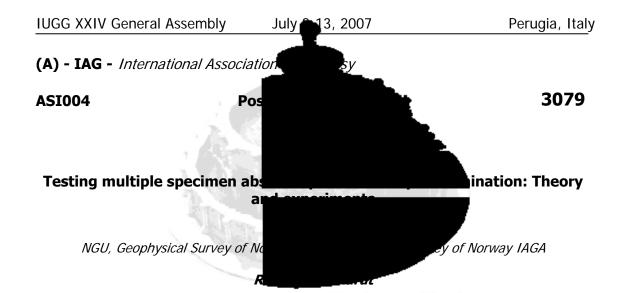












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Two recent proposals of multiple specimen and simplify absolute paleointensity determinati fundamental symmetry claim for thermorer 245, 438-453, 2006). Thisclaim states that, and remagnetisationtreatments are to first present a theoretical analysis of the assumption validity. We further outline how the multiple specin

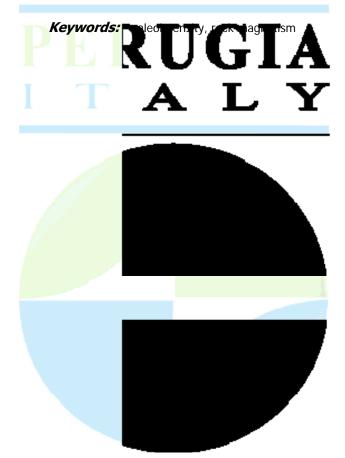
Bhnel (EPSL, 248, 508-517, 2006) relies on these symmetry conditions. Our theoretical analysis and experimental testssuggest only a limited validity of the symmetry relations. We point out that an especiallyimportant condition in the multip set back to zero. Otherwise the symm experimental work. In any case, there ar question a full symmetry of TRM process multiple specimen methodtends to overe sizes.

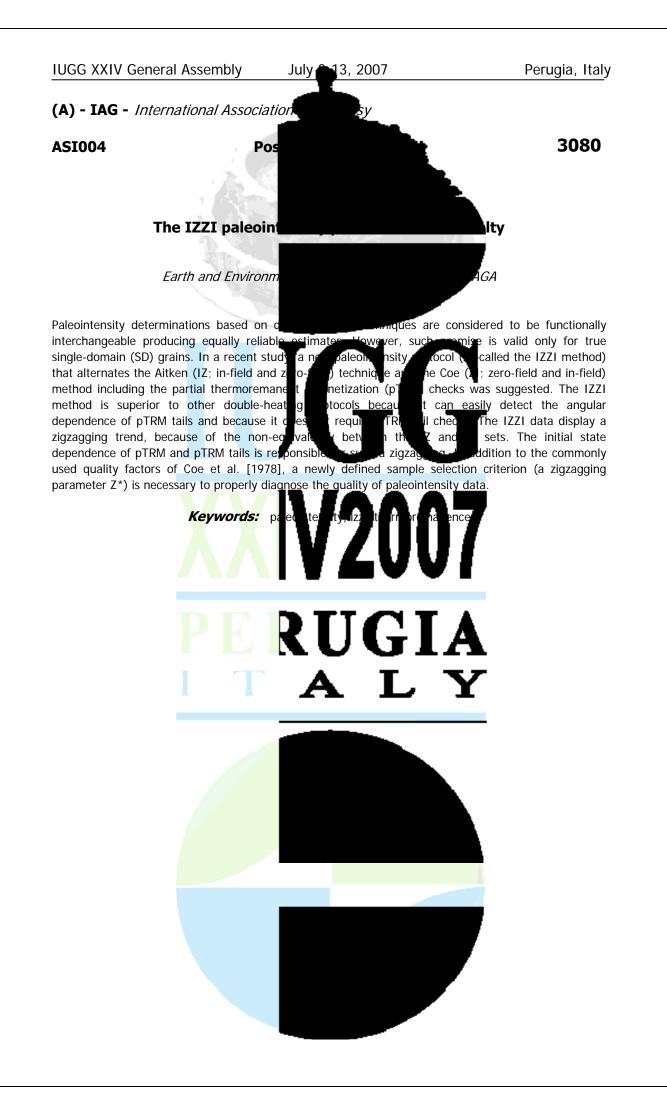
pear Both met ods in multidoma nden<u>t of ara</u>i /mme<sup>1</sup> vit ind t laim tensity

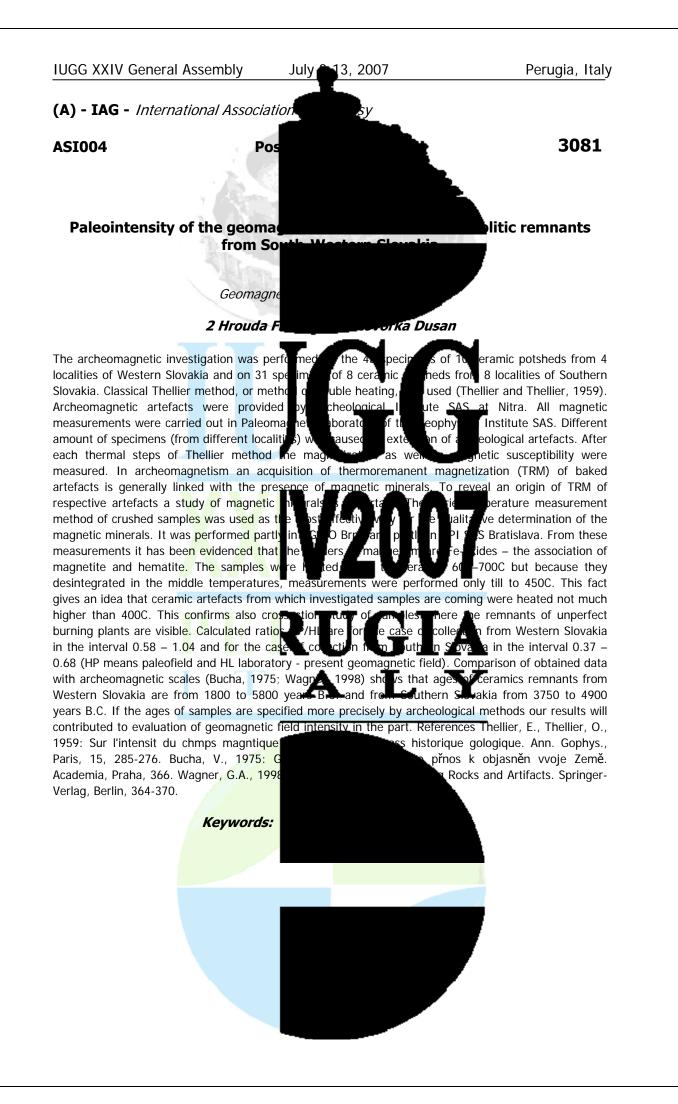
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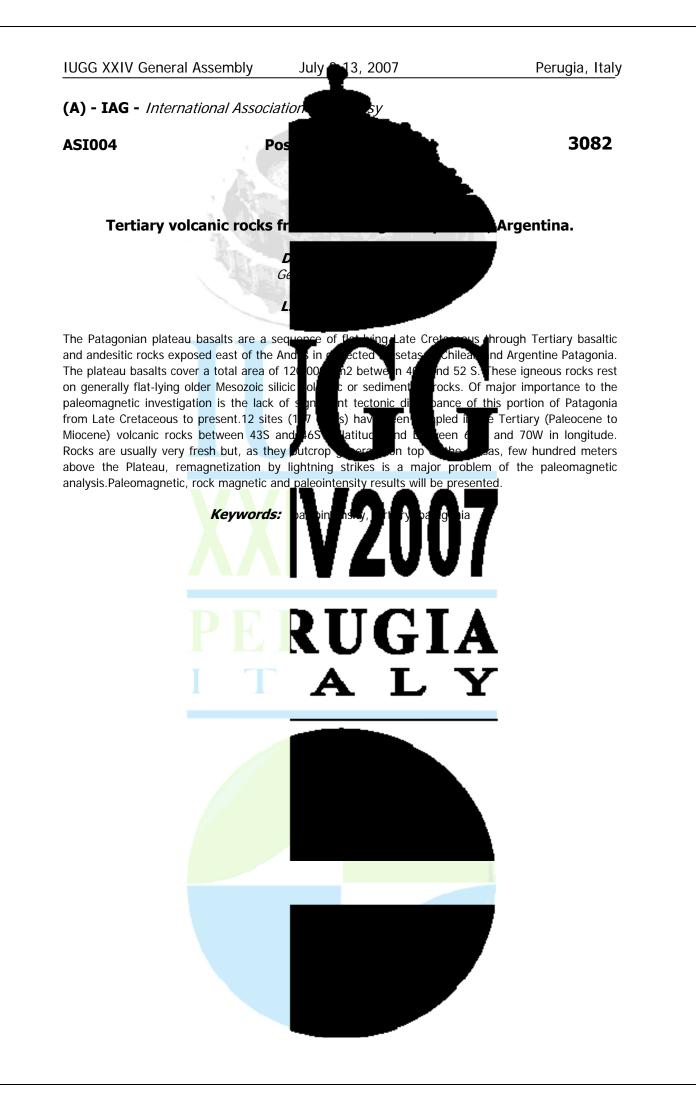
rge potentialto improve licitly or pplicitly, are based on a articles (Biggin and Poidras, EPSL e, partial thermal demagnetisation hall field shifts.Here we e basic conditions for its deriv roposed by Dekkers and

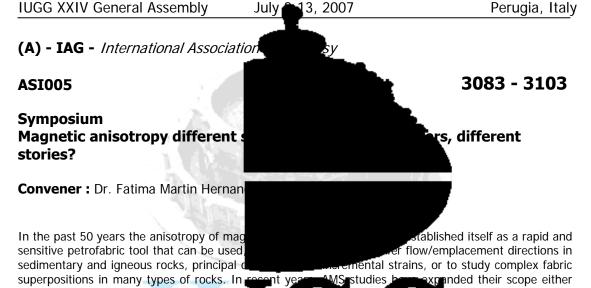
> heatingthe field is not conflict with previous in the literature, which ta, which show that the iate PSD to MD particle











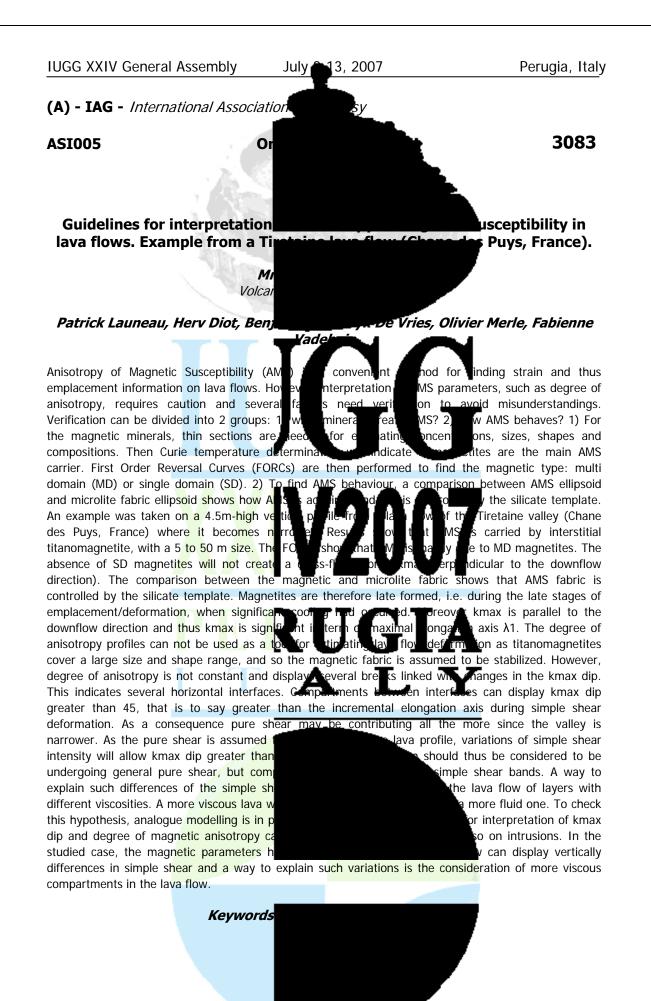
superpositions in many types of rocks. In recent y by developments in the theory linking the acc sophistication of already existing measure en measurements that include anisotropies of en together recent studies of magnetic anisotro y fabrics to bulk anisotropy, with special en measurements (AARM, AIRM, HF-AMS, etc.) or t mineral fabrics with texture goniometry, neuron and specially those methods that can be used to present in a single rock

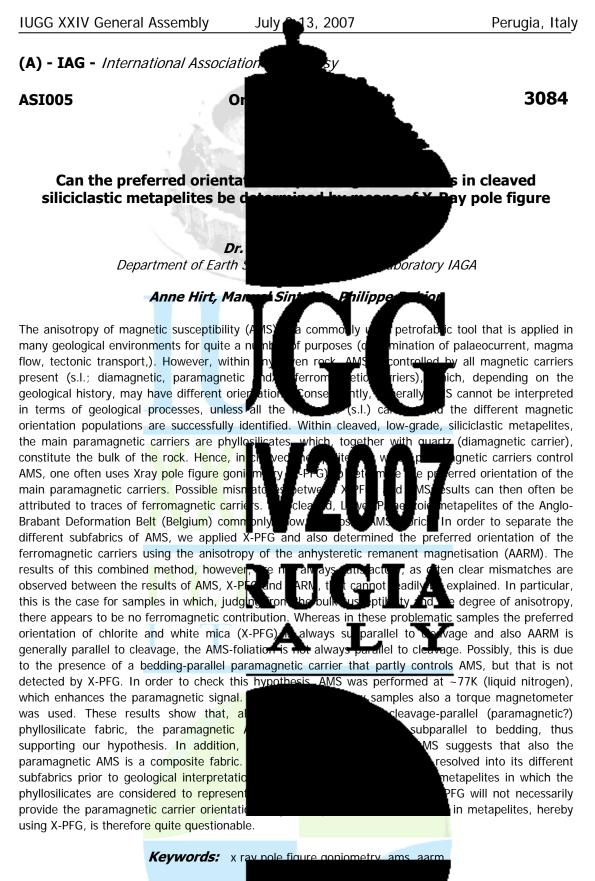
ent years AMS studies accordion miner ent ichniques or l ent ichniques or l ent ince and of h y le from all difficient or to beratu. Cordi on the action mage ed to some of the cond

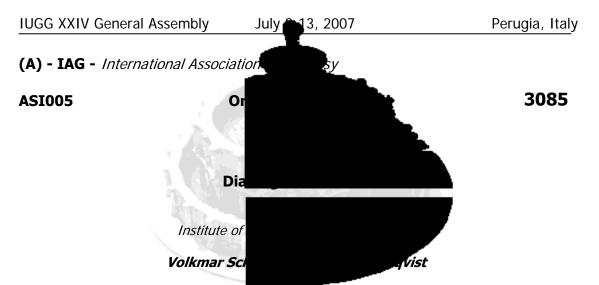
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strains, or to study complex fabric bein expanded their scope either vabrics by the increase in the ne inclu on of a new family of fields. This session aims to bring nt scale perspectives, from mineral ions while with new types of ions beneen magnetic fabric and lysis un SED are also of interest, and the subfabrics







The contribution of diamagnetic anisotropy to the to rock is often very small and easily overprinted by phases. Although the anisotropy of diamageeting calcite, very few studies have isolated these carbonate minerals to establish their magne often incorporated into the crystal structure further step, a method was developed to measuring the susceptibility anisotropy in high fi

magnetometer. This procedure exploits the fact that the ferrimagnetic contribution to the torque signal undergoes saturation in high fields, the paramagnetic susceptibility increases at low temperature, and the torque of the diamagnetic contribution on a series of synthetic marbles fabricated is possible to isolate the diamagnetic fabric anisotropy. Additional tests were made on possible to isolate subfabrics due to Fe-po practical limitations of using this procedure to fabric will be discussed.

somropy of j anis nv f nerals my Initially we otrop<u>y in rela</u>t ises th ility to e the sep mag m ter

tic\_susceptibility (AMS) in a netic and ferromagnetic paran atively strong, as in the case for undertaken a systematic study of hip t<u>o the am</u>ount of iron, which is ome paramagnetic. In a c fab rom the total AMS, by nd 77 K with a torque

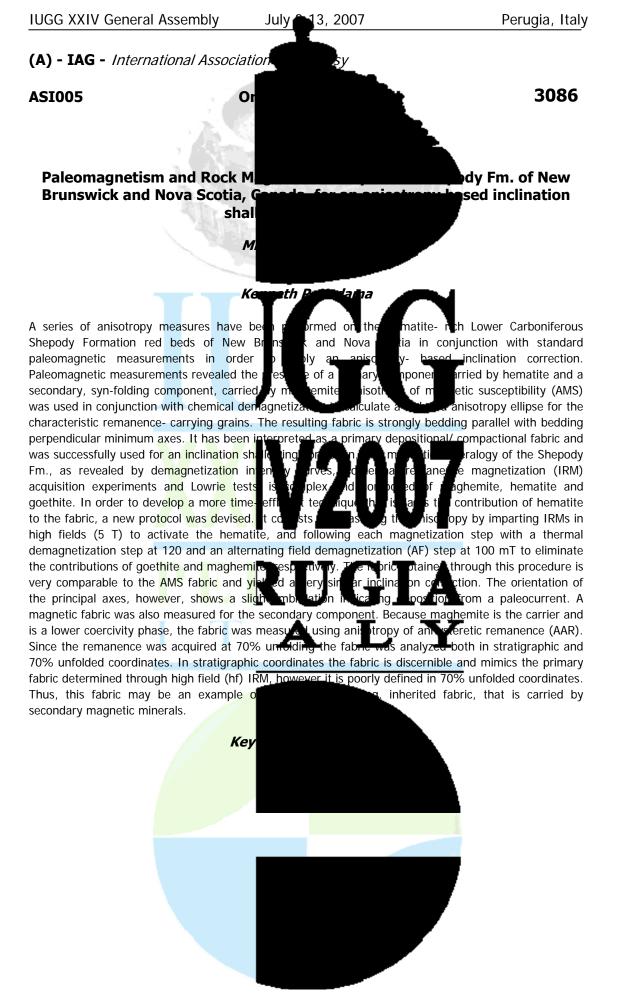
he method was tested Results showed that it ore than 5% of the total les Nappe, where it was locality. Theoretical and diamagnetic contribution to the magnetic



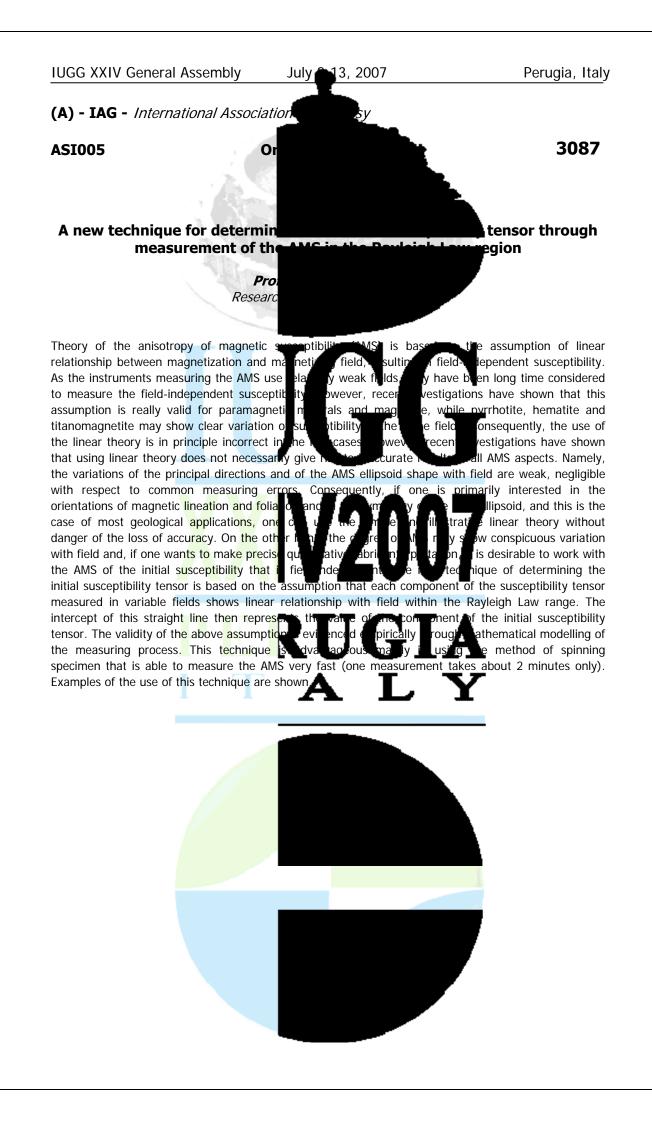
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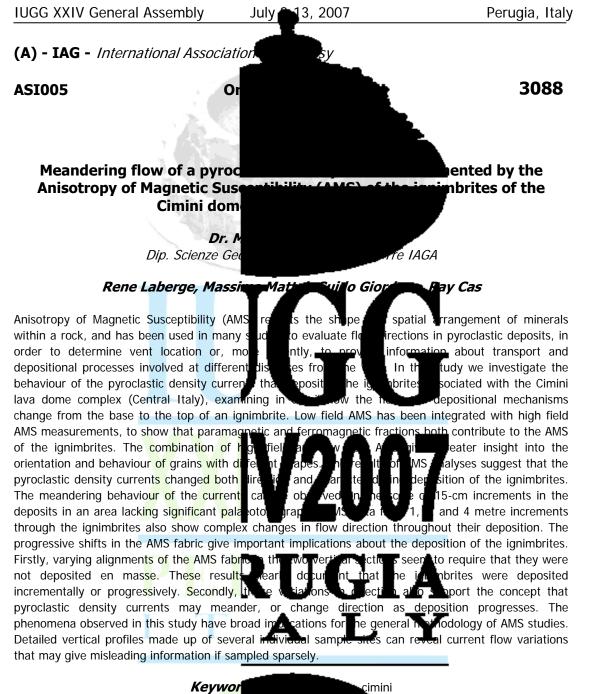
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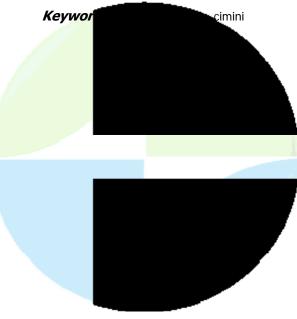
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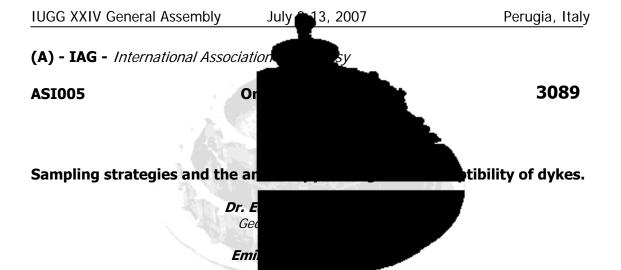


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Most studies of the anisotropy of magnetic susceptibility axes should define a unique orier direction. Theoretical considerations, howev amount of shear experienced by the flow undesirable at first sight, based in a theore advantage of such variation in the orientat confidently than until now if proper attention In this work we report the results of a pilot st

resampled two dykes from the Koolau dyke complex in Oahu and for which magma flow direction was previously inferred albeit with some uncertainty. The resampling was made following the guidelines suggested by the theoretical work as close the dyke walls and across the dyke). The theoretical model and allow us to identif Therefore, we show that despite a compl the measurement of AMS can yield end mechanism of emplacement of many igneous ro

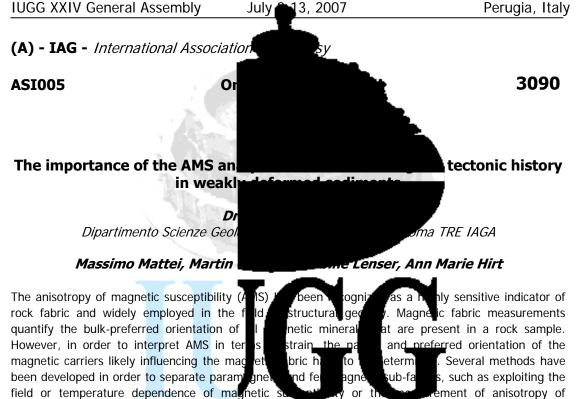
(AMS) sus ve t 6n R ict systematic agma. Althou del i<u>t has be</u>e he AN Έρ n to che o tes

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ykes have assumed that walls and magma flow é dy ations of AMS as a function of the his feature of AMS might seem iggested that actually we can take nfer n ha flow directions more ollow luring sample collection. bretical predictions. We

> one profile parallel to od agreement with the ation in a given profile. ics and magnetic fabric, spects related with the





anhysteretic remanence. One of the not yet fully understood topics is the origin of the magnetic lineation under progressive deformation. Based mainly on magnetic studies in deformed rocks from compressional tectonic settings, several rotation, pressure solution or neocrystallization low temperature and high magnetic field texture analysis) demonstrates that magne anisotropy. Less is known about the origin of r scarcity of strain markers (faults, folds, cleavage) and their fine-grained nature, which make difficult, or

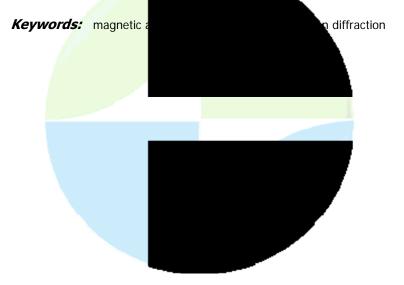
deformation is discussed, together with

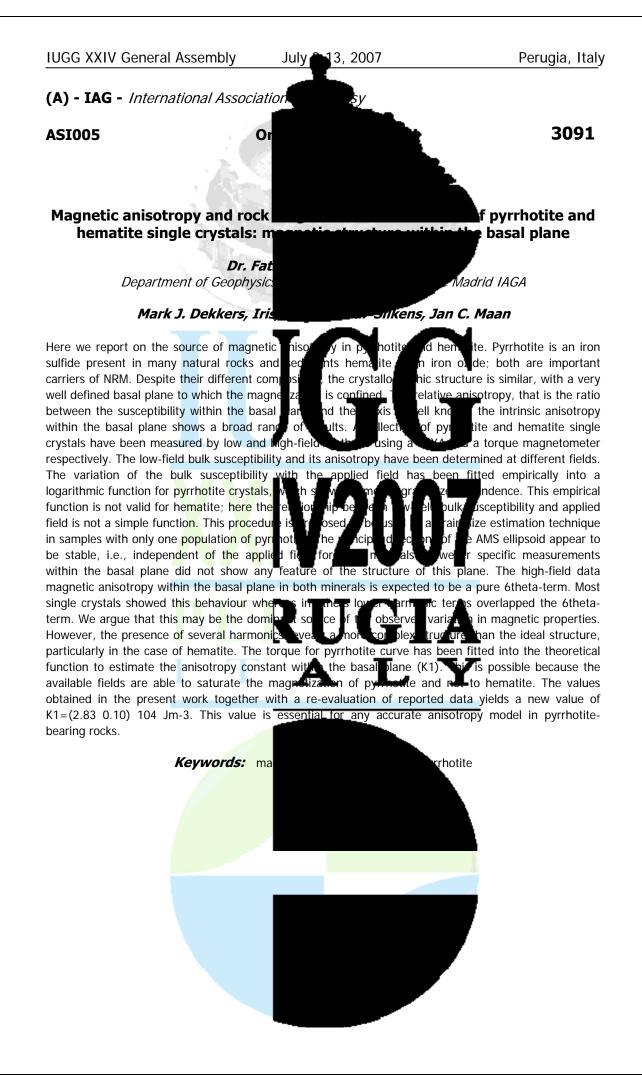
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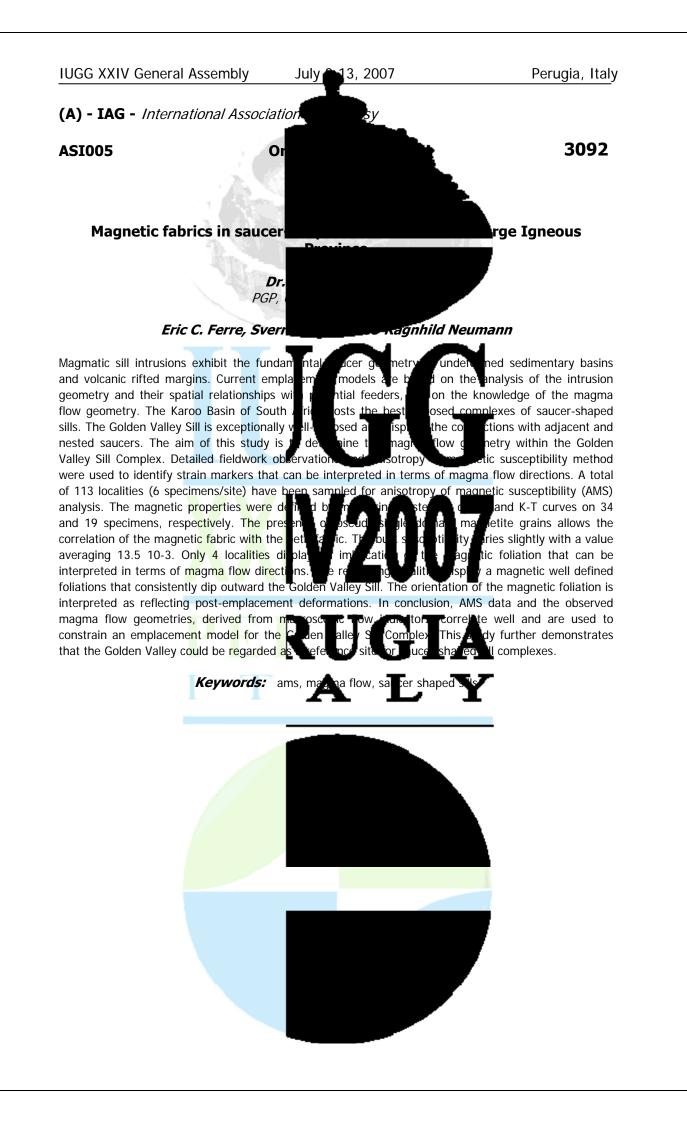
ement of anisotropy of voked, such as grain tic measurements (e.g. analysis (e.g., neutron tant control on magnetic because of the common

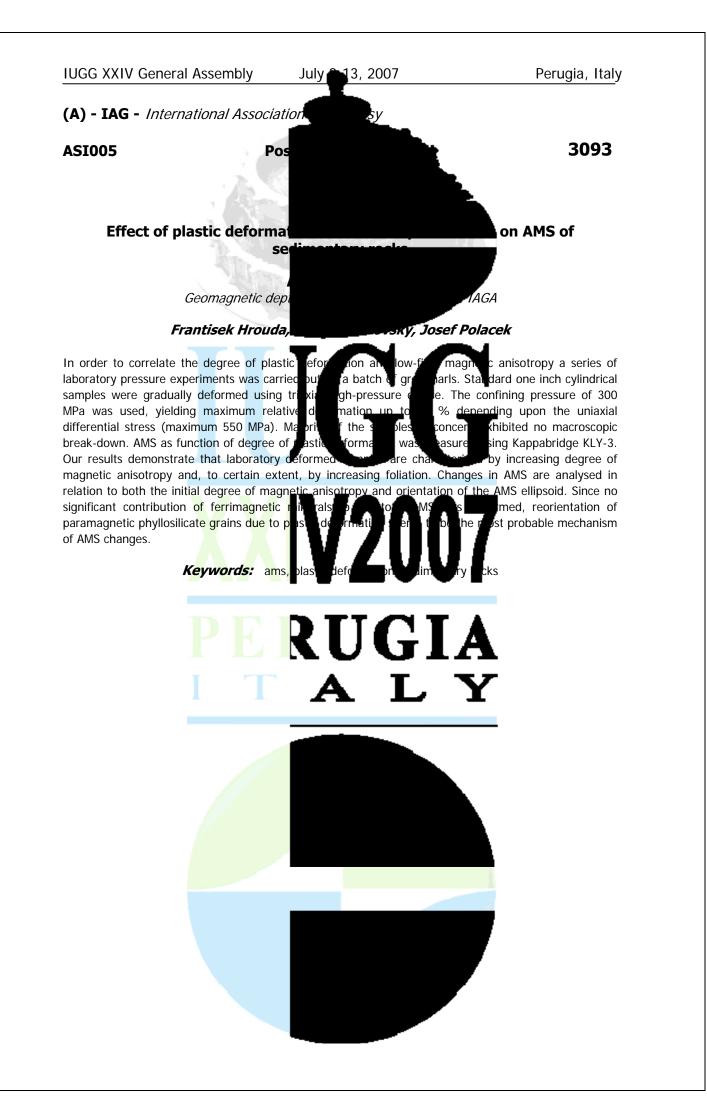
even impossible, to perform strain analysis. In this talk, the development of magnetic fabric during n the origin of magnetic expla prmed rocks, where no kly

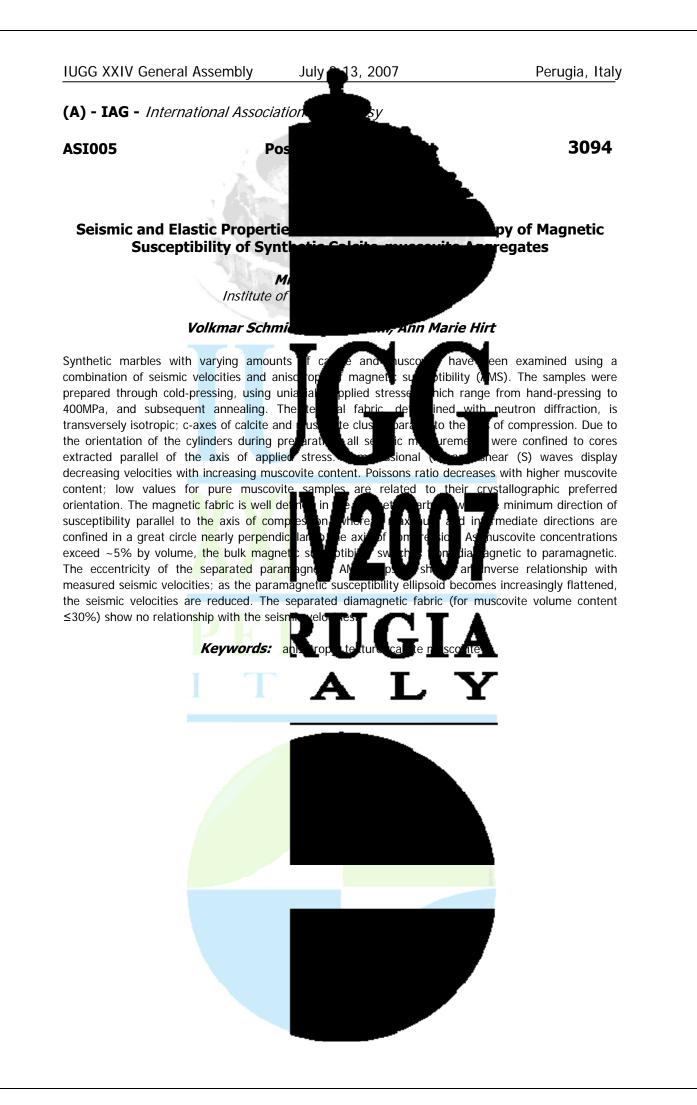
lineation in deformed rocks. Particular a ring a clect correlation between evidence of tectonic deformation is visible a b s tectonic and magnetic fabric. The importance of the integration of magnetic and mineral fabric analysis in structural studies is pointed out, underlining the the observed magnetic affic reflects the magnetic minerals preferred orientation induced by testor deform In we y deformed rocks, this approach may represent the unique tool for detecting deformation. In fact, the integration of magnetic and mineral fabric analysis demonstrates to be a suitable tool to study strain mechanism on the grain scale and regional deformation pattern in croscopic evidence is not visible at the mesoscale.

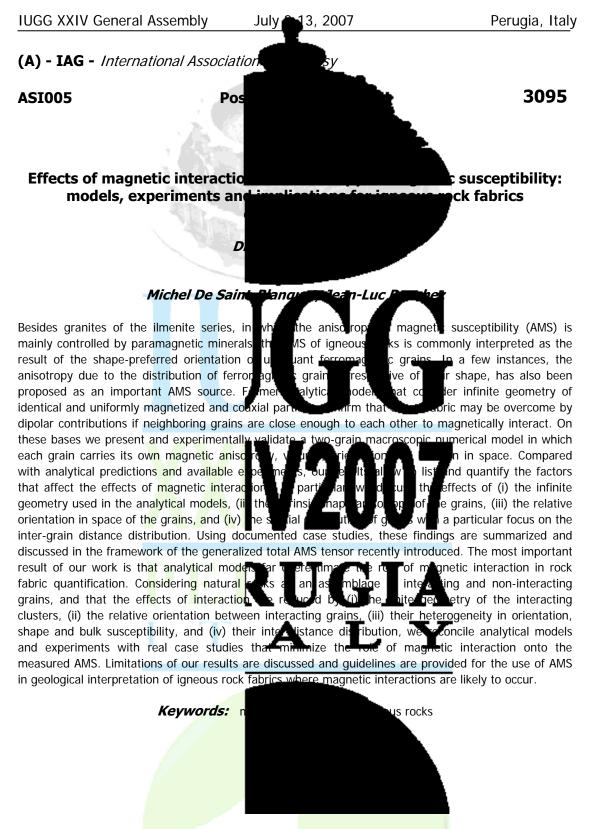






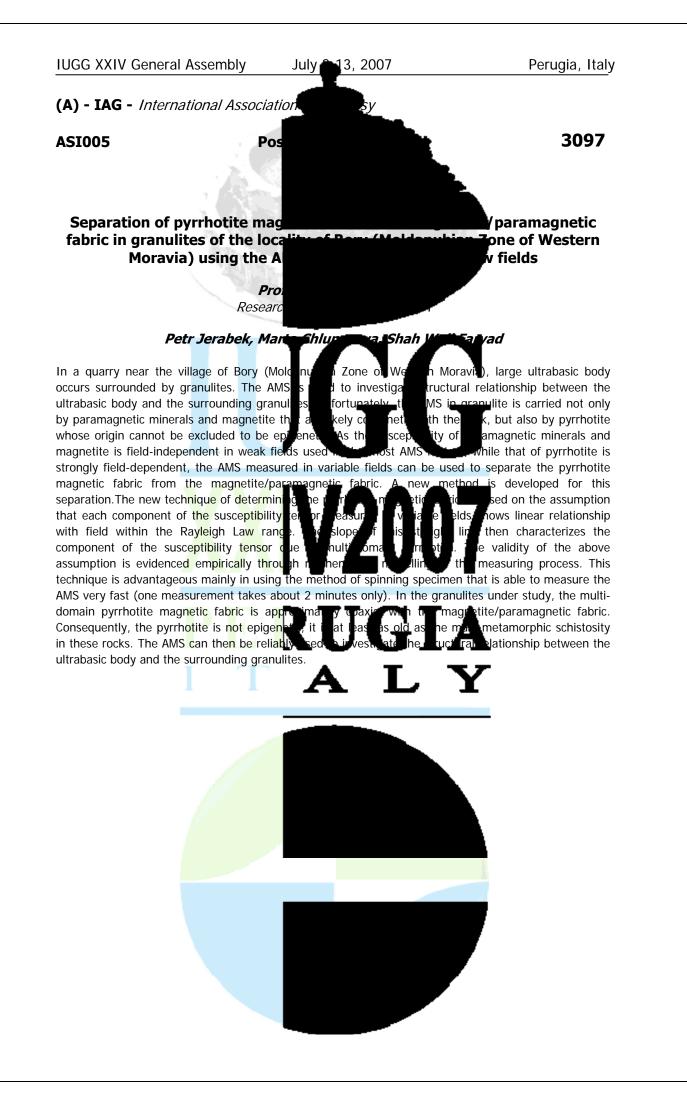


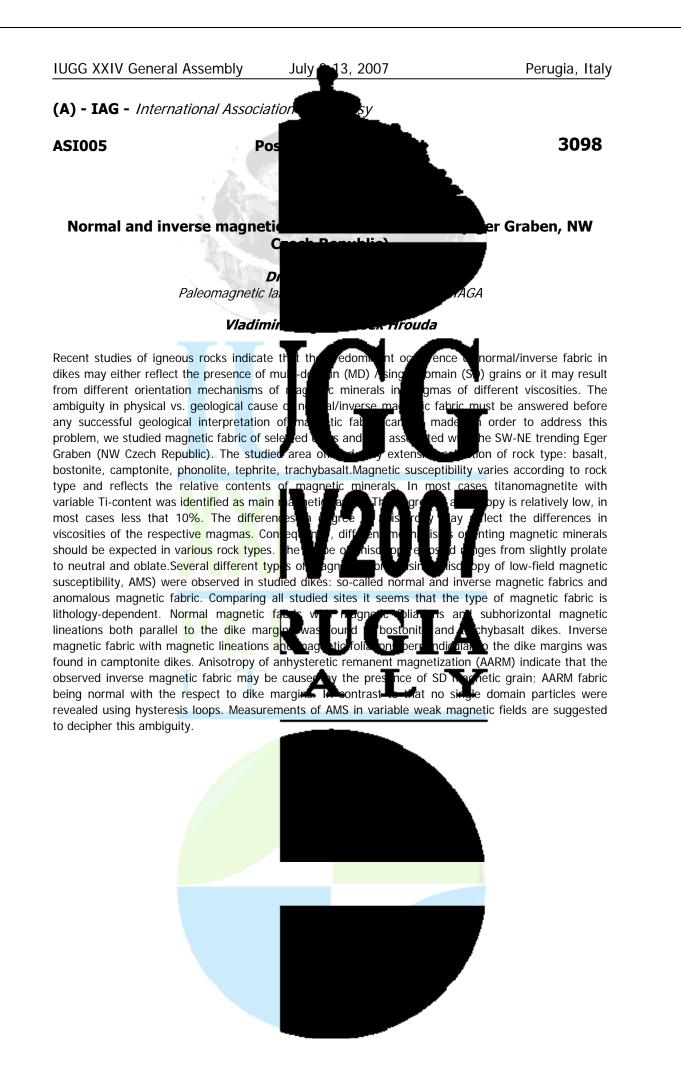


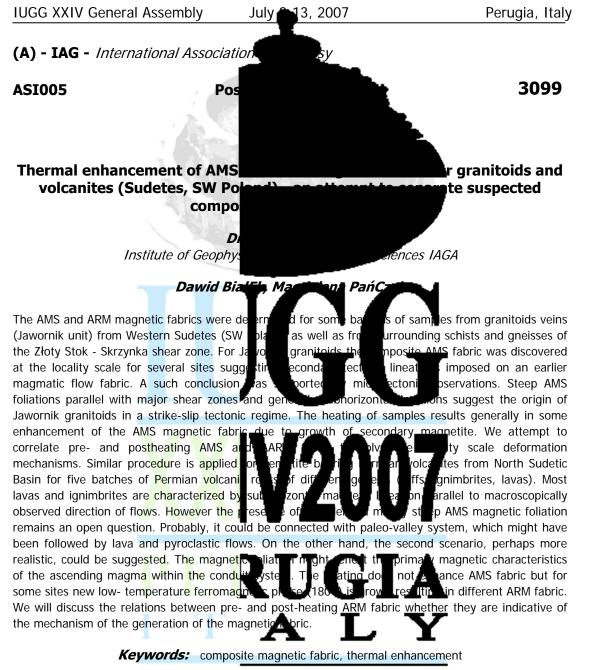




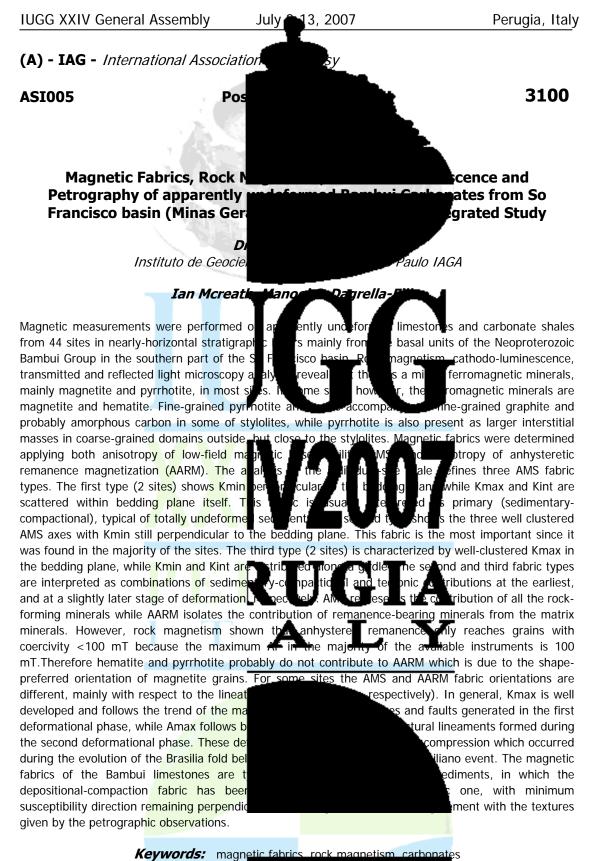


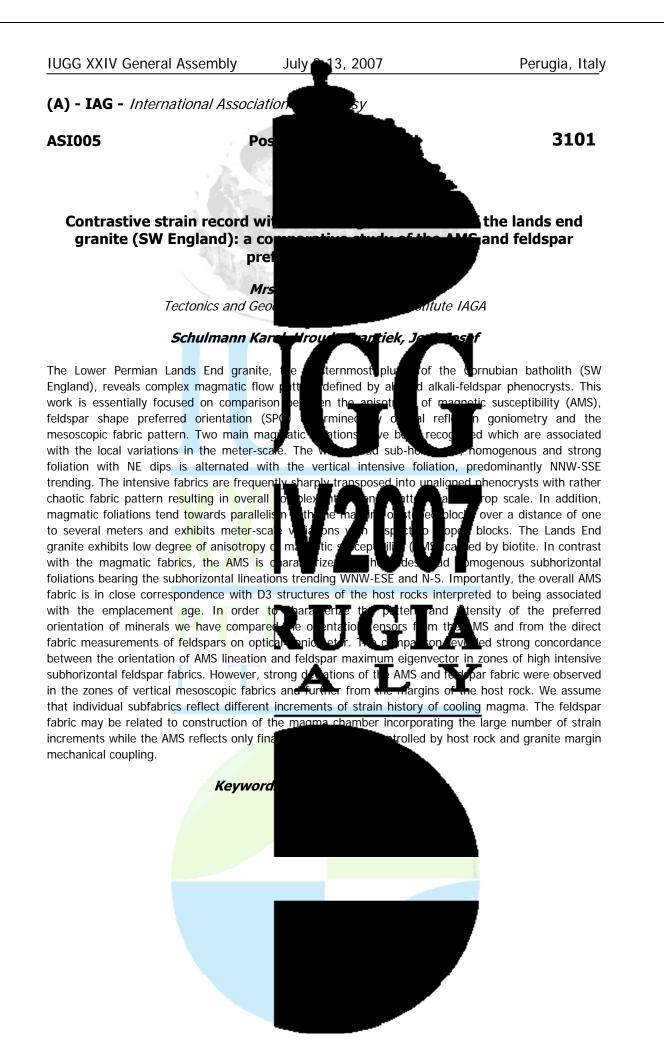


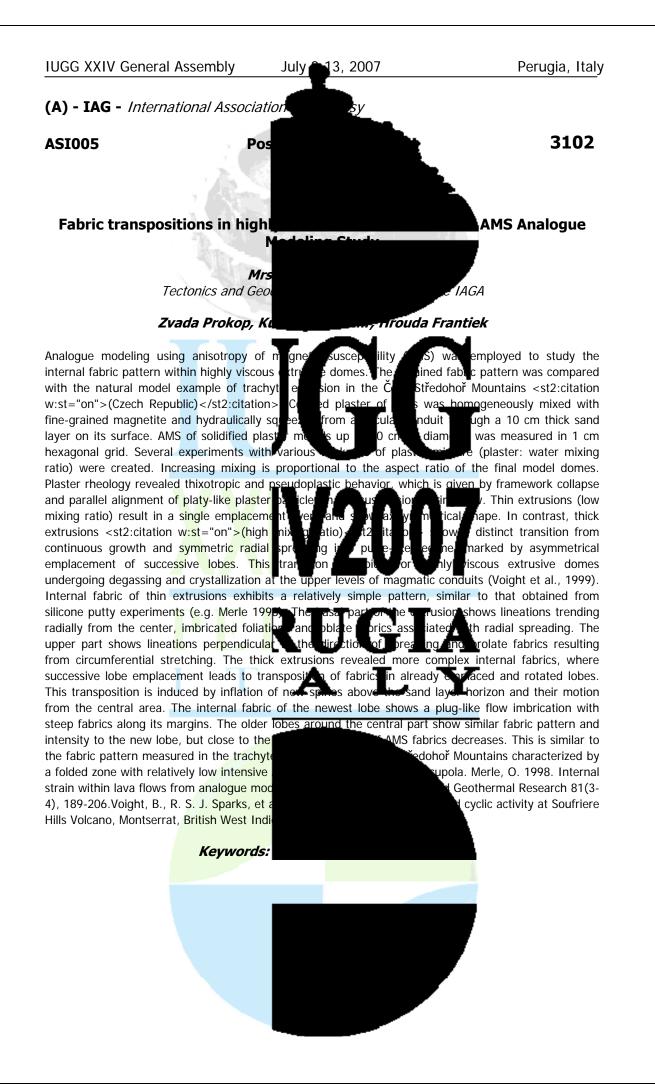


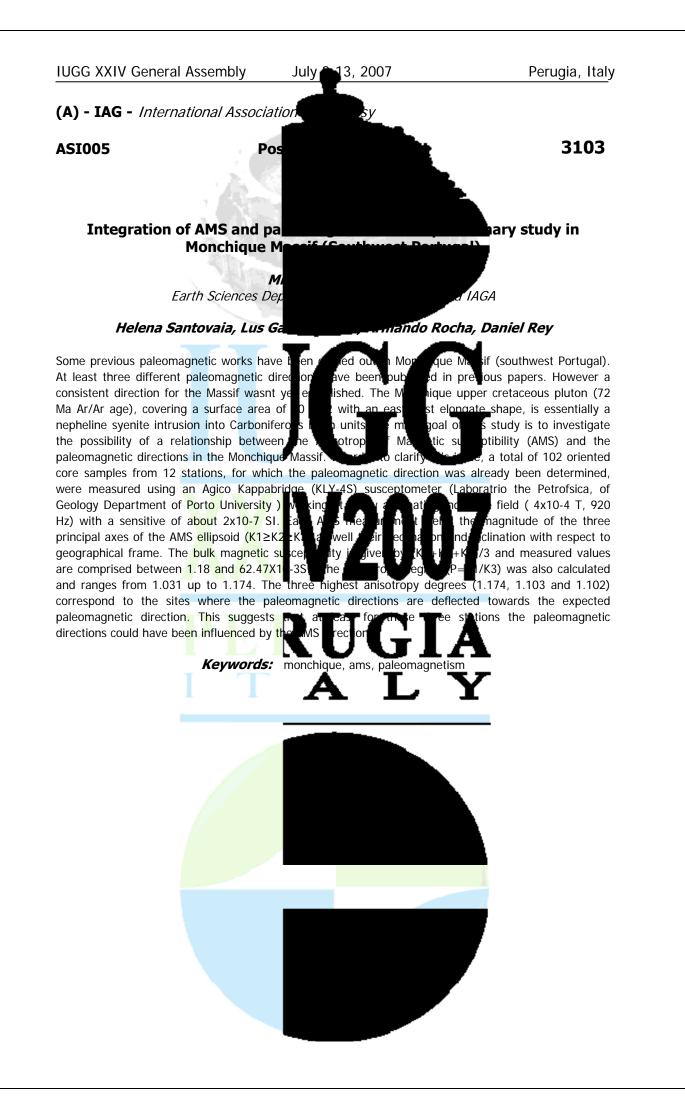




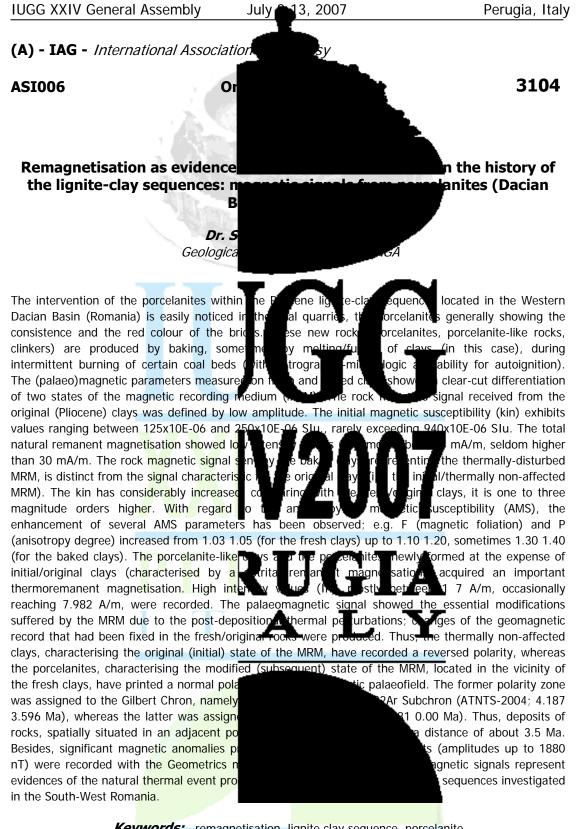






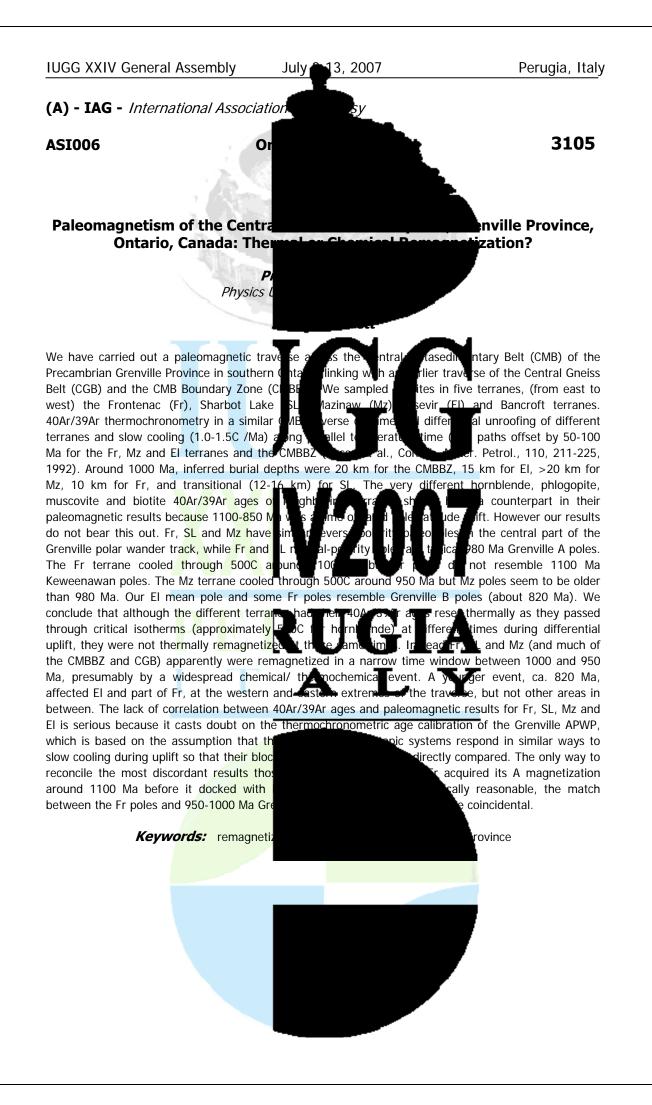


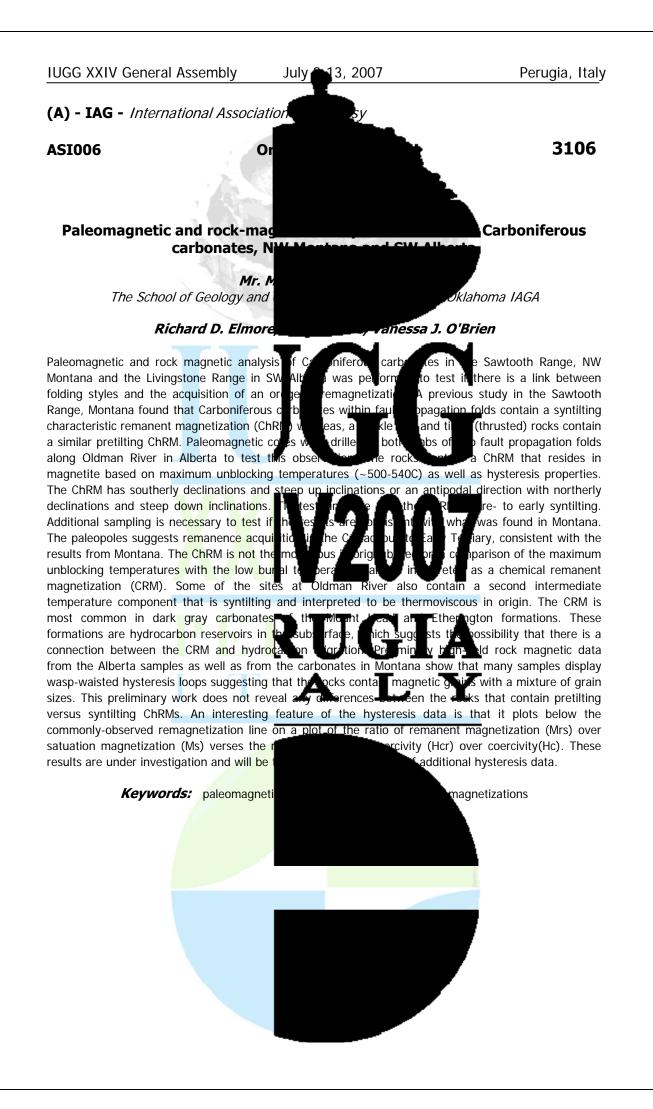


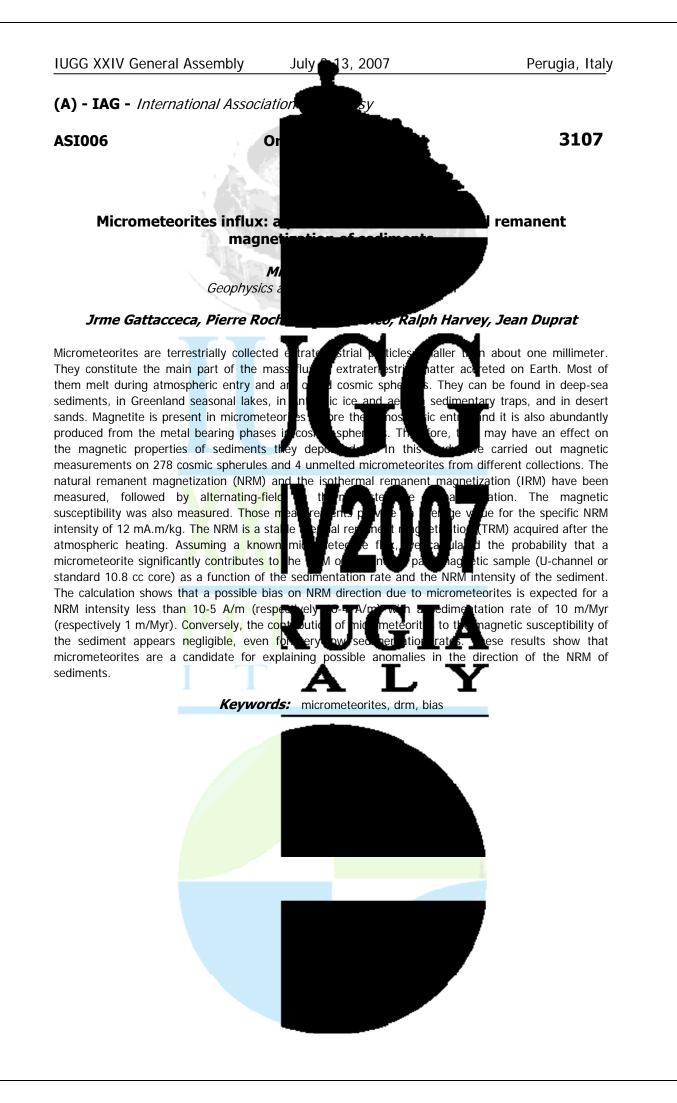


Keywords: remagnetisation, lignite clay sequence, porcelanite

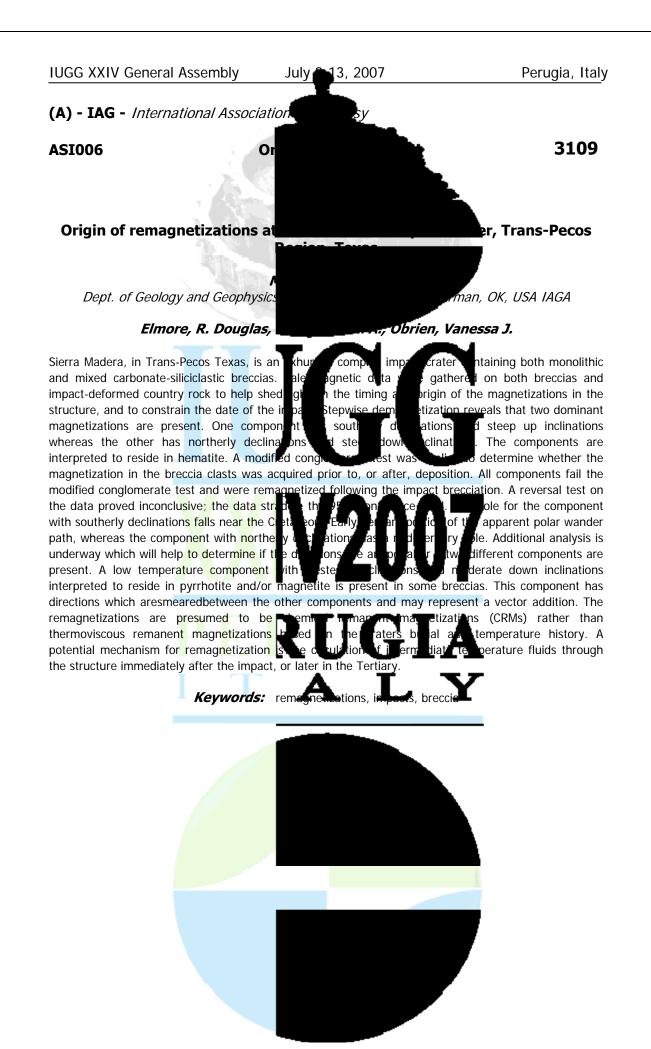


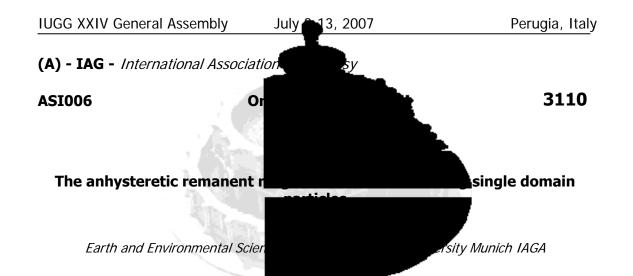












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The anhysteretic remanent magnetization because of its sensitivity to the domain st remanent magnetizations. On the other han property of being extremely sensitive to manual the ARM acquisition process in natural assen Direct micromagnetic calculations of the AF the calculation of the ARM susceptibility presented. This approach is based on a complete

particles, and on a statistical description of the interaction field, which can be easily extended to the calculation of other weak-field magnetizations reversal mechanism of the magnetic interactions effects, which include the c nonmagnetic matrix. SD magnetite particle 0.01% by volume, far below the nominal interacting systems. A concentration of 0.2% interacting value. The analytical model presented here also provides a direct means to calculate the effects of interactions on the anisotropy of ARM (AARM) in terms of geometrical parameters that

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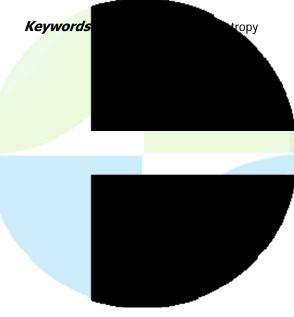
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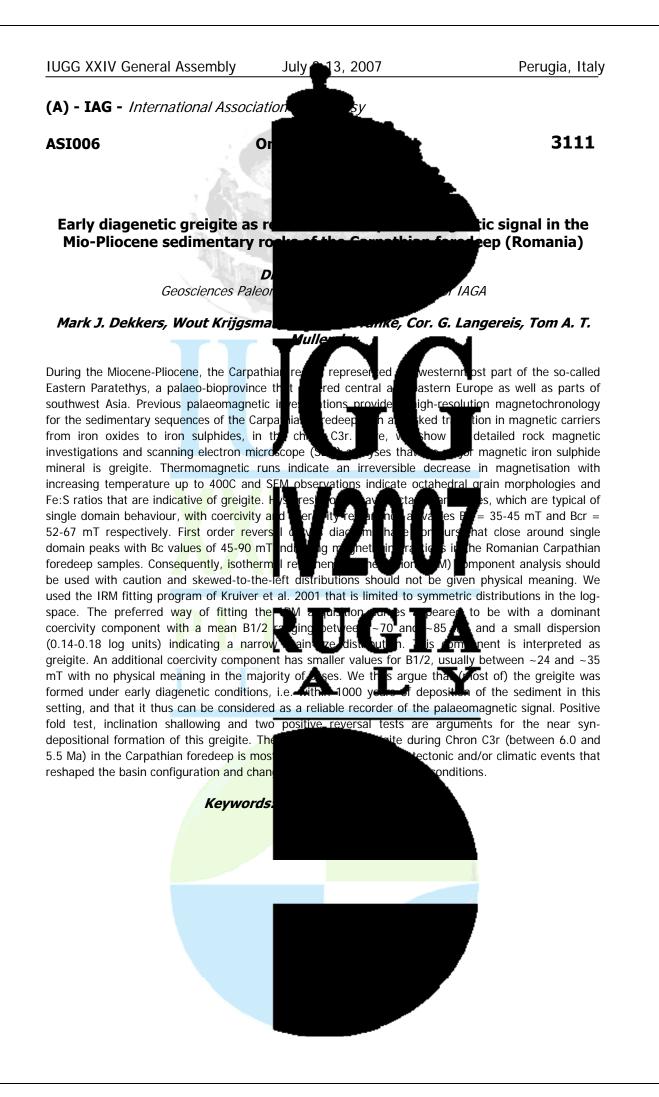
sm and paleomagnetism ind th lose analogy to natural her weak field magnetizations the It is therefore desirable to model cles and the effects of interactions. erefor analytical approach to sing omain (SD) particles is on of thermally activated

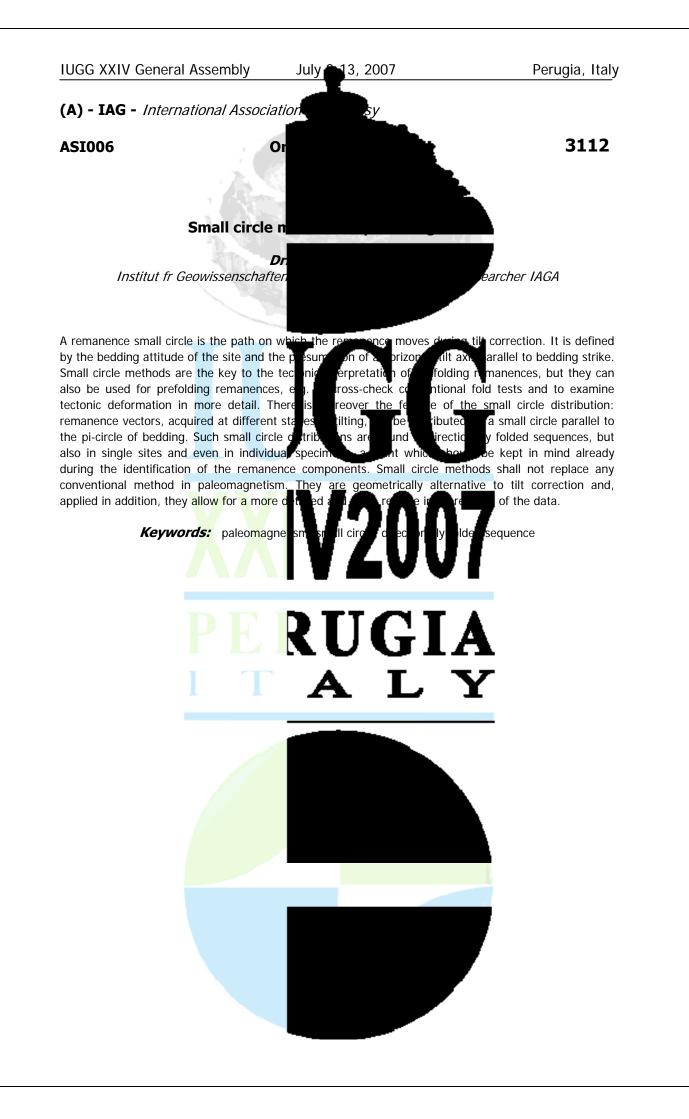
> hd (3) magnetostatic the particles within a oncentrations as low as ugh upper limit for nonetite to 50% of the non-

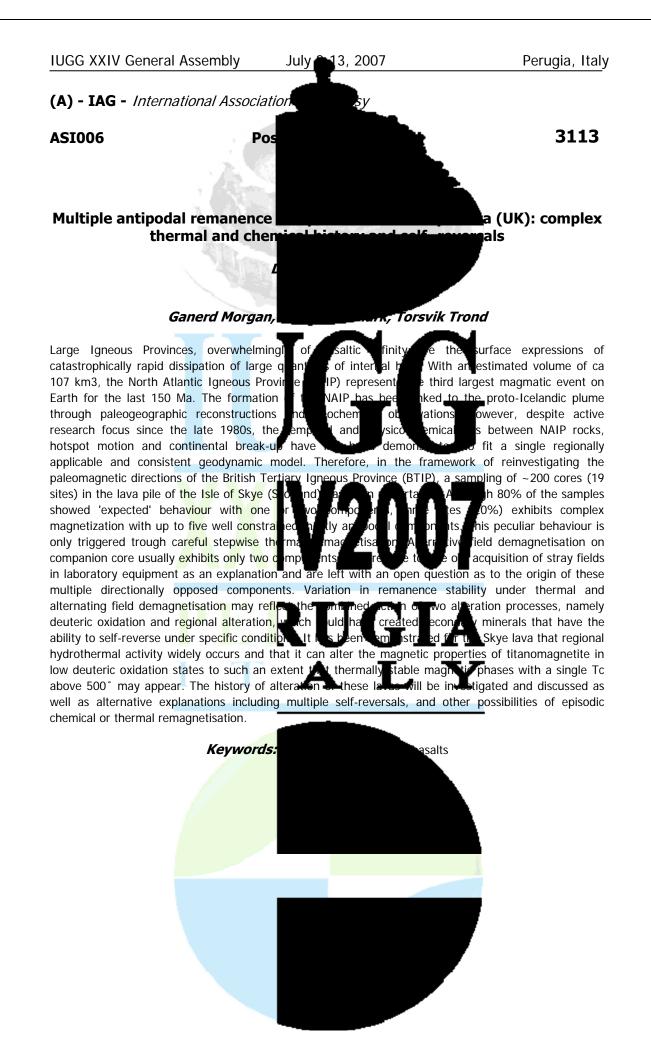
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describe an orientation-dependent distribut alled distribution anisotropy" is similar studies on the anisotropy of magn ropic tial arrangement of the anis particles, expressed by the dependence the orientation of the he ge ance o sample, produces a unbalance between positive and negative interaction fields that modulates the directional dependence of ARM intensity. The ARM of Tadversely affected by D magnetite interactions at concentrations >0.5%, where the an tropy p ter disple a complex behavior that depends very strongly on the concentration, the coercivity and the geometric arrangement of the particles.

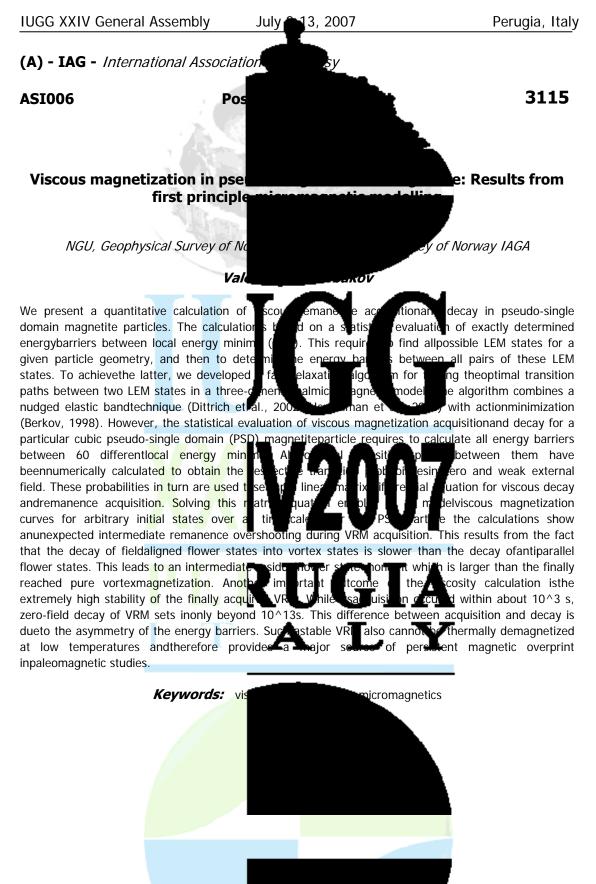












## **IUGG XXIV General Assembly**

(A) - IAG - International Association

## **ASI007**

## Symposium Magnetic signature of past and

Convener : Dr. Ann Hirt **Co-Convener :** Dr. Monika Hanesch

Iron is one of the most common elements of magnetic iron minerals may constitute a also an important element in biological pr have been used as a proxy for environme

sediments in which various magnetic pair nete magnetic signature in soils or leaves, which the improvement of instrumentation and knowledge about the relations between diffe some cases these magnetic parameters pro methods. This symposium will address the f obtain the magnetic signature of environ ent sediments or vegetation; 2) the importance of bion 3116 - 3134

entration and mineralogy onmental conditions. Iron is ally sensitive. Magnetic methods ast 20 years so that the applicability of magnetic methods can be now evaluated. Examples of large data collections include loess and lake nge in climate; or the to atmospheric pollution. In light of es new perspectives for deeper of the environmental materials. In whio ot available with other ion of niques that are used to natu materials such as soils,

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mental magnetism; and ocesse 3) case studies and palaeoenvironmental reconstructions where magnetic studies contribute information that would be otherwise unavailable

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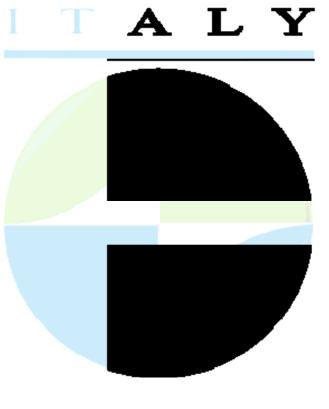
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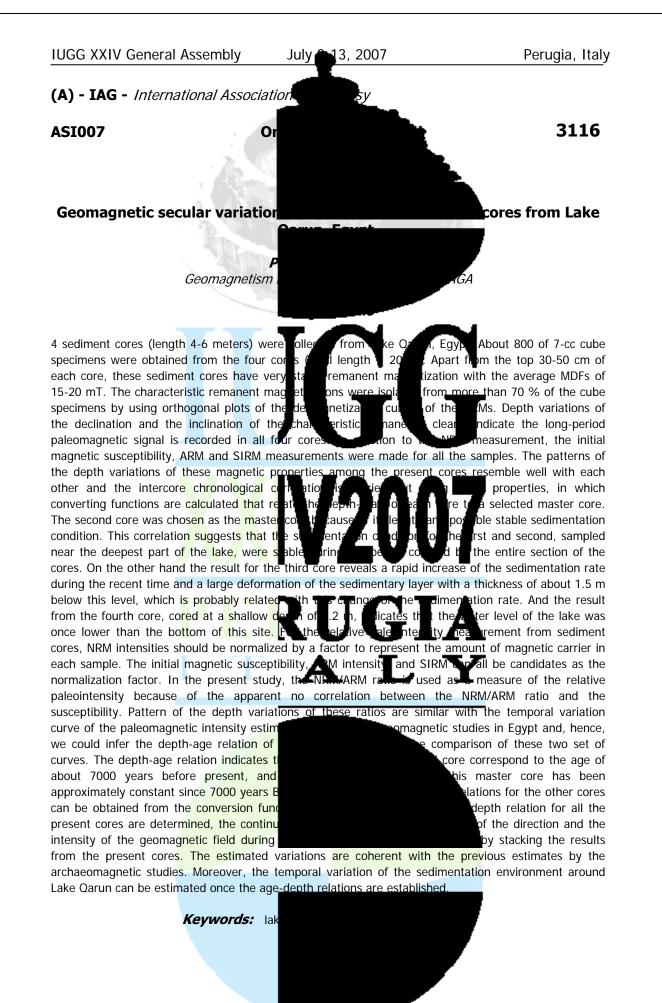
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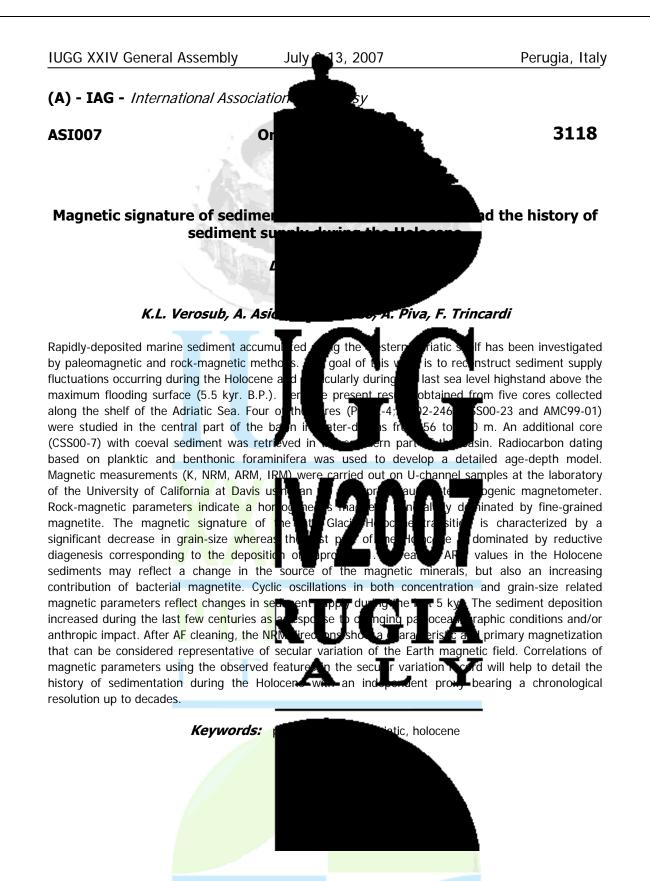
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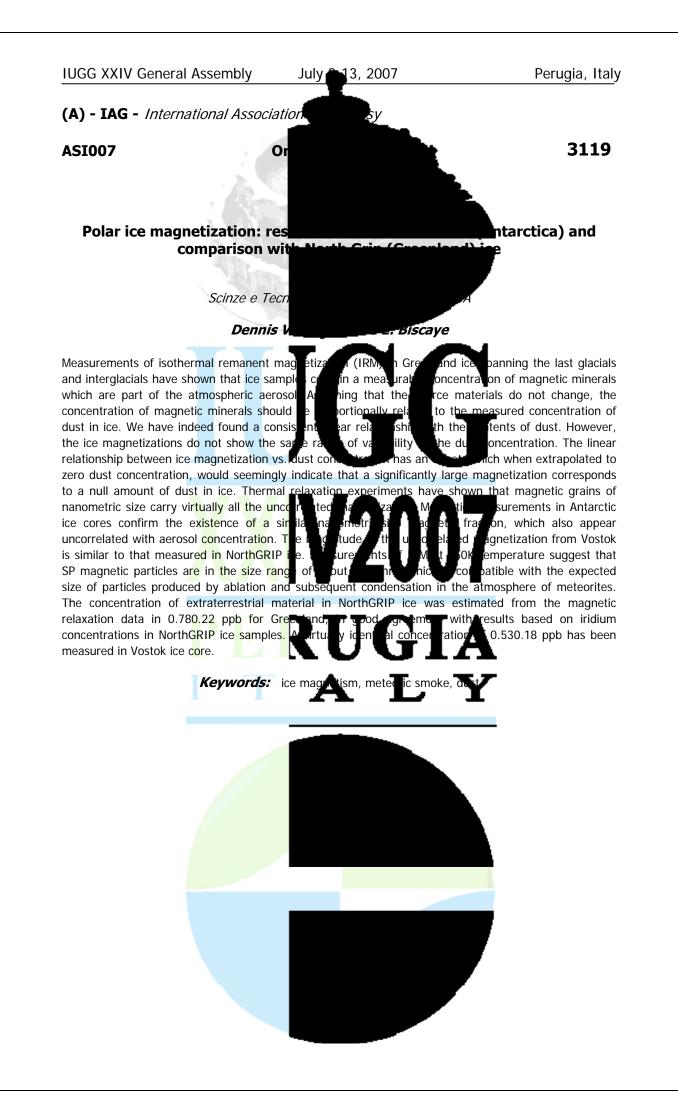
that

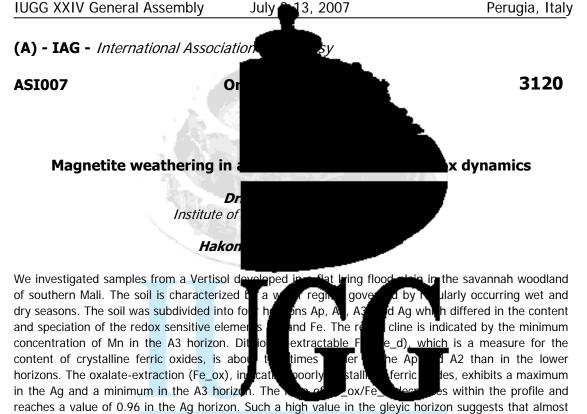












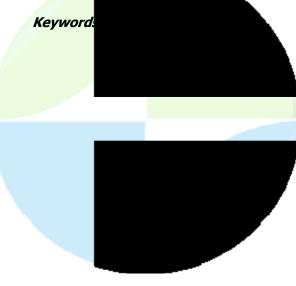
all ferric oxides are present in a poorly crystallized form. These chemical data provide evidence for a longer seasonal waterlogging in the A3 ar the magnetic susceptibility (x) varied betw the A3 horizon. The values of  $\chi$  were Magnetization (M) versus applied field (B coercivity phase with a closure field of less two horizons and was increased by about a factor 2 in the A3 horizon. A similar trend was found for the remanence of coercivity (Bcr). The ratio of Bcr to Bc was higher in the upper two horizons. The ratio

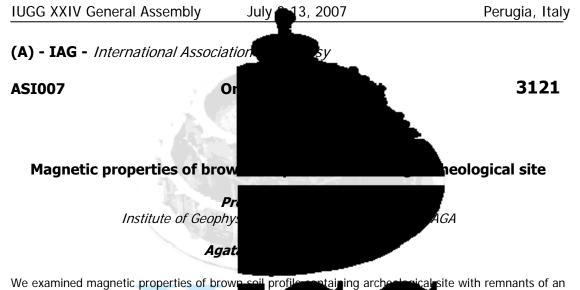
ons. Within the profile 1.6 x 10-7 m3kg-1 in he upper two horizons. characteristic for a low was similar in the upper

between the remanent magnetization Mr s was more than a factor of 2 higher in the two lower horizons. The (FQ plots indicated a larger contribution of particles with higher Bc in magnetic data reveal a ll t 10 decrease in the magnetite content and a larger contribution of smaller grains in the A3 and the Ag horizon. Considering the soil chemical data, this nagnetic p tern can b explained by the seasonal tite disso fluctuation of the watertable. The pronounced page tion in the lo er horizons of our Vertisol can be explained by a seasonal interchange of surficial maghemitisation under oxic conditions and microbially induced reductive dissolution of this maghemite layer. Furthermore, the present occurrence of magnetite throughout the profile and the constant soil formation factors during the last 10000 years suggests that even ur etite dissolution is a slow process.

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ancient kiln or fireplace. All magnetic para untouched soil profile taken near by. Mag eti topsoil to maghemite with decreasing Tb w occurring at the base of a kiln. The border b Within the layer of a few centimetres magn abrupt passage is observed for all magnet fresh topsoil is also well marked in spite of more

hete soil bui ineralogy cha overheated the bottom of eraloc ar eters ansitic

from r

d when compared with chai graduary from hematite in the rs. The final product is magnetite iln and the loess beneath is sharp. hetite to hematite. Such bord etween overheated and IRM and ARM increased

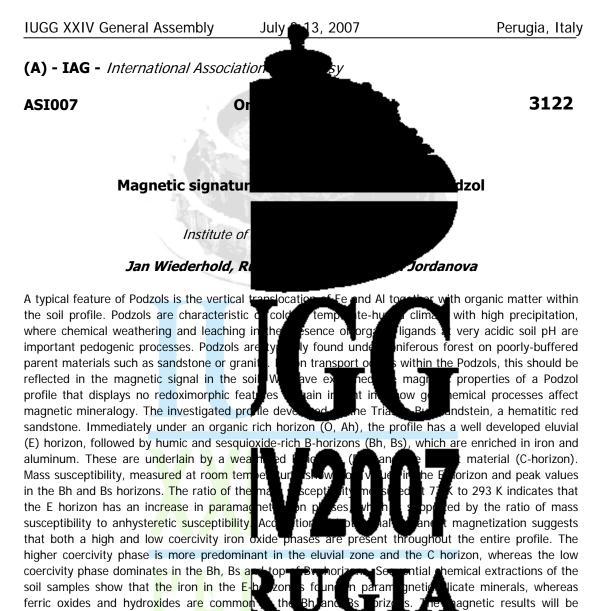
gradually starting from the depth of 30 cm until 100 cm, then all these parameters abruptly decreased to the values characteristic for the loess of <u>unheated</u> soil profile. Coercivity of remanence decreased for

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overheated soil in comparison with soil overheated layers is well demonstrated parameters as susceptibility, magnetization curves for burnt and undisturbed soils le deepest deficit of oxygen occurred at the reduction was completed and resulted in creation

mineralogy within the cr and such magnetic of K(T) and SIRM(T) st temperature and the his depth the process of

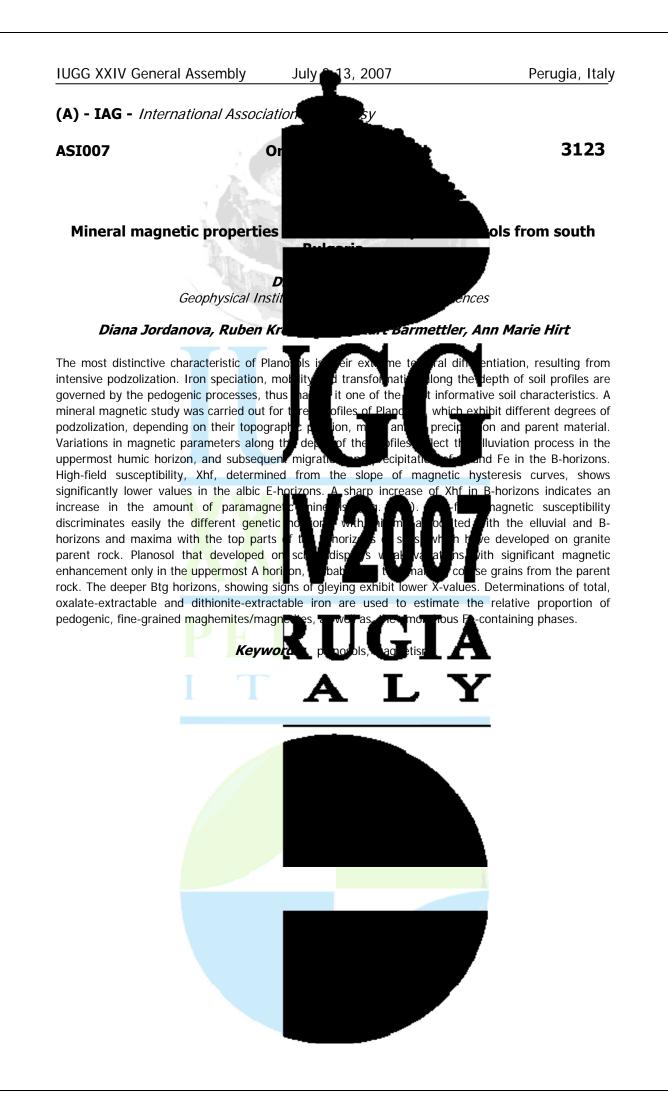


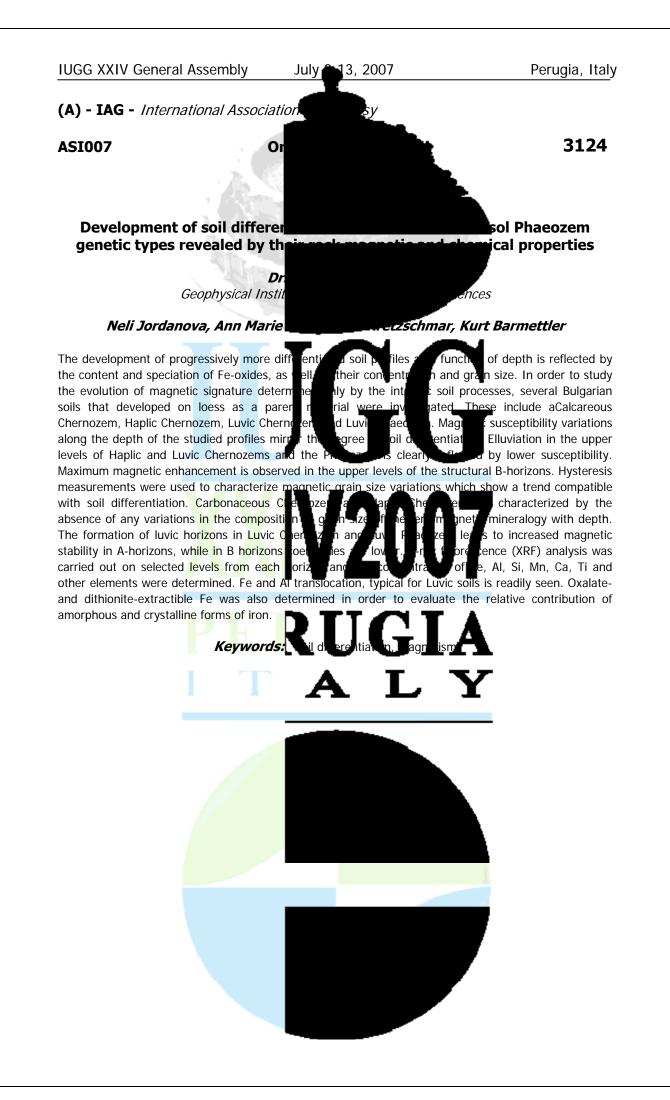


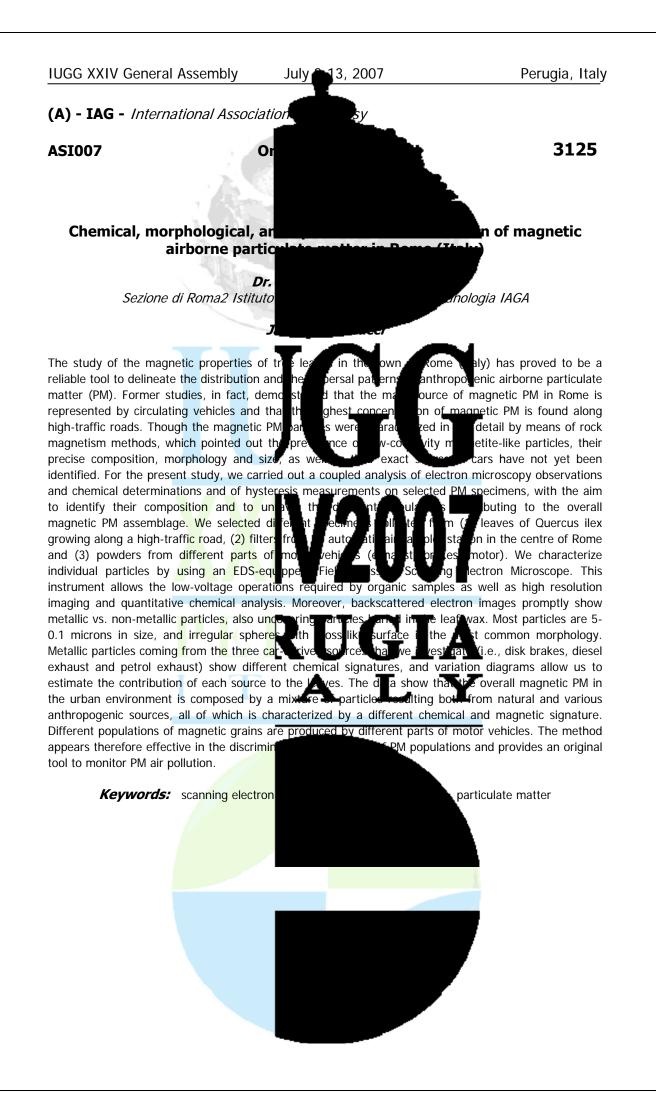
ferric oxides and hydroxides are common on the Bh and Bs porizons. The magnetic results will be discussed together with soil chemical data and in the light of the pedogenesis of the soil profile. The combined investigation of magnetic properties with soil chemical analysis provides new insight into pedogenic processes and the magnetic mineral by casoils.

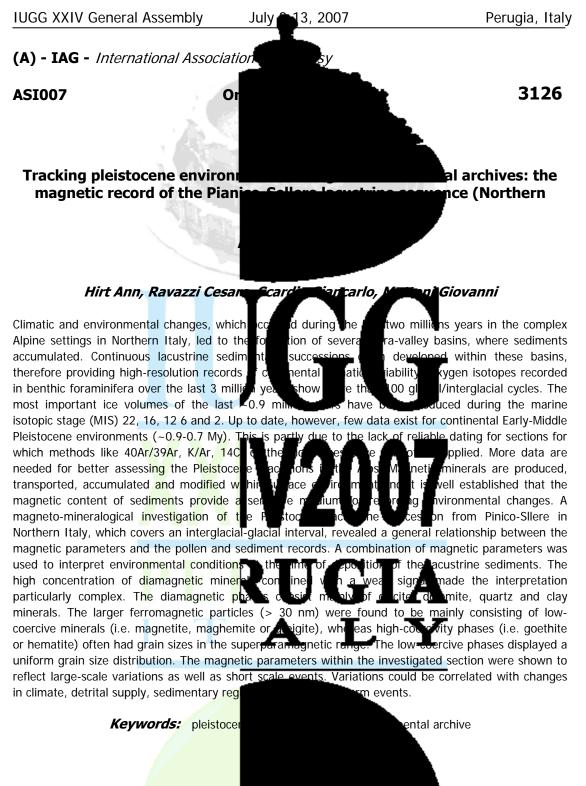


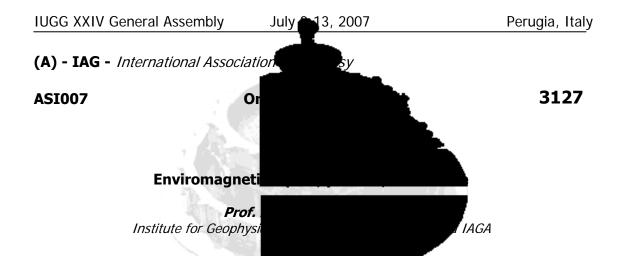












The ubiquitous occurrence of iron oxid atmosphere, and biosphere has led to the widespr environmental change. First-generation enviromagnetics to such diverse topics as p site investigations. An accelerating publica because of a wider application of well-estab understanding the basic concepts that under use of natural biomonitors to assess urban depositional basins, and the persistent observation

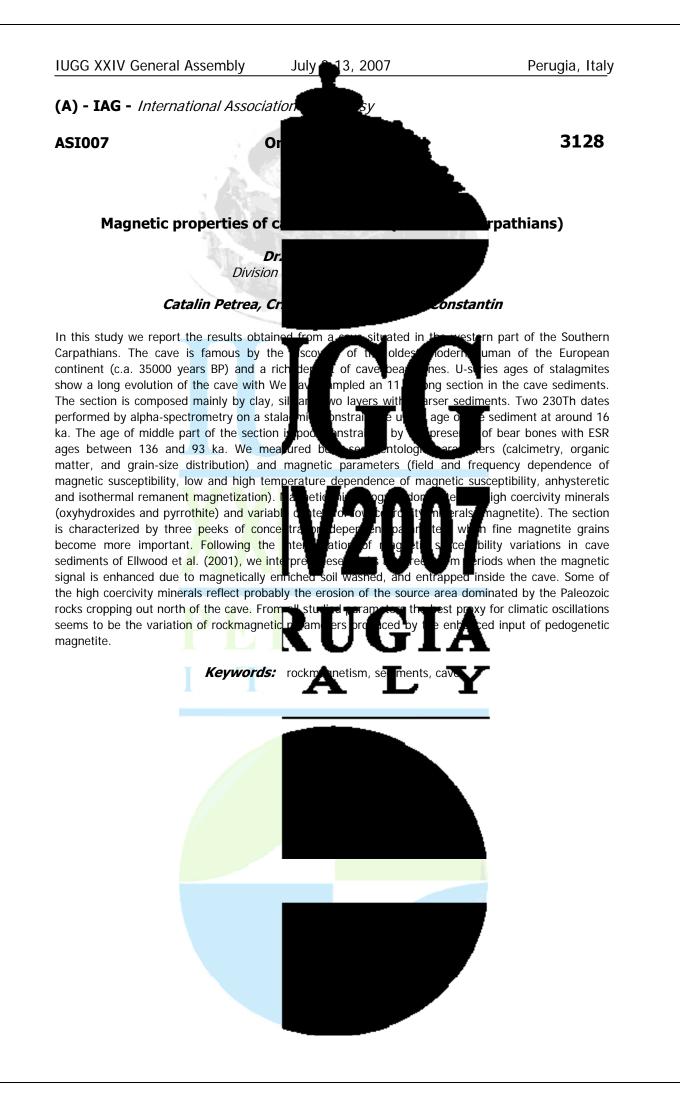
records. Examples of the latter include sophisticated "unmixing" procedures to separate (and identify) the multi-component input that comprise most natural environments, attempts to properly take into account the chemical environment (partic innovative use of ferromagnetic resonance been achieved, but more often than no qualitatively. For the future, improved qu really be quantified? Can the mass flux inv assessed? Can mineral pathways in pedogenesis

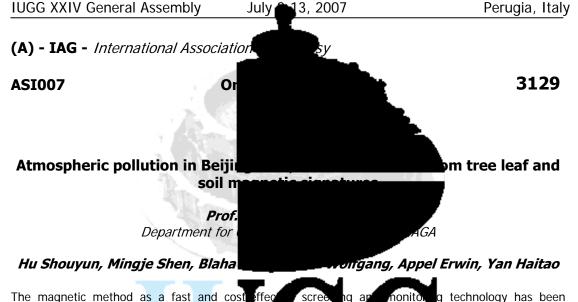
inthosphere, pedosphere, hydrosphere, use of mage tudi irmlv have al change, po put indicates nethods, but s of t subje the f g of t bllu -pr nkovi

measurements for tracking the application of stablis on monitering, and archaeological t the field is still growing, partly because of increased emphasis on ormer are the increased ource(s) of sediments in in palaeoclimatic proxy

> nd sediments, and the sil structure. Much has herto been interpreted goal. Can palaeoclimate rculation be magnetically







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The magnetic method as a fast and cost successfully applied in environmental pollu studies were only related to one environme environment of Beijing area is controlled climatic situation and is heavily influenced by factors related to urbanization. The basin-li deserts, causing regular sandstorms, intensify the

fallout and accumulation in pedosphere relationship between magnetic parameter environmental responses to various hum selected in a combined way as targets of (cypress and others) were taken in the ye soils were conducted and 68 cores (20-50 cm deep) were sampled and soil profiles measured on site in

Beijing urban and suburban area. The high resolution results revealed big regional differences of the magnetic susceptibility (MS) distribution n the profiles. MS was found to be highest in power plants) whereby lower MS topsoil va Soil MS from different depths in the western industrial area exhibits the highest values of 400-100010-5 SI in the upper 5 cm layer. There is a gradual decrease to 250 30010-5 SI by background values (geology) of 150-20010 eastern countryside are much lower (around 150-20010-5 SI in the upper 5 cm layer), and relatively

coincide surprisingly well with the topsoil SIRM) and the content of certain pollutar environmental magnetism of tree leafs ser major urban areas. Additionally, more deta three selected soil profiles from the steel Summarizing, tree leafs as dust trap uncontrollable soil conditions and history neglected and short term pollution record

cent years. However, most case atmosphere or pedosphere. The I, topographical, hydrological and tivities, traffic and other cultur ng NV nds from the Mongolian

high Beijing. In order to investigate the environmental situation in such a complex metropolis, an approach had to be developed and applied which combines screening/monitoring of atmospheric dust and its

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tant targets are the ration of the different leaves and soils were 650 tree leave samples tic measurements on top

oils (steel mill, coal-fired

he eastern countryside.

Let als in different depth within

atmospheric pollution in

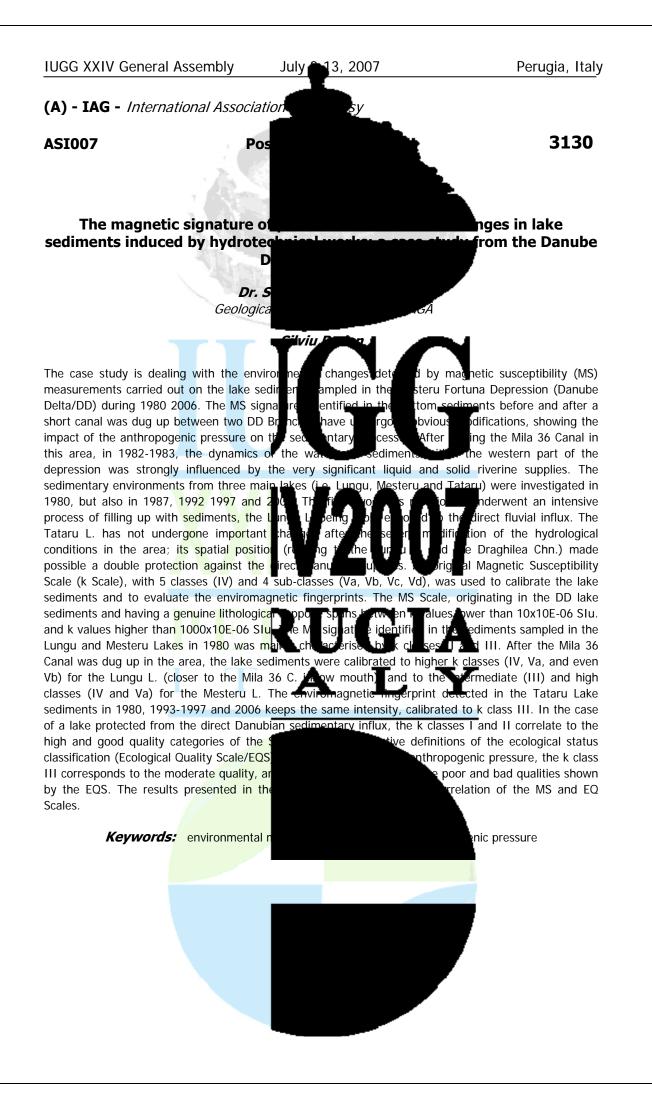
5-20 cm depth, followed The value from the city center and stable along the profile. The MS distribution <u>patterns of the tree leafs within</u> Beijing greater area lation of leaf magnetic properties (MS, the nondestructive, time-efficient he state of the environment of nalyses were carried out on a site with dumped soil. int advantage that the kground signal can be bending on the specific

requirements. The project will be continued to monitor the expected improvement of the Beijing air quality due to the Steel mill moving out and other respective actions in the forefield and after the 2008 Olympic games.Acknowledgment This work is supported by the funds from the National Natural Science orschungsgemeinschaft

Foundation of China to HS (40674033, (grants AP 34/21-1 to EA, 446 CHV 111/7/

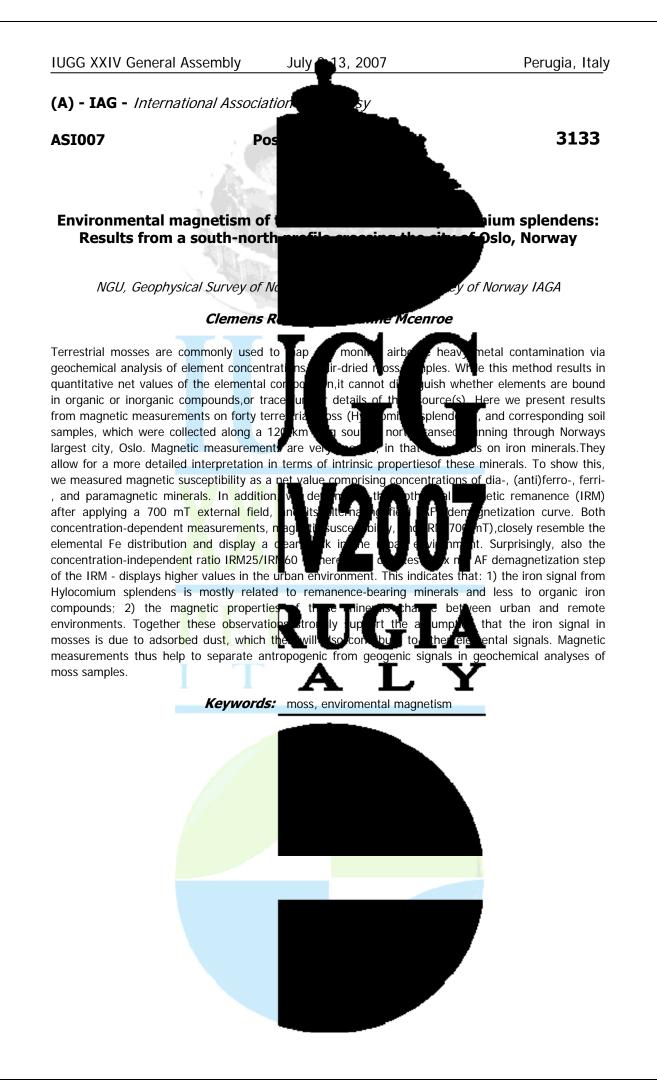
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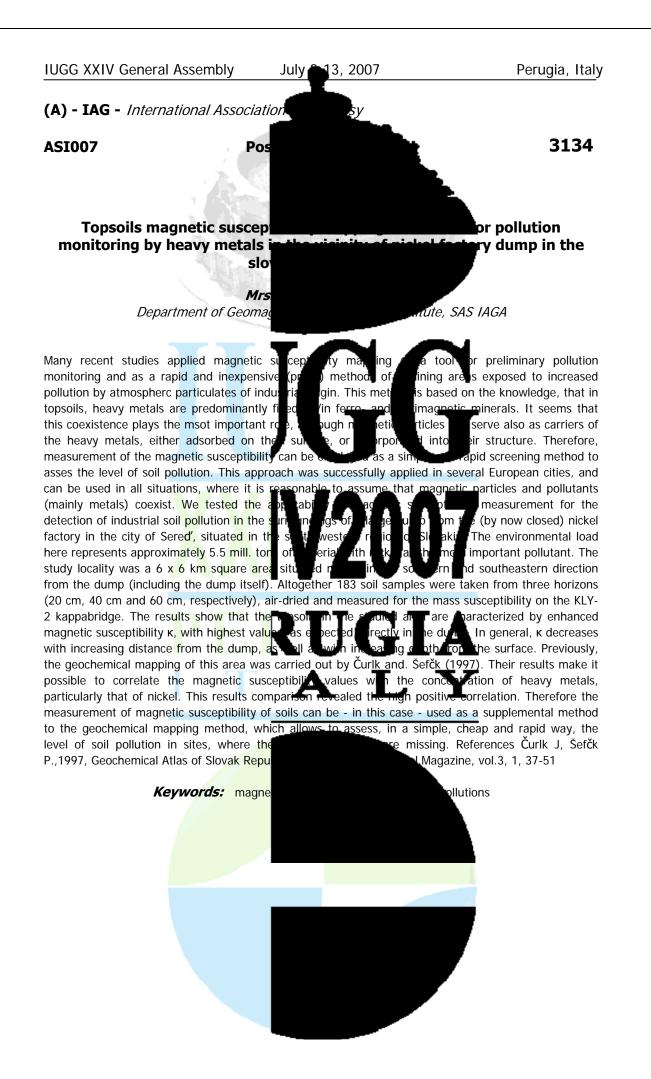
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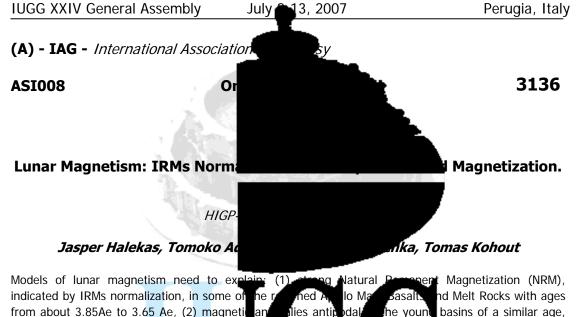






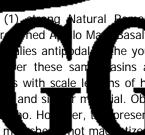






from about 3.85Ae to 3.65 Ae, (2) magneti (3) the absence of major magnetic anom anomalies over uplifted basement. (4) stror kms, or less, are found over the Cayley Forr been taken to require the presence of a lun dy

a lunar dynamo at that time, why were the basin n It is also an uncomfortable coincidence that the dynamo is only extant close to the time of the late heavy bombardment. Given these difficulties and questions of the efficiency of dynamo action in a lunar core, it is worth reexamining other possible the antipodal anomalies, while the observ the anomalies over central peaks and up Crawford and Schultz (1999) has demonstr teo magnetic fields. Srnka et al, (1979) sho demagnetization characteristics similar to therman

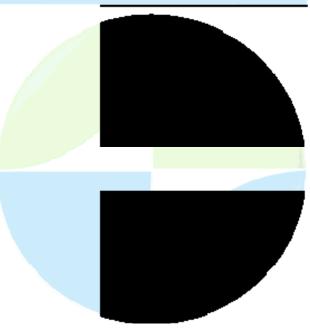


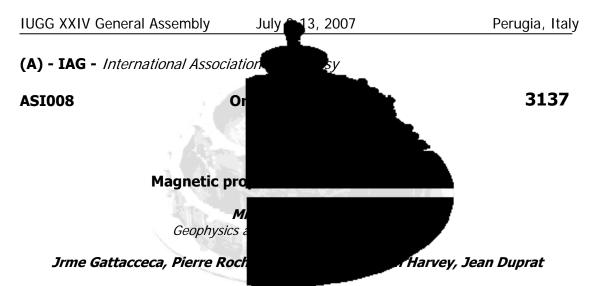
he yound basins of a similar age, asins and the presence of minor ns of homogeneity of the order of ation (1) has frequently dilemma. If there were the field of the dynamo.

> ds model accounts for 2003) may account for . Experimental work by ling at kms/sec generate recorded by shock with

remanent magnetization. The question that remains is whether all of the observed lunar magnetization can be explained by impact related magnetization directly and indirectly through magnetizati fields of material magnetized by impacts.

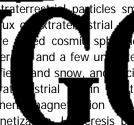






Micrometeorites are terrestrially collected extraterre They constitute the main part of the mass fux them melt during atmospheric entry and measurements on more than 400 cosmic sp aeolian sedimentary traps, Antarctic blue ice and textural analyses confirmed the ex magnetization (NRM) and isothermal rem alternating field or thermal stepwise demognetization

and anisotropy of magnetic susceptibility were also measured. Magnetite is the main magnetic mineral in cosmic spherules and micrometeorites, and most samples have pseudo-single-domain magnetite grains. The mean values for hysteresis pa usually show a large coercivity and are th consistent with a thermal remanent n atmosphere. The anisotropy of magnetic su be related with the barred olivine texture. classification of Iron type and Stony type spheru



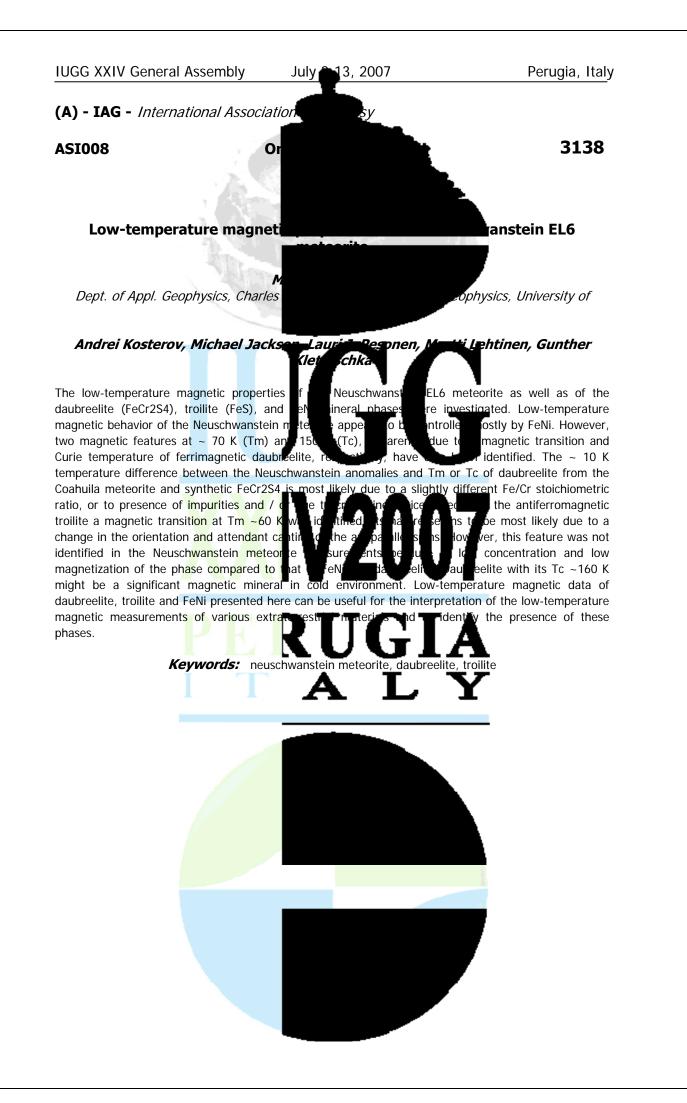
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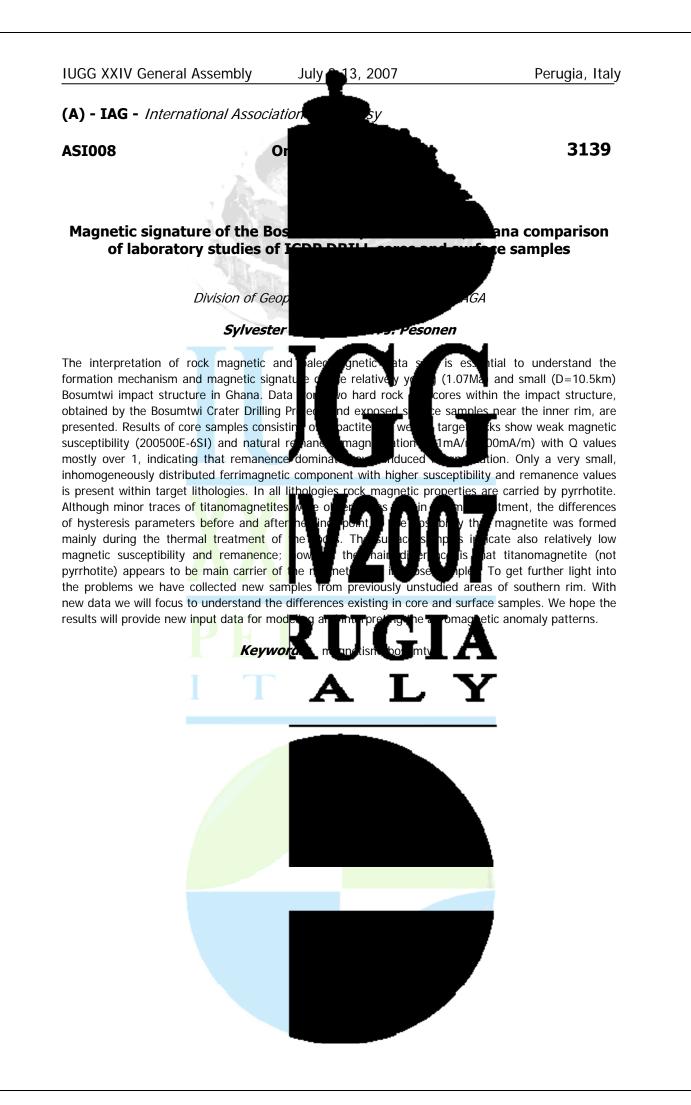
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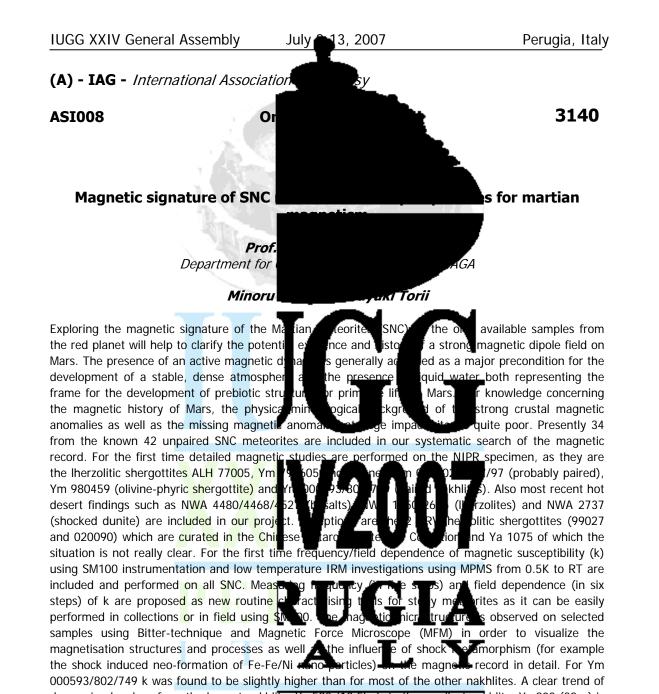
han about one millimeter. reted on Earth. Most of ériaľ es. In this study, we performed ed micrometeorites from Antarctic cific deep-sea sediments. Chemical les. Natural remanent measured, followed by We magnetic susceptibility

> = 0.38. The samples The NRM/IRM ratio is ng the cooling in the planar fabrics that could destructive proxy for the









decreasing k values from the largest nakhlite, Ym593 (13.5kg), to the smallest nakhlite, Ym802 (22gr) is evident which most likely reflects terrestr influence of terrestrial weathering and its based on the magnetic signature. General shergottites, sometimes even within one homogeneous distribution of the magnetic lowest k values were obtained for the lhe while ALH 77005 showed much higher val factor, is in the range of 1,01-1,15 which Low temperature experiments (MPMS) revealed the presence of magnetite and Ti-, Al-, Mg-substitutes

as well as ferri-chromite in some cases. For the first time, clear evidence was obtained (detection of the 34K transition) for monoclinic pyrrhotite (Fe7S8) being a dominating magnetic phase in some shergottites [3,4]. Surprisingly, monoclini nakhlites by magnetic/micromagnetic mea impact demagnetization model based on t which was proposed by [5]. However, sim needed on future Mars missions to test our

A new more quantitative test of the n weathering effects is proposed uite variable for the Iherzolitic h contrasts with the more ps and the nakhlites. The ange of NWA 1950/2646 otropy of k, here the P surface intrusive rocks.

> in the Ym000593/749 dings might support the of monoclinic pyrrhotite I magnetism) are urgently ditions and to fill the present

## IUGG XXIV General Assembly July 3, 2007 F

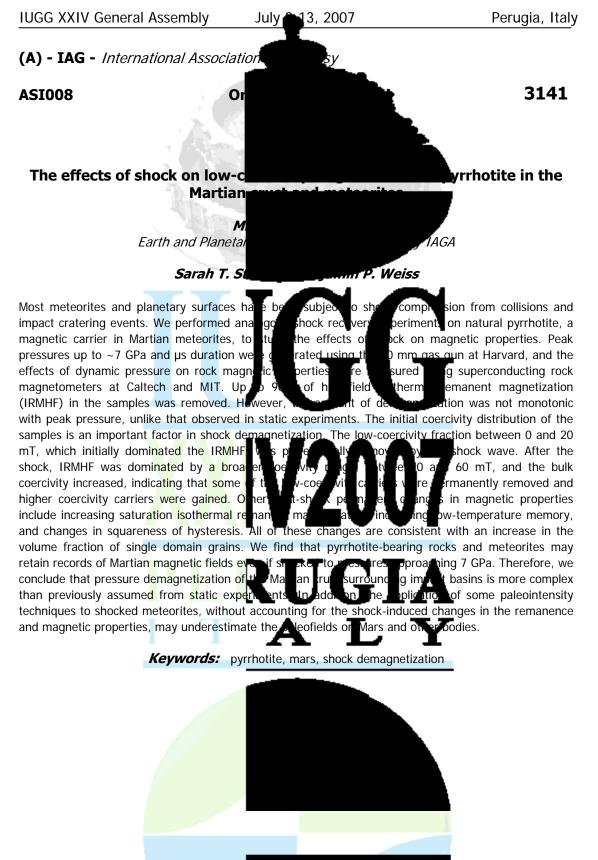
Perugia, Italy

gaps between Mars meteorite and in-situ data and the hae P., Gattacceca J., Chevrier V., Hoffmann V 40/2005, 529-540. [2] Rochette P., Gatta Hochleitner R.: LPSC XXXVI/1614, 2005. [4] Funaki M., Hoffmann V., Torii M.: Trav Brunet F., Ouladdiaf B., Hood L.: Geophys. M.. Abstract AGU2007/Acapulco.Acknowle prority programme "Mars and the terrestr museums and many private collectors is highly acknowledged.

haematite problem).References: [1] Rochette ki M., Hochleitner R.: Meteor. Planet. Sci., ffmann V., Lorand J.P., Funaki M., Ant. Meteor., 30 (2006), 22-23. Ochette P., Fillion G., Ballou R., Funaki M., Hoffmann V, Torii by DFG (VH) within the by NIPR, NASA, several







IUGG XXIV General Assembly

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## **ASI009**

Symposium Progress in palaeo- and rock-m

Convener : Dr. Ramon Egli Co-Convener : Dr. Eduard Petrovsky

The symposium will address recently paleomagnetism, rock- and environmen microwave demagnetization and paleointe single crystals. In the field of rock m characterization of magnetic particle assemblages properties, low-temperature transitions, quantitative unmixing methods. Contributio methodologies are welcomed, especially if li mineral properties that can be used for sediments, as well as reports on the statistic

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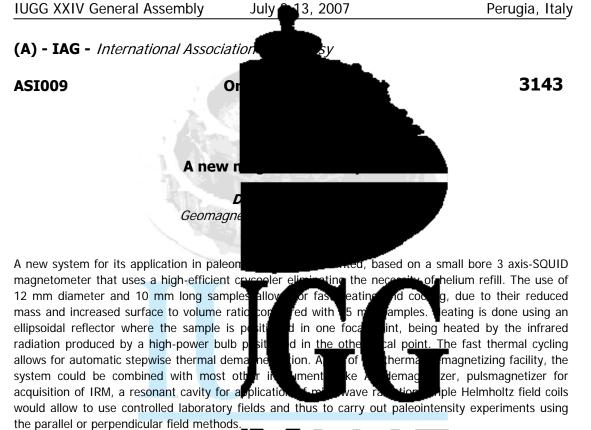
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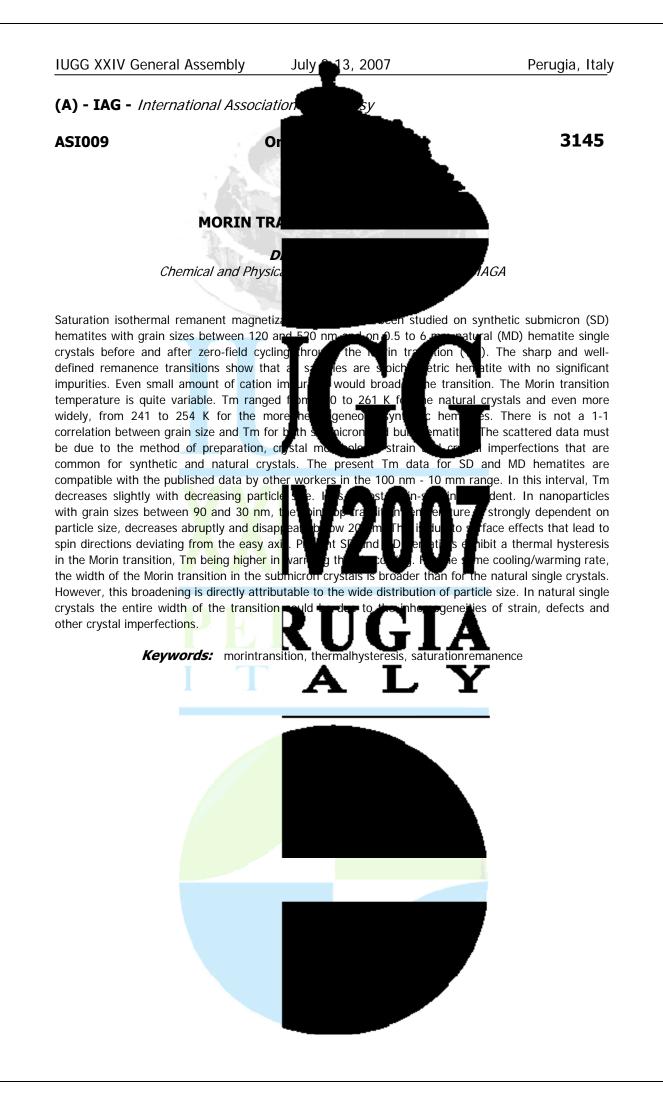
ng theories related to in paleomagnetism include es, as well as measurements of given to various techniques for the as FORC diagram and other hysteresis size distributions, and gra of the abovementioned ground Included are models of magnetic tification purposes in rocks and tic particles ns of



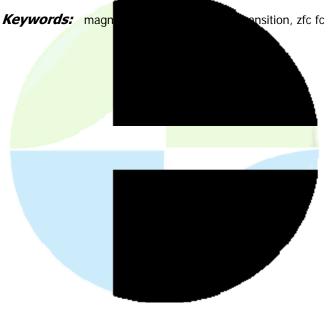


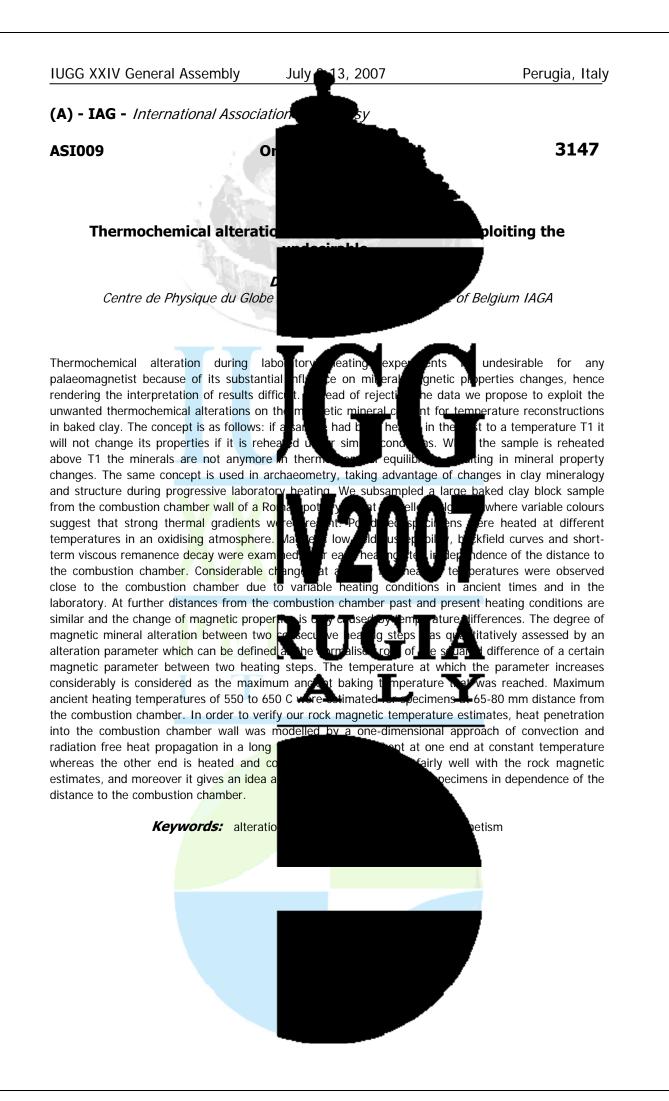


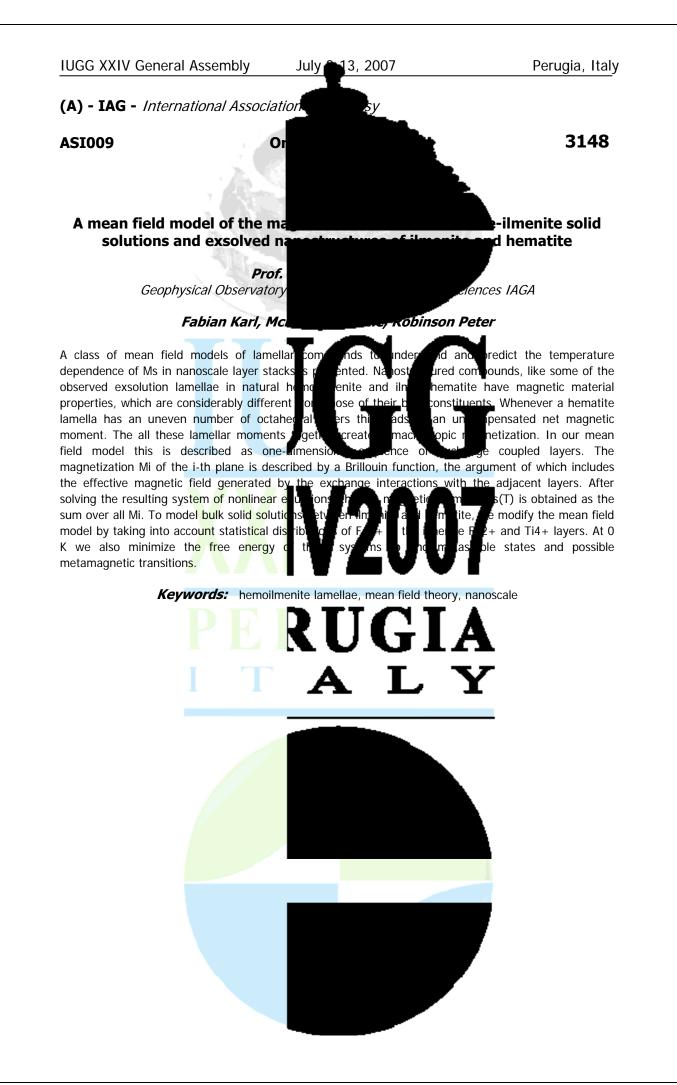


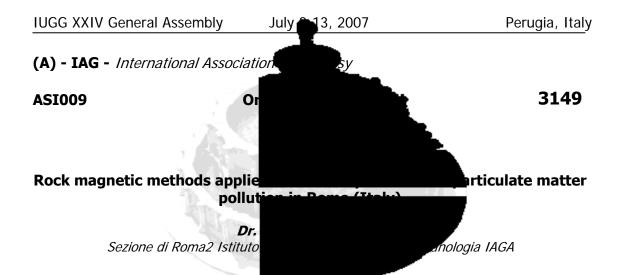












In the last years a series of researches particulate matter (PM) in the town of Rom rock magnetic methods to provide origina temporal trends in air pollution and for the involved the analysis of trees leaves, colled analysis of air filters, collected over one fu stations installed in the whole Latium regi showed that the main source of magnetic PM pa

represented by vehicular traffic and that the intensity of concentration-dependent rock magnetic parameters actually provides a valuable proxy to delineate distribution of anthropogenic PM particles in the urban environment. Tree leaves ar accumulate and retain PM particles. Leave than those from deciduous species. In ge coverage for biomonitoring of air PM pollu with an increasing distance from high-trafic indicate that the magnetic fraction of PM is composed by a mixture of low-coercivity, magnetite-like,

on the car '(It The n air endent) bro ication of the n va<u>rious</u> (July ling stat

properties of airborne estigate the potential of as to for the monitoring of spatial ad ious pollution sources. The study widely diffused in Rome, and the ) (20C automatic air sampler in the wn of Rome). The data whole Latium region is

pendent capability to ler magnetic intensities hity of a detailed spatial of the magnetic content magnetic measurements ferrimagnetic particles with a wide spectrum of grain sizes, related to different natural and

c and has a characteristic anthropogenic sources. The natural comp agnet magnetic signature that is indistinguishable pogenic PM10 fraction is e anj a mixture of fine superparamagnetic particle irair s. i steresis data were also and e n' nair used to estimate uncertainties associated with detailed magnetic measurements on small size tree leaf specimens. This contribution will outline an upd on the stat the art for this field of d overviev research.

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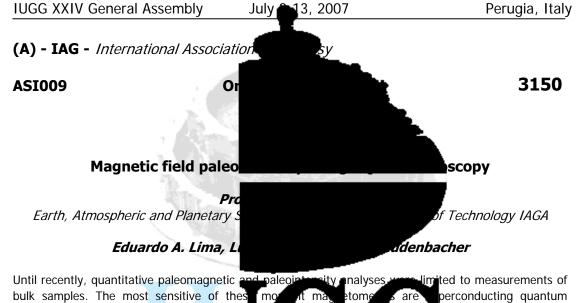
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Keywords: environmental magnetism. biomagnetic monitoring, particulate matter





bulk samples. The most sensitive of thes interference devices (SQUIDs), which measure centimeters in size with moment sensitiv microscopy, we have begun to adapt the е geological thin sections with spatial resolution Am2. This affords the possibility of const inir sample. Here we present a detailed paled hagnet

Project using SQUID microscopy and moment magnetometry in combination with borehole magnetometry, petrographic and geologic <u>data</u>. We <u>demonstrate</u> how SQUID microscopy can be used to measure the paleointensity of the field resolution field maps enable us to make section which can be correlated with the st zones within the samples. This is the rst demagnetization and paleointensity studies Mi

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perconducting quantum are sample typically millimeters to the recent advent of SQUID the <u>fine-scale</u> magnetic fields of lies of better than 10-15 t sens netiza distribution within the Hawaii Scientific Drilling

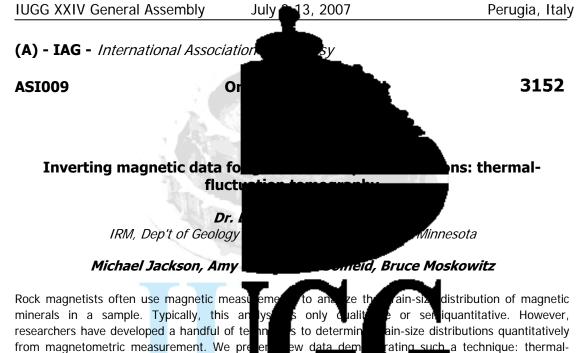
k.y. ago. Our high

ments on a single thin textures, and alteration opy to alternating field affords the possibility of

retrieving more accurate paleointensity data from heter neous samples that are altered at scales too fine to be distinguishable with moment magnetometry.







of temperature. Each point on the derivati is e alen CL distribution space of grain volume and microcoe ', Hk). inverted to solve for f. Our previous results have concentrated on the characterization of nanophase materials, exploiting low-temperature blocking. Here, we expand the results to include stable singledomain grains; including samples of the samples, it was necessary to use high-ter involved with thermal-fluctuation tomod lad

incoherent reversal, and ray-path sampling uses hysteresis loops rather than DC demigned measure. Though thermal fluctuation tomography magnetic tool.

fluctuation tomography. The technique is ba

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DC de

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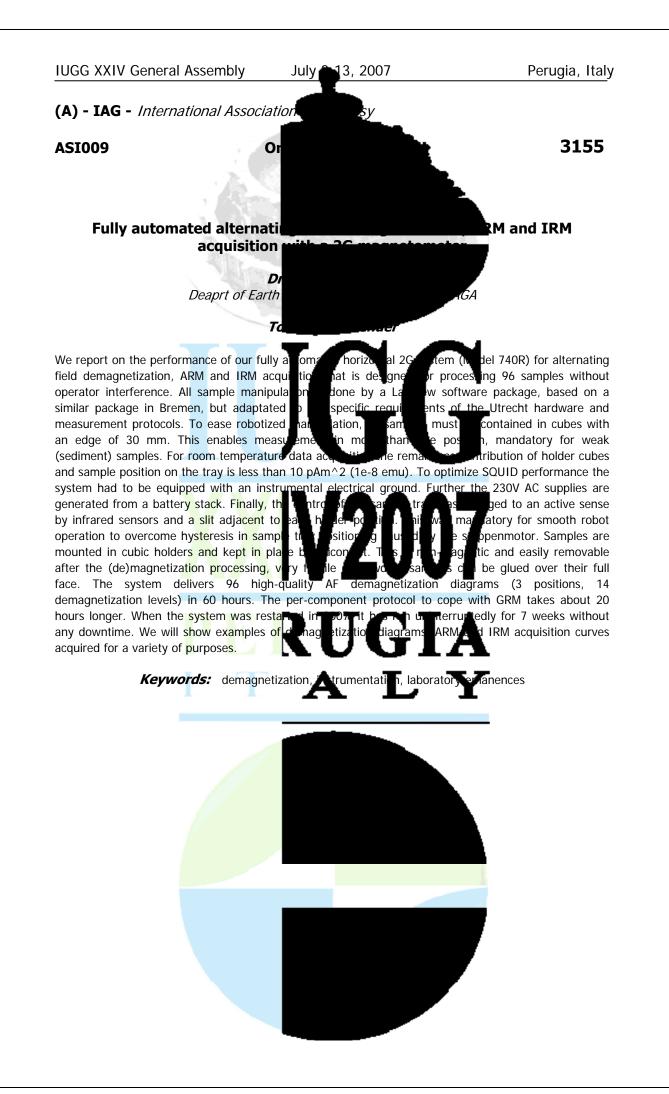
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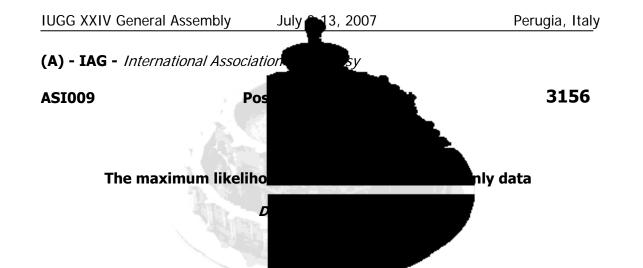
on cui measured as a function a line egral through the jointhography, the data are

c bacteria. For these address complications uted grain orientation, tuation tomography that s take much less time to it is a new and powerful rock-









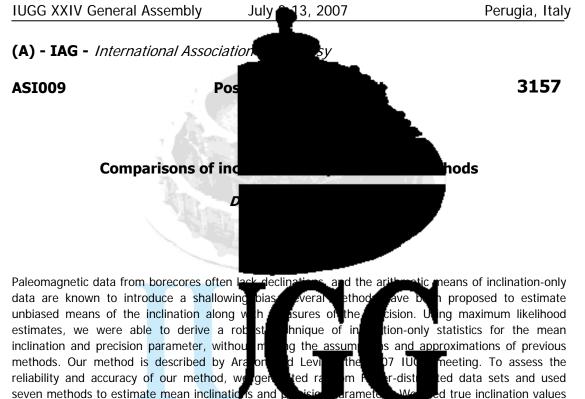
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hallowing bias. Several

methods have been proposed to estimate upliase ng with measures of the he in eans ation mize the ikelihood function of the precision. Most of the inclination-only metho designet to marginal Fisher distribution. However, the alytical form he maximum likelihood function is ons and approximations that are fairly complicated, and all these methods various assu inappropriate for many data sets. For some and di e estimates provided by a sets nction to systematically these methods are significantly displaced, peal the lihoo shallower inclinations. The problem in locating the function is partly due to of the difficulties in accurately evaluating the function for all values of interest. This is because some elements of the log-likelihood function increase exponentially as precision parameters increase, leading to numerical instabilities. In this study we su nential elements from the likelihood function, and we are now ation in the parameter space and for any inclination-only data se e can now calculate the partial derivatives of the likelihood function the maximum likelihood without the assumptions required by pre iou vard. The information to separate the mean inclination from the precision parameter will be lost for very steep and dispersed data sets. It is worth noting that the likelihood function always has a maximum value. However, for some dispersed and steep data sets with f nction takes its highest value on the boundary of the parameter space, i.e degre but with relatively well uen iy defined dispersion. Our simulations indicate at fre r certain data sets, and relatively small perturbations in the data will drive the maxima to the boundary. We interpret this to Tean inclination and the indicate that, for such data sets, the information needed to separate th precision parameter is permanently lost. To the rel and ac racy of our method we generated large number of random Fisher-distributed data sets and used seven methods to estimate the mean inclination and precision paramenter. These comparisons are described by Levi and Arason at the 2007 IUGG meeting. The results of the var favourable to our new robust maximum likelihood method, which, on average, is t mean inclination estimates are the least biased toward shallow values. Furthe only analysis can be obtained from: http://www.vedur.is/~arason/paleon

Keywords: pale

The arithmetic means of inclination-only data are

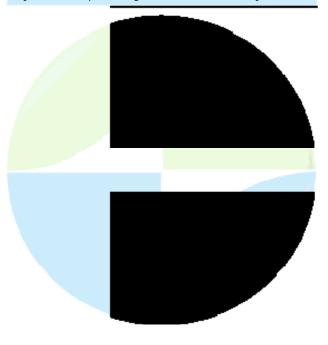


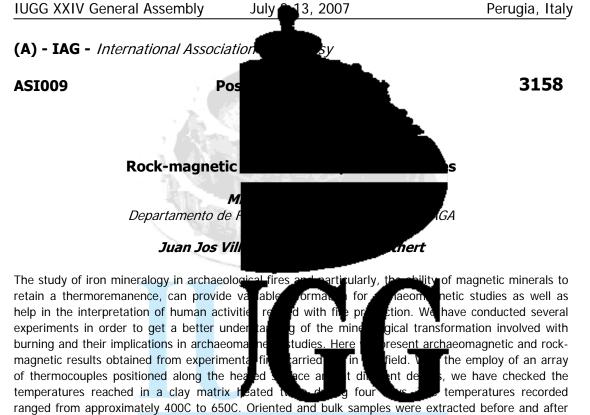
of 0, 10, ..., 80, and 90 degrees; true precision parameters of 10, 20, 40, and 100; the sample number in each data set was 5, 10, 20, and 100. For each combination, we generated one thousand random Fisher-distributed data sets, and for these using declinations. For inclination-only da Arithmetic mean; Kono (1980); McFadden-Enkin-Watson (1996) Gaussian-estimates; fina new robust technique. In many cases the stir displaced from the true peak of the likelihood function to systematically shallower inclinations, especially for steep and dispersed data. It appears that the mean inclination estimates of the original McFadden-Reid statistics, still used by some paleomage

d true inclination values ramet true Fisher mean, also he following methods: and modified methods; lihood estimates by our methods are significantly the anthmetic mean, and, in our of t

opinion this method should be abandoned various methods is very favourable to our new maximum likelihood t reliable estimates and s th ho gi ; III the mean inclination estimates are the least biased toward shallow values. Further information on our //www.ve inclination-only analysis can be obtained from: htt .is/~araso eomag

*Keywords:* paleomagnetism, inclination only, statistics





carrying out the heating in order to perform a complete set of magnetic mineral analyses. In addition to determine the Characteristic remanence (C magnetic experiments including the m Isothermal remanent magnetization (IRM analyses of the IRM coercivity components the primary mechanism responsible of the these minerals does not seem to have effect further away

had

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demagnetization, rockity, hysteresis cycles, S, K-T curves and the hematite to magnetite is The thermal alteration of than 5 cm of depth, but is highly noticeable in the first 2-3 cm where single-domain magnetite has developed. This kind of analysis appears to validate

Ms and TRMs. The study

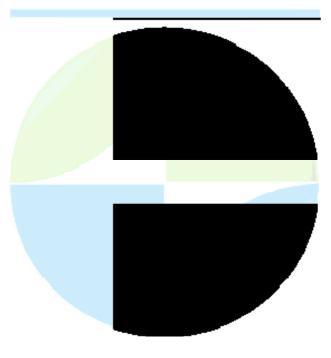
tions in the reliability of

stinctive thermal impact on the

of p

the suitability of these samples for intensity soil can be shown by the changing magnetic of these transformations related with burn the archaeomagnetic data.

Keywords: fire, rock



# IUGG XXIV General Assembly

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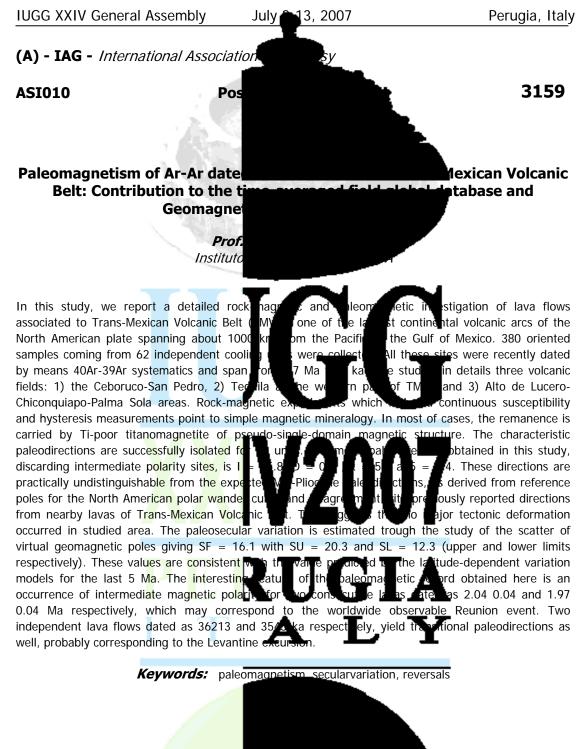
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## **ASI010**

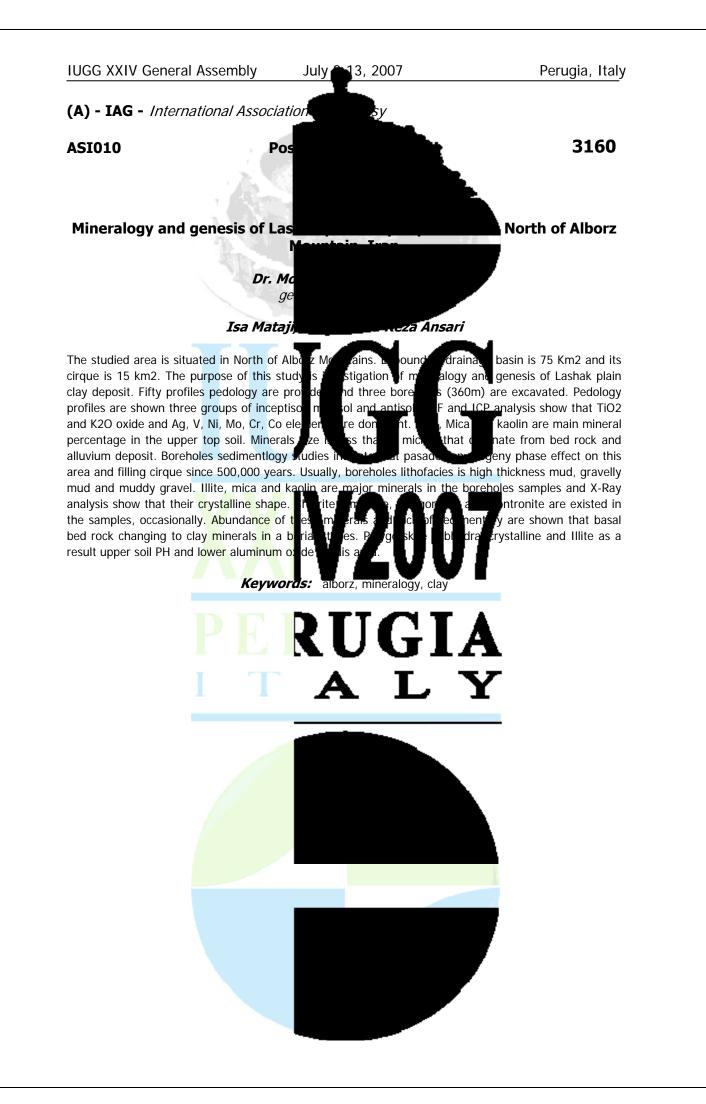
# Symposium Open Poster Session

**Convener :** Prof. Helga De Wall **Co-Convener :** Dr. Tomasz Werner

This open session is being organized solely fit directly into the scope of the specific m deal with new and innovative aspects a present provacative ideas, interpretations your poster board. presentations that do not attract contributions which netic studies. Please feel free to be attractive for (heavy) discussions at





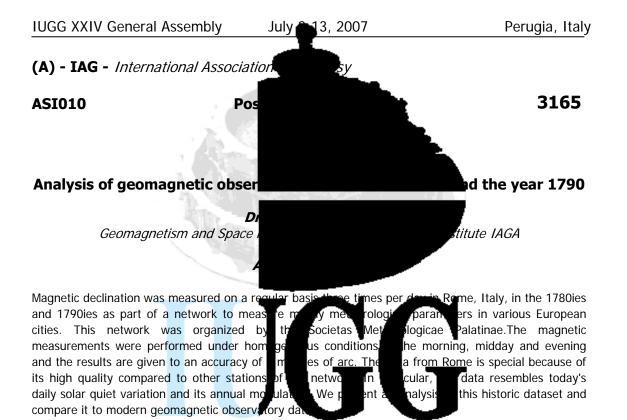




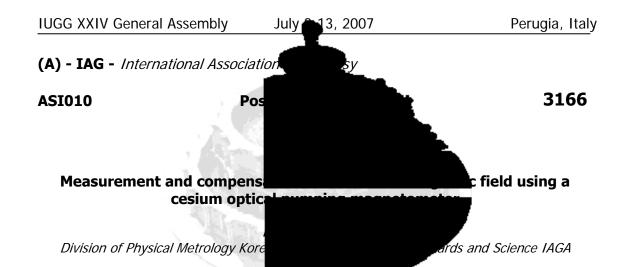












The optical pumping polarization in the resonance(AMR) is used to measure a precise technique in comparison with traditional nu larger polarization effect. Therefore, the sen in low magnetic field range. The earths mag the 3-axis Hemholtz coils serially connected sources for compensation coil of the pe measurement and compensation of time-varying

laboratories, which are away from the artificial magnetic field noise sources. The main and the auxiliary coil systems were set up in a distance of about 50 m distance from the each other in order to delete of mutual magnetic field dissipation and the in the main coil system. Those coil system the same coil constants and coaxial axis time-varying EMF variations. Each of th appropriate current by dc current sources. auxiliary coil system are trimmed by the shunt resistors. The time-varying EMF variations and the

apor me ne 6n r dens etic f lagnetic l so and uncertain ti۱ eld(E<u>ME) me</u> and liar il for EMF A٨ pagne nar quipm

for atomic magnetic advantages of the AMR fhe n e(NMR) Consist in a million times AMR are better than NMR method ment system consists of couple of control, three current field controller for the nstalled in nonmagnetic

tes which can be used per component having he permanent EMF and hs is supplied with the etween the main and the current instability are compensated by the Cs-AMR controller, the sensor of which is placed in the center

ing place of the coils is

local field variations and

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of the auxiliary coil system. The residuation determined by the following parameters lik temperature drift in the two coil systems. of the EMF using a Cs-AMR magnetometer will be discussed in detail.

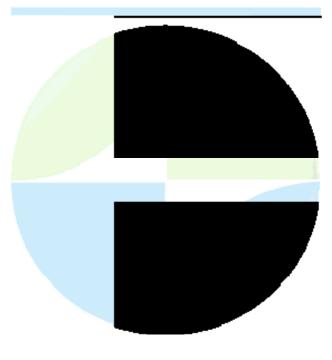
Keywords: earth

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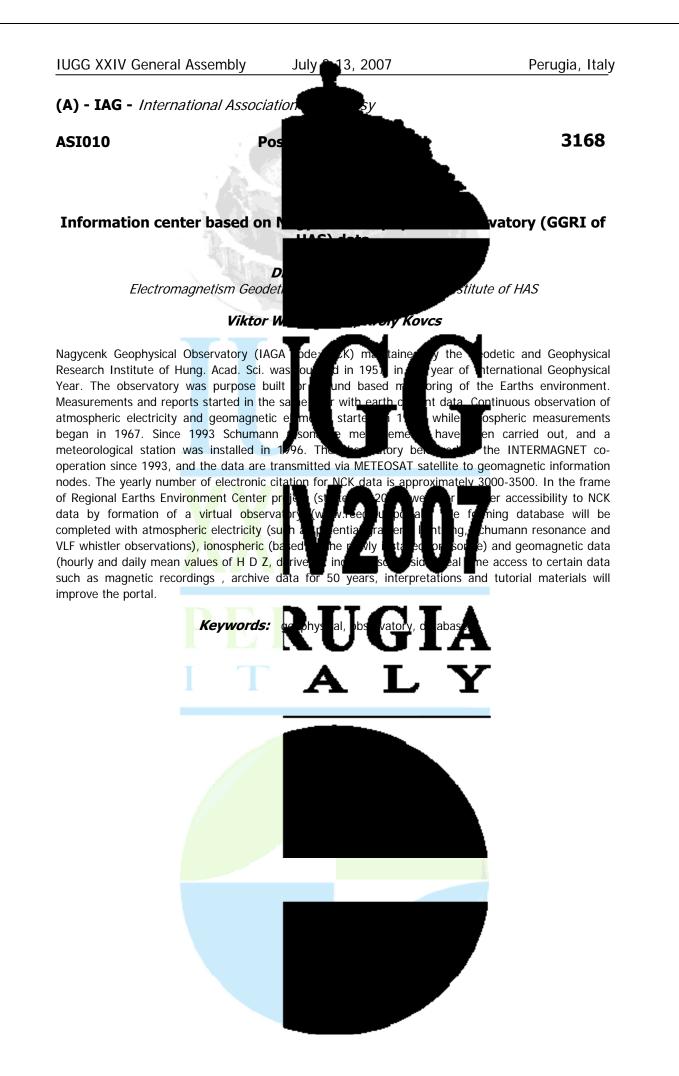
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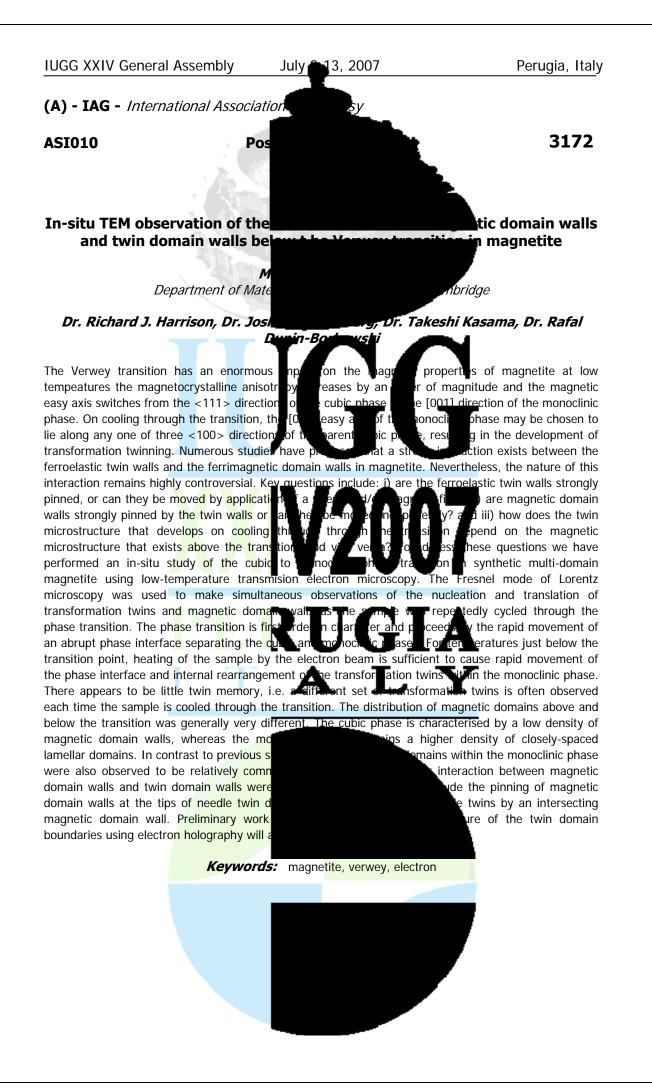












#### IUGG XXIV General Assembly

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## ASI011

## Symposium Environmental studies

Convener : Dr. Maxwell Meju Co-Convener : Dr. Claudia Mabel Sai

Advances in digital technology and concur inverse numerical modelling have led to im as brought geophysical (and in particular theoretical resolving capability in near-surf

of electrical and electromagnetic methods or their challenging environmental problems. We insite comfollowing: (i) 3D investigations of derelict of commin non-invasive procedures for tracking or molitor in the loading from agricultural activities) and bigen latic hydrochemical attributes of near-surface tage (iv) and correspondence principles for geophysical point techniques (multi-scale approaches) and time-lap. In the mathematical models and controlled field experiment

their combination with contributions that can ninated and gro the progress soil of ation; (iii) Re e pro (iv) Development of re pmalie /) is oved chara satio cand

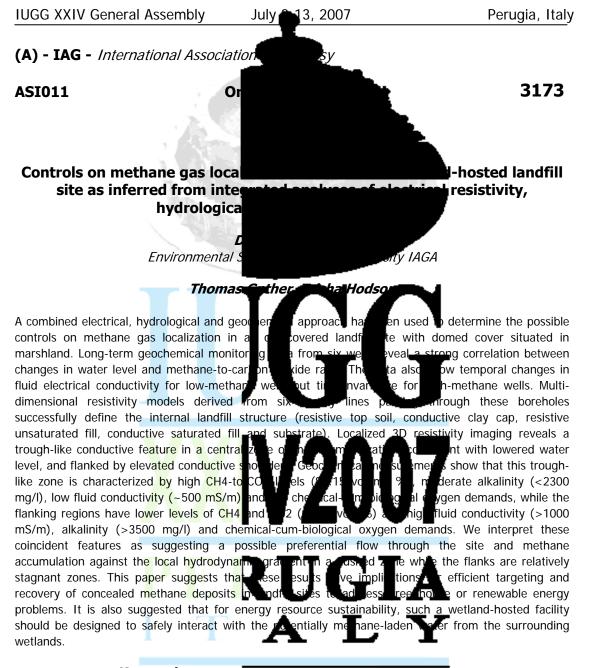
in and multi-dimensional appretation techniques as well (appretation techniques as well (appretation within range of their is session focuses on novel applications ation with other methods to address

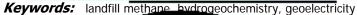
al with but not limited to, the ground ater resources; (ii) New soil degradation (e.g. by chemical e prediction of petrophysical and of rebust surface-process models oved sugration of field and lab and (susceptibility)





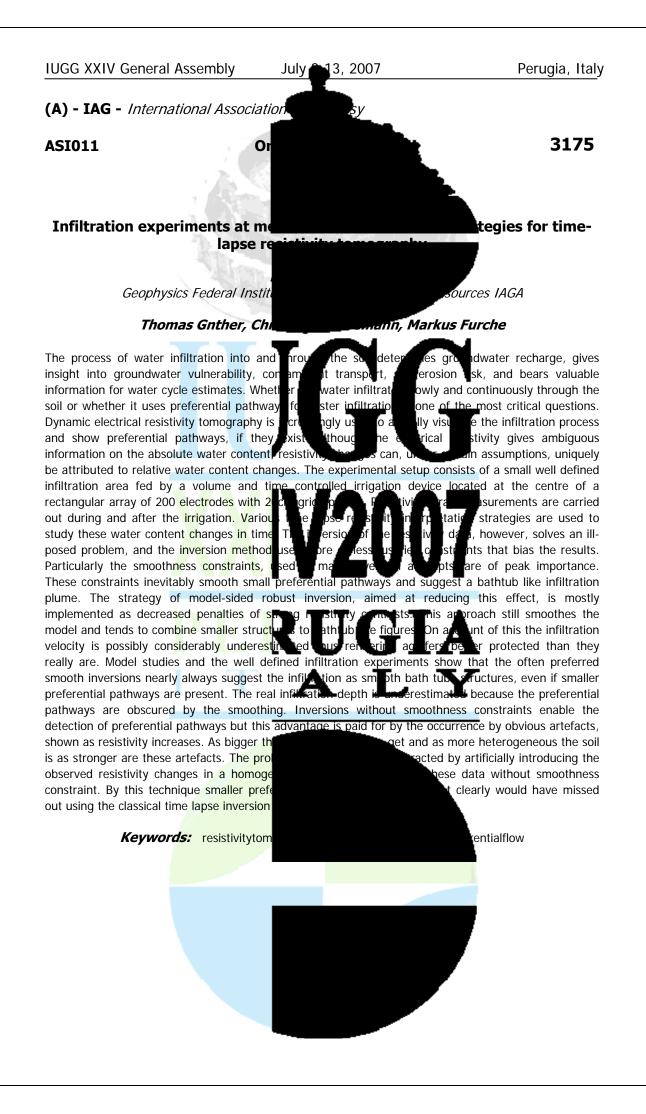
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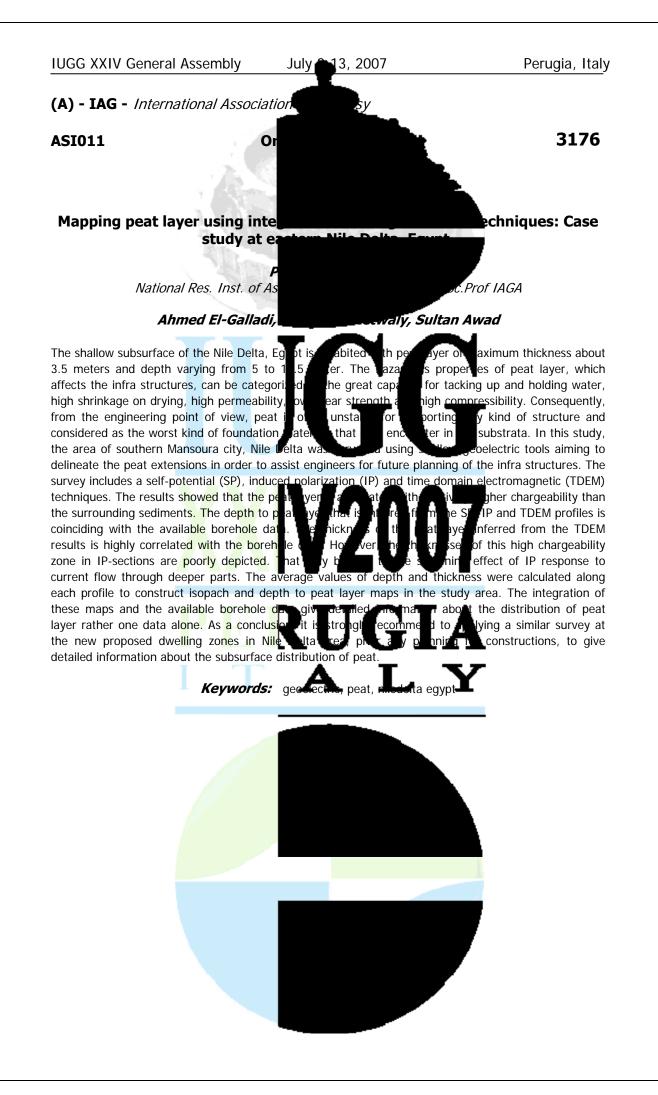


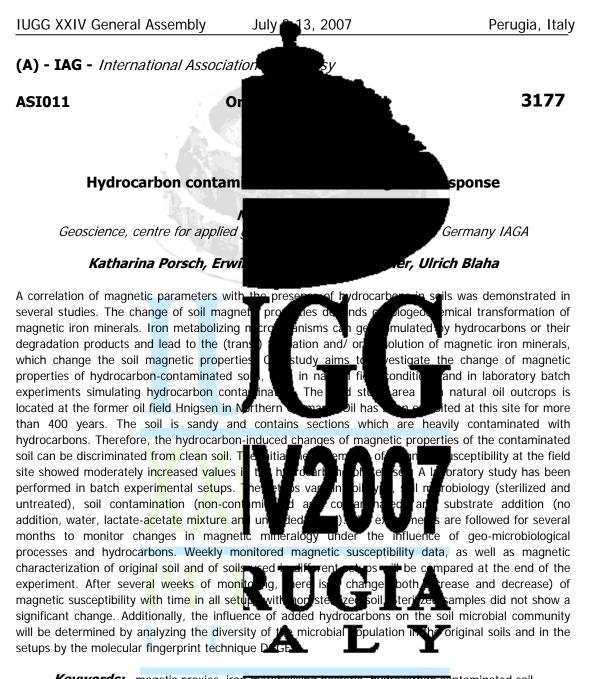






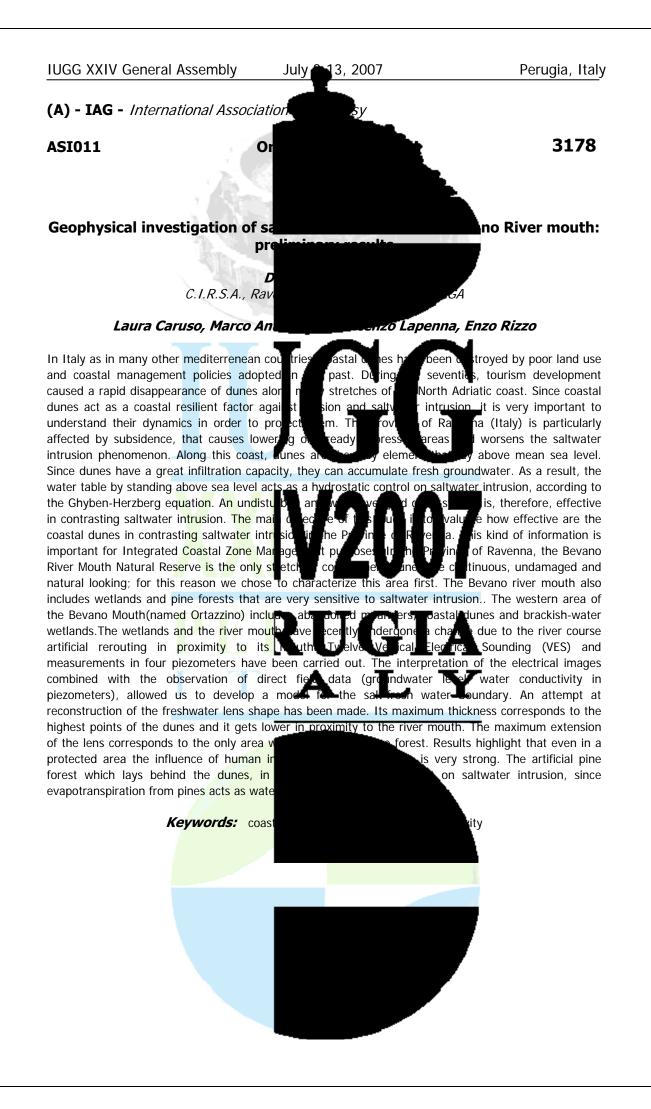


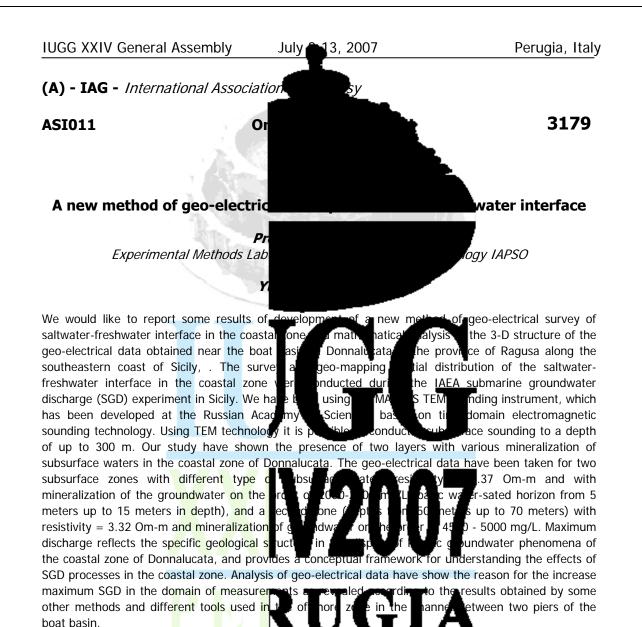




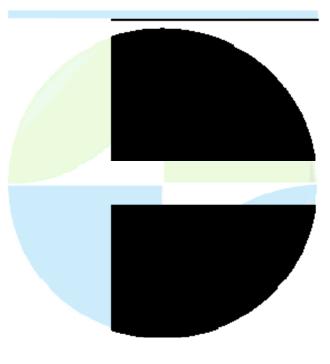
Keywords: magetic proxies, iron metabolising bacteria, hydrocarbon contaminated soil

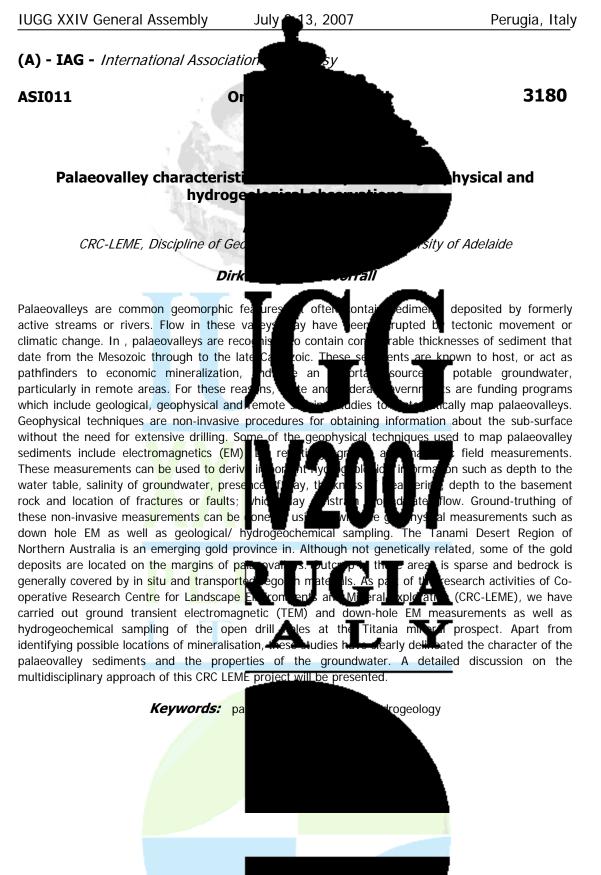


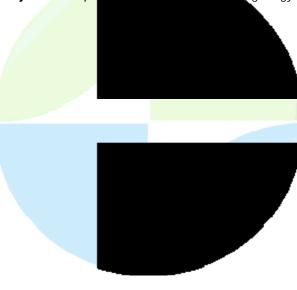


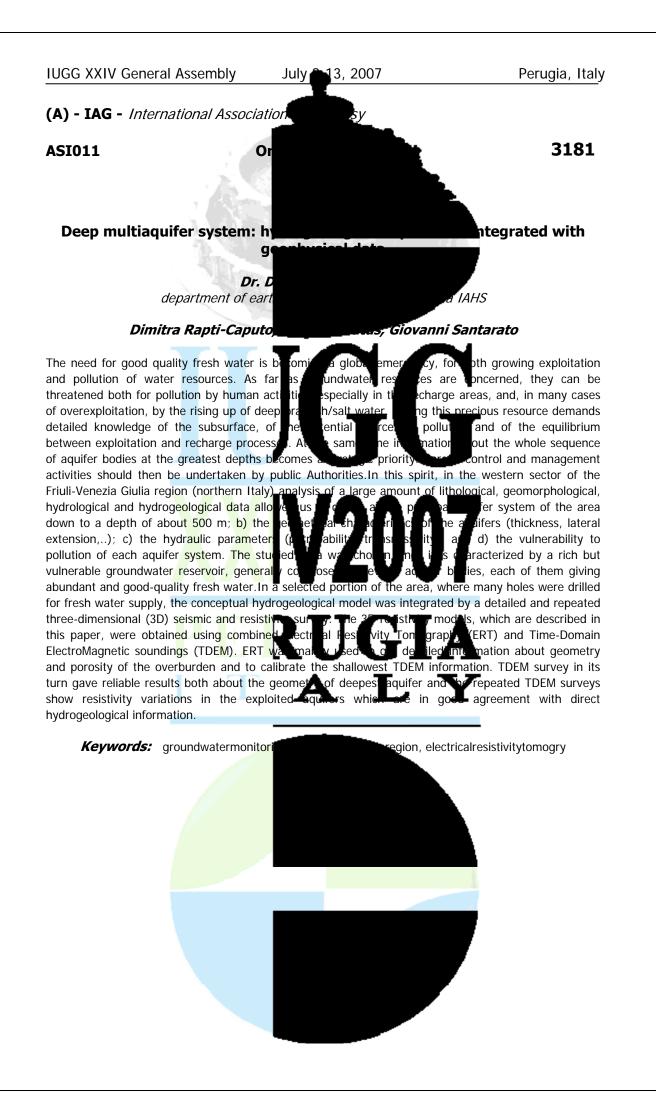


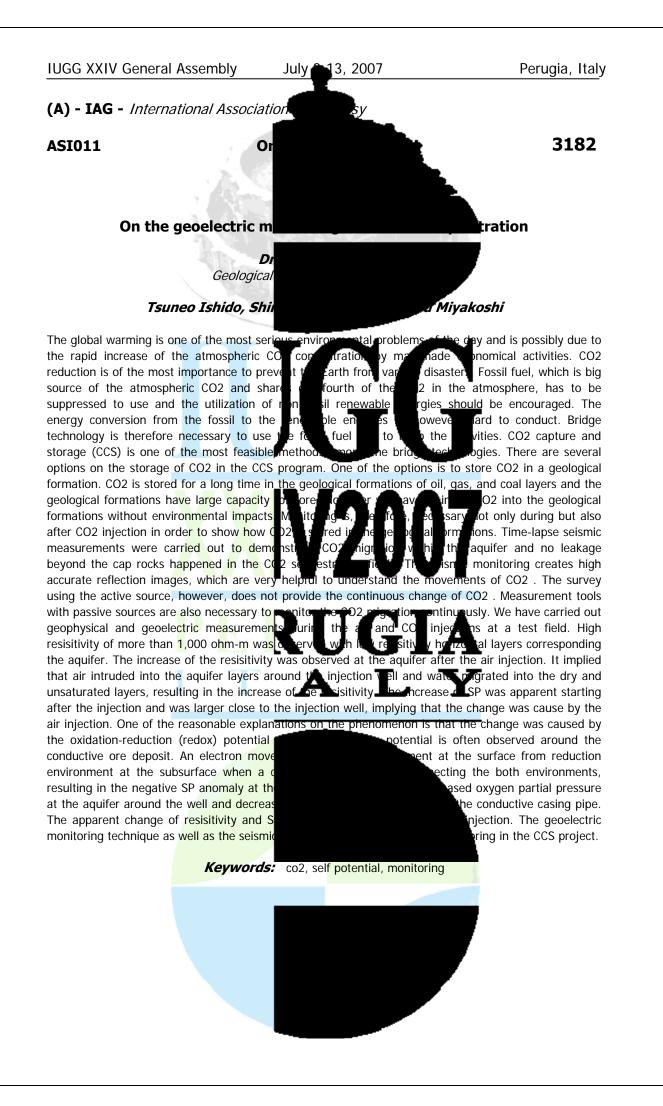
Keywords: near surface environmentingeo electric l'survey, gis un water interface



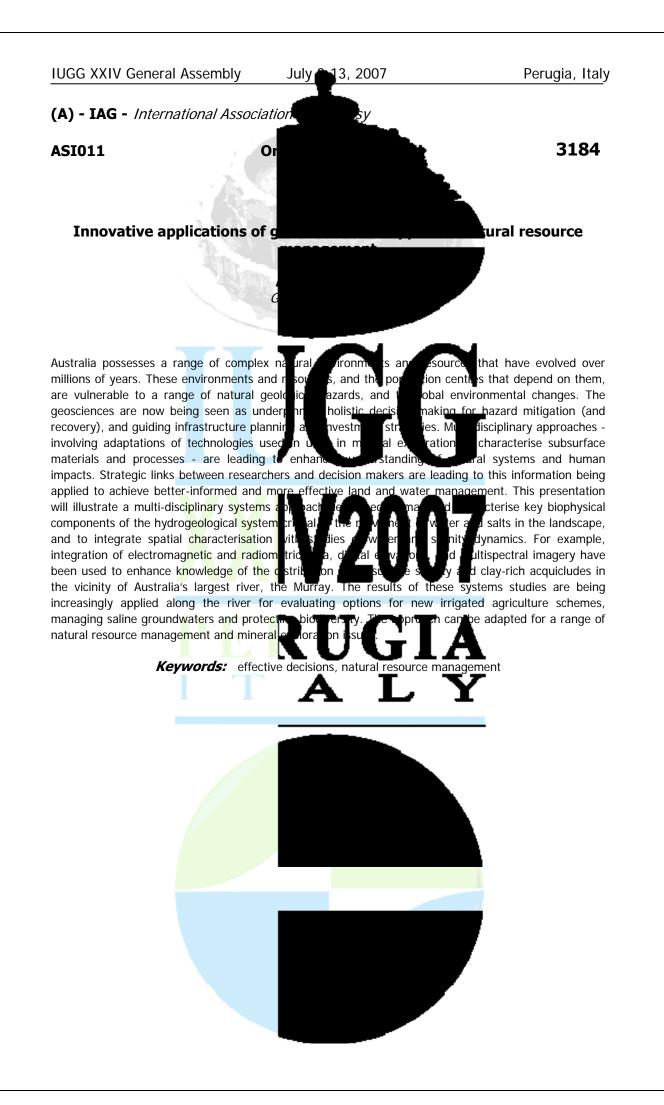


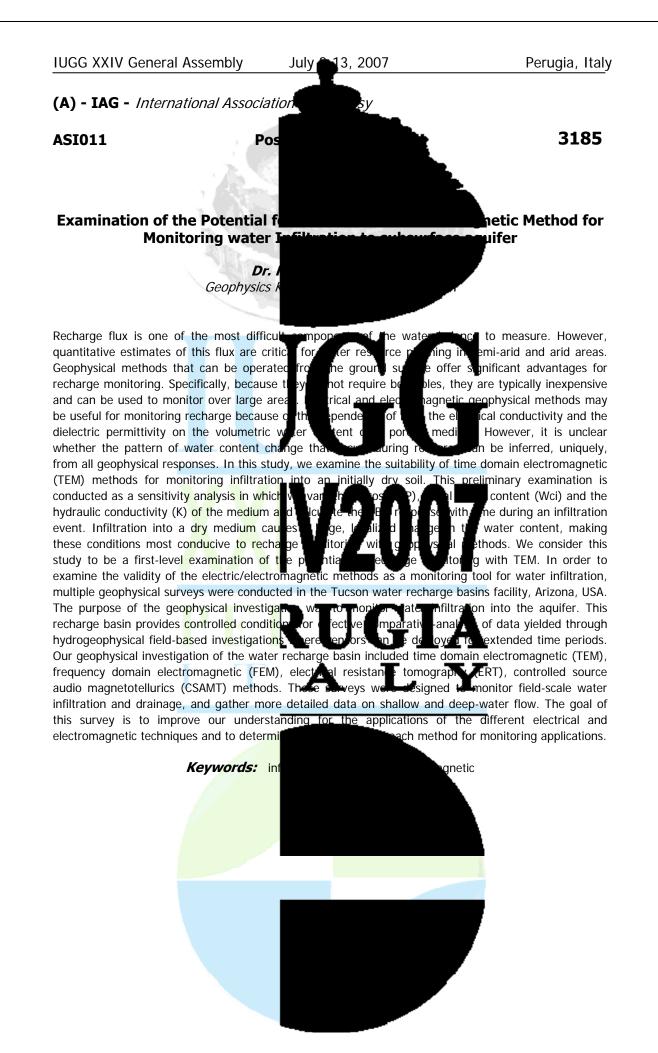


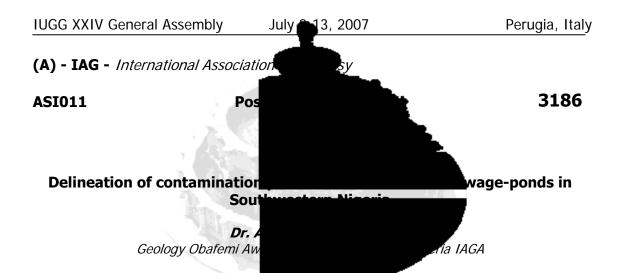












Integrated surface electrical resistivity and terrain of Southwestern Nigeria in the vicinit to detect soil contamination due to the spre conductive lithologic layers, and access the ponds. Dipoledipole resistivity profiling and intervals along five 200-m long east-west g four subsurface geologic layers comprise bedrock, and competent bedrock. A distillet low

weathered bedrock and possibly suggests contamination of this layer. The filtered real component of the processed VLF data detected three dist filled with conductive fluids and/or lithe movement of contaminated effluents. Th contamination of the subsurface soil layer existence of this contaminated plume pose living in the vicinity of the sewage-ponds.

trom: M) surve of 5 oxi wage effuer groundwater low <u>frequen</u>c cal tra es of ritic cla zone c

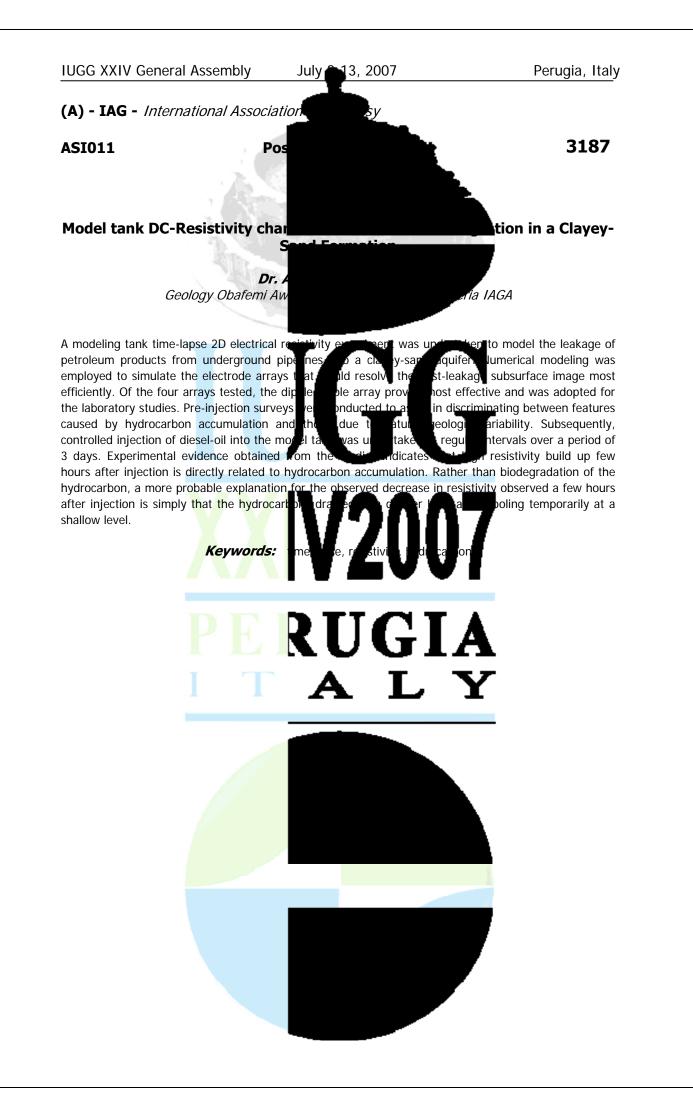
onducted in a hard-rock ent ponds. The aim was e trea ate possible leachate plumes and tion in the vicinity of the sewage-F) data were acquired at 10 m tions obtained revealed istivity sand d, weathered/fractured g to the contamination

plume (labeled B) was delineated from all the resistivity sections. This low zone extends into the

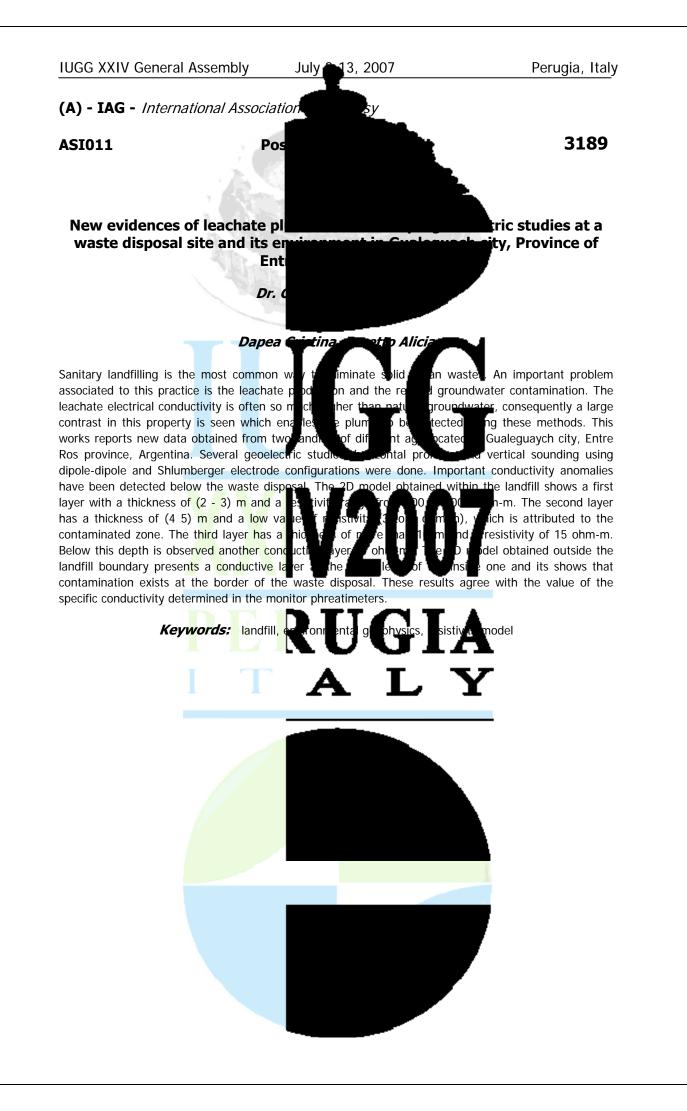
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tive of fractured zones e as conduits for the ethods suggest possible the sewage-ponds. The and health of the people

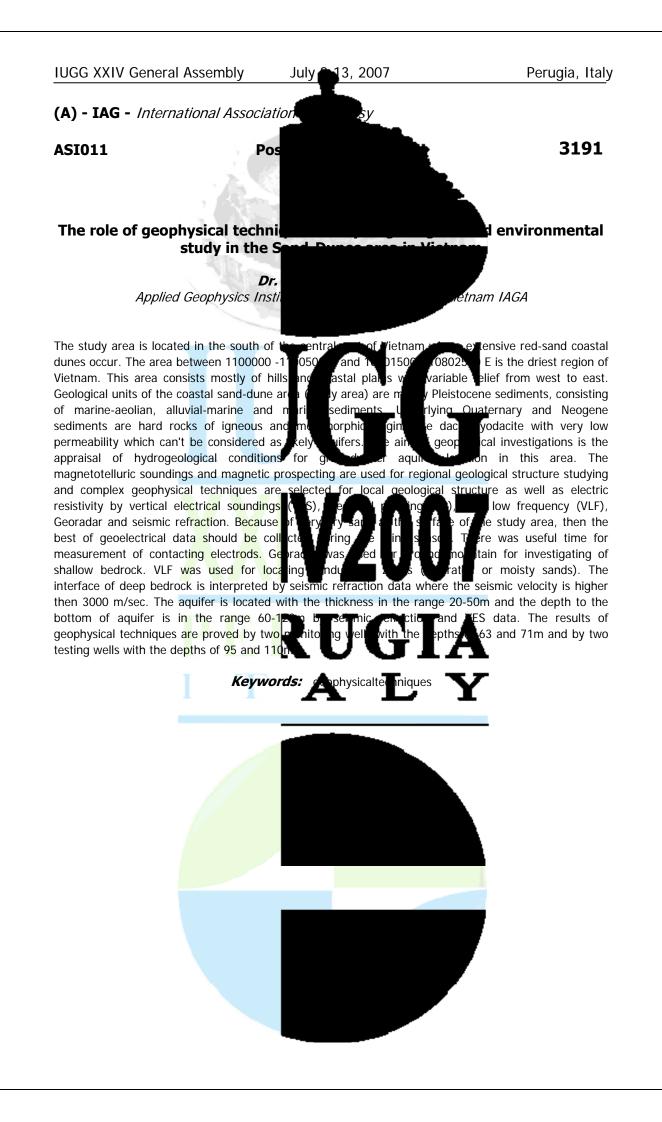


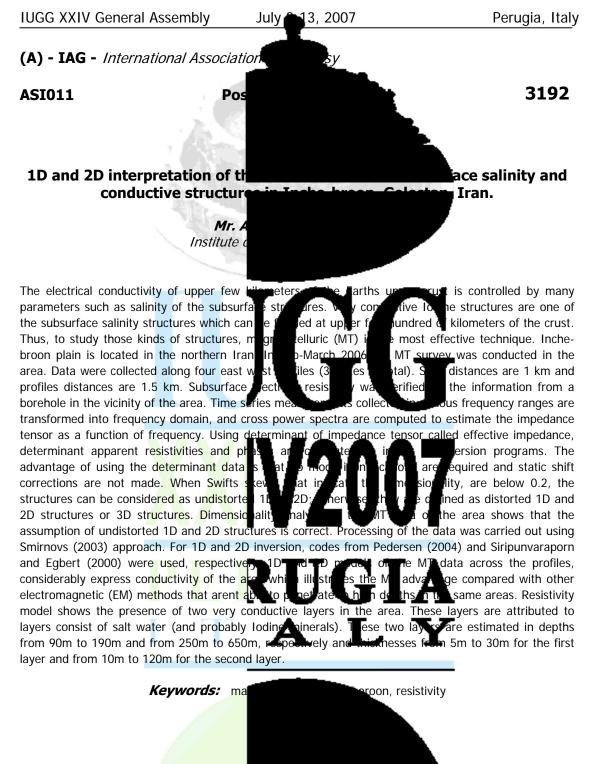




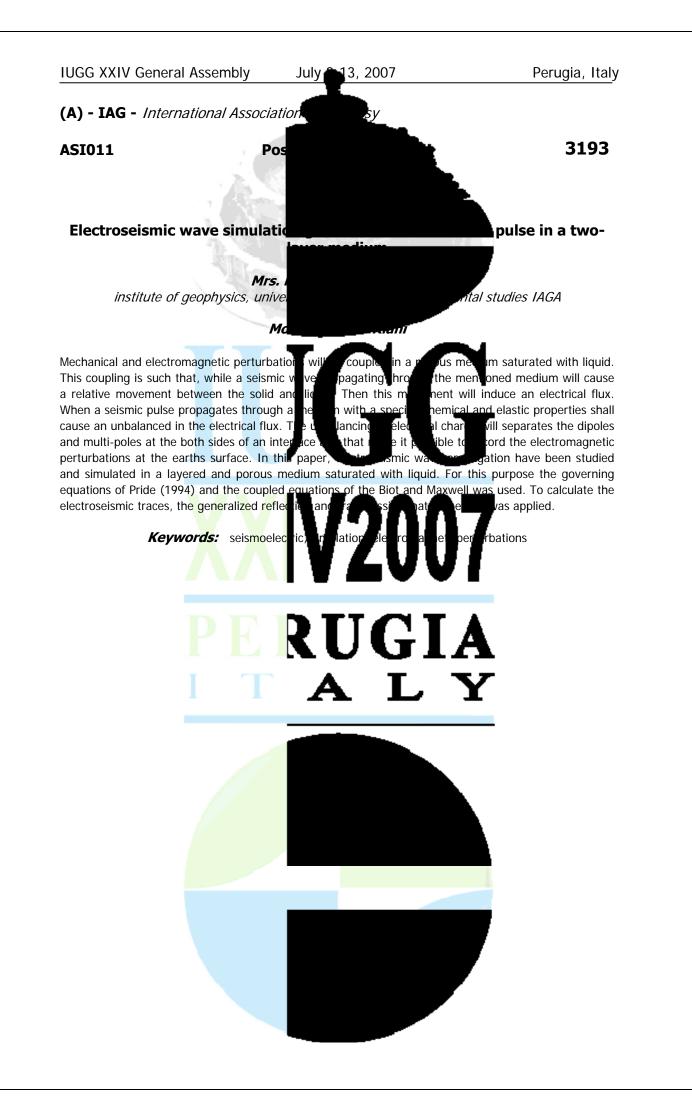




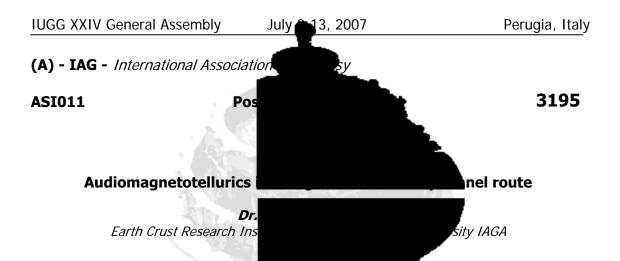








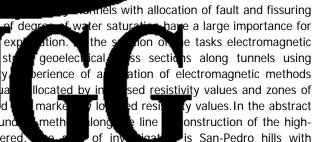




Investigations of geological structure along

zones, study of their structure and estimation of degr their successful construction and subsequer sounding methods can be used, allowing differentiation of rocks on electrical resistiv shows that monolithic blocks of rocks are u faults and fissuring are usually water satura results of the audiomagnetotelluric (AMT) speed railway Madrid Vayadolid are confidered.

metamorphic rocks and granitoids, where the tunnel consisting of two lines at the depths from 20 up to 250 m and the length of about 6 km is constructing. The AMT method is based on the study of natural electromagnetic fields in the audio frequen AMT system ACF-4M realizes the high acc deg. for impedance phase). Investigations tunnel route with distance between sound hg impedance phase curves was carried out usi section up to the depth of 600 m was obtained.

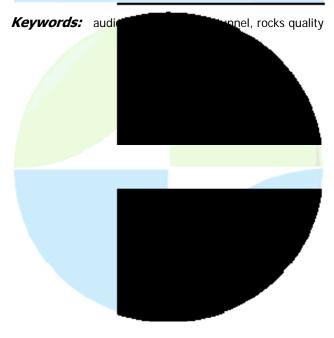


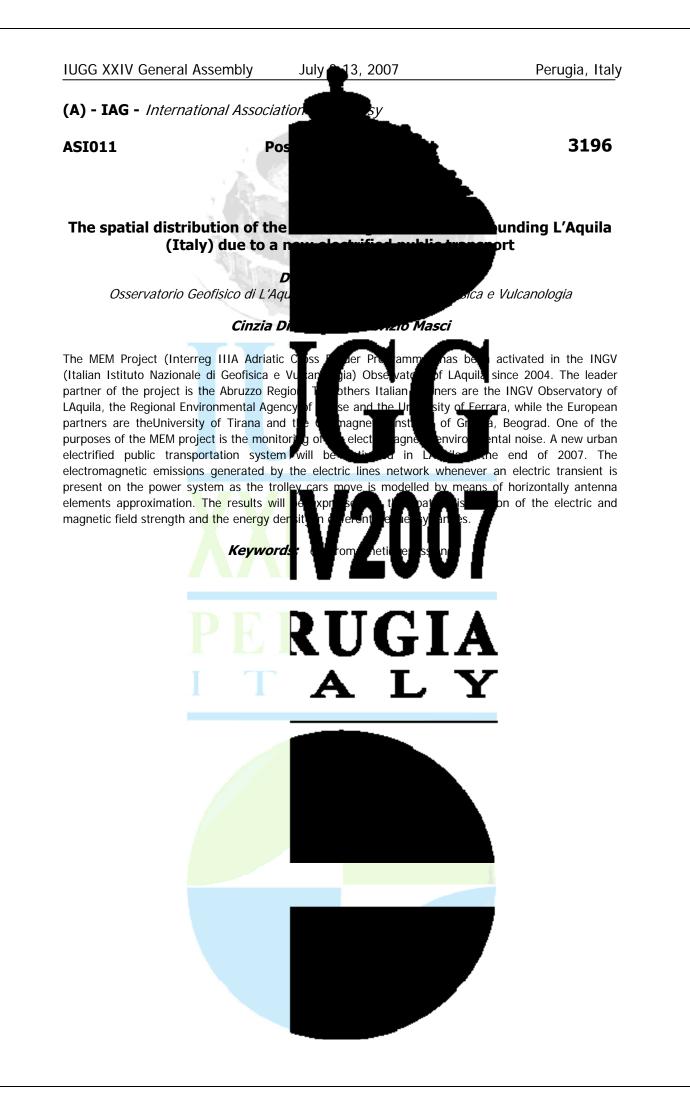
ame a large importance for e tasks electromagnetic íon ð ss sections along tunnels using ation of electromagnetic methods sed resistivity values and zones of y values. In the abstract onstruction of the highis San-Pedro hills with

kilohertz. The modern arent resistivity and 0.5 ut along the San-Pedro apparent resistivity and d the geoelectrical cross data show that by low resistivity values, less

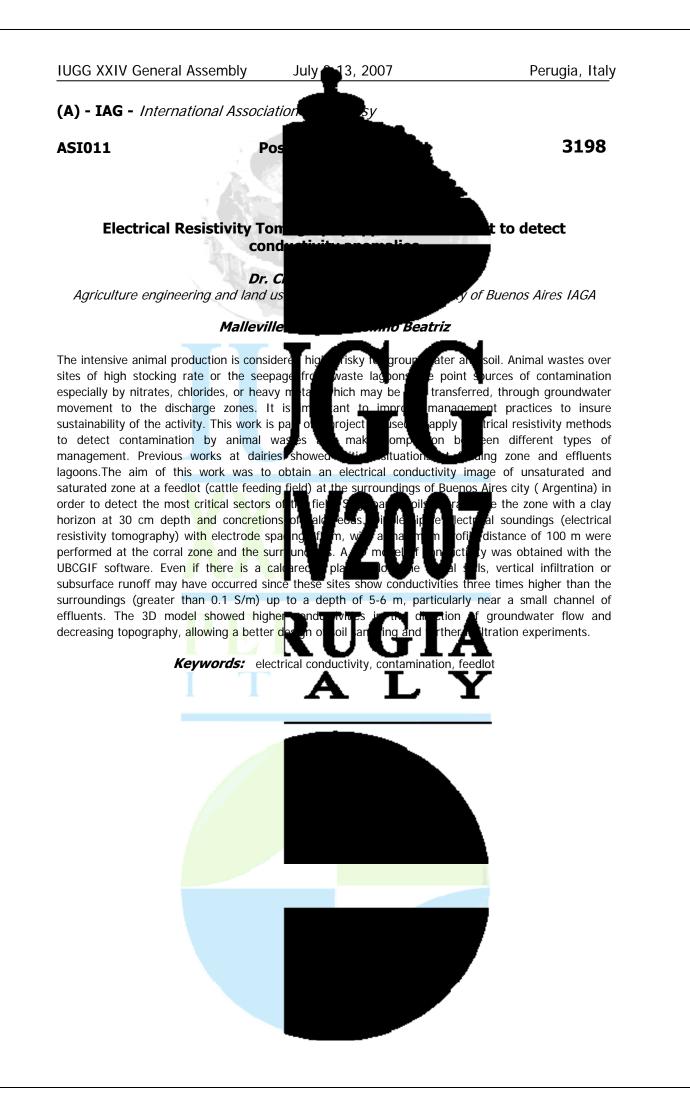
then 300 Ohmm, are marked broken and water saturated rocks. Values of resistivity of 300-1000 Ohmm are typical to broken rocks, and high value 000 Chmm to monolithic rocks. According to the specified values of resistivit ble" "good" quality from the of the AMT method are point of view of conditions for the tunnel stri Re uns cate correlated both with data of geological investigations obtained at previous stages of work and with results of previous drilling. At the same time on the demonal conducting zones, AMT data number of appropriated to faults, missed at previous stars e alloc The AMT ata have allowed receive essentially new information on structure of the area of the San-Pedro tunnel.

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#### **IUGG XXIV General Assembly**

Perugia, Italy

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## **ASII012**

## Symposium Small- and meso-scale structur observations and modeling

Convener : Dr. Anasuya Aruliah Co-Convener : Prof. David Hysell

Remarkable advances over recent year thermosphere and ionosphere observation resolutions. Many techniques now achieve

and a few and minutes temporally, with resolutions cases. Numerical models are also beginning nested-grids. Meso-scale structure is most solar wind with the magnetosphere, ionosph small scale variability may account for the d up to 2 between models and observations. latitude electrodynamics in forcing phenome

ometers and l exp ame i the ablished by thermospher ncy in the hig s nov div as wa

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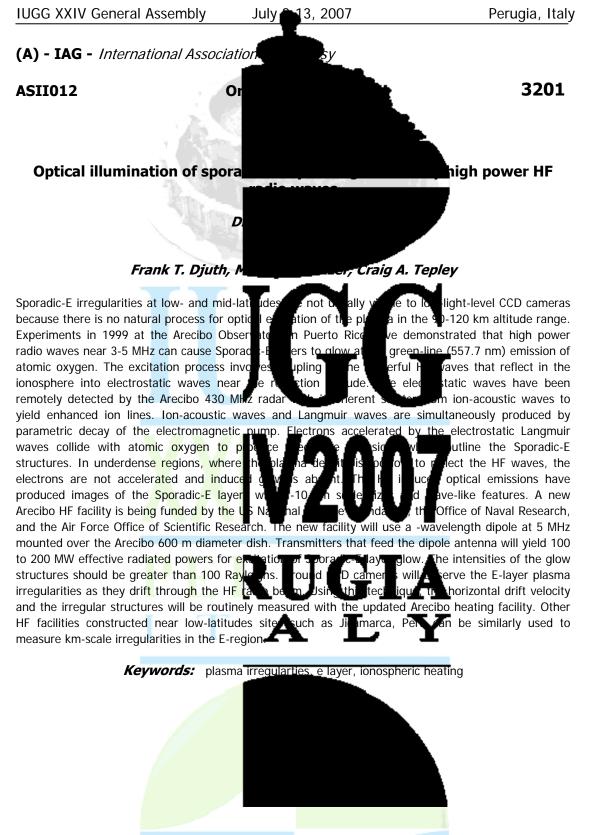
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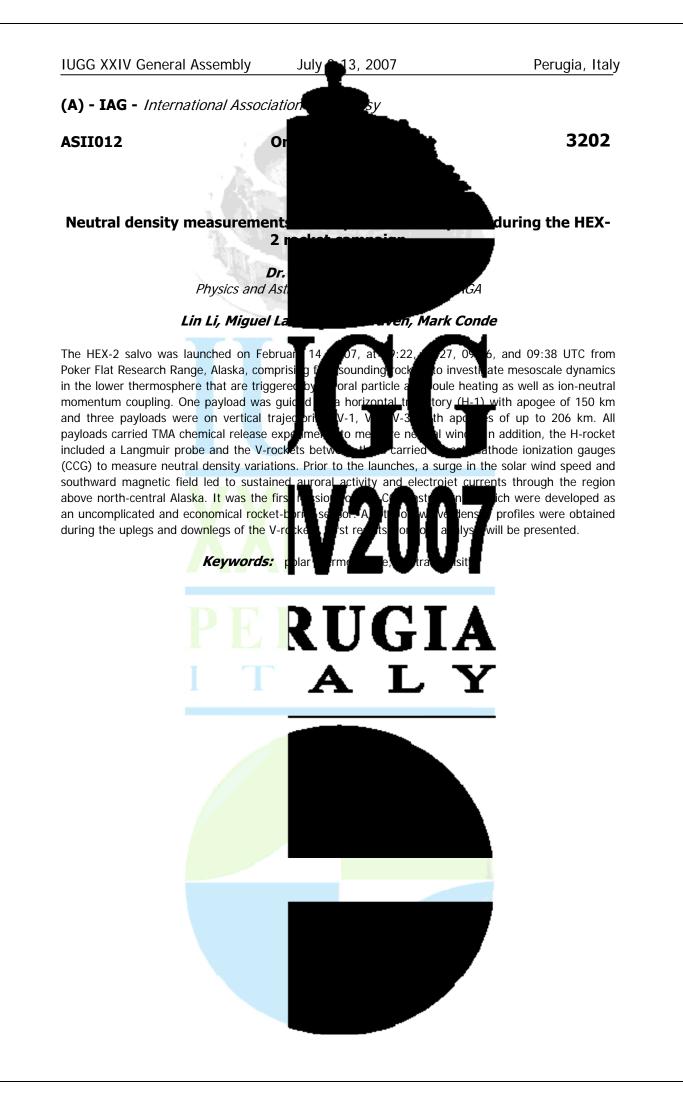
d ionosphere:

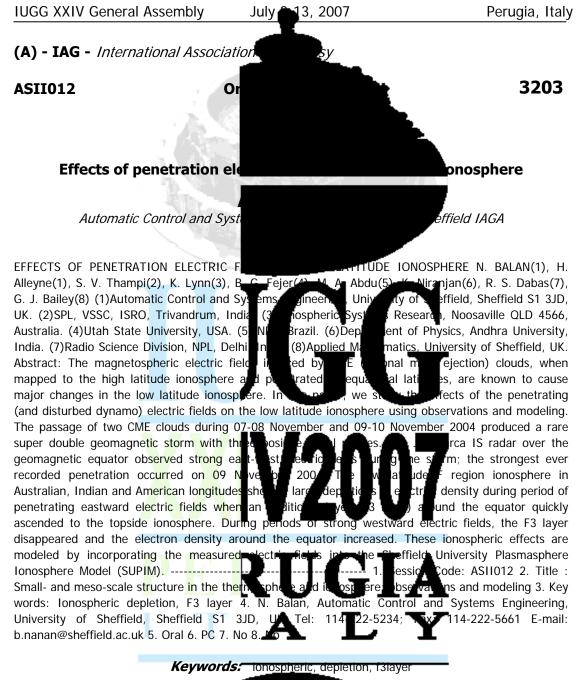
ar techniques are allowing ever-smaller spatial and temporal ations of several 10's kilometers spatially nd being possible in some ution ising techniques such as

highly dynamic interactions of the or example, it is now thought that itude energy budget by a factor of detail the role of highand vertical motion.





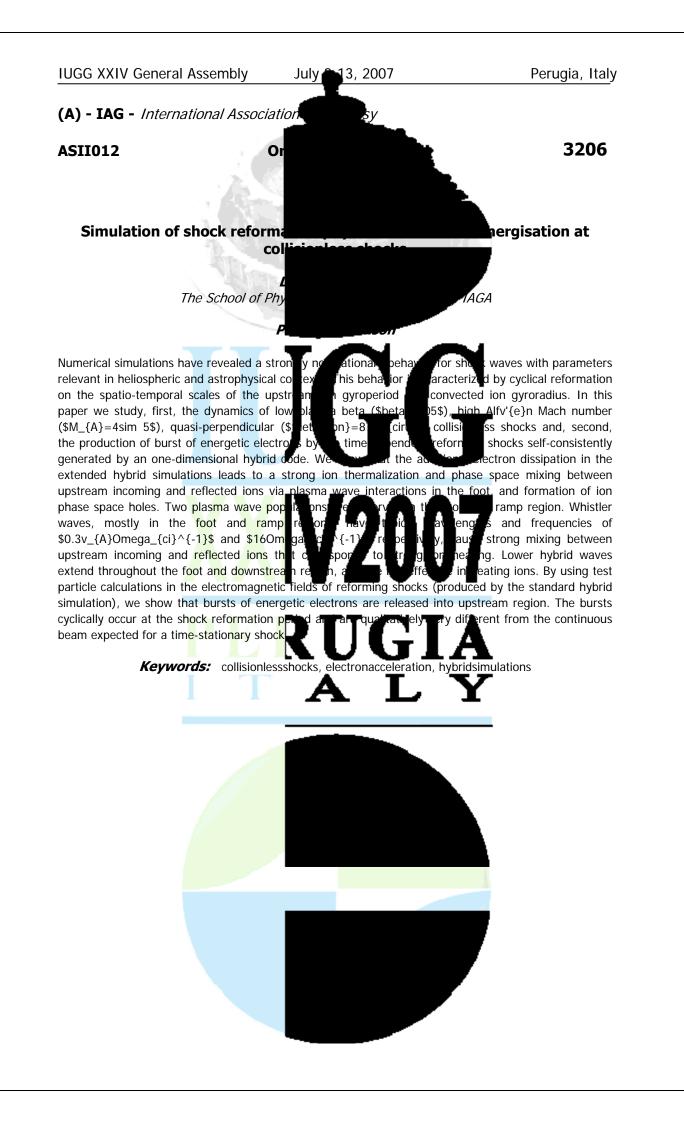


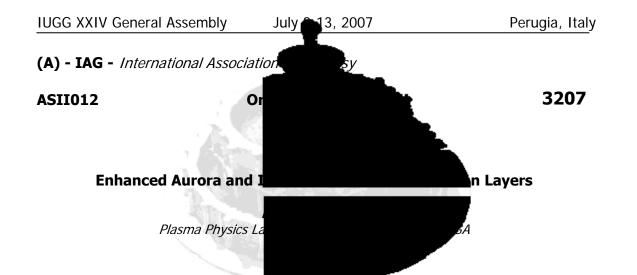












Nearly half of the time, natural auroral displays exhibit aurora." There is a substantial body of evide enhancement of the background electron de sit altitude in the E-region. The electron enhar into thin layers, which occurs for specific spectral characteristics of the emission in emissions result when wave-particle interag eV ionization energy of N\_2. We investigate insta

eigenvalue solutions of the instability including ionospheric collisions and kinetic effects which both play a role in localizing the instability to the thin ambient electrons into a suprathermal simulations. Such electrons could produce

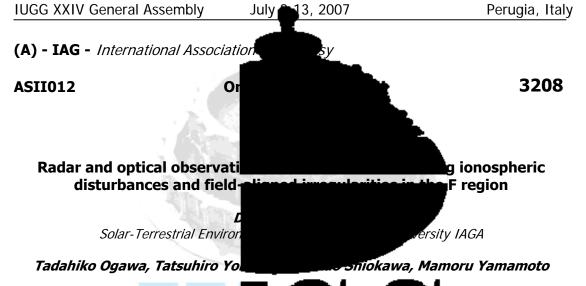
1 km), onnea tha tected by inco is related to ion f<u>o the i</u>a hance t amb ele occu

ns to presence of strong cross-field currents that accompany electron precipitation. We examine global a

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lavers known as "enhanced ptical displays with an these ent scatter radar around the same accumulation of heavy Fe and Mg heric electric field. Based on the t is b ved that the enhanced gies at or above the 17 heavy ion layers in the

> the instability can heat all-particle electrostatic he aurora.



We report for the first time simultaned Disturbances (MSTIDs) and Field-Aligned Ir imagers and the MU radar. The all-sky imag (34.9N, 136.1E), Japan. MSTID propagatin airglow images at the bothsites. To investig mapped onto the 630-nm airglow layer (260 the triangulation using all-sky images at Sata and

of vatio ies (FAIs in e operated at westward w ial rel sh ude). ude ∖ls wiṫ

Traveling Ionospheric F region sing two all-sky airglow ata (39.0N, 139.9E) and Shigaraki multaneously observed in 630-nm tween TID and FAIs, FAIs were ne air layer was estimated by ho intensity and upward

Doppler velocities coincided with the airglow depleted region due to the MSTIDs. On the other hand,

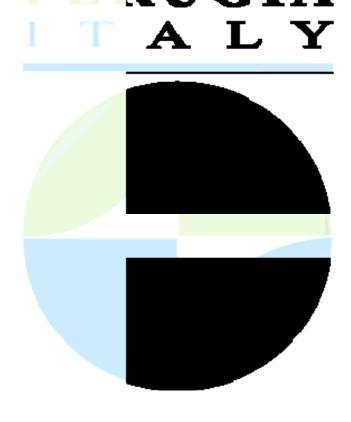
Keywords: airglow, radar, tid

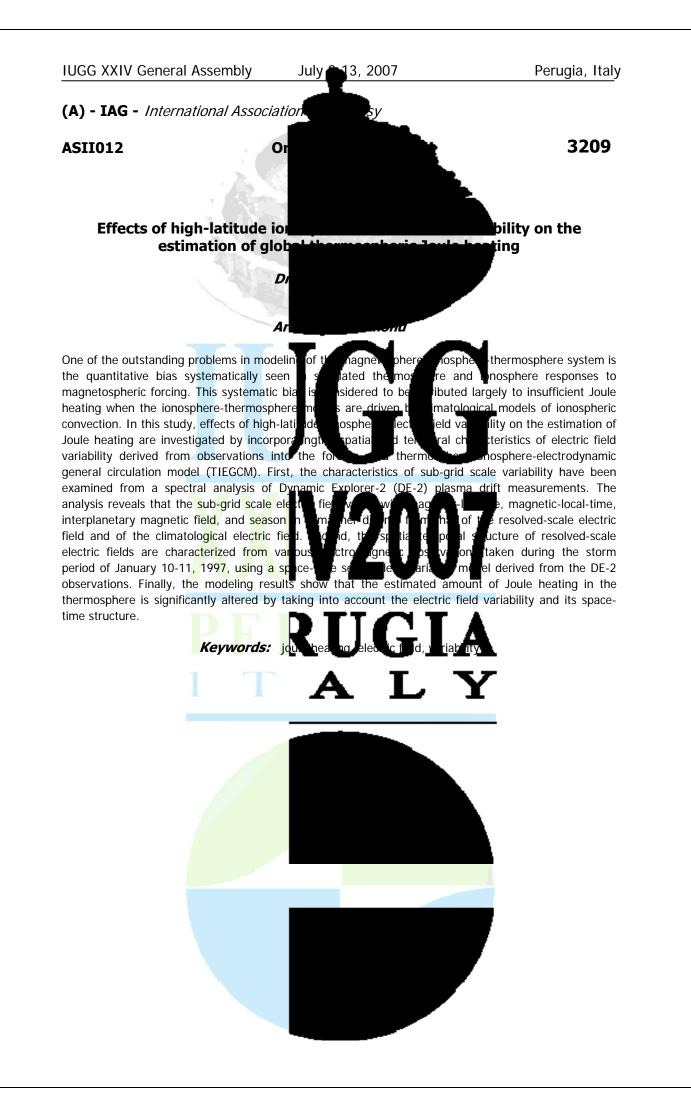
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enhancement. The directions of the Dopple polarizationelectric fields associated with t electron density perturbations caused by that FAIs could be generated by the gradie electron density associated with the MSTID

FAIs with weak echo intensity and downward\_Doppler velocities

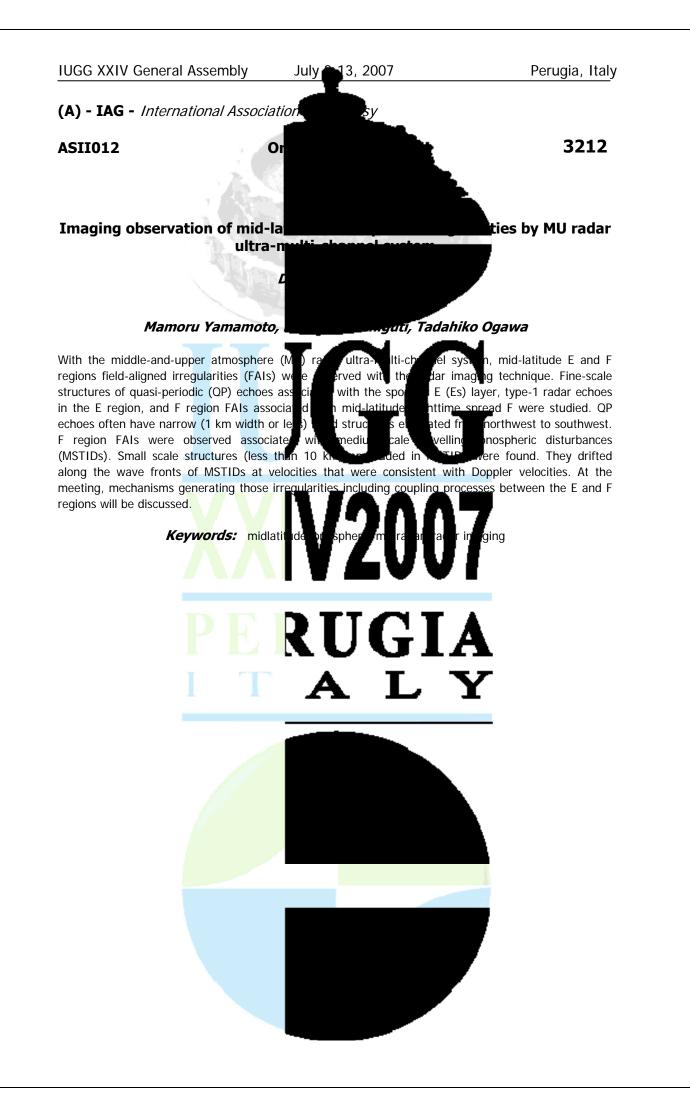
coincided with the airglow B drifts caused by the carried out to simulate Ds. The result suggests hespatial gradient of the



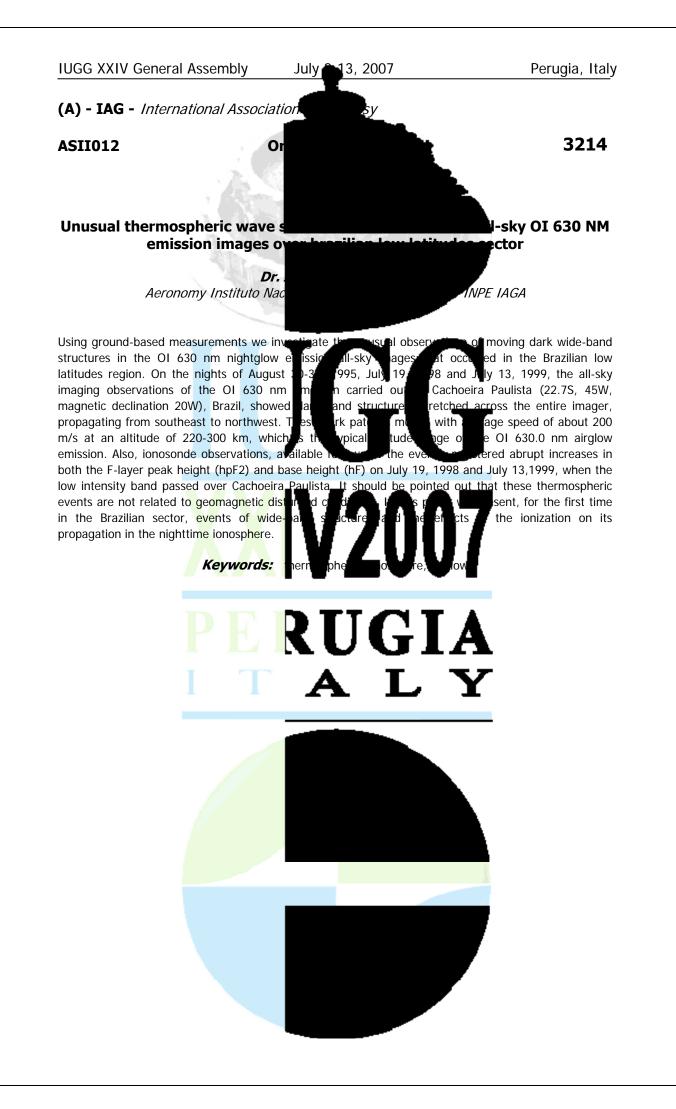


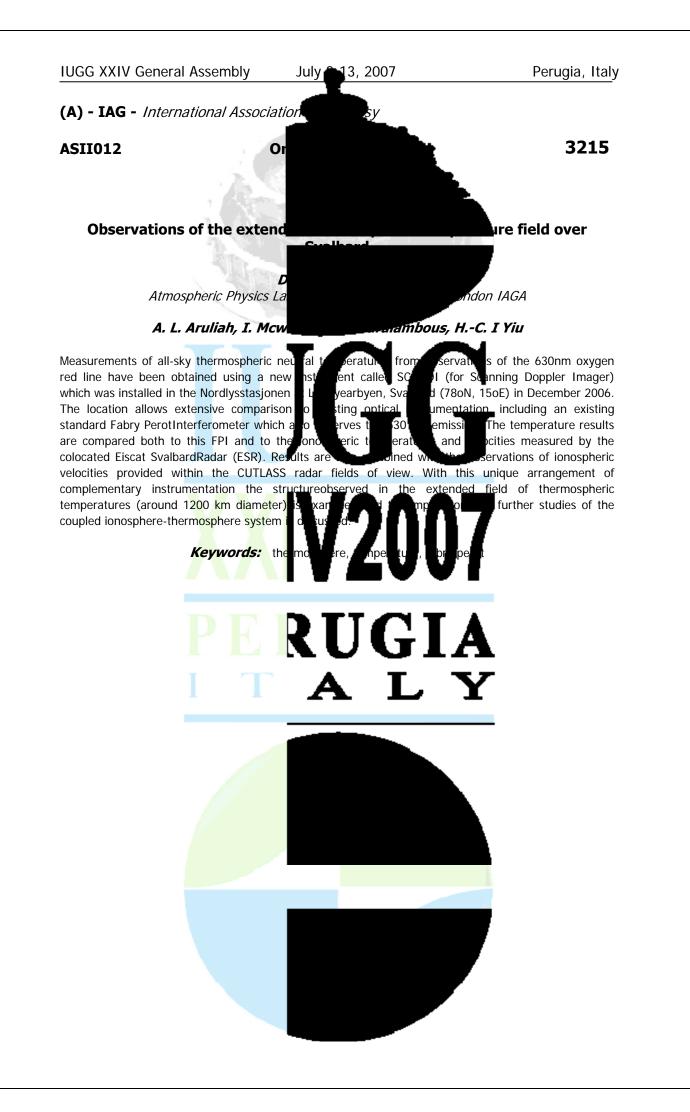


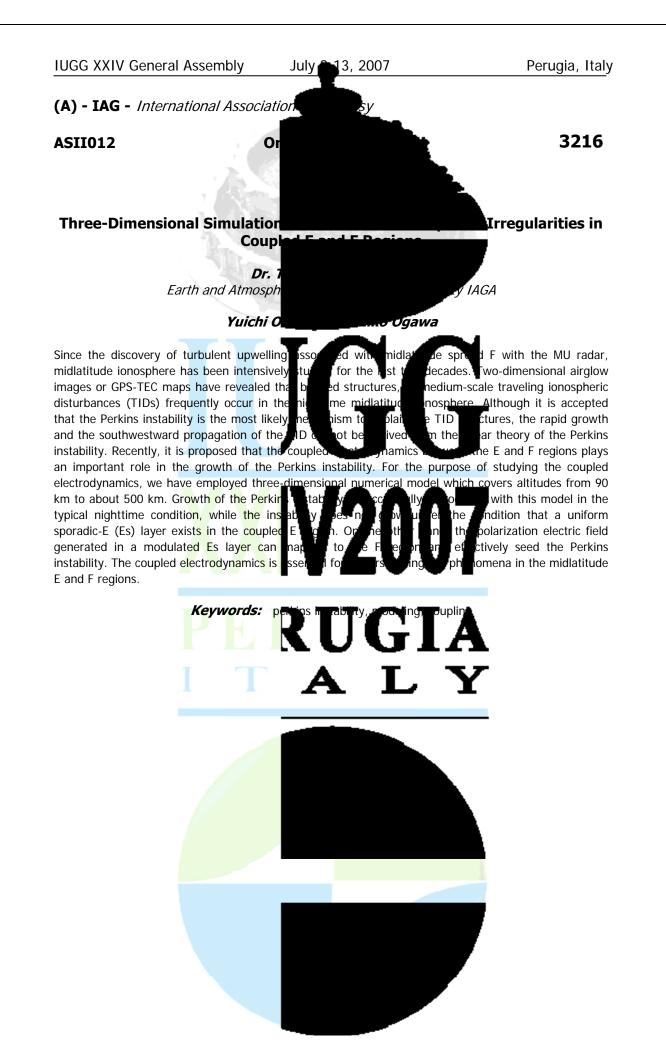














Perugia, Italy

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## **ASII013**

# Symposium Response of the ionosphere-th data availability and modeling

Convener: Prof. Alan Aylward Co-Convener: Prof. Lie Zhu, Dr. Bala

Global Circulation Models (GCMs) of the seasonal and solar cycle variability of the situations, though the individual elements between them, their timing and their relative storms, the sort that occur only a handful understanding and predicting the flow of ev understanding of the physics. This is solar-t missions and improved ground-based facilit the resolution and complexity of GCMs is b resolution of the data. How far we have c extreme events is the topic of this sessi argument for more directed ground-based experime agnetic storms:

fairly accurately the diurnal, and winds. However, in dynamic can generally be explained, the balance to predict. During extreme are still dif ne be articularly complex, and lour 1 es will be the ultimate test of our Weather - at its limit. New space ta for studying these events, and with the volume and to 🖪 nd simulating the more tandir expected to form an sent S Sace m



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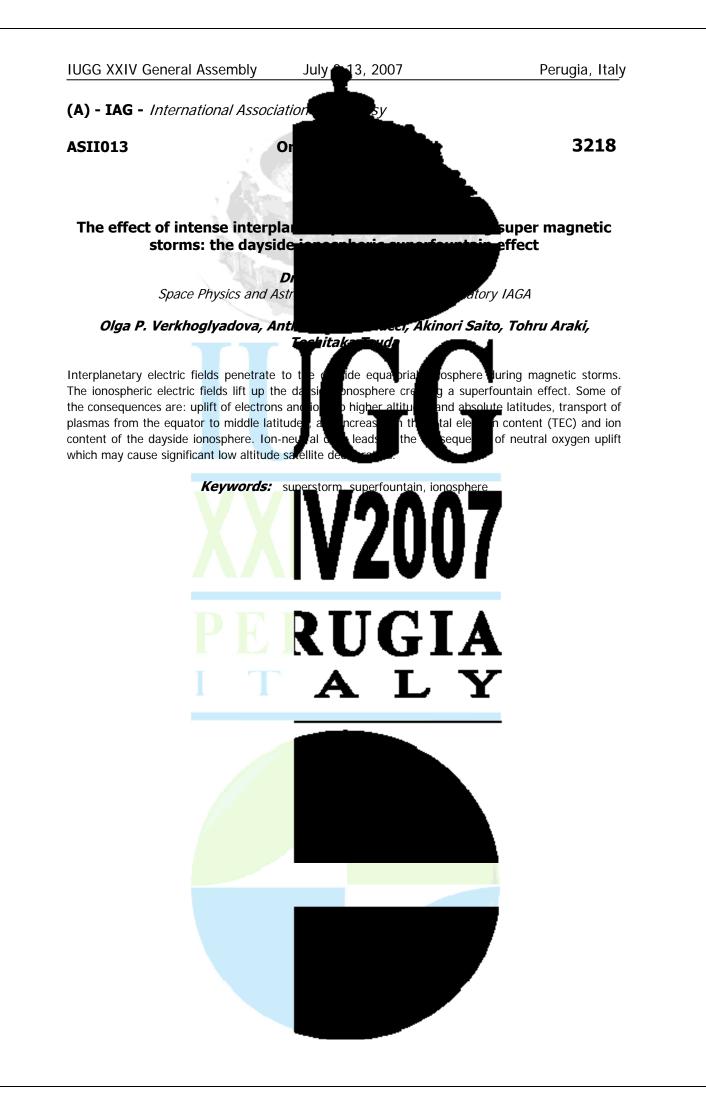
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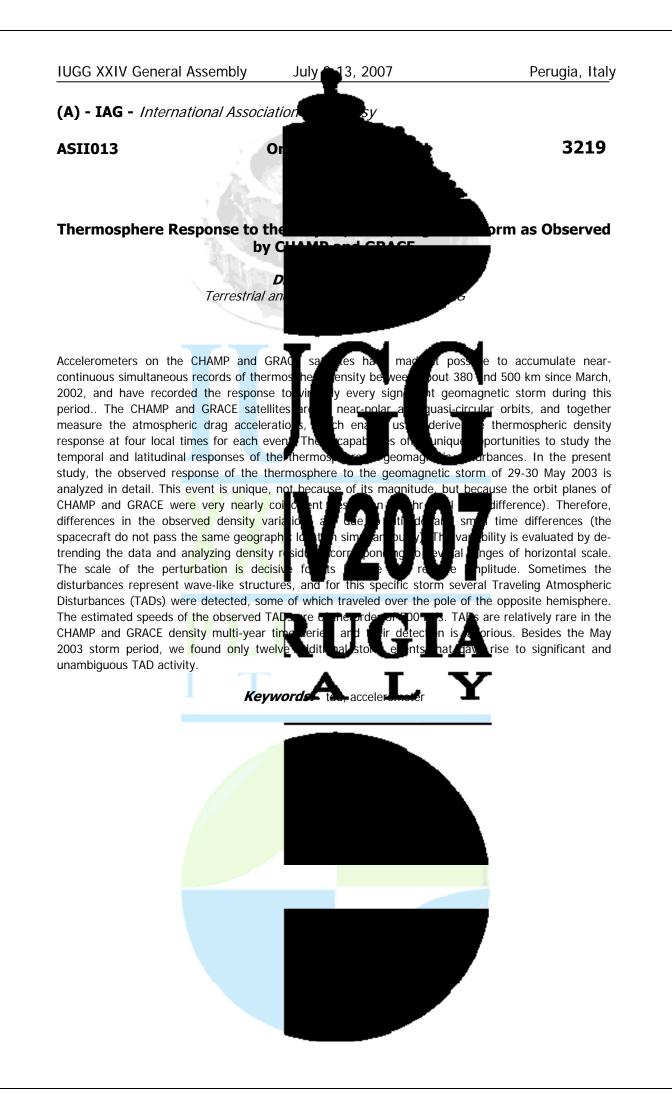
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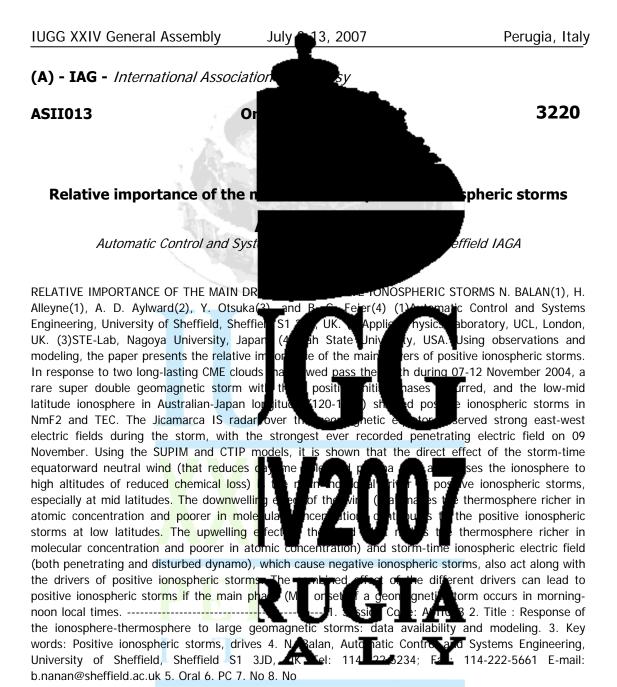
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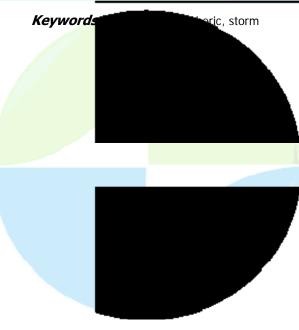
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(A) - IAG - International Association

## **ASII015**

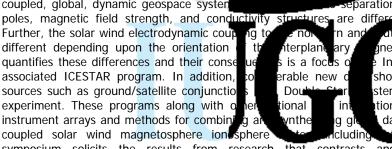
## Symposium Conjugate and interhemispher

Convener: Prof. C. Robert Clauer Co-Convener : Dr. Kirsti Kauristie, Dr.

The Earths magnetosphere is an electrody ionospheres, each with different geophy characteristics of the northern and souther coupled, global, dynamic geospace systen

Further, the solar wind electrodynamic couping to different depending upon the orientation quantifies these differences and their conse ЦÆ associated ICESTAR program. In addition, tο sources such as ground/satellite conjunctio experiment. These programs along with o instrument arrays and methods for combinition coupled solar wind magnetosphere ion sphere

symposium solicits the results from research that contrasts and/or considers the coupled, interhemispheric global system including the consideration of times when the two polar ionospheres may not be coupled. The symposium also investigate very high latitude phenomen appropriate are papers that consider the fal phenomena Results from observation, the and discussion in this symposium.





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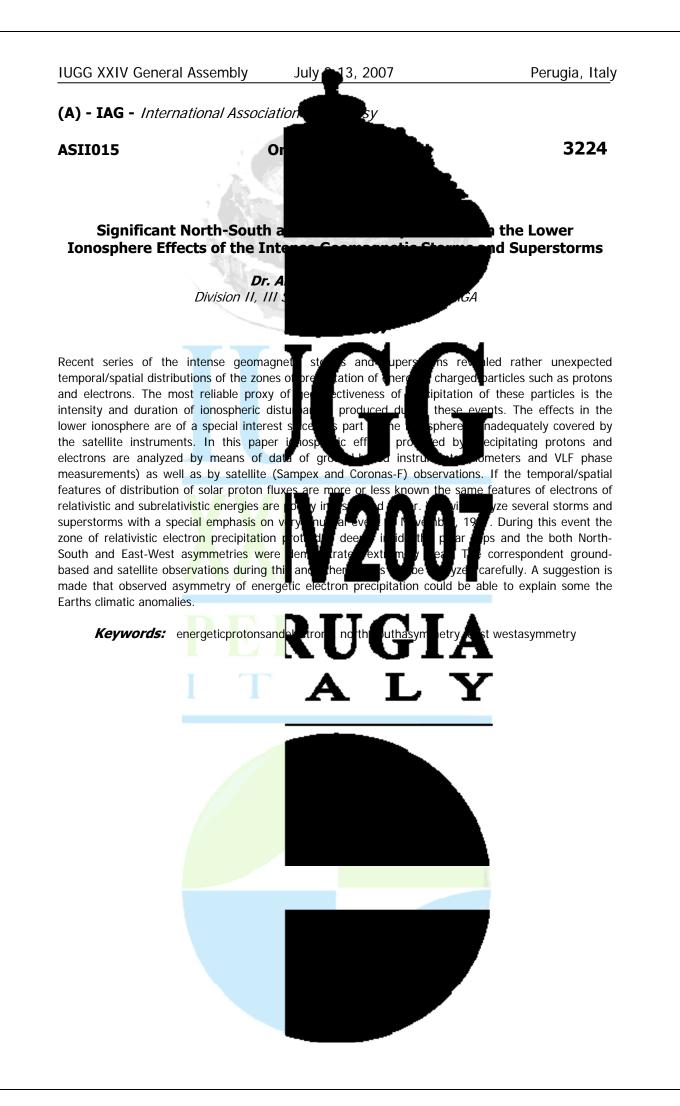
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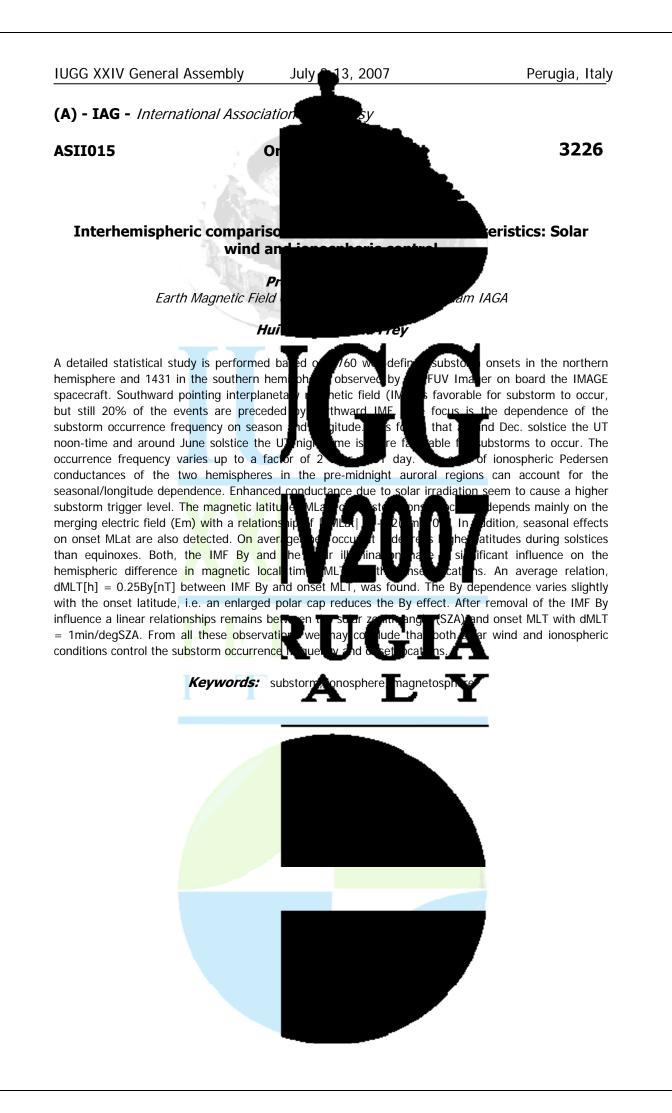
thern and southern polar rties. The unique physical onsidered in models of the fully separation of geomagnetic and rotation t in the two polar regions.

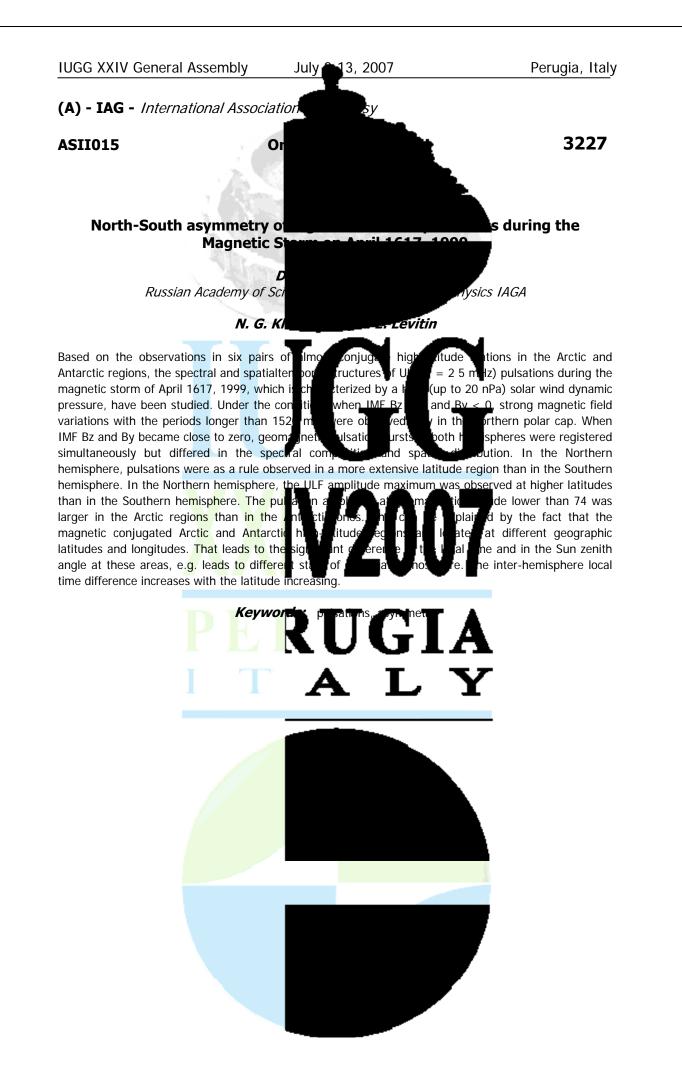
emispheres can be very athe inetic find (IMF). Research that International Polar Year and the should be available from various ster) he coordinated Themis tional orts are producing new data s to investigate the fully ispheric coupling. This

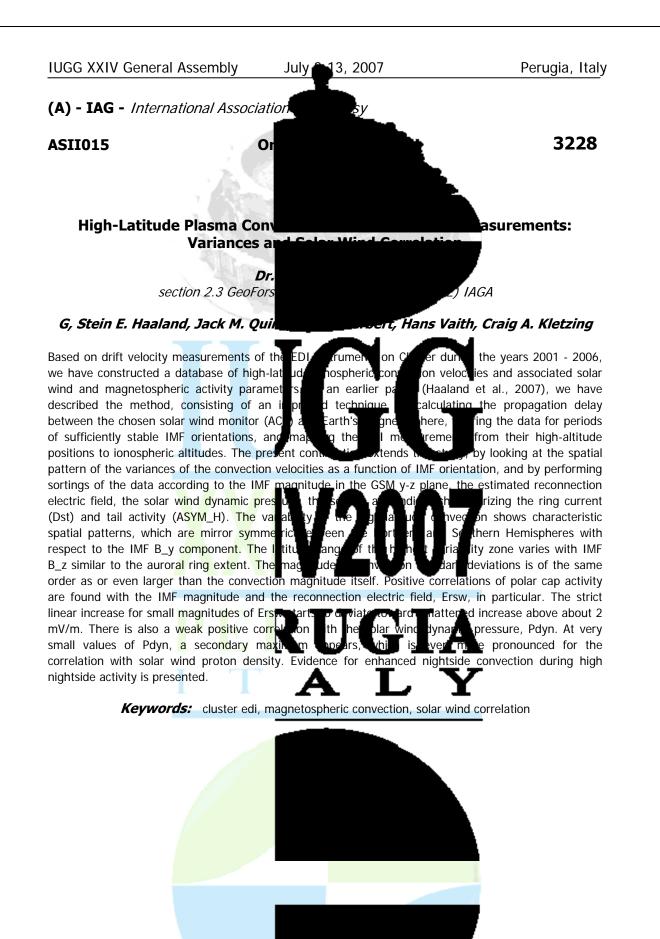
> that can be used to are ineffective. Also symmetry of polar cap solicited for presentation



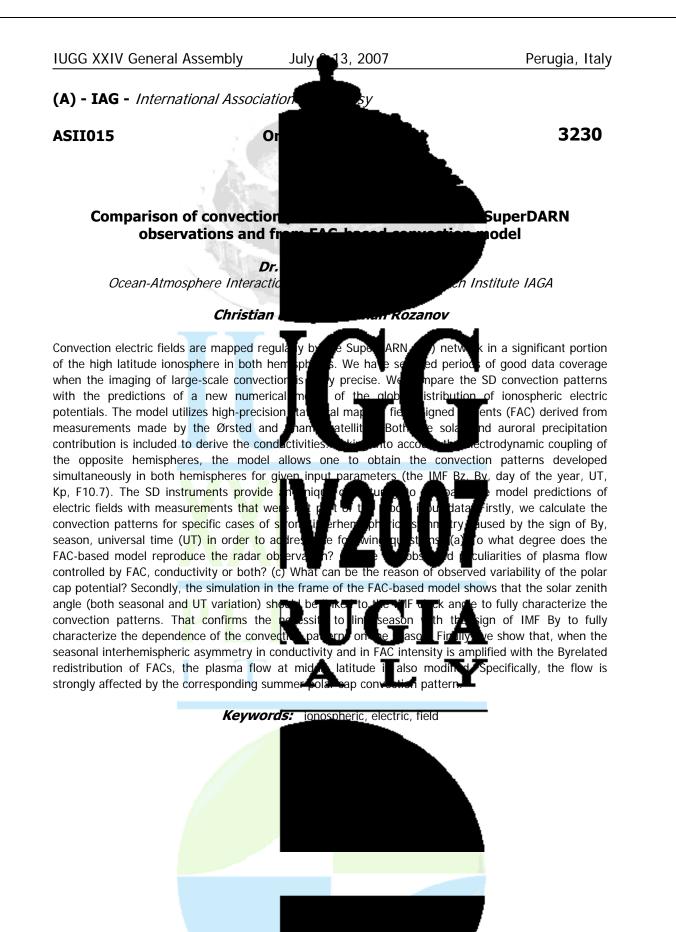


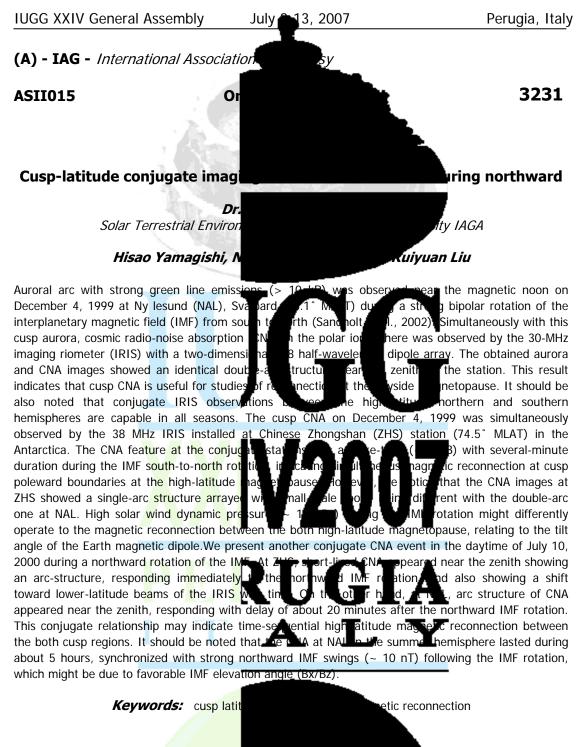






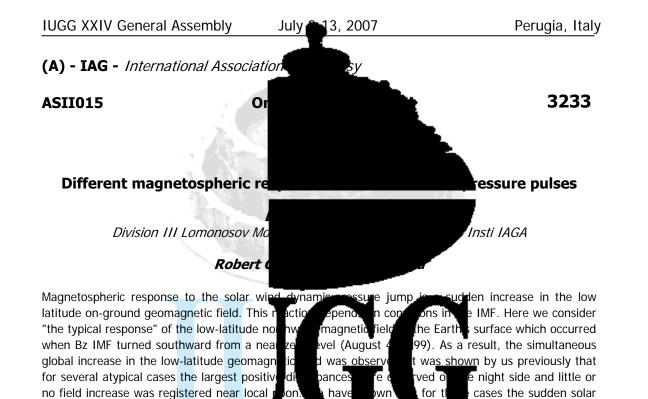






words: cusp latit





Keywords: mad 2007 LUGIA

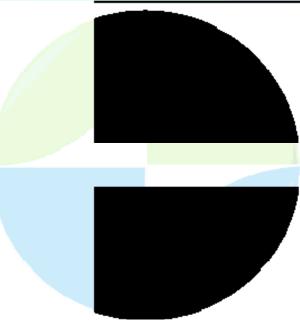
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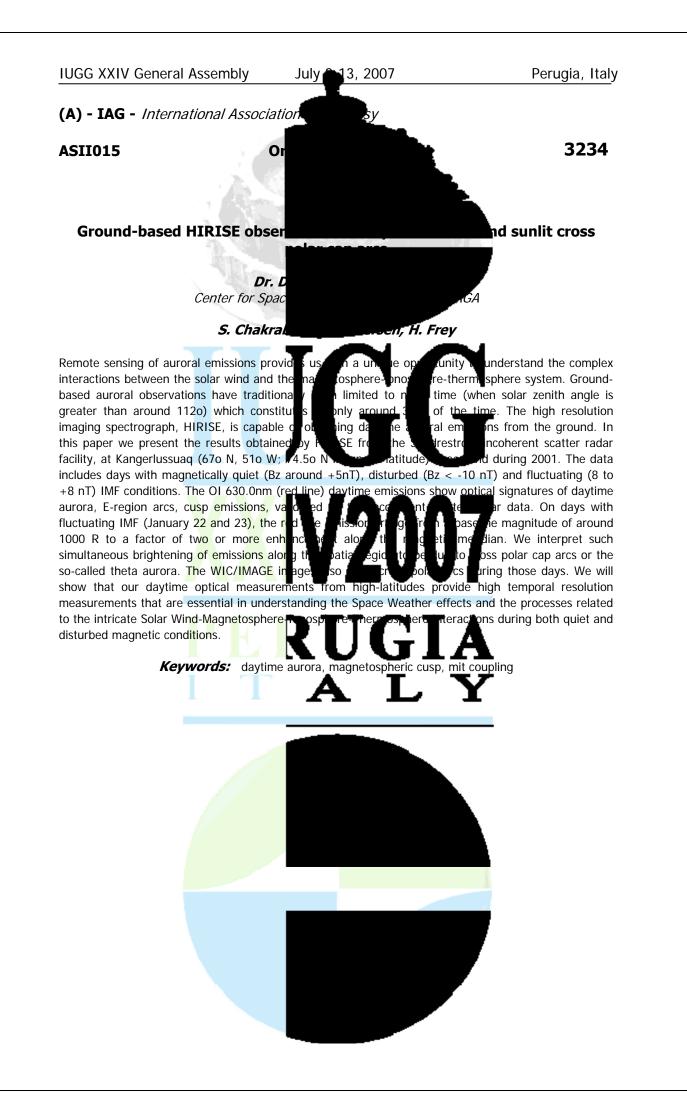
of the IMF from a near

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wind pressure pulses were associated with a similar

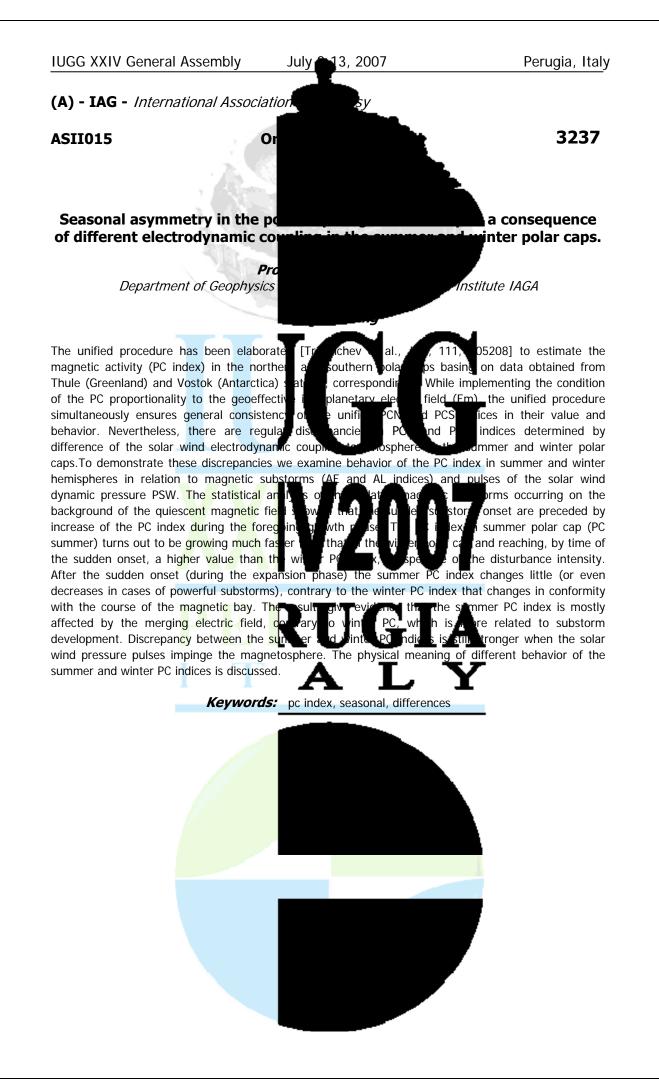
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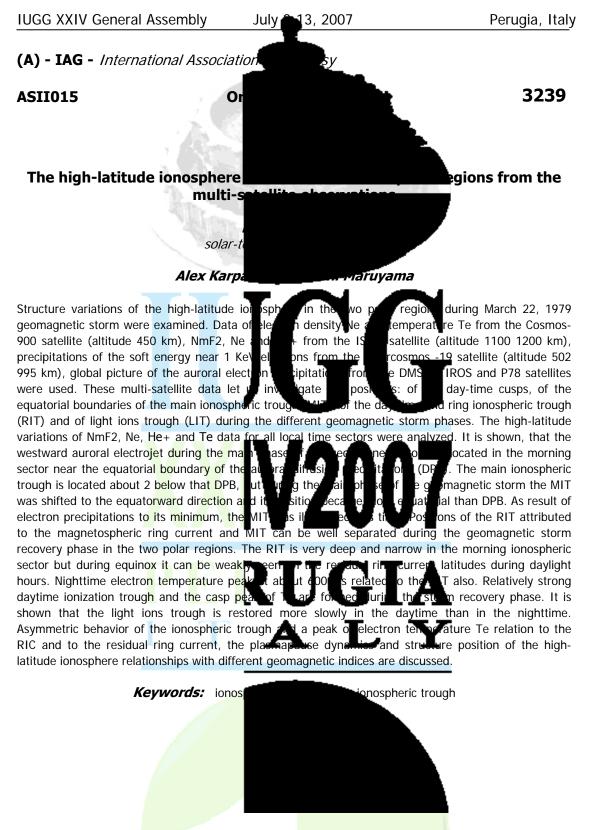




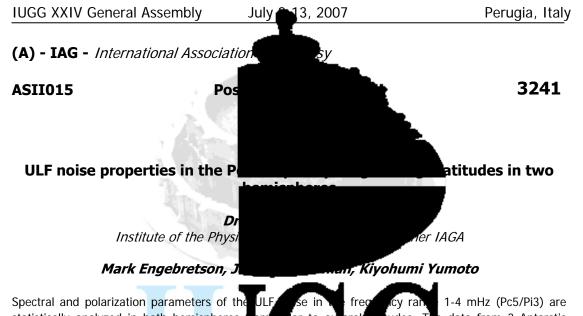












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statistically analyzed in both hemispheres station deep in the polar cap (P5,P6 and \ meridional profiles along 40 and 100 magn along the MLAT = +/- 80 are systematica conditions. For several nominally conjugate sta at different timescales are analyzed to releal a re-

by comparison of spectral coherence and correlation coefficients between different station pairs within compact station groups. It is found that, determined mostly by geomagnetic latitud geographic latitude, especially at high latit two hemispheres is found which can be p rtl The position of the points with maximal co here

IMF parameters. The position of actually conjugated points also depends on timescale and differs for elliptically and randomly polarized signals.

lar to au bra Arctic polar s ridian<u>s in bo</u>t zed a ed un pairs peren ctra geogra

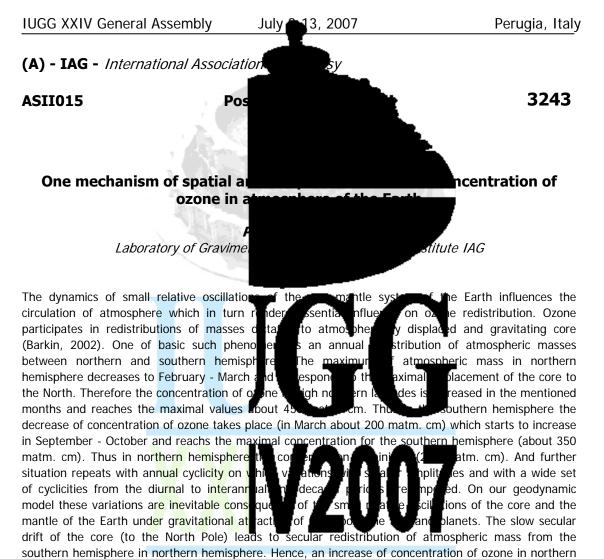
tudes. The data from 3 Antarctic ns (ALE, THL, SVS, and RB), two mispheres\_and longitudinal profile various solar wind/IMF nd correlation functions e and inter-hemispheric

asymmetry in dependence on the IMF orientation. The actual conjugacy at different latitudes is analyzed

r in two hemispheres ematic influence of the h the ULF parameters in on the IMF orientation. with MLT, frequency, and







hemisphere and proportional, but asymmet ern hemisphere should be observed. The distribution of linear trend one shows, that during on o h h mis here a concentration of 1979 - 1999 a similar asymmetry took place hd ozone decreased faster. As a result of long action of the discussed mechanism (at conservation of core linear trend to North Pole) the concentration of came in northern hemisphe will surpass considerably the concentration of ozone in the southern hereis re, as i erved act lly (Surkova, Chubarova, 2006). The observed decreasing of the general contents of ozone in atmosphere, and also some of other particularities of spatial and temporal concentration of ozone are determined by others mechanisms. References Barkin Yu.V. (1 endogenous activity of planets and satellites and its cyclicity. Izvestia cekzii na Nat. Sciences, Issue 9, December 2002, M.: VINITI, pp. 45-97. In Russian. (2006) Nitrogen, oxygen and

their compositions. In: Modern global c N.S.Kasimov, R.K.Klige) .v. 1. A1. M., "Scie

Keywords: ozone conc

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pent. In 2e volumes (Eds.

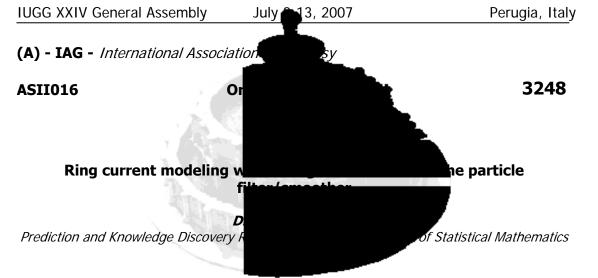












## Genta Ueno, Yusuke Ebihara, MeinChin ni, Pontus C:son Shin-Ig Brandt, Donald G. Mitch I, K hirð eika. Higuchi mov

The inner-magnetospheric processes are str imposed on the magnetosphere and propert external factors are obtained from empirical inputs in many ring current models, those large errors in model outputs. In order to achieve

dynamics, it is desired to estimate the external factors with high accuracy. For obtaining good estimations of the external factors, we have developed a data assimilation scheme with an algorithm based on the particle filter/smoother. As immediate but with a delay, the estimation ring current modeling. The particle filter/ relatively low computational cost. The degeneration'; that is, a posterior PDF com s to after several times of filtering. However, we overcome this problem with a procedure to combine several

ntrolled by e ne pl<u>asmash</u>e ships \ the s cor lar stii ative

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al factors such as the electric field Although estimates of these dition and then used as r wind ncerta es, which may result in ngs of the ring current

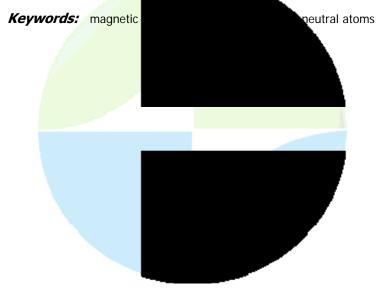
> ng current state is not in data assimilation for es at former times with problem called 'particle of the ensemble members

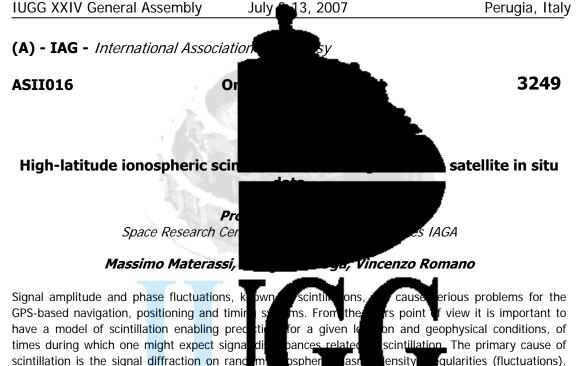
ensemble members in a filtering process. The present scheme is designed to assimilate the global ENA hprehensive Ring Current Model data from the IMAGE satellite into a kineti-(CRCM), developed by Fok et al. (2001 fac (the electric potential distribution, plasmasheet ion density, and atur) free parameters, and mp estimates of those parameters are obtained through data assimilation. In accordance with the estimates tibution is also estimated we introduce the data of the external factors, the ring current ion d 2 assimilation scheme and demonstrate the perform nce of it 🖬 ugh a de assimilation experiment using artificial ENA data generated by another run of the CRCM with a typical setting for the external factors. Some results of data assimilation using\_real data sets are also shown to illustrate the applicability of the present scheme.

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supplemented with the ionosphere mode and irr hisotro model morphology of scintillation provided a suitable propagation model is used. This paper will present

Explorer 2 plasma density data, IRI ion Satellite data were used to derive the s profiles provided information about the p model input parameters are: position of the Kp. As the output we get the scintillation compare the modeled and observed S4 index

the scintillation model for the Northern Hemisphere high-latitudes, constructed using the Dynamics lint

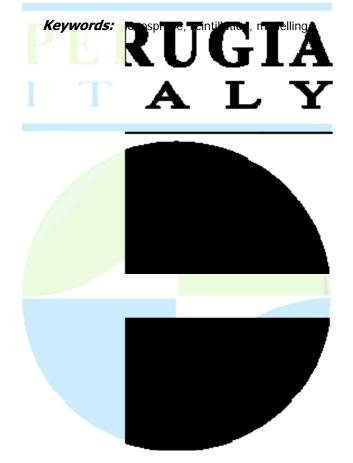
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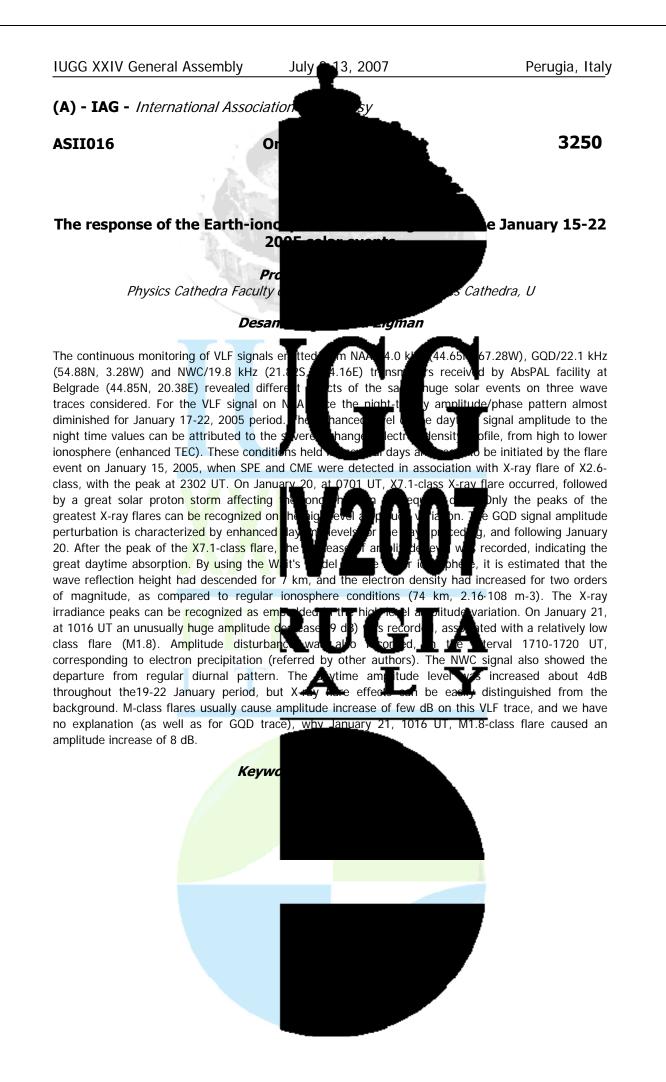
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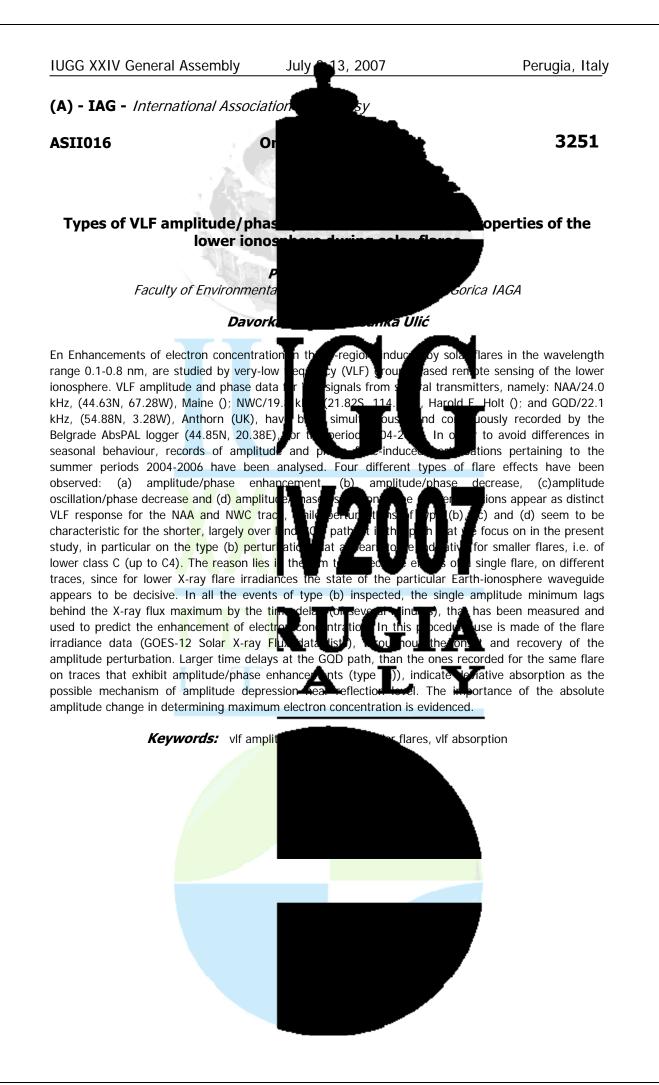
gularities (fluctuations). measurements. When they can be applied to

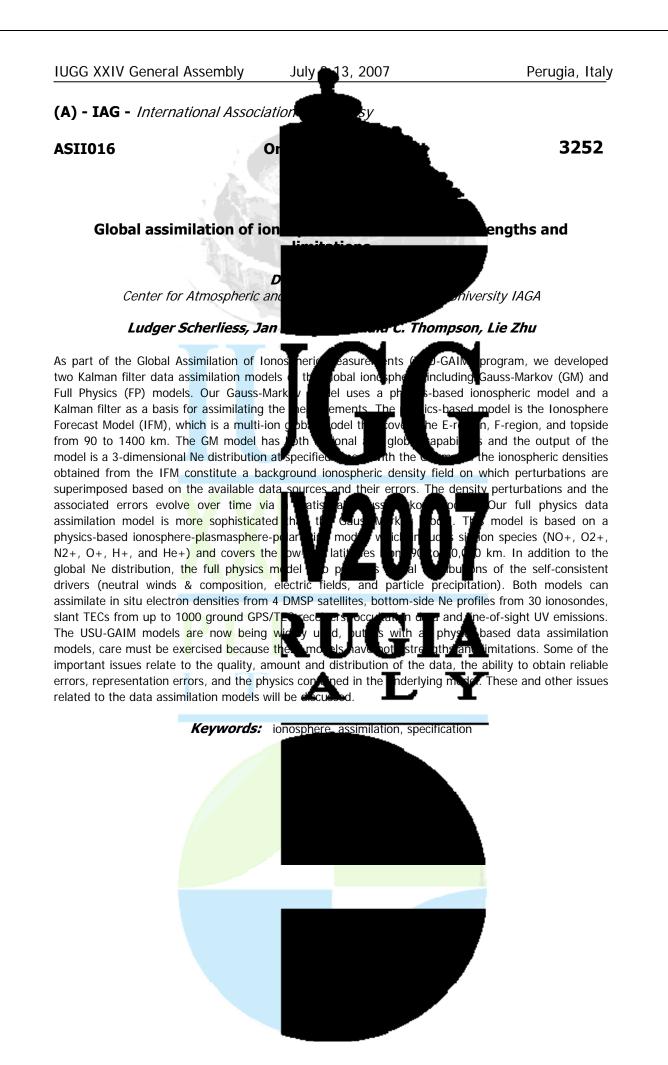
n propagation model. parameter, while IRI rity slab thickness. The magnetic activity index ceiving stations, we will

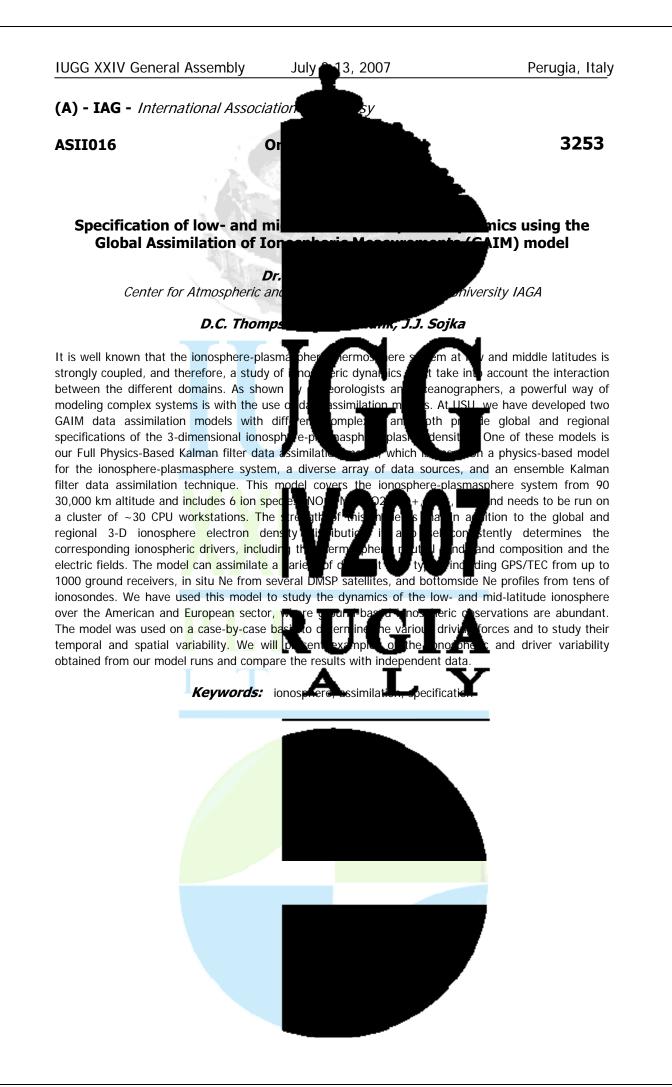


scintillation is the signal diffraction on rand Information about these fluctuations are





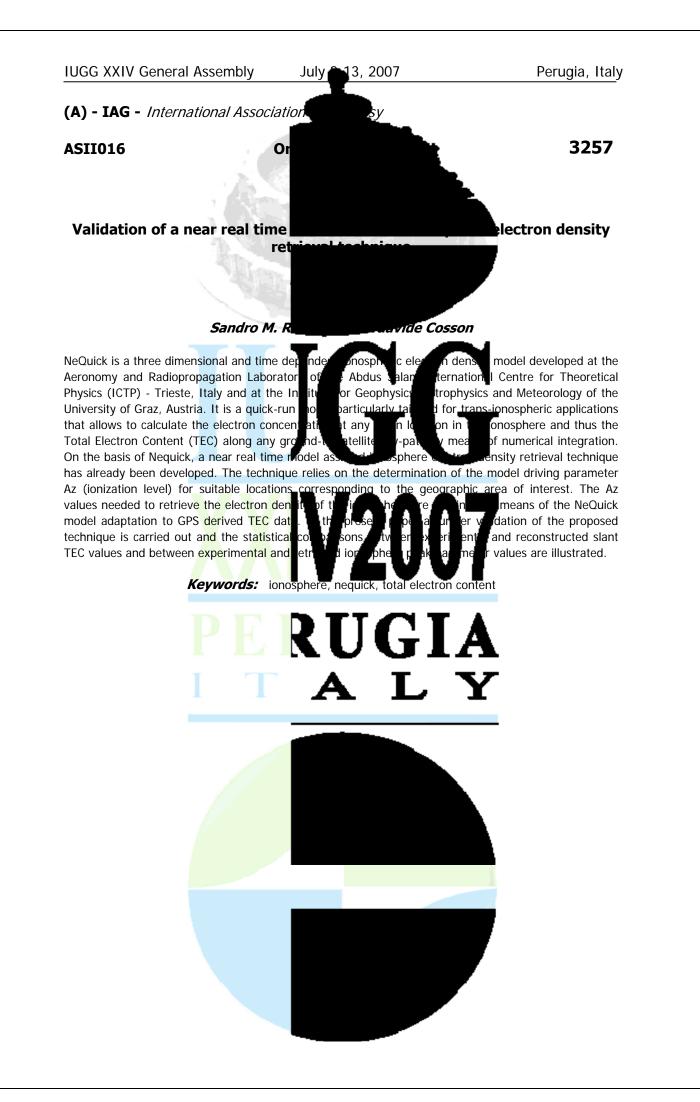


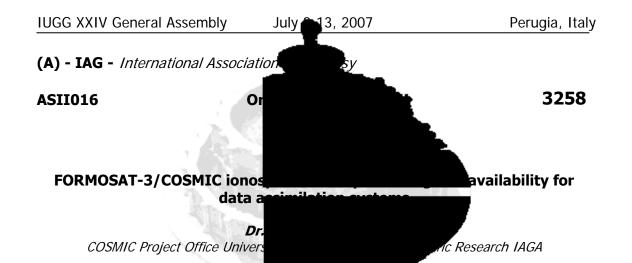












FORMOSAT-3/COSMIC, a six satellite cont atmospheric and ionospheric research an carries three instrument payloads: 1) A Glob Photometer (TIP), and 3) A Coheren (CERTO/TBB). The focus in this presenta instruments. The GPS receivers measures possible to derive the total electron content the same time. This includes so-called occultation

vertical electron density distribution below 800 km. By the end of 2007, when the satellites are in their final orbit configuration, they are expected to provide about 3500 near real-time, globally distributed TEC data arcs per day. In addition, the recombination of oxygen and electrons a processing of the GPS data involves cyclecalibration for transmitter and receiver dif Þre of the data, their spatial and temporal distr

lation, provide da ssimi oning System omagnetic be <u>on</u> ion nd L2 ise png l toι h prima

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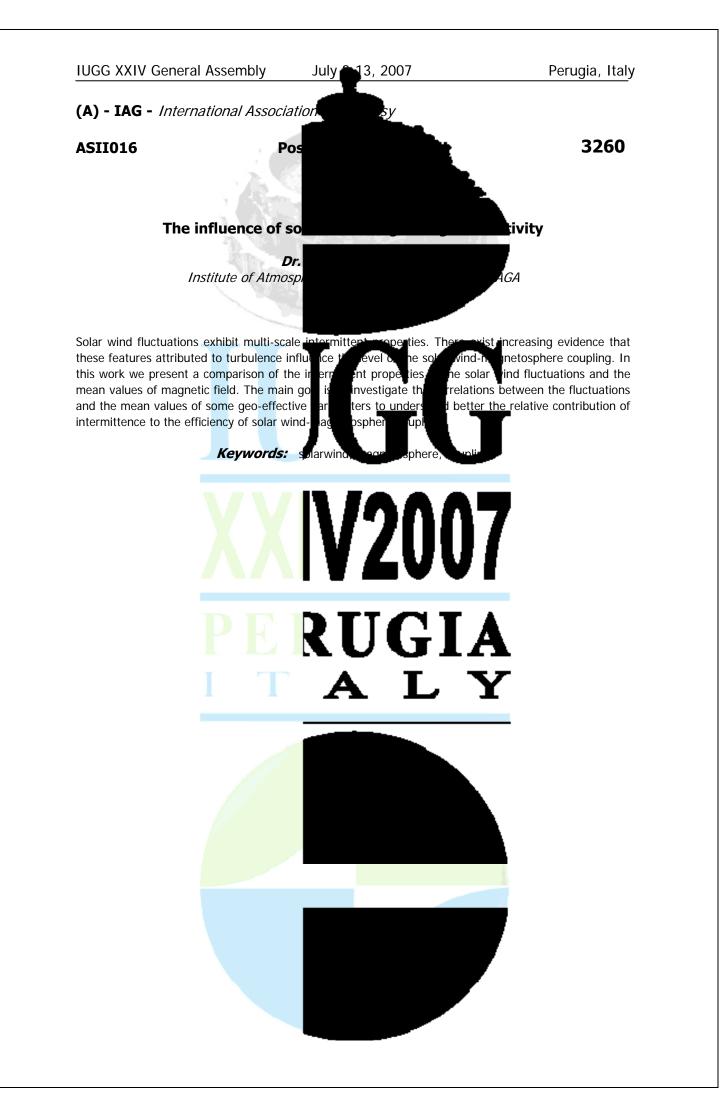
th of data available for SAT-3/COSMIC satellite FOR S) receiver, 2) A Tiny Ionospheric b Tomography/Tri-Band Beacon eric data from the GPS and TIP ranges from which it is d psei thirte GPS satellites in view at e information about the

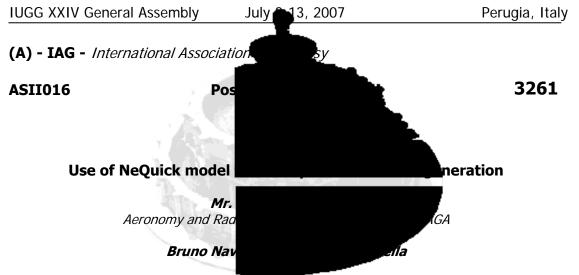
> iolet emission due to Earth's night-side. The ulti-path mitigation, and ig issues, the availability cy will be addressed.

Keywords: ionosphere, assimilation, gps









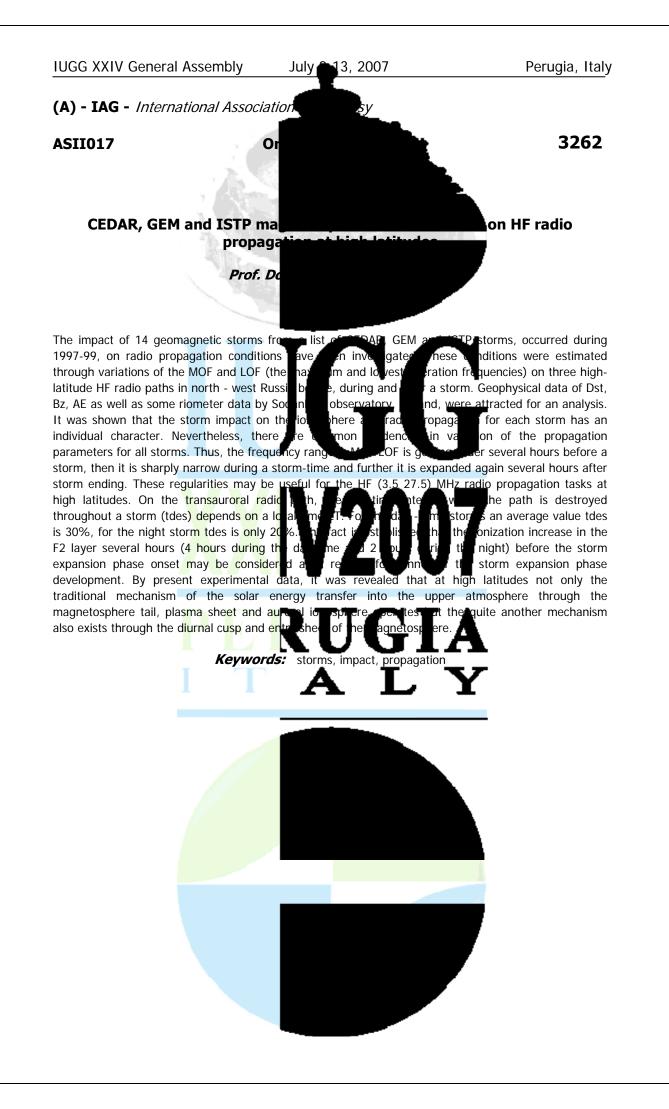
NeQuick model is a simple electron density profiler. Salam International Centre for Theoretical F ysics It is able to compute electron density along articler has been developed to adapt the NeQuick divince ar content values. In such a way it is possible a conn density in the ionosphere both for quiet and divinmodel to generate realistic ionospheric scenarios region of interest. This paper presents the techniq examples of produced scenarios.

profiler of the innosphere ysic arieste, ally ar ark ry grount to all vine arameter Az to ar of n a three-dimenor de thed points. arios which convents the echnique used or scen.

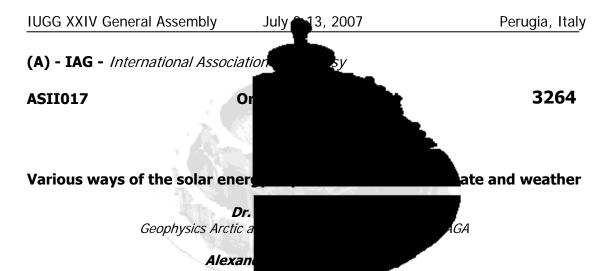
at the diversity of Graz, Austria. Lite ray-p ths. A simple technique roduce experimental total electron onal representation of the electron technique allows to use NeQuick to assumionospheric effects in a generation, and shows various











Variability of the climate and weather during the la (including EUV radiation) can not be uniqu source of energy can be the particles consta includes corona mass ejection (CME), conn well as a constant emanation of the solar fields. Two kinds of the solar particles, determine energy of solar wind which can demonstrated close connection between the atm

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that the solar radiation Earth Space. Additional surface. Jux of the solar particles hd local strong magnetic fields as weak large-scale solar magnetic eriodicity of variations, bace. Experimental data solar wind parameters.

Processes of transmission energy of the solar wind inside near-Earth Space can be realized by means of the electric fields and currents which changes global electric system of Earth. Our experimental data in

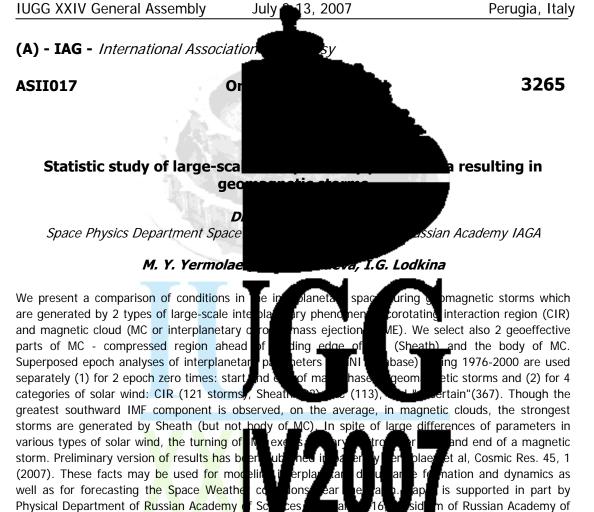
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the Antarctica (Vostok Station) show a k surface and energy of the solar wind. One a conductivity of the ground surface. So, atmosphere will depend on this important Earth, producing redistribution of temperat estimations of this mechanism are presented in

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ectric field on ground global electric circuit is wind inside the Earths different regions of the Experimental and model

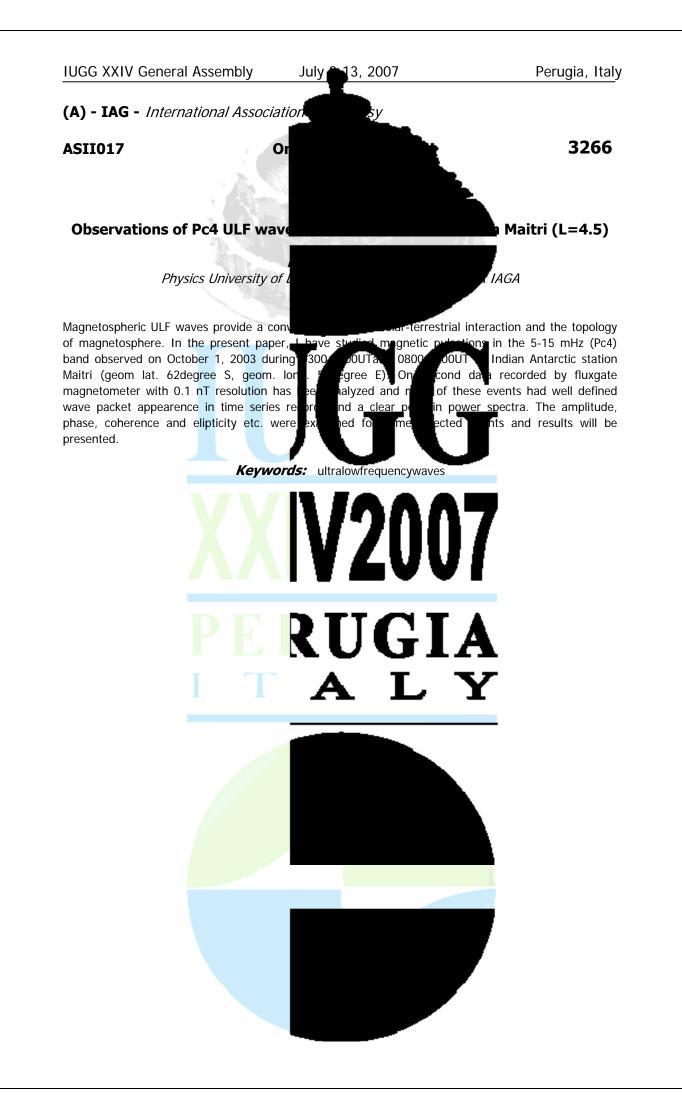


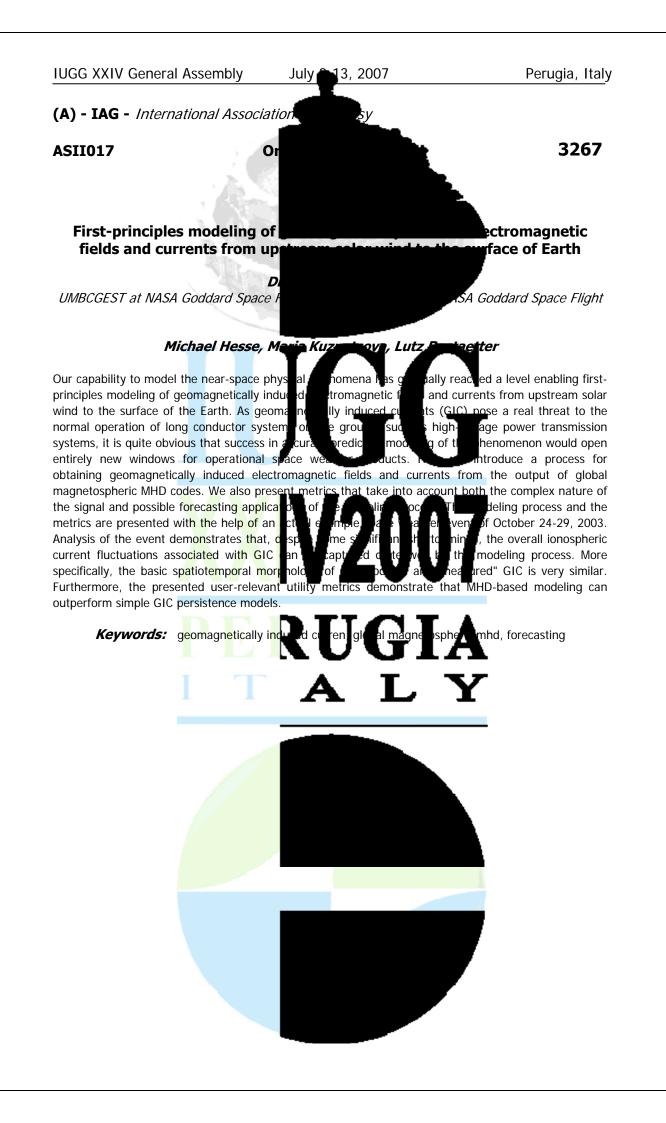


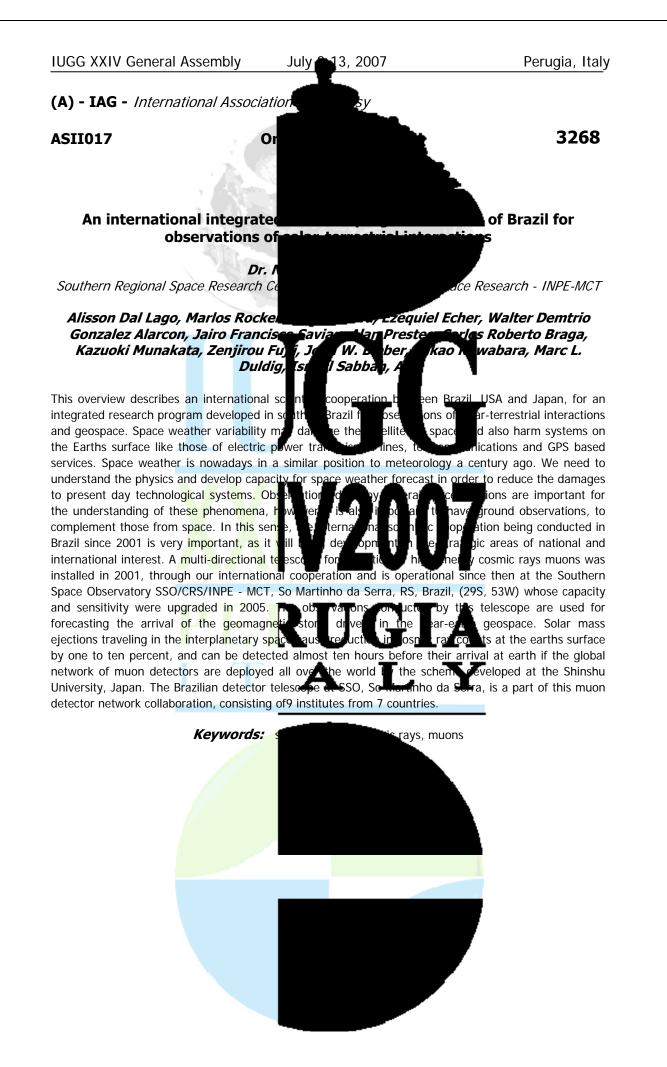
of Russian Academy of



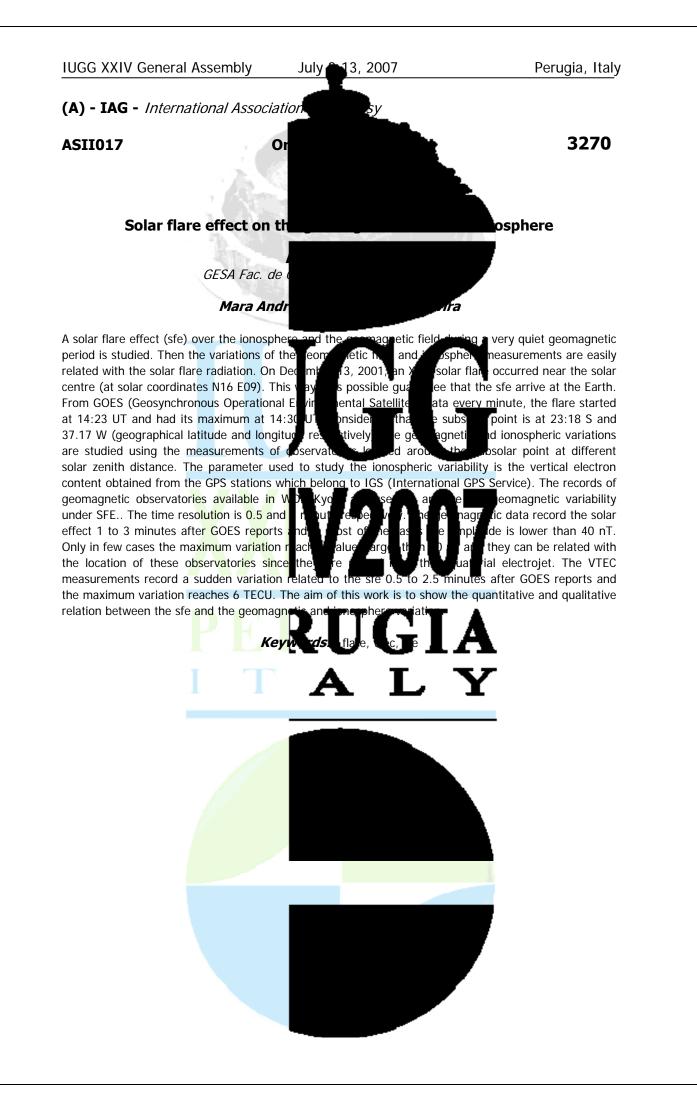
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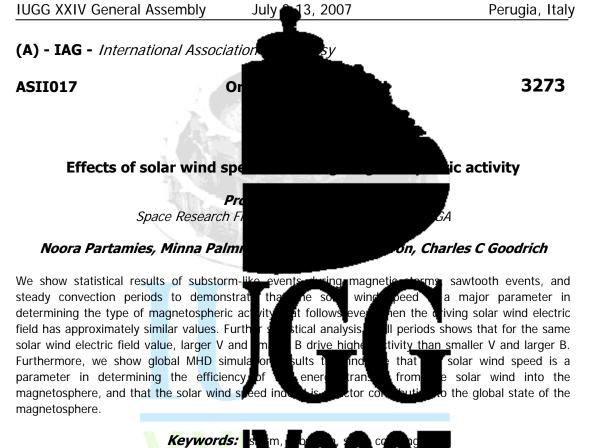




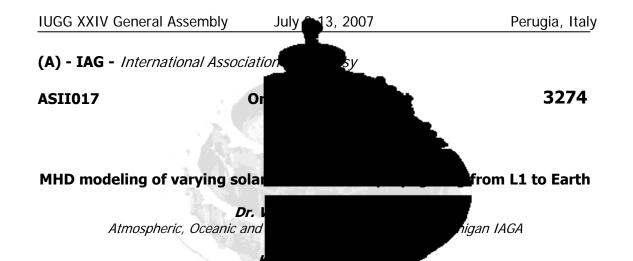












In recent years, significant progress has be the Sun to the Earth's orbit and its interaction massively parallel MHD models with adap require knowledge of the solar wind param from the Earth where the inflow boundary of are typically measured in the vicinity of the To date, only limited attention has been give L1 to the Earth's bow shock. If the plasma flow

distance would be covered by solar wind in about an hour, and the flow parameters measured near the bow shock would be the same as at L1. There are numerous techniques developed for describing the transport of solar wind plasma through t methods involving minimum-variance and understanding what might happen with the interspersed, and various SW and IMF disc plasma. To address this, we therefore pres of the solar wind and IMF disturbances from the

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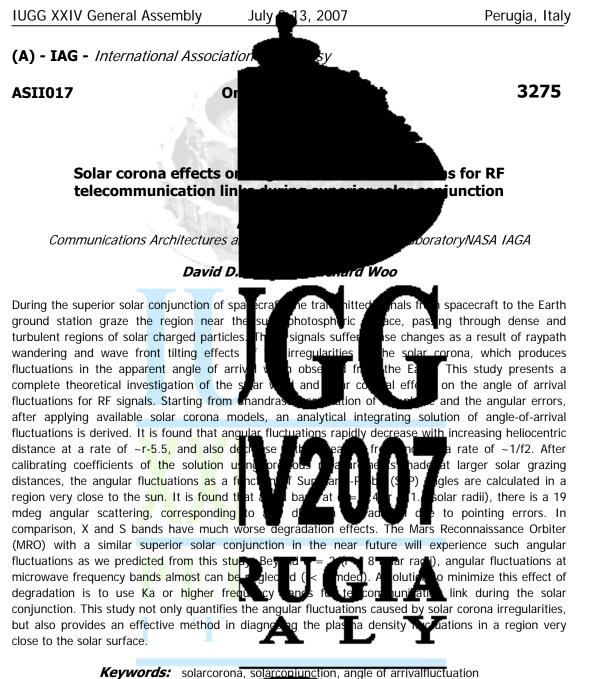
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plan wind propagation from sphere by using global hagnetos heric models, however, nd IMF) at about 35 Re upstream n reality, the solar wind conditions ately 200 Re upstream. varying solar wind from eady, then this 200-Re

tic propagation to the ever, provides a clear wer and faster flows are

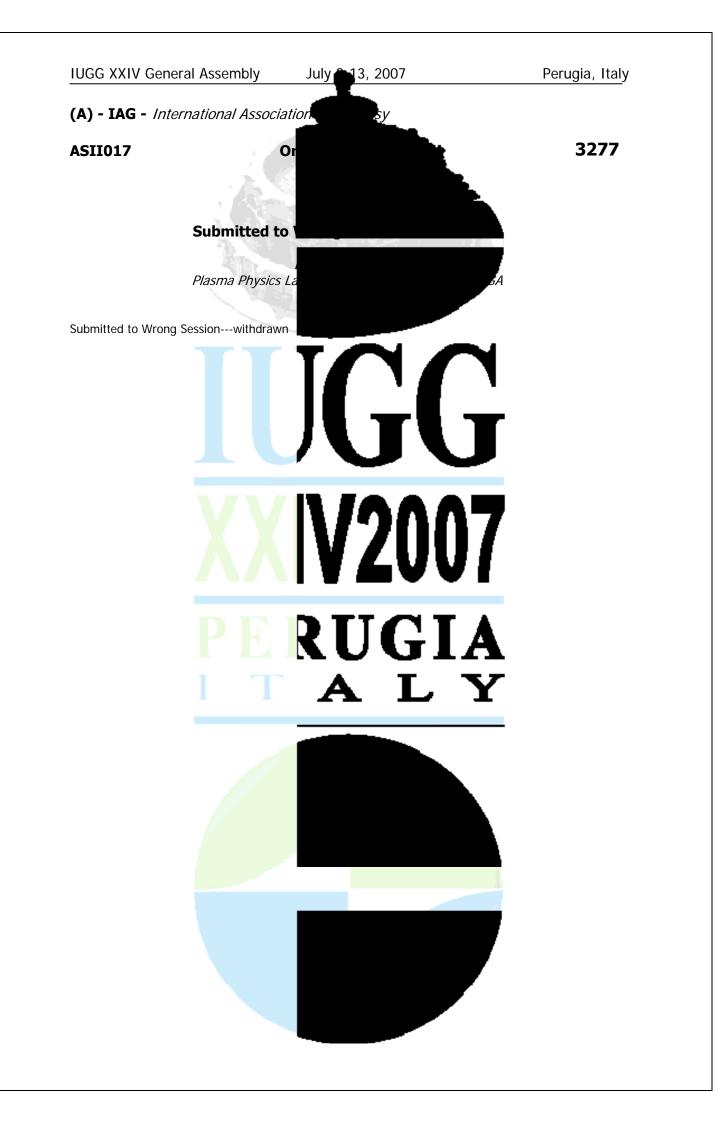
ough the slower ambient the realistic propagation e Earths bowshock and magnetopause.

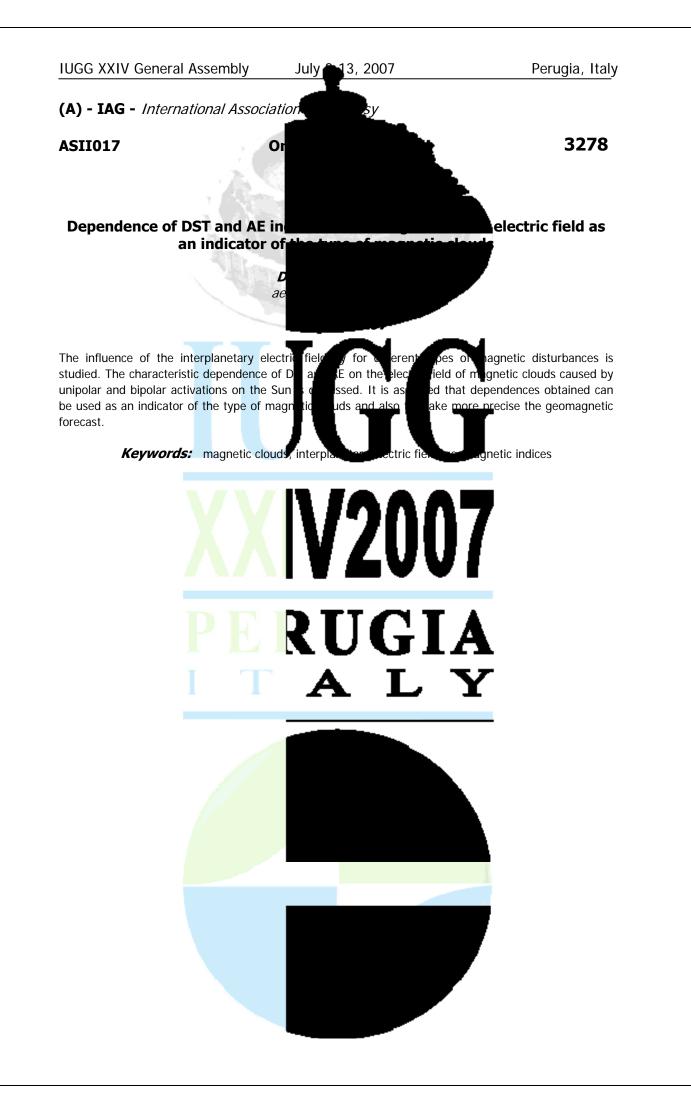


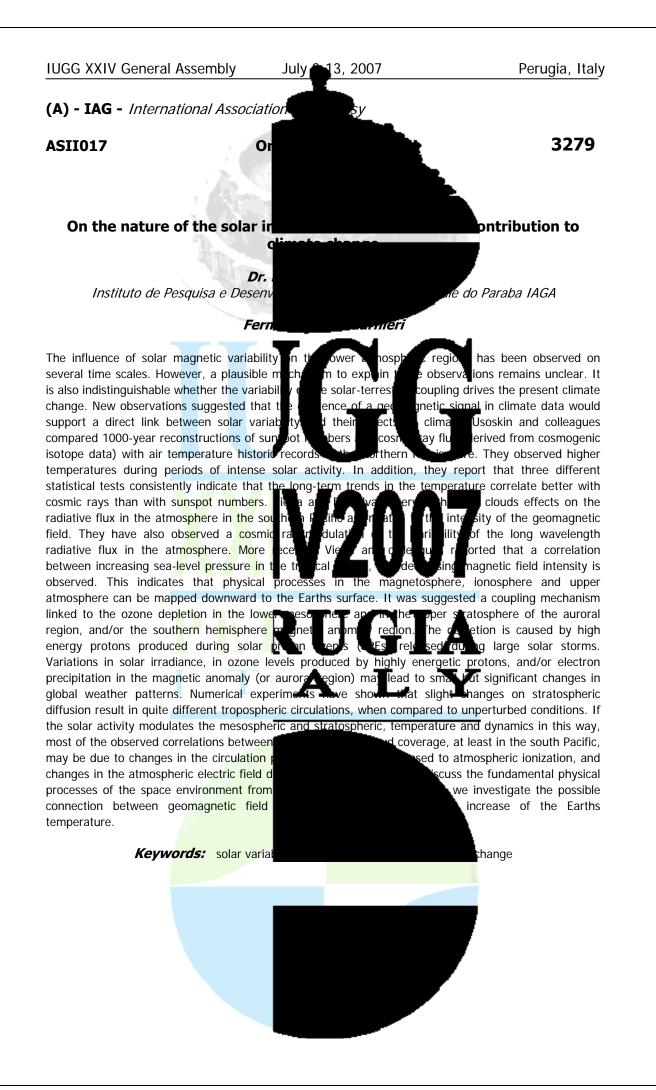


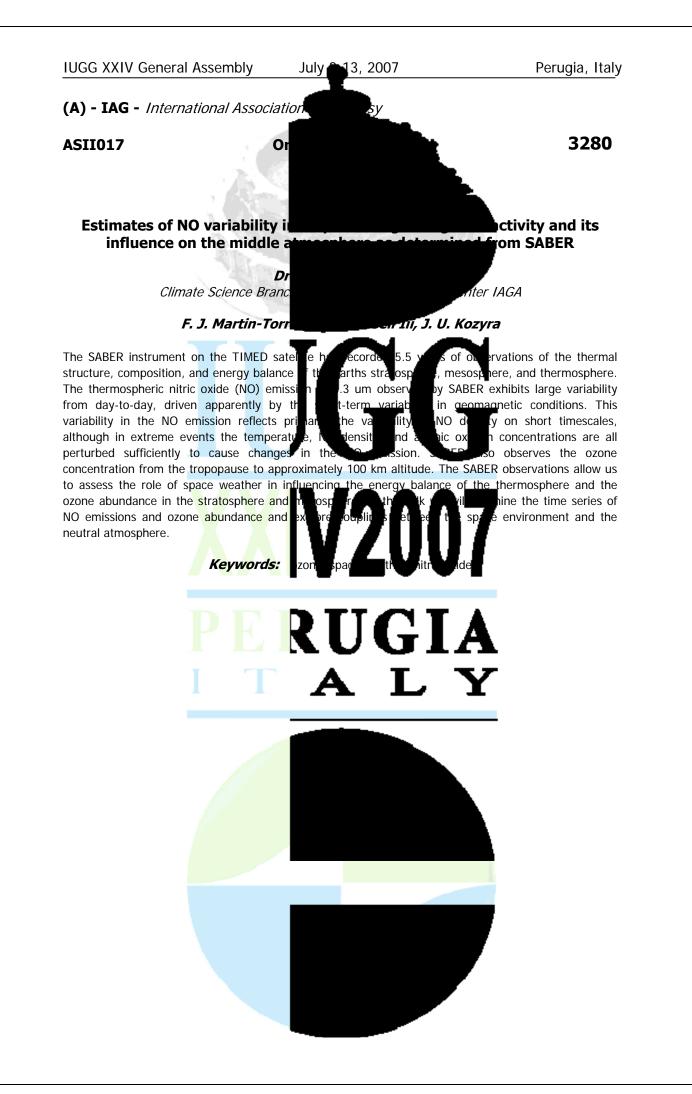


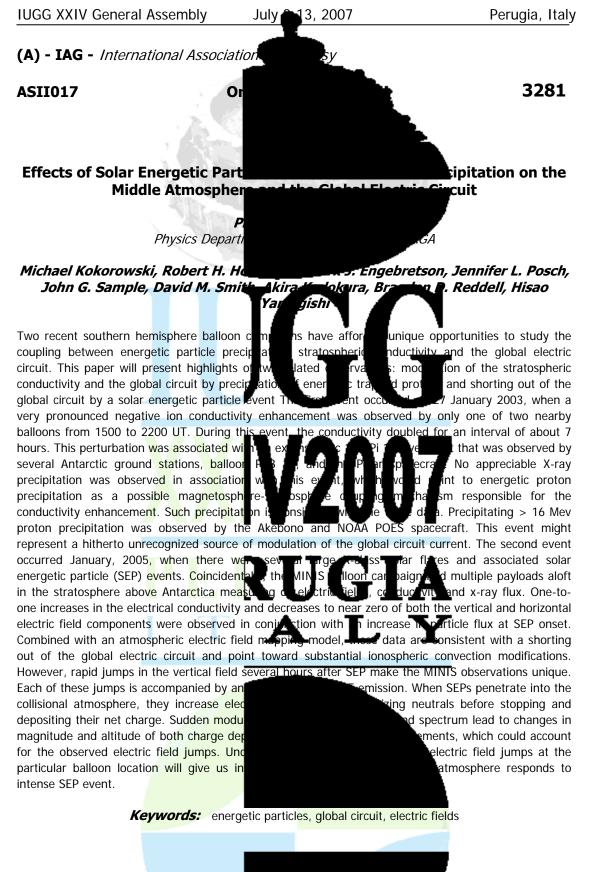


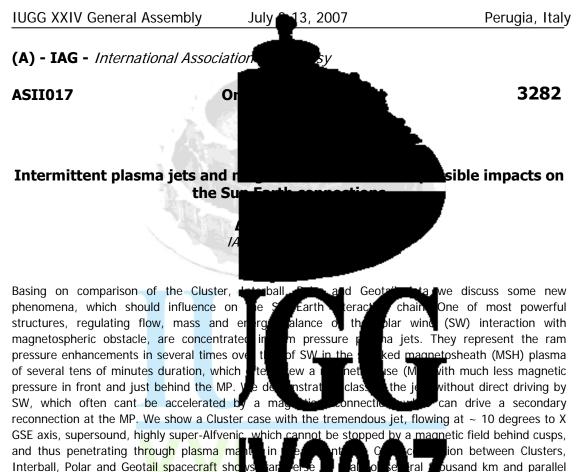












Interball, Polar and Geotail spacecraft sho scale up to few RE. The jets looks to be u removing of the momentum excess in MSH hfte approaching boundaries. One of a mechanism by MHD infinite rise of piled-up magnetic field lines in magnetic pressure can become dominating even in the regions with dominant ion pressures, providing an effective interface between moving MS

the Alfvenic collapse also for the boundarie that such powerful intermittent phenomena the studied for accounting of the mass, momentum and energy flows in the chain of the Sun-Earth interactions. This work was supported by ISSI and NTAS-03-51-4872 and 0 1200008-8050 grants. interactions. This work was supported by ISSI and

Keywords: sun earth connections, strong plasma jets, alfvenic collapse of barriers

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flow balance (~ 30%),

noving plasma in front of

fvenic collapse- predicted

face. Finally we suggest

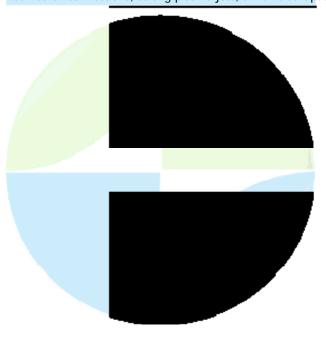
S. We discuss implementation of

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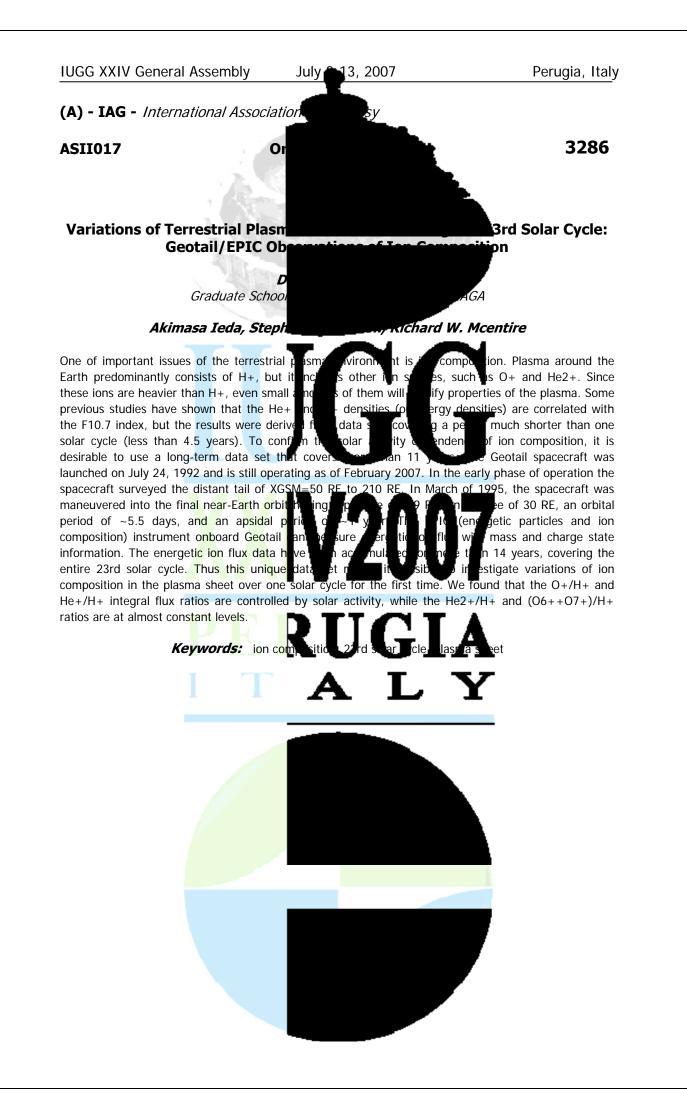
3D transverse flow disturbances. The rising



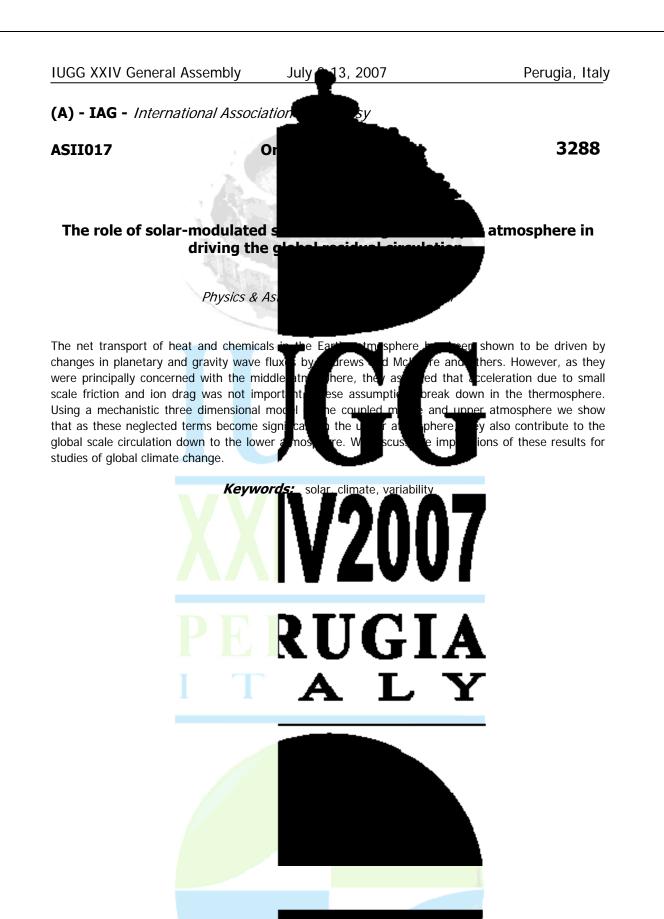


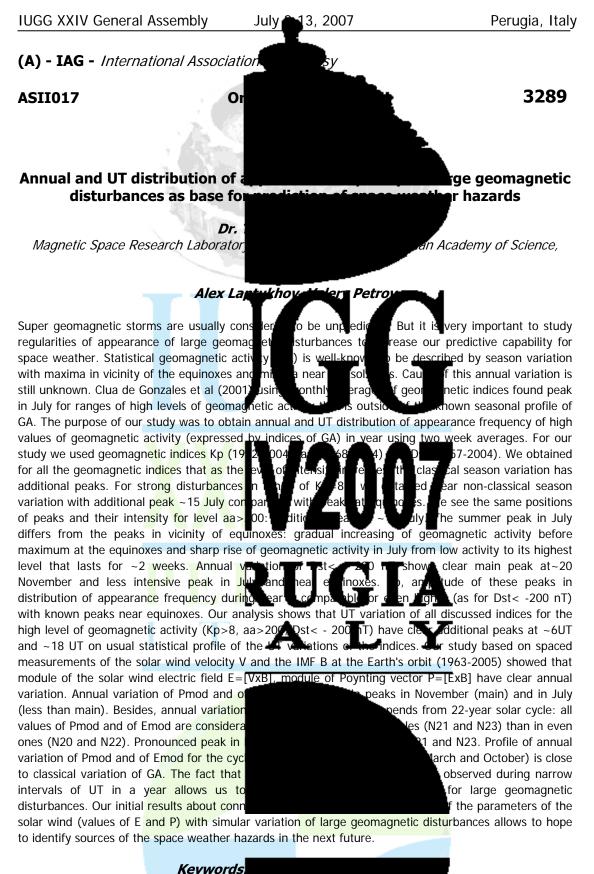




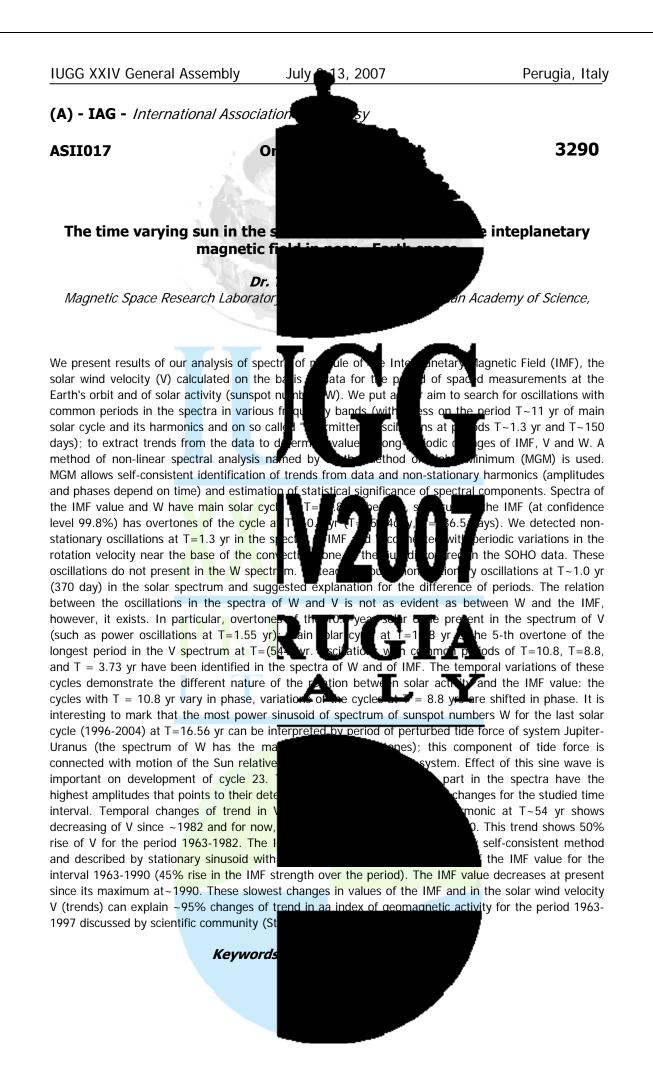


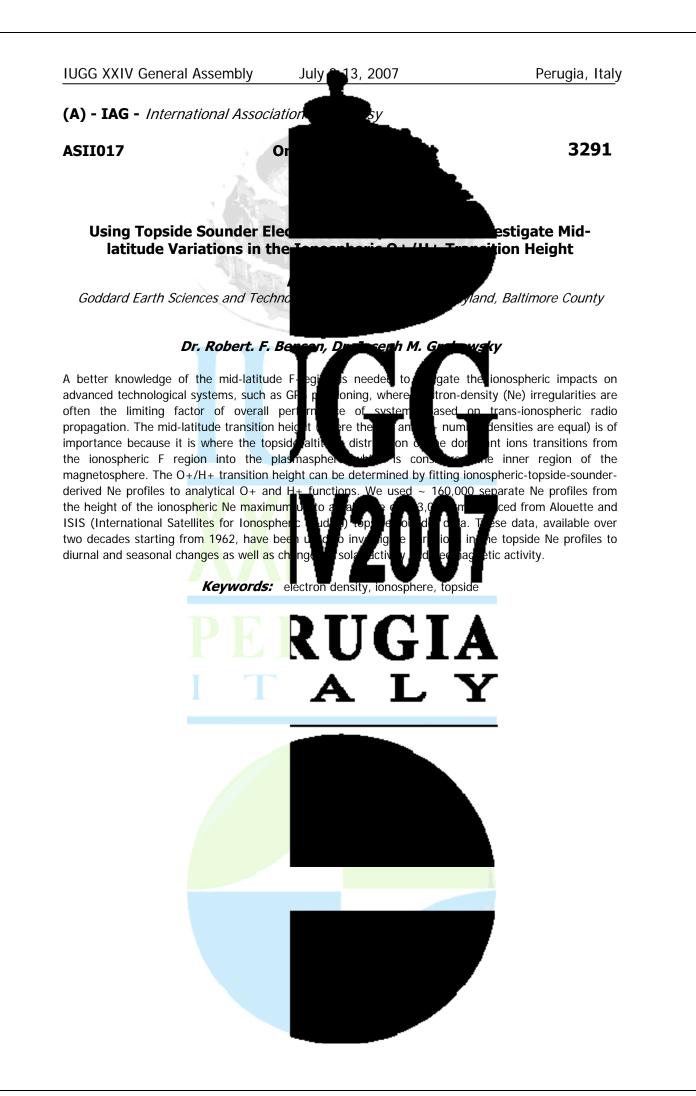


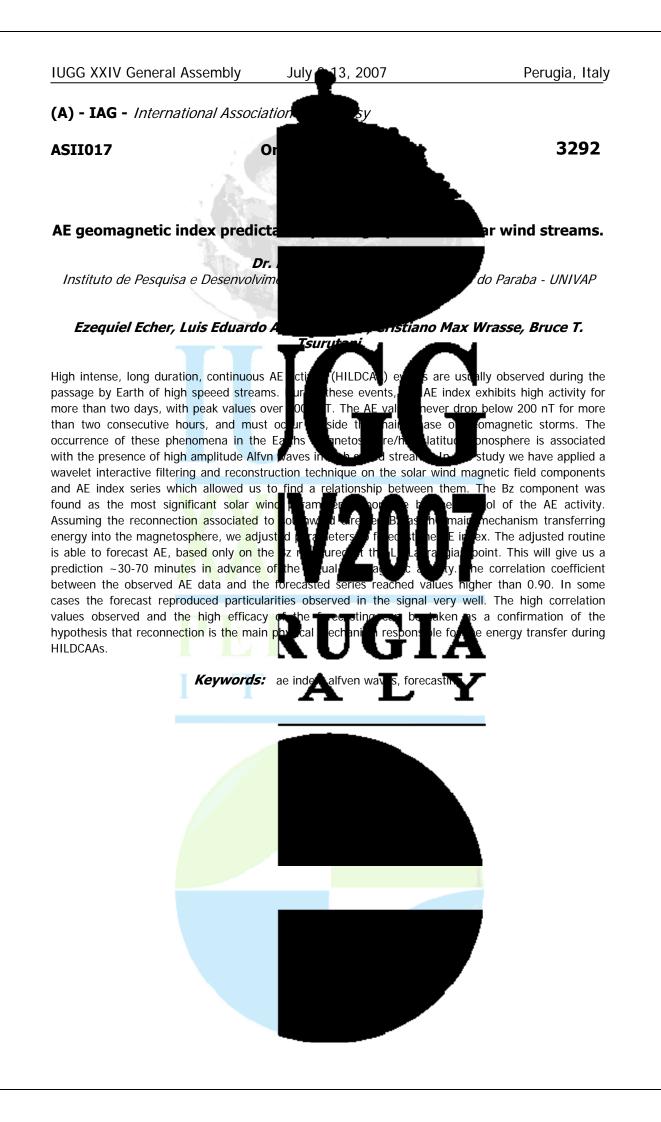


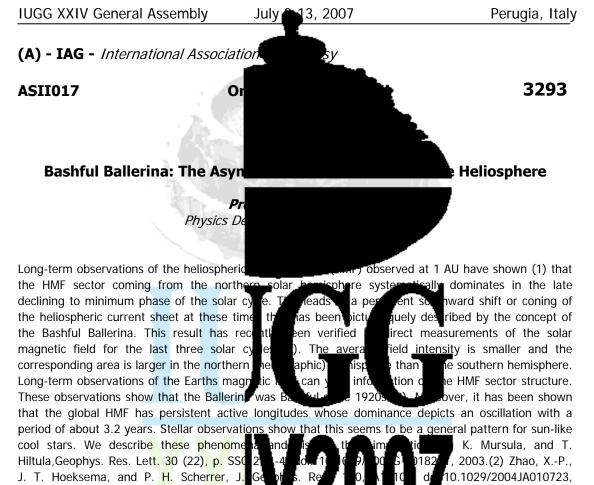


Keywords





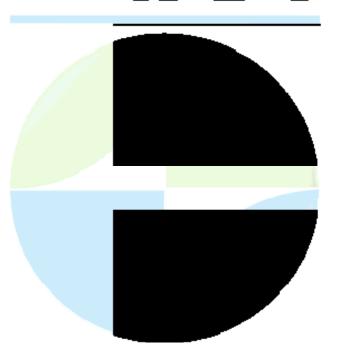


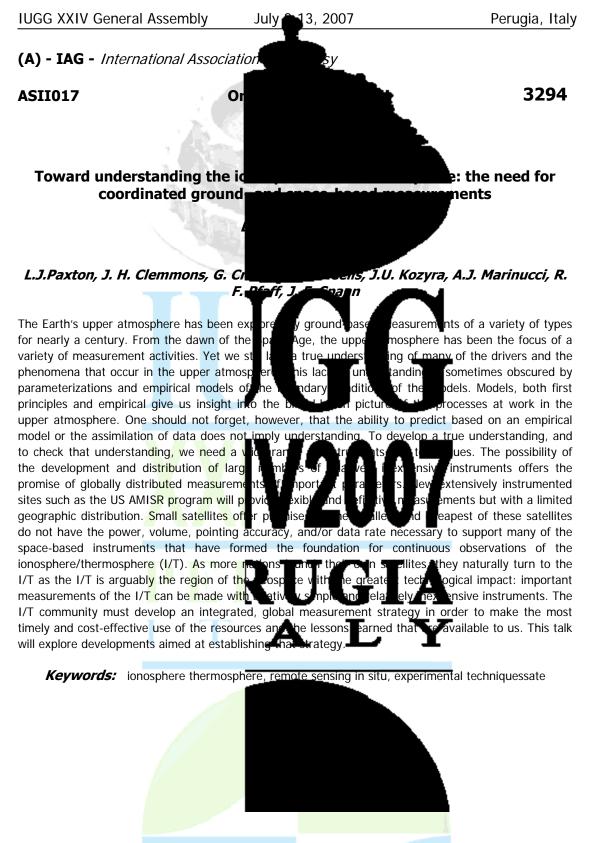


2005.(3) T. Hiltula, and K. Mursula, Geo 2006.

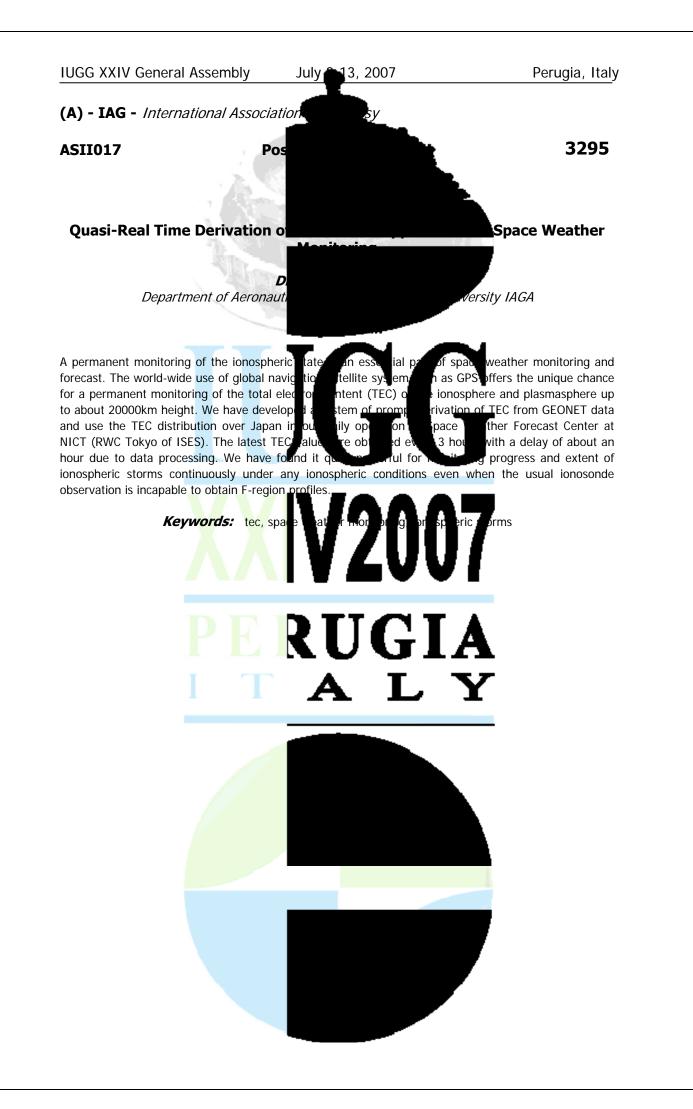


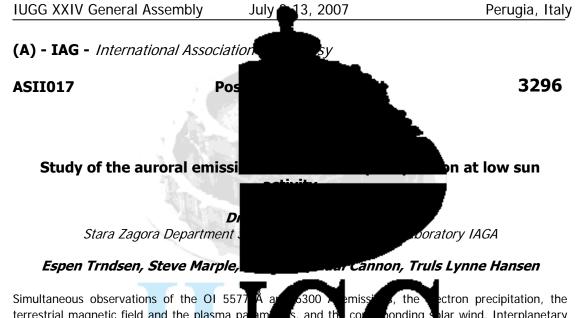
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terrestrial magnetic field and the plasma pa Magnetic Field and geomagnetic activity ind order to study the Sun-Earth interactions u have been obtained from the All-Sky Image Imaging Riometer for Ionospheric Stud information about the precipitating electrons with

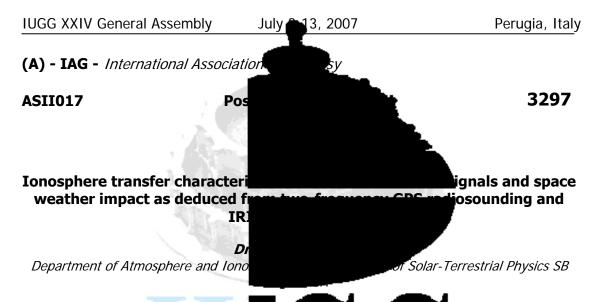
heights centered at about 90 km. The magnetic field components have been measured by the Andenes magnetometer (69.3N, 16.03E). The essential ionosphere parameters have been acquired from the measurements of the Digisonde, situated spatial and temporal evolutions of the terrestrial magnetic field has been obse geomagnetic activity changes has been st ldi the ALOMAR eARI Project, EUs 6th Framew

and the co a near the S iet condition posit at oisj 'in the

onding splar wind, Interplanetary cycle minimum have been used in ages of 5577 and 6300 emissions es (69.3N, 16.03E). The R, An (69.05N, 20.79E) gave Finlar x100keV and deposition

rrelation between the lectron fluxes and the here to the solar and der a project, part from

Keywords: aurora, particle precipitation, quiet conditions



## Edward L. Afraimovich, ich. Tatarinov uri . asuk vel

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Continuous improvements of VHF radio te applied importance to radio astronomy. VH pulsars. Nowadays huge low-frequency rad MHz) are being constructed to record puls solar radio emission intensity at fixed frequencies a other methods of monitoring of coronal mass ejections. In order to extend the dimension of observable solar radio corona they endeavor to use

interpretation of the ground based radio t distortions of radio astronomical signals at and navigation systems (GPS, GLONASS, parameters is a built-in function, in pres Int characteristics has not been appropriately work model IGRF-10 and values of ionosphere altimeter measurements. The obtained v characteristics of phase delay, Faraday and initial parameters of radio astronomical signals (here ionosp for different levels of geomagnetic and solar activity

as well.

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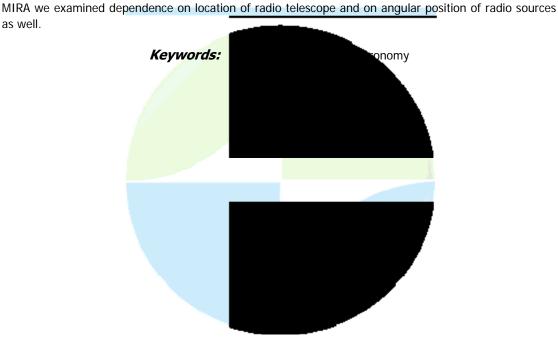
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de due to growing scientific and ations of the sun and DFAR, 240 MHz; MIRA, 80-300 listance. Registration of very important along with

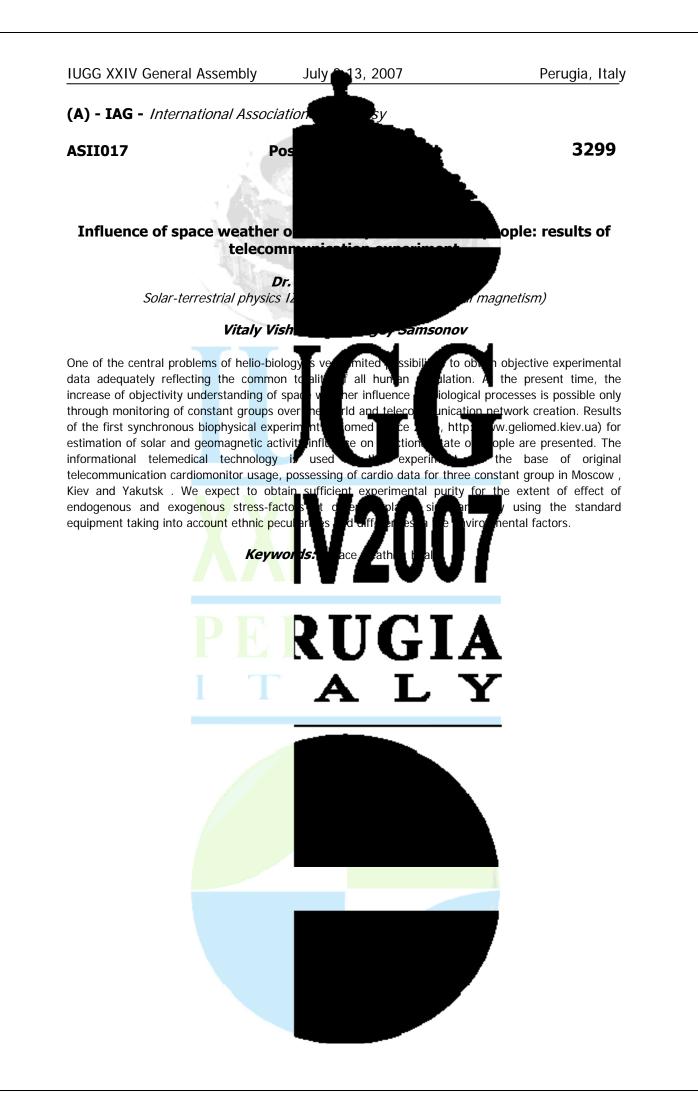
frequencies of VHF band. At the account the possible Intrast to modern radar hstruction of ionosphere of ionosphere transfer d a method and software

ou for calculation of the ionosphere measure of rotation RM, and the measure of dispersion DM for specific experimental and space weather conditions. We used the ionosphere model IRI-2001, magnetic field from GPS and satellite peduc were recalculated into Γ and rund departion and polarization bdul changes. We proposed the relevant method of ionosphere corrections permitting to reconstruct the ere). In the For we made calculations On the inples of ra tio telescopes LOFAR and

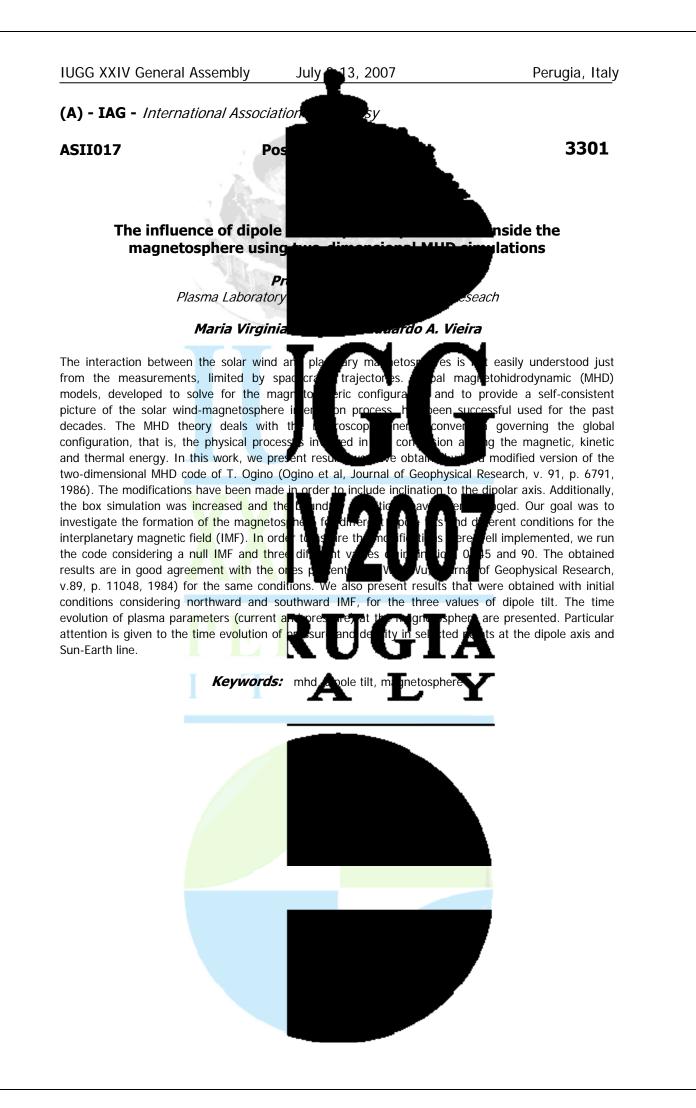
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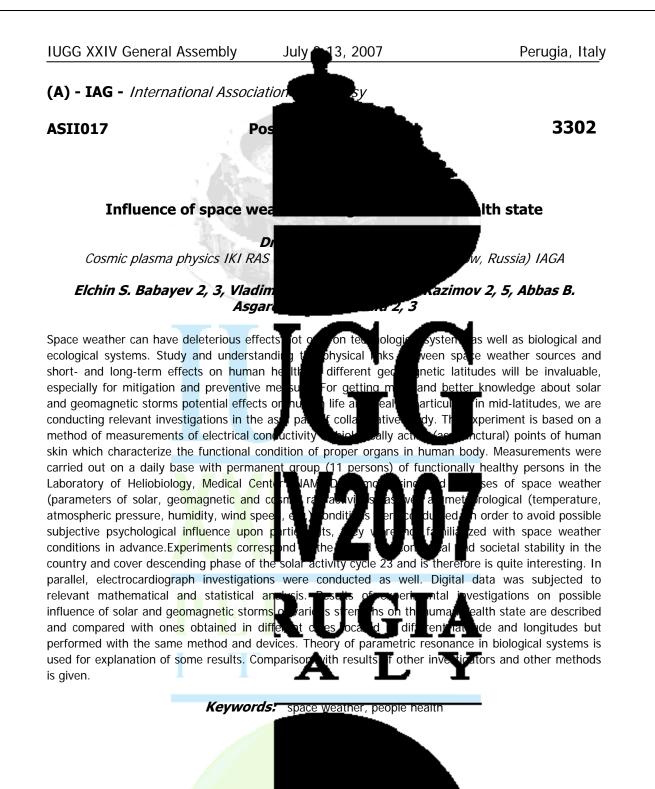


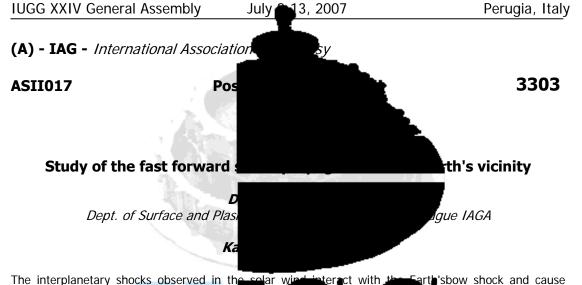












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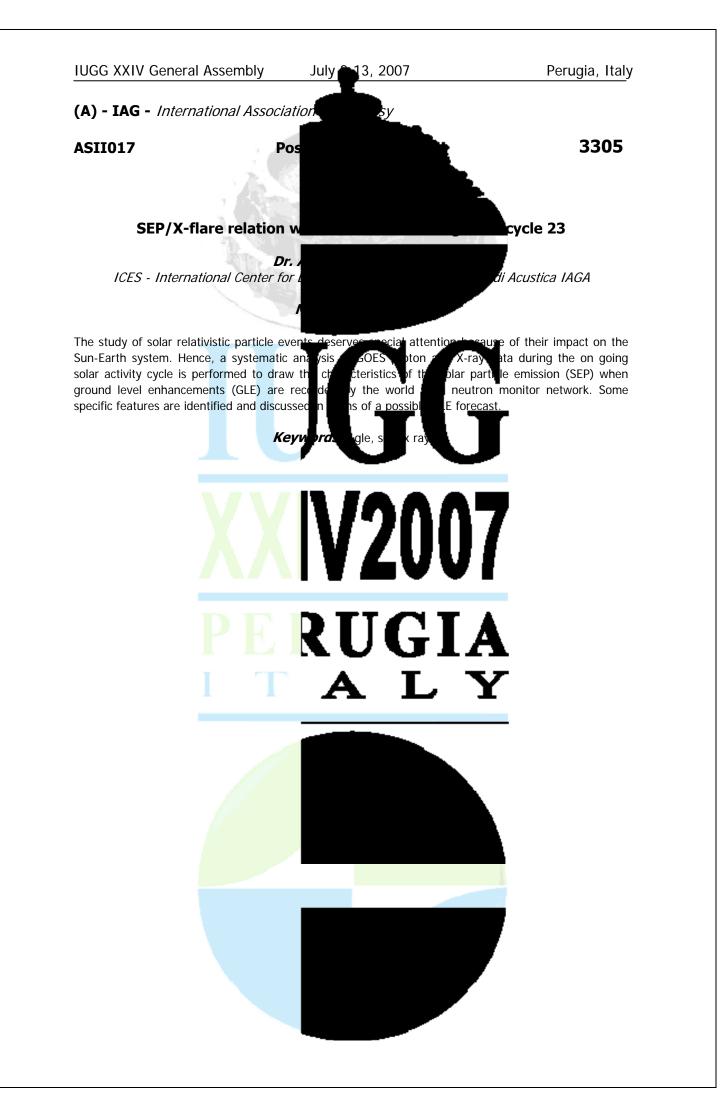
The interplanetary shocks observed in the solar wir pressure pulses on the magnetopause and ts r waves into the magnetosphere. Using a set of with different solar wind parameters magnetosphere. The shocks were recorded i Wind, IMP-8, SOHO, Genesis, Interball-1, G evaluated. Further in the Earth's magn osi Cluster, Interball-1, and GOES series sate ites. The propagation velocities of observed disturbances indifferent parts of the dayside and near-Earth's magnetosphere, depending on the orientation of the interplanetary shock normal. Also, we will try to explain observed structuring of the shock data.According to our results, the shock s especially more closely to the Earth, than i places of the dayside magnetosphere. Su magnetosphere is compared with available

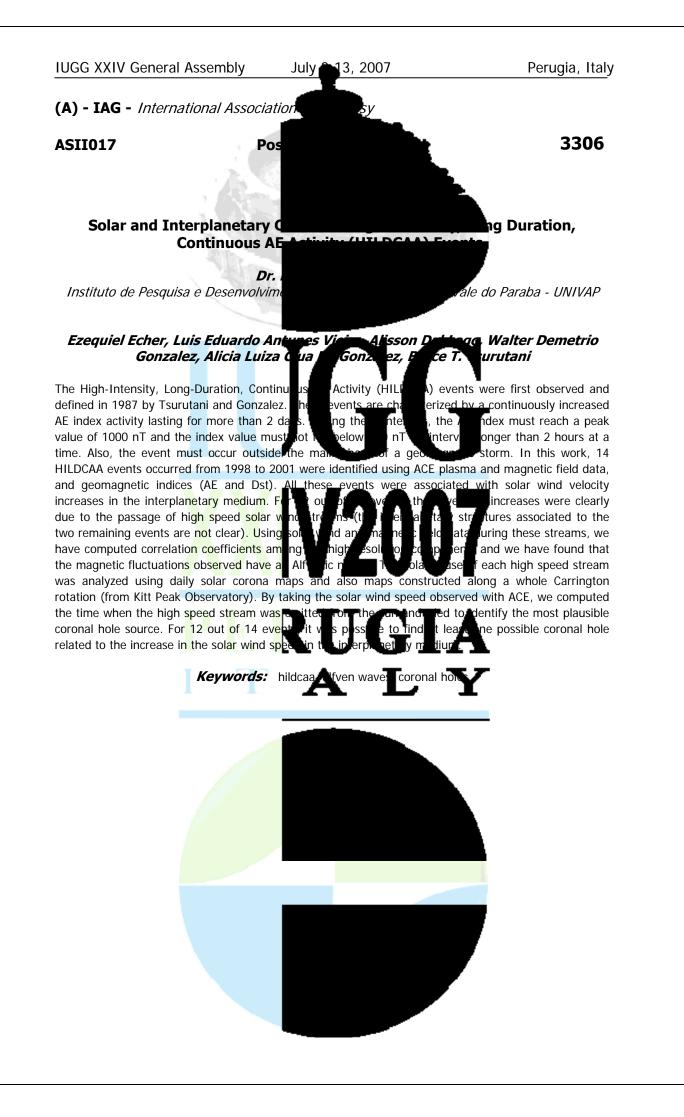
arth'sbow shock and cause unch different types of the rvations rom 1995 till 2006 years propagation into the Earth's eous<u>ly by several satellites asACE</u>, arameters could be well eir bas able a from Geotail, Polar, hparison and tracing of

> lution magnetospheric Earth's magnetosphere, es vary even in different front inside the Earth's

Keywords: interplanetary shock, earths magnetosphere







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(A) - IAG - International Association

## ASIII018

## Symposium Magnetopause and magnetosh boundary dynamics (Divisions

Convener : Dr. Christopher Owen

The magnetopause and its boundary layers from the solar wind into the magnetosph importance to magnetospheric physics. d

spacecraft missions. These observations observatories. New progress in simulations, HD. physics of reconnection and boundary layer invites contributions on a wide range of n structure of the magnetopause current lay signatures of the various forms of plasm magnetopause and their relevance to solar wind disturbances with the magnetospher The boundary layer formation at the magnetopause and

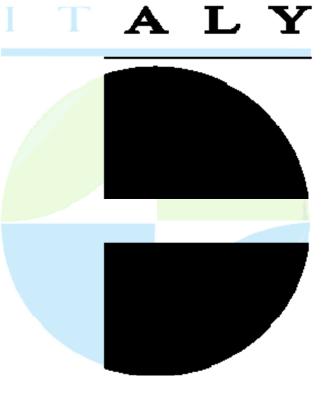
dynamics are also highly relevant. Multi-spacecraft and/or ground based observations which relate the magnetopause signatures to phenomena observed inside the magnetosphere or in the ionosphere are particularly welcome, as are modelling and

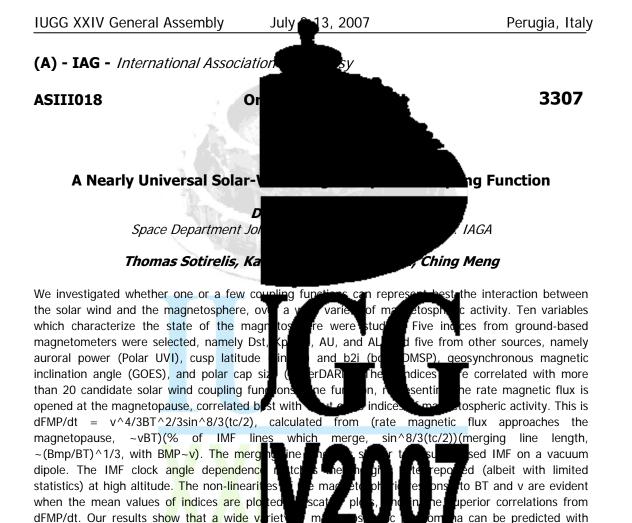
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## tion, diffusion and

omentum and energy transfer rocesses are therefore of central e regions continue to be returned from ations from ground based tical advances allow the d the as never before. This symposium ics, including observations of the and their transient variations, the reconnection, at the ma the interaction of solar pling, h, plasma diffusion and onne influence magnetopause

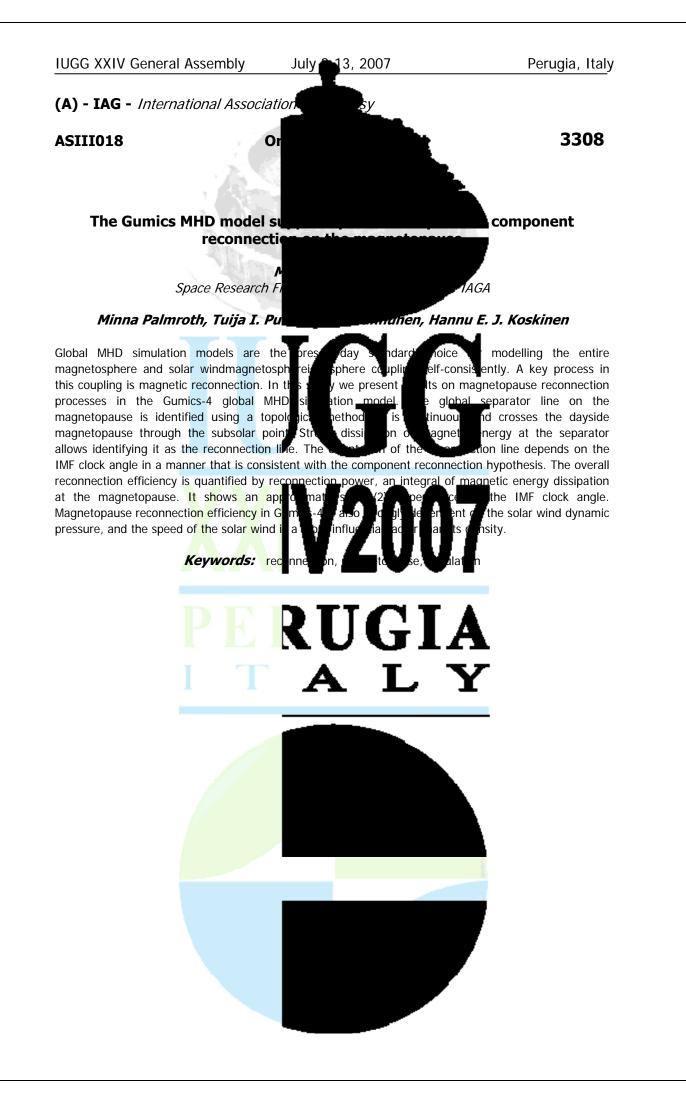
he observations.

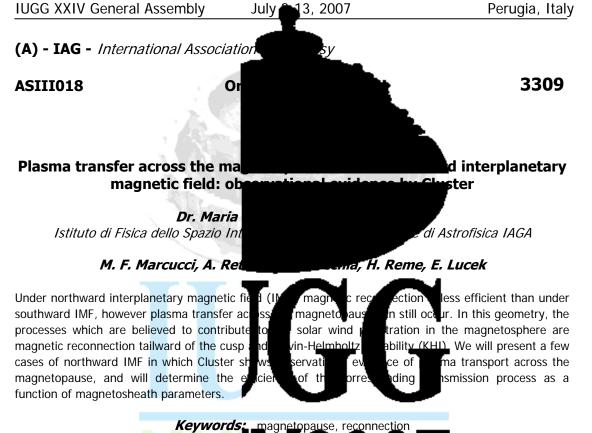




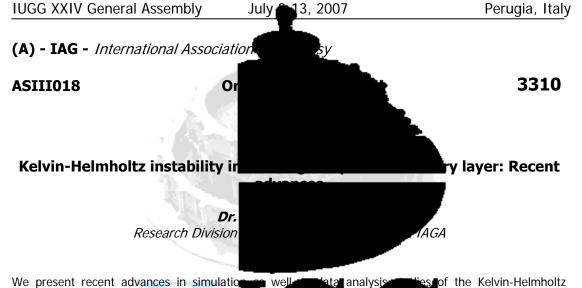
reasonable accuracy (r > 0.80 in several cases) ab initio, that is without the time history of the target index, by a single function, estimating the dayside merging rate.











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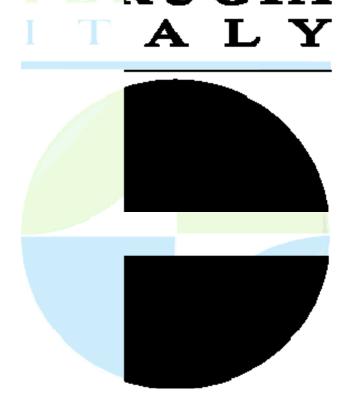
instability (KHI) in the magnetopause bouidary solar wind plasma into the magnetosphe simulations of the KHI conducted under va plasmas onto a closed portion of magnetos reconnection, (2) that a very large-scale v spatially rather than temporally, and (3) th role in energy transport from the boundary layer

analyses of Cluster and Geotail data, combined with simulation results, are that (4) vortices can roll up in both dawn and dusk flanks of the magnetotail for northward IMF periods. (5) that a current sheet with thickness comparable to ion inertia le that reconnection can occur in the vortex wind plasmas to the magnetosphere. Also (2D vortex structure) in the flank low-latitu еt

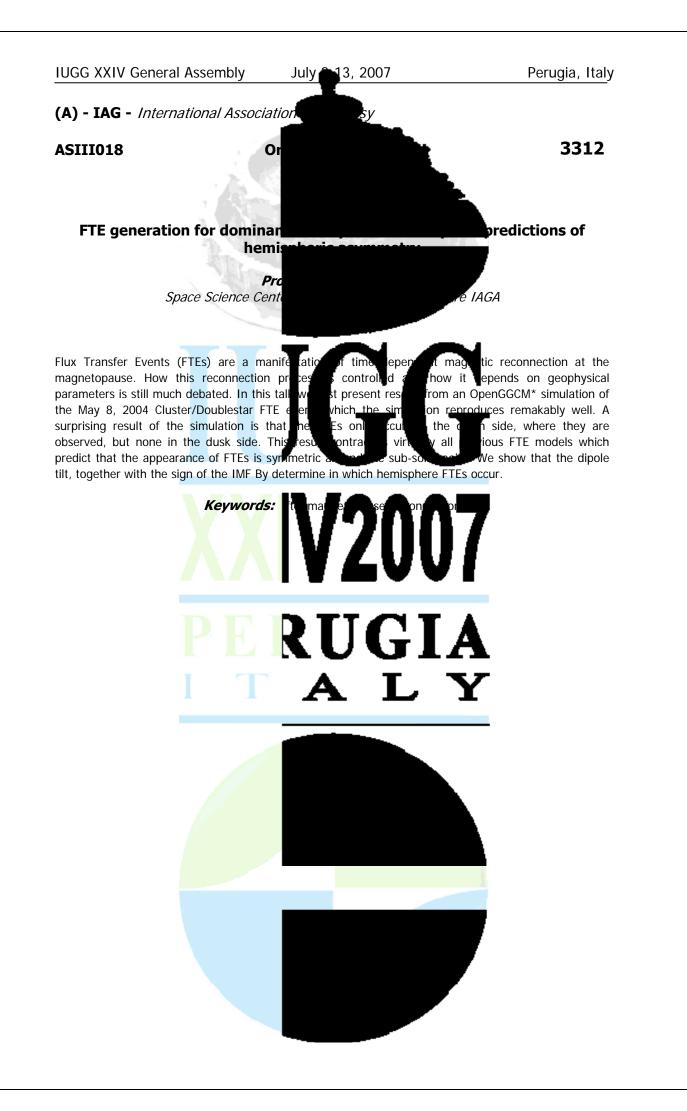
or efficient transport of édiato conditions. Based on 3D MHD v (1) that capturing of solar wind ur through KHI-induced magnetic quick when the KHI can grow d in r d-up vortices can play a t findings from in-depth

ed-up vortices, and (6) ng the transfer of solar allov hstruction of streamlines vations.

Keywords: magnetopause, kelvin h instability, plasma transport

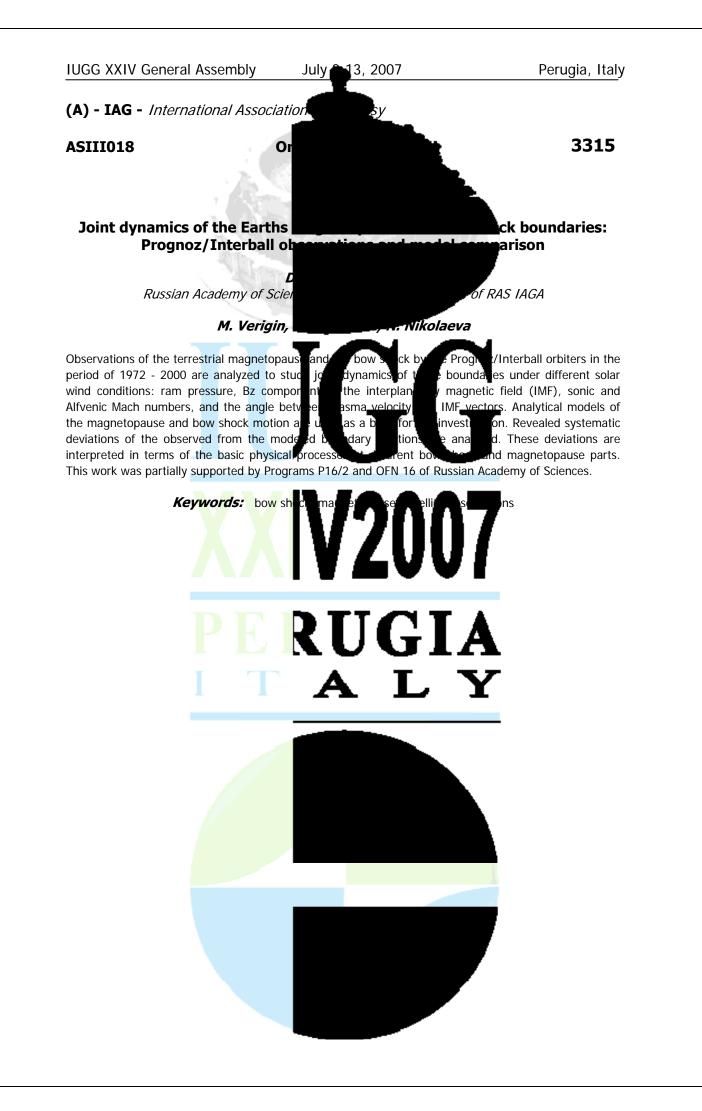


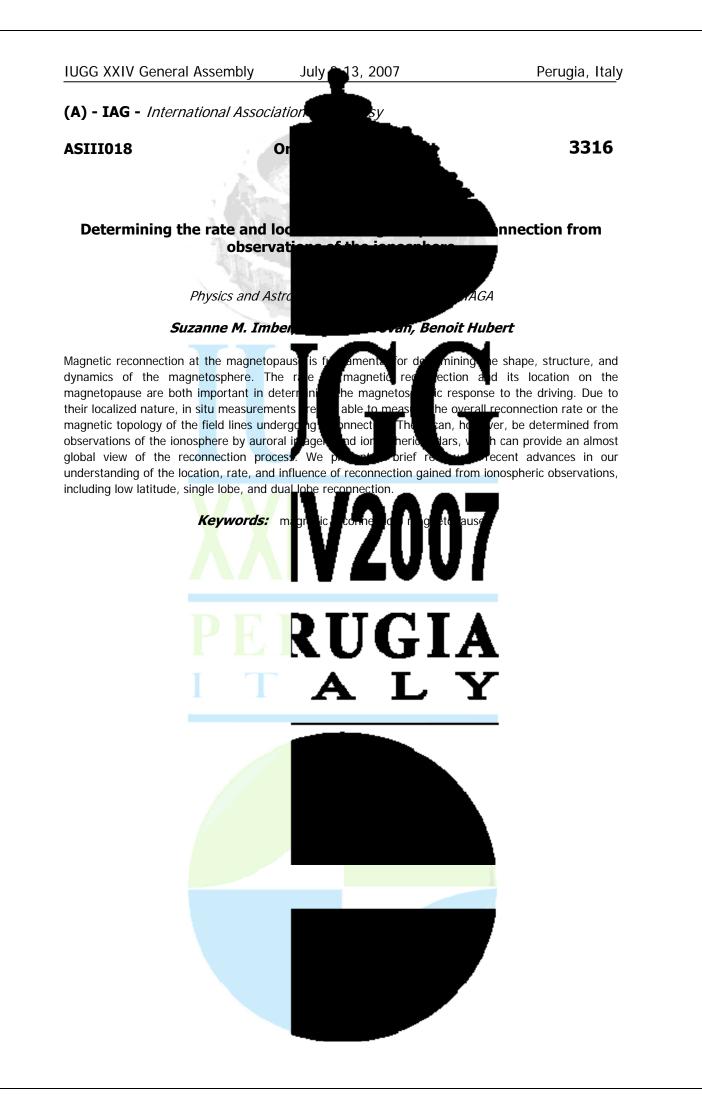


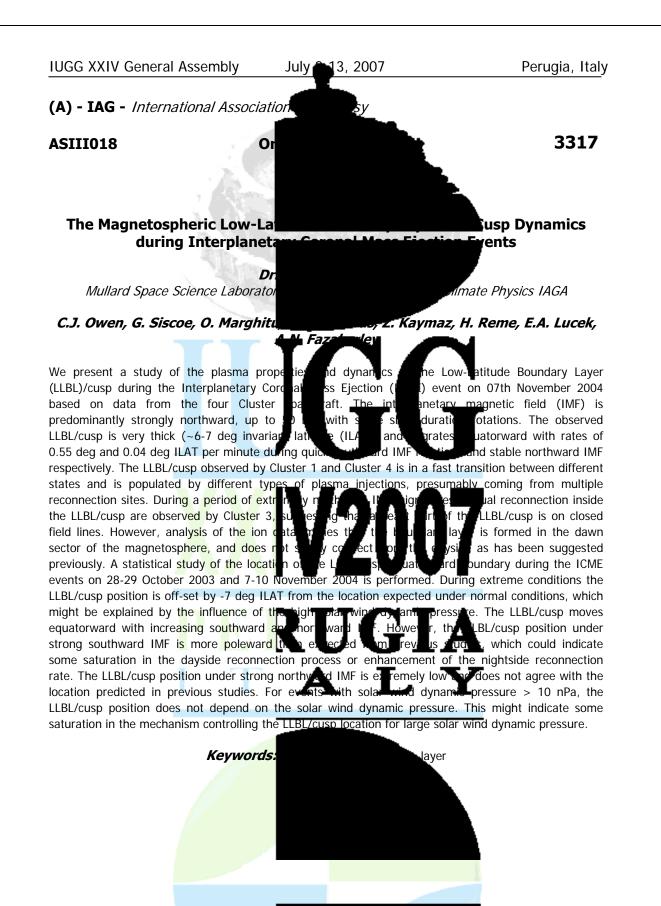


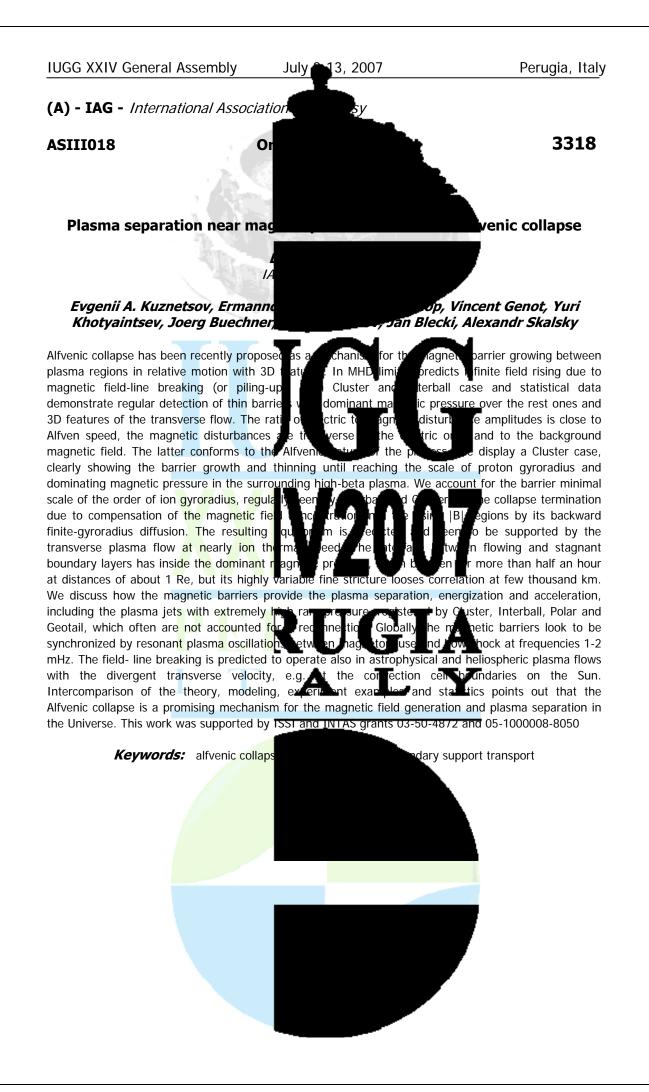


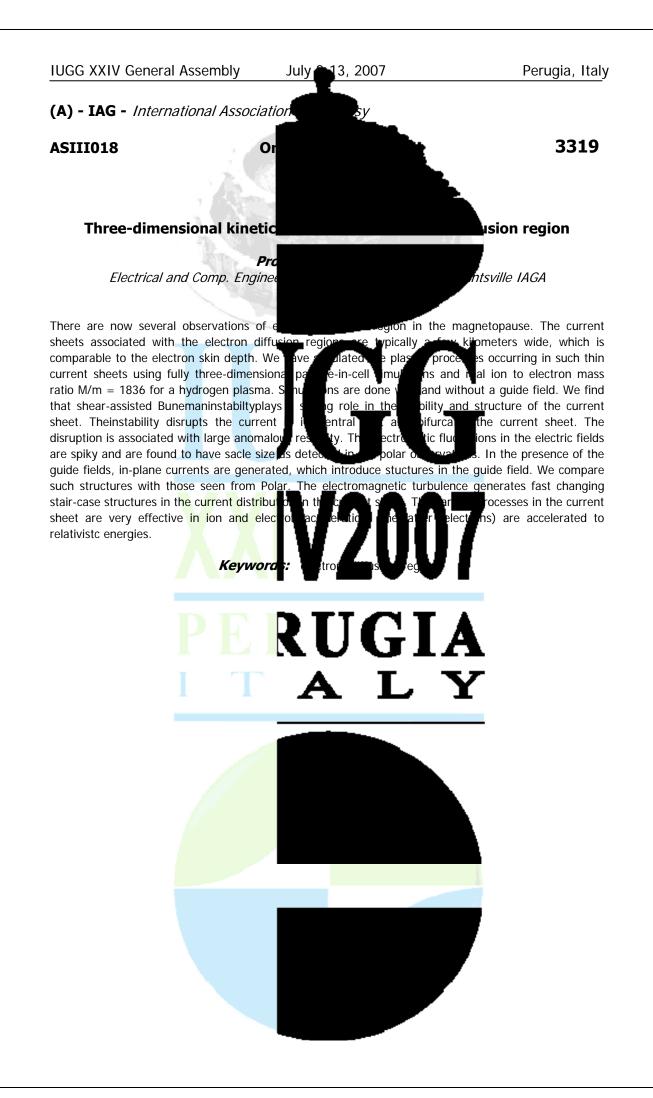


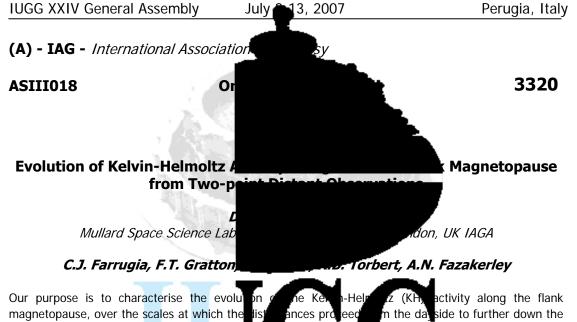












tail. We examine whether the adjacent bou da activity, is then subject to increased turbul towards the tail. We use two-point distant of latitudes, from GEOTAIL and CLUSTER, to uar two sites, in a period of northward interplanetary

while CLUSTER is tailward of the dusk terminator (19 MLT). We compare growth and power from magnetic field fluctuations as well as the thickness of the low latitude boundary layer. An estimate of the boundary layer thickness at each magnetopause, derived from an empirical "transition parameter") found between th both sites. At the tailward site, the bounda demonstrates the efficiency of the KH insta

ayer, expecte vels <u>and wh</u>e ons a th the i sifi eld. G

form as a result of continued KH it widens from the subsolar point agnetopause and at low sk flan KH activity between the of t on the dayside (15 MLT)

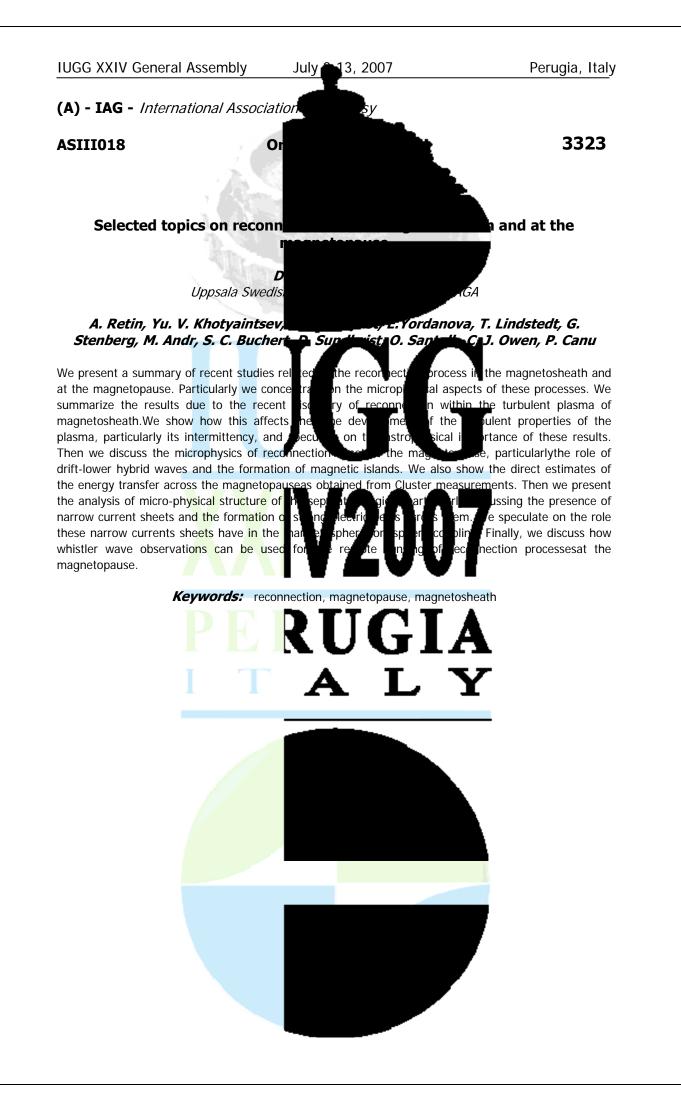
> mal distances to the ematic relationship (the electron temperature at and is thicker. This result

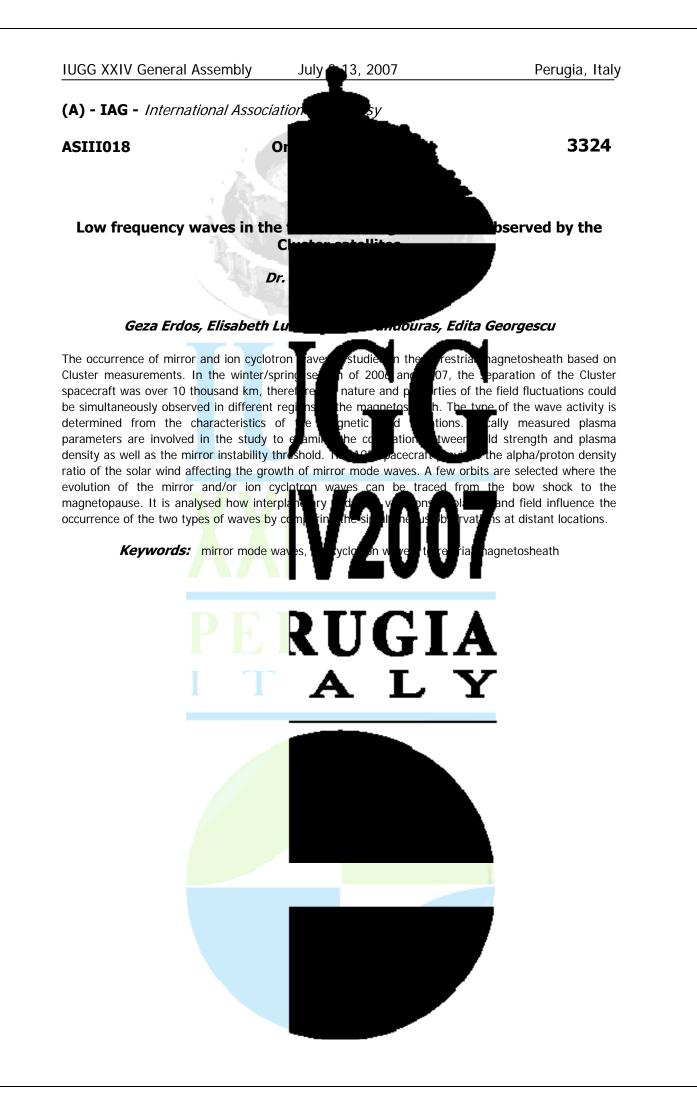
Keywords: magnetopause, boundary layers, mhd waves and instabilities



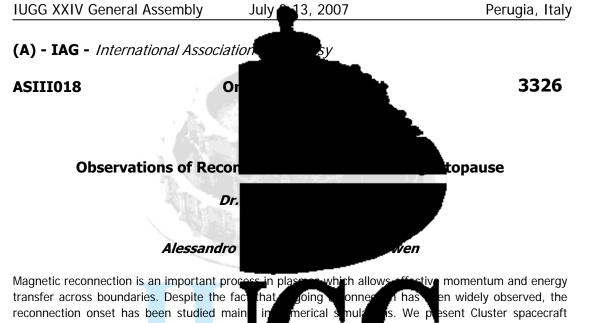












reconnection onset has been studied main in observations of several subsequent magne op guide field Bm~B0 which show the evolution fro stage the current sheet is narrow ~c/omegadi waves are observed at the current sheet of ges depleted plasma and increased guide (corp.) field

in plasmon which allows offer hat engoing to onner out has intermetical simulations. We prove crossings we density recent tangential to entional we has a this-literatructu gest insity then to mall ield simples and insite the

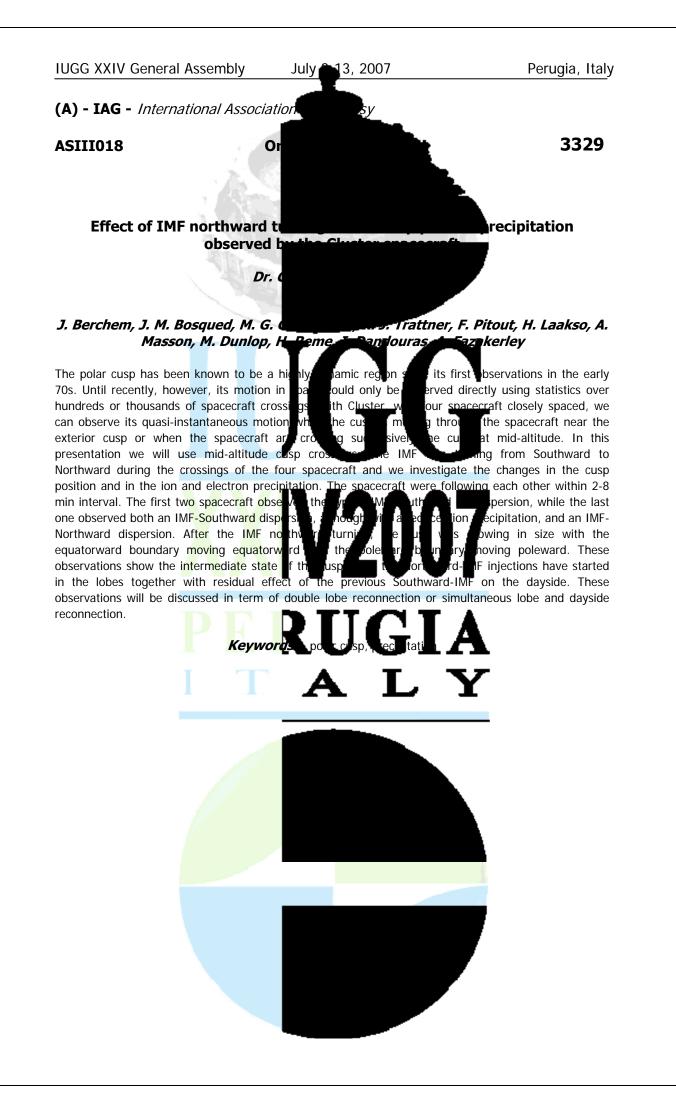
A has ven widely observed, the is. We present Cluster spacecraft lensity asymmetry and significant itional magnetopause. At the initial structure strong lower hybrid drift imall we magnetic islands with the second sheet, indicating the

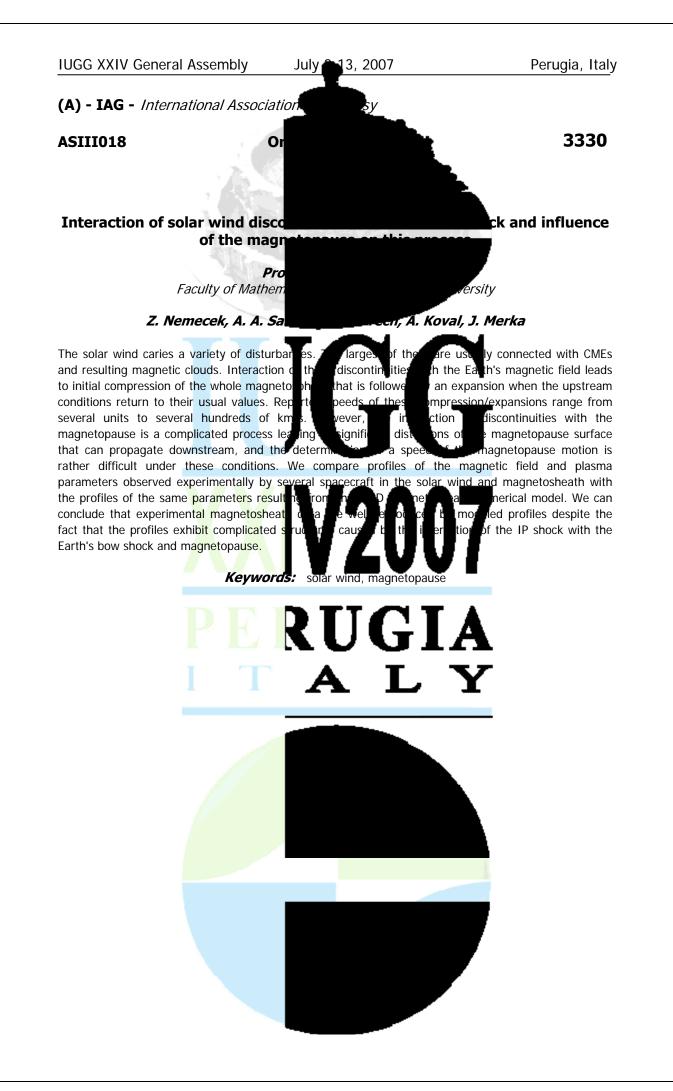
reconnection onset. During later crossings a much thicker magnetopause is observed, consistent with ongoing reconnection.

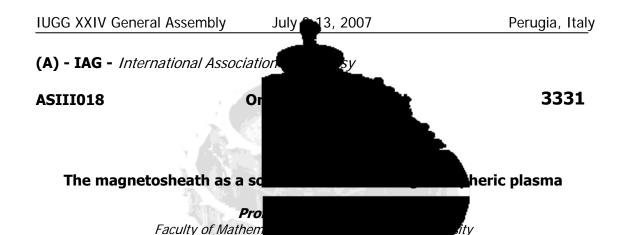












The solar wind is a dominant source of the magnetospheric origin have been identified well upstr

of these two regions - solar wind and magne psph studies tend to connect the magnetospheri their changes and a role of the magneto: general view of the magnetosheath being parameters are simply related to those in down to the magnetosheath bringing with j types of waves and the disturbed plasma come

the reconnection rate. Particles accelerated due to reconnection or magnetospheric particles on reconnected field lines again interact with the magnetopause. In this contribution, v studies and discuss the importance of the magnetopause. Since such studies requir tl sides of the magnetopause, the contributio

asma. On the other hand, particles of the of the bow s ated is n mena wi S pł is usually ne gion <u>of a q</u>u wind ped aet ontacť

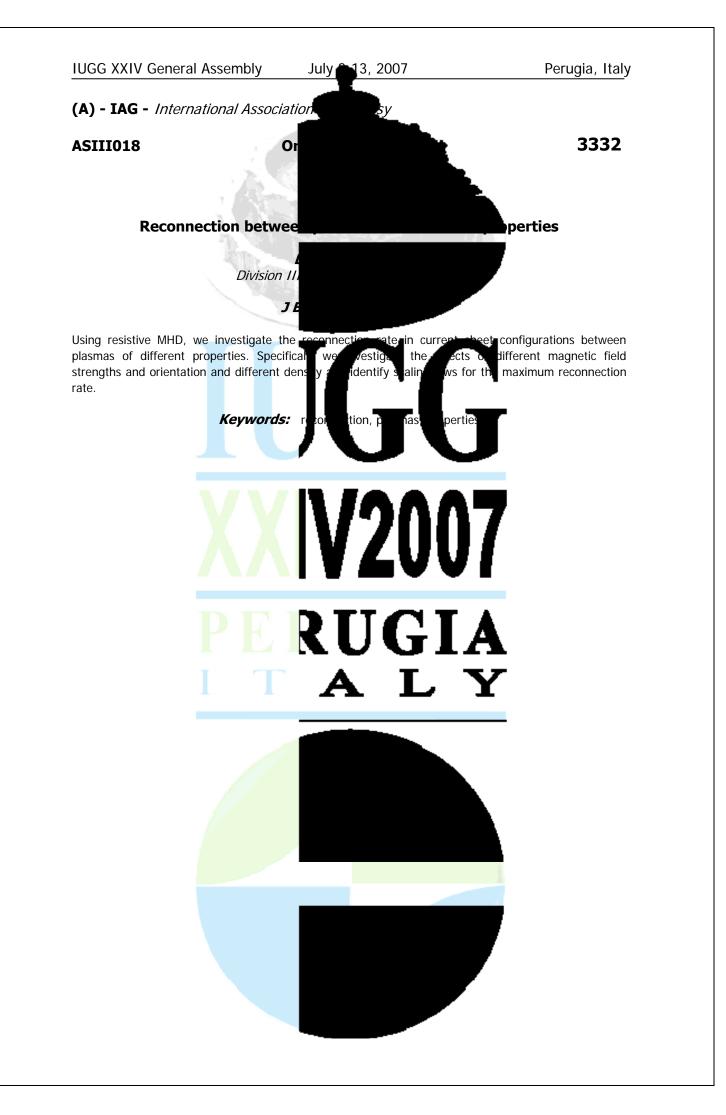
Although a mutual coupling etosheath, a majority of he m wind and IMF parameters and/or ed. This omission results from a low where the IMF and plasma fluctuations are blown ticles ese particles excite new hagnetopause. Pressure

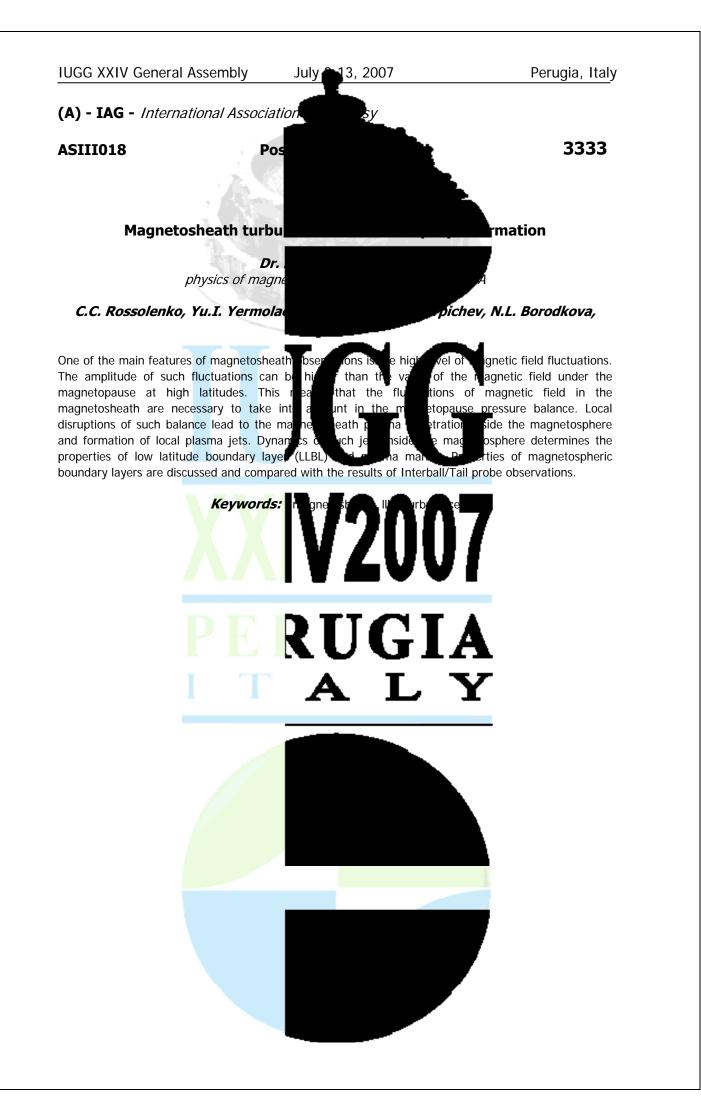
fluctuations distort its surface and variations of the plasma speed and magnetic field direction change

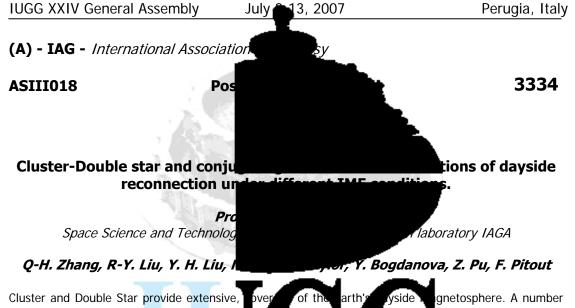
fores

level of fluctuations at ults of magnetosheath ma transport across the he environment at both uster observations.

Keywords: magnetosheath studies, imf, plasma







of events provide close conjunctions with ins cluster and Double star TC-1 spacecraft are in the cusp or magnetopause and the grou are typically also approximately conjugate v provides upstream information, while TC-1 situ space measurements, information is availab

instrumentation. Signatures of reconnection (FTEs and boundary layers), ULF wave signatures and other features of magnetospheric response, show corresponding, and often temporally related, ground signatures. Four key reconnection events a can be shown to be temporally induced FTEs are associated with poleward moving ground magnetometers and riometer bean which are simultaneously reflected in the Simultaneous reconnection signatures are seen under

tation at he te with Zhon on li<u>es unde</u>r ESR ra on ate v Zho hemis

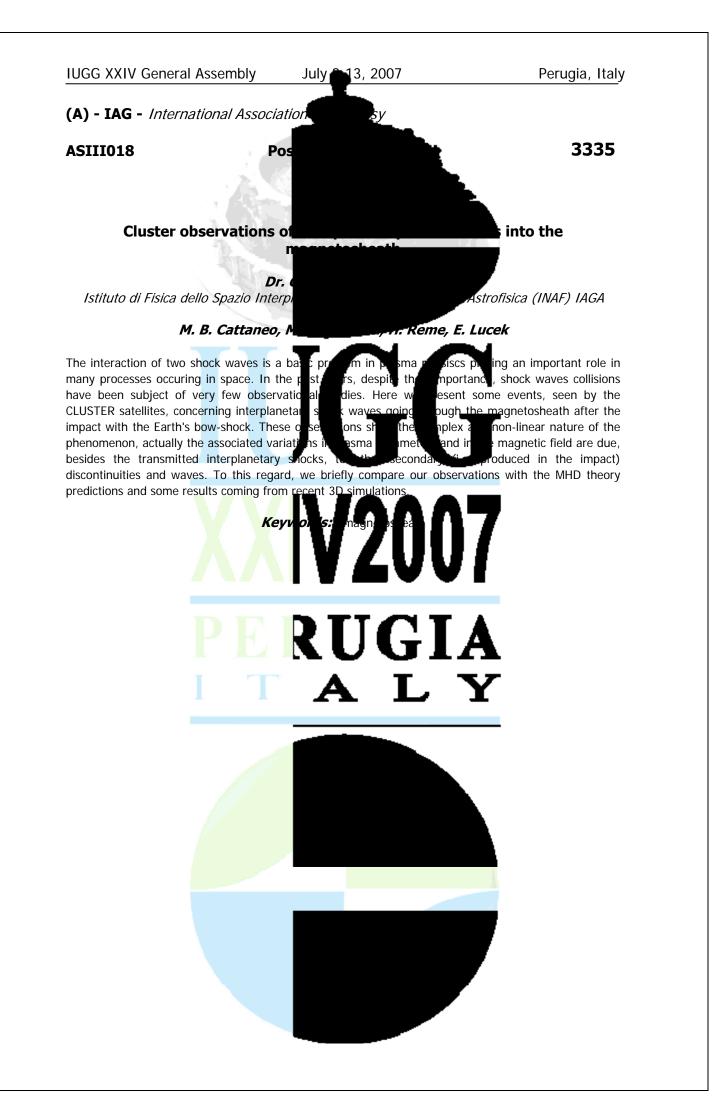
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ctic base Zhongshan station. The n when one or more spacecraft lie cusp position. These conjunctions some occasions, Cluster bard. an. li neral, apart from the in m a variety of ground

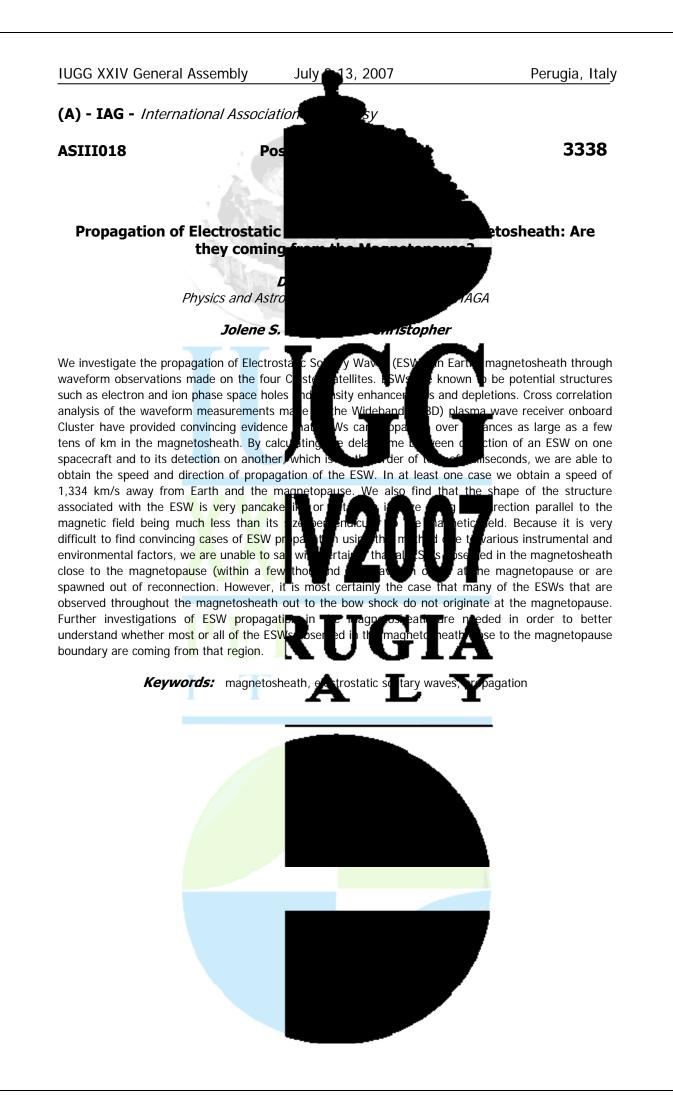
gnetometer signatures 2. Oppositely directed related signatures in the shown to have motions absorption signatures. 4. ions of low clock angle.







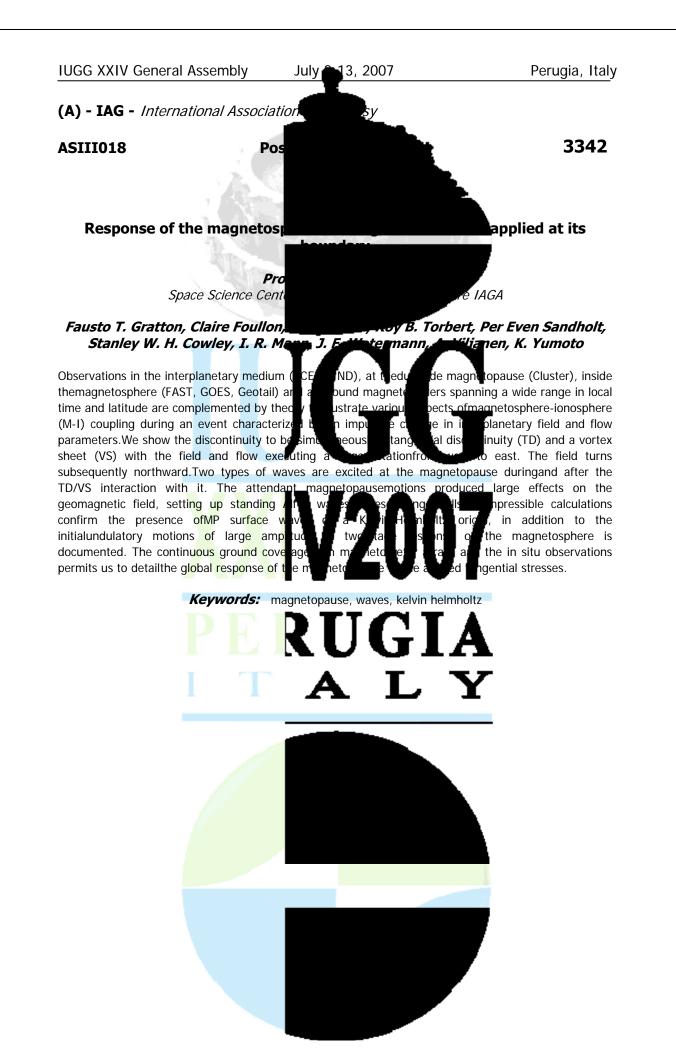


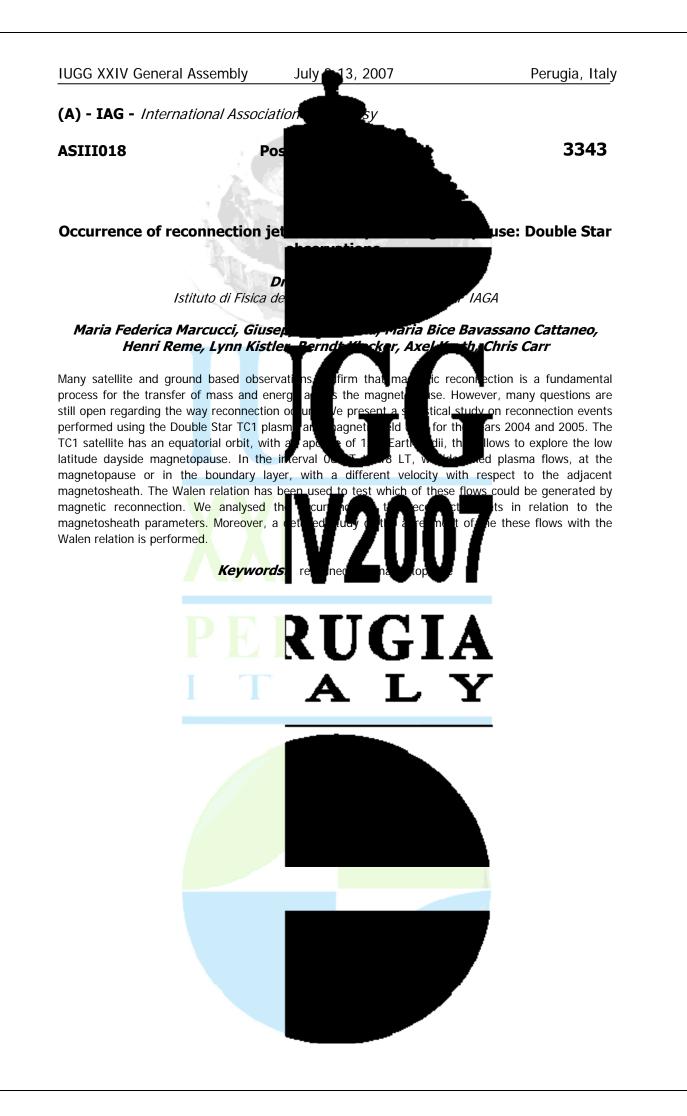


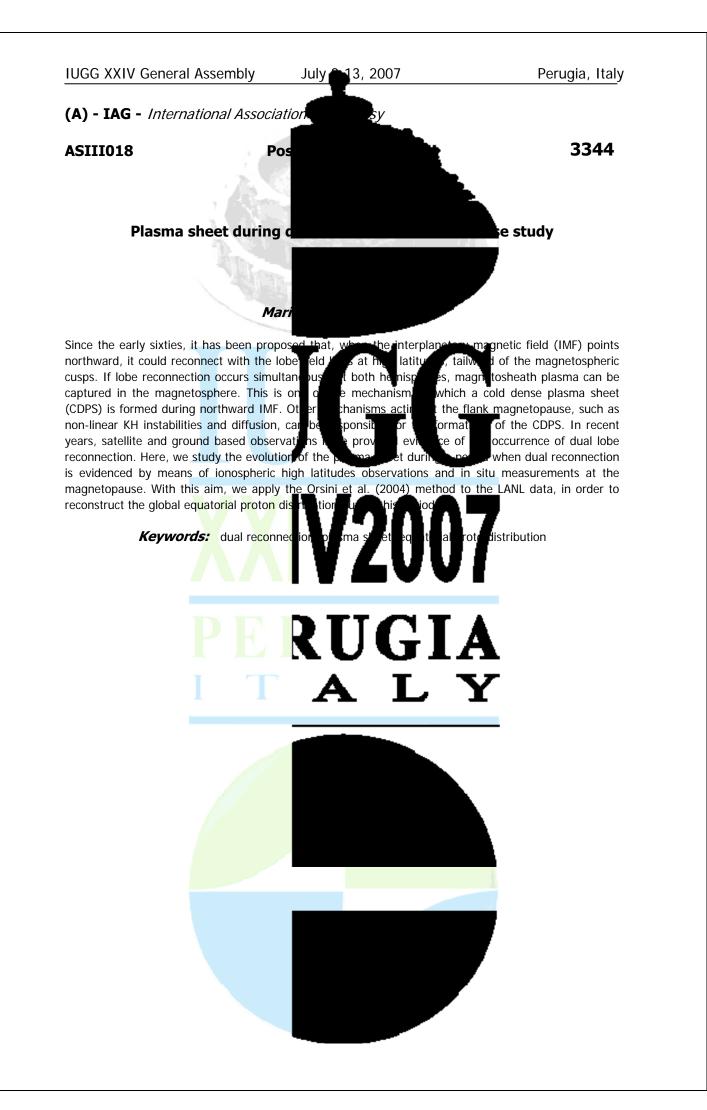














## IUGG XXIV General Assembly

Perugia, Italy

(A) - IAG - International Association

## **ASIII019**

Symposium Progressing to closure in magn processes

**Convener :** Dr. Vassilis Angelopoulos Co-Convener: Prof. Wolfgang Baumi

Much progress has been made recently o central region of the geomagnetic tail. The complex structure and dynamics than expe meso-scale dynamics and turbulent structure observational capabilities enabling critical reconfiguration. The symposium provides a dynamics, evaluating evidence for and ag theory, simulation and modeling to identify processes and their manifestation in globa that address the dynamics of current shee near Earth and mid-tail regions.

and fl Notably, m meg Smpe r discus bn ( oposed instal y processes subs heir r bn

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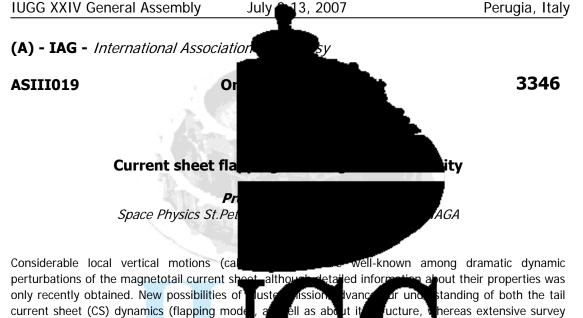
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ent sheets developing in the has proven to be the seat of more uple current sheets, coupling of micro- and ellite missions provide new energy release and tail isms e relevant scales for current sheet processes, and comparison with ant to magnetotail and substorm ributions are welcome ment Priority will be given to bstori

ubstorm





provided by Geotail mission allowed to probe greatly advanced capabilities of measurin previous picture of smooth and almost pl includes large-amplitude meso-scale sheet g tilted locally, (2) the perturbation has a kink-like st

frequently associated with substorm expansion quarter) is observed under quiet auroral bursty bulk flows, although there is no si thin strongly tilted dynamic sheets are a formation/propagation mechanism(s) are relationship to substorm activations and BBF generation. we also discuss the properties of the flapping demonstrate a wealth of complicated shee

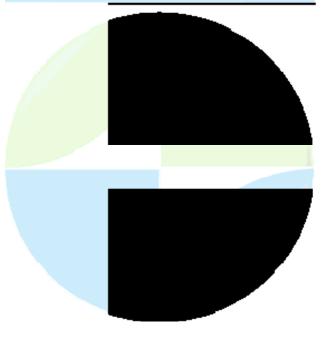
listributions a ther statistical characteristics. With ents and pr ation Cluster made it clear that olied. eets<sup>-</sup> sheet dynamics often ans in heet ( strongly deformed and :h a few YZ plane), they are (3) seen most frequently in the central tail sector and (4) propagate systematically from central sector toward the tail flanks (confirming their generation in the magnetosphere). They are

th CS normal rotating in f them (more than a similar to that of the e two phenomena. Very on diffusion region. The s point out to their close

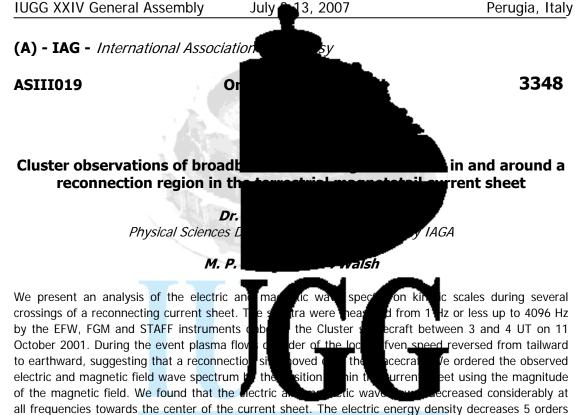
structures as obtained from 3d-MHD simulations. On the other hand, flapping current sheets as well as bifurcated sheets etc) of different scale (ranging from thin sheets n ineret leng to thick sheets) in which pre-Cluster view of the ļunlik ions are not the main current carriers. The dir fhat or tail current sheet, we face the variety of essentially non-Harris and variable current sheet plasma distributions, which require a new step in the the tical analy

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Keywords: magnetotail, structure, dynamics







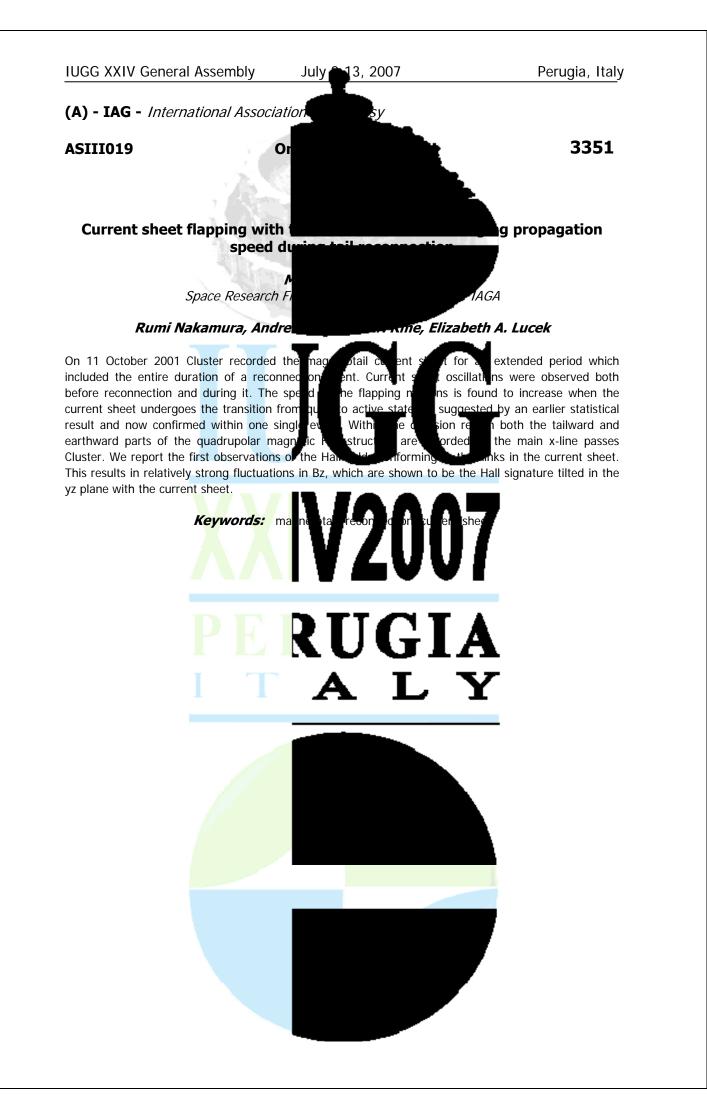
of magnitude from the edge of the current sheet to the center and the magnetic energy density peaks within the current sheet and is decreased sheet, the electric and magnetic wave spe power law spectra with exponents  $\sim$  1.4 0.1 - 1000 Hz, spanning from MHD to alm bst activity is likely to be whistler wave tupule reconnection from wave-particle interaction

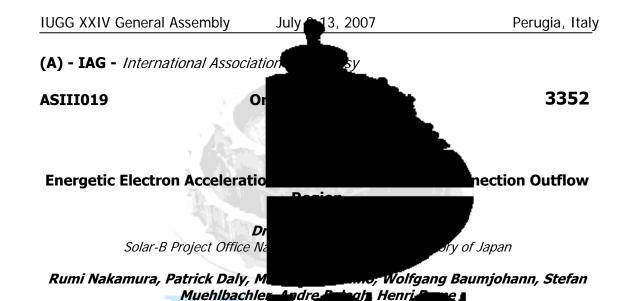
ter. Within the current tromagnetic noise (i.e., the frequency range ~ We argue that the wave ons of these results for











Energetic electrons in an earthward reconne tio We found a good correlation between the e (Bz) enhancement within a 0.25-second tim be associated with magnetic reconnection, the fast proton tailward/earthward flow re the four spacecraft Cluster, we can clearly see the

earthward direction. Furthermore, we find that the energy spectrum of the energetic electrons becomes harder toward the downstream region. A negative Bz enhancement is also observed. The intensity of energetic electrons enhancement associat associated with the positive one. To dis acceleration in the magnetic reconnection temporally evolving magnetic structures of acceleration, in addition to X-line acceleration outflow region.



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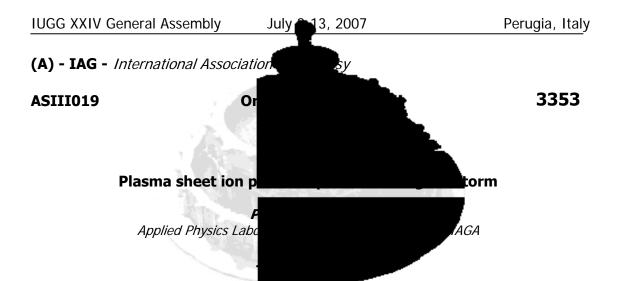
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been observed by Cluster/RAPID. ment and a normal magnetic field ormal magnetic field is thought to sitive eversal observed during for m etic reconnection. Using cture propagates in the

> t is weaker than that of energetic electron cecraft position in the ly indi cates second step ownstream reconnection





Over 200 substorm events were carefully selected fr ensemble of ground instruments. From thes observations. Four substorm phases were d recovery. Plasma sheet 2-D ion pressure, de observations were constructed for each of the that the ion pressure is higher in the inr enhancement can be attributed to the te enhancement can be attributed to the density premidnight has been previously reported and attributed to the curvature and gradient drift of the ions.

The postmidnight density enhancement may result from the enhanced convection. The profiles show that the ion pressure near the midnight me onset, during the expansion phase. The pr and declines further during the late recov that of the growth phase. This near midnig phases can be attributed to both tem temperature, and density profiles provide observ

vations eve mor an iamely, d ow nd temperatu ır su<u>bstorm p</u> of 5la e en en ent

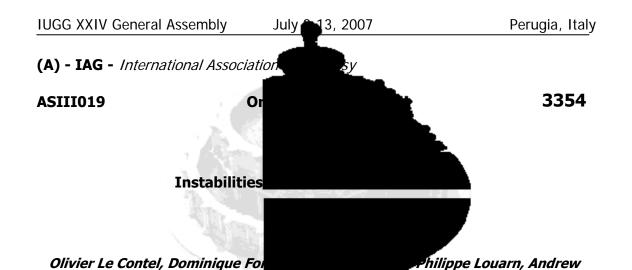
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bm Polar UVI, VIS, and an ave simultaneous DMSP the xpansion early recovery, and late ofiles inferred from DMSP satellite s. The growth phase profiles show e premidnight pressure sheet. while postmidnight pressure ature enhancement at

ght after the substorm e early recovery phase ssure is still higher than expansion and recovery nts. The 2-D pressure, ts to the competing substorm theories.



πiona



On September 12th, 2001 the four Cluster s lcec sheet (CS). At the end of the growth phase remain inside it. On this spacecraft evidence with a large By component confined very cl thickness (~1000-1500km) of the CS this c argued that the magnetic shear associated minutes later the CS thickness remains similar,

observe large ion flows. In fact the ion flows associated with these quasi-nulls are rather modest (~200-300km/sec), which is due to the fact that t E and B modulations are not consistent moving kink mode. No evidence is found for signatures of fast flows (~800km/sec) eastward, and intense high frequency way of the kink mode leads to a filamentation of the bursts.

S becai ven for bi-dir he e<u>quator (</u> tion is table; , is wit lizir com oscillations are then observed, together with quasi nulls in the modulus of B. We therefore expect to

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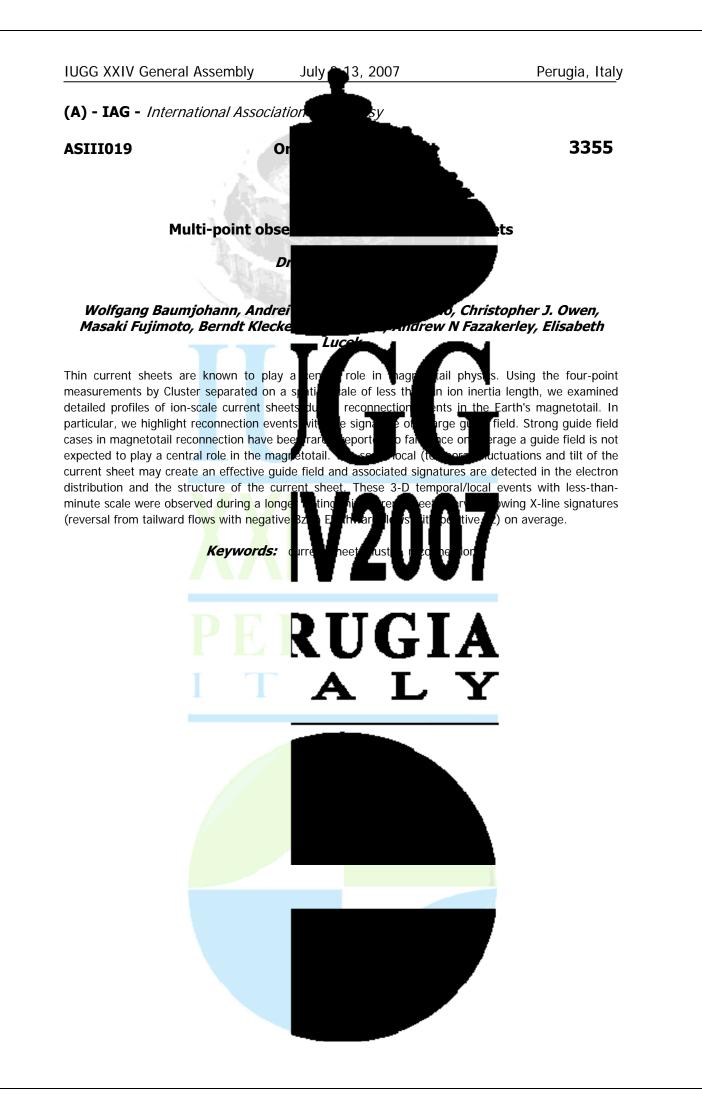
our in a thin tail current n that daily one spacecraft could nal electron distributions, together guide field). In spite of the small asts almost 10 mn. It is e ma tic configuration. A few akens. Large amplitude

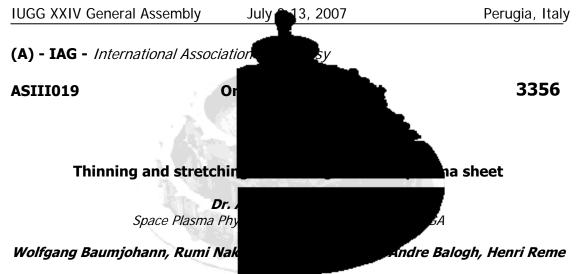
con

e same time as B. The stent with an eastward thickens do we observe structures that move the non linear evolution he reconfiguration of B and the fast ion



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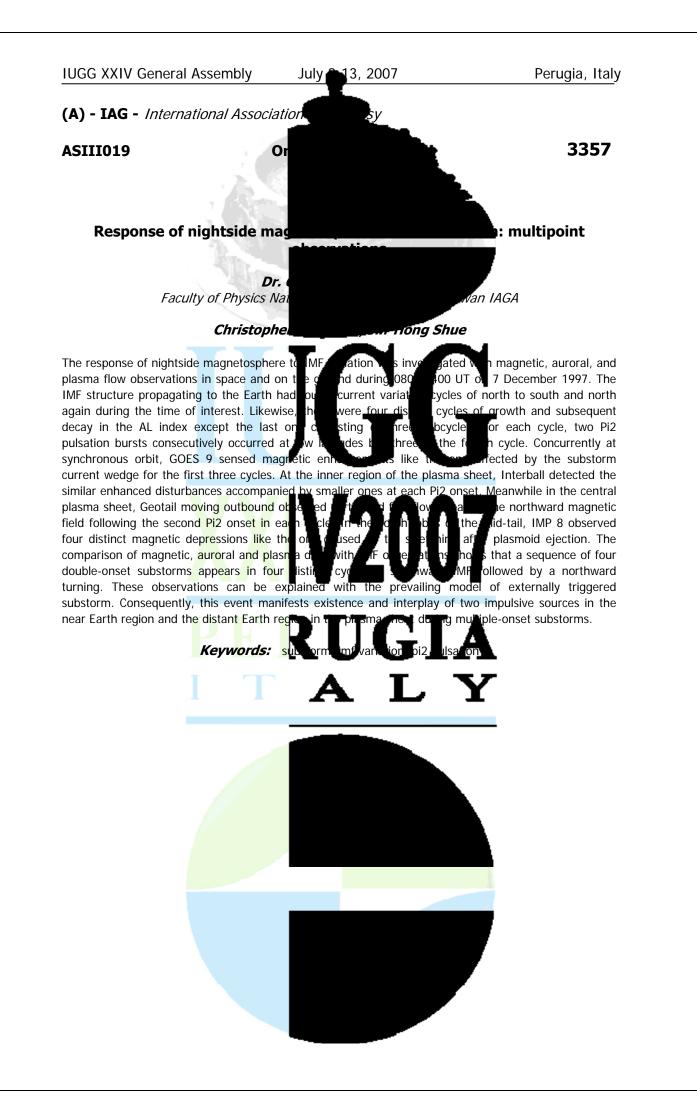


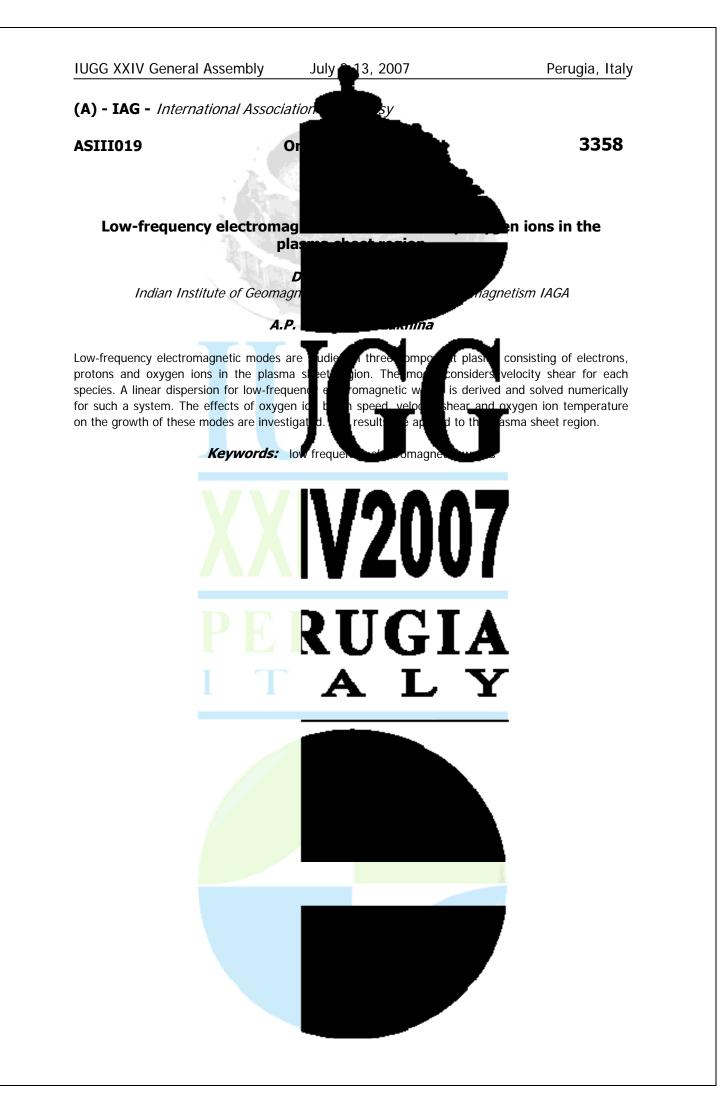
With Cluster observations in the magnetotail we study during 39 intervals. Cross-tail current densiting variations. Typical pre-onset values are Bz 1 1 11 density increase on average is not accompanies at 30% of events are characterized by the large (2017) dynamics even with small Bz. Most of location s, were with tailward flows. In some cases emiedd the estimation of thickness requires a caution.

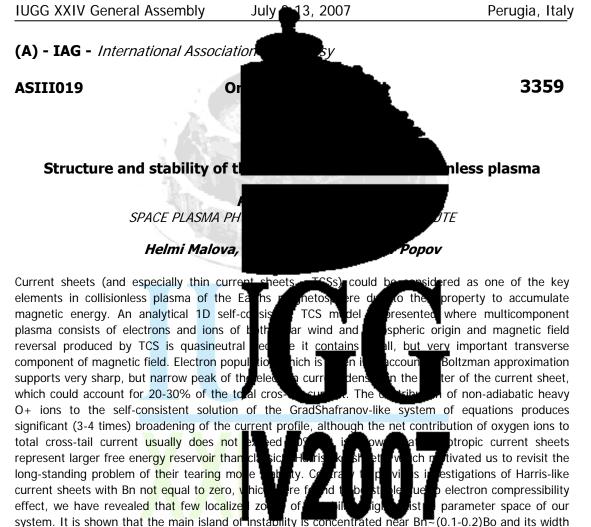
we study chroamics of plas (ger unly scales J0 -1. T, J0  $\sim$  4-8 mm ie th a corresponding ( $\sim$  T) guide field or s, associated eddo surrent weet sociat

associated by the set of the set





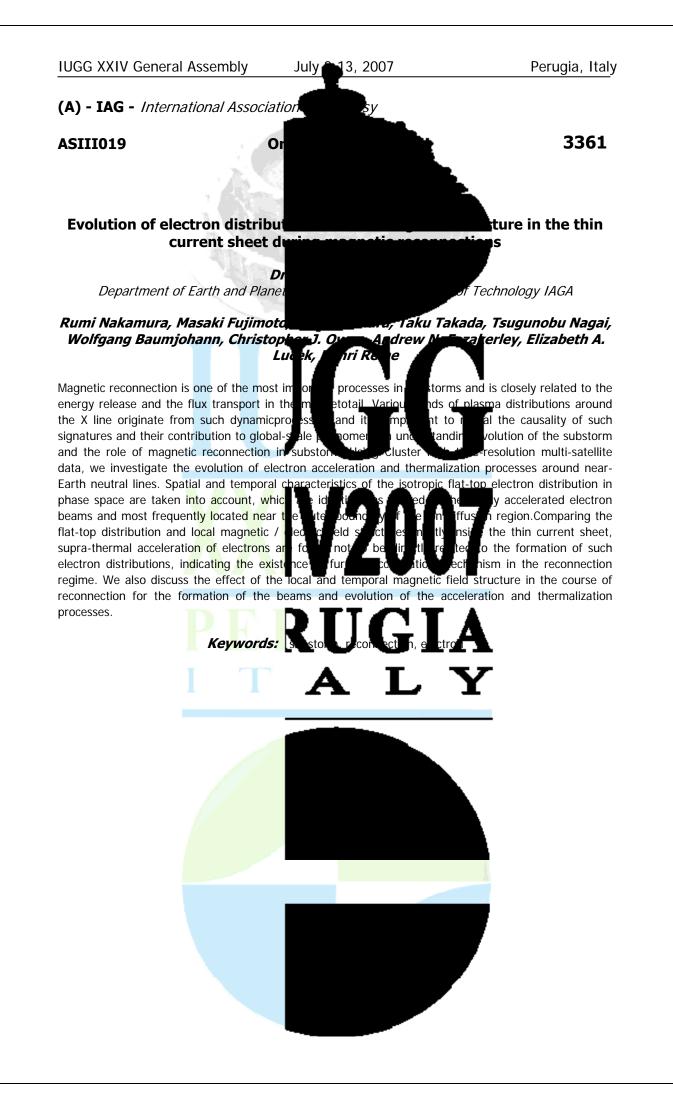


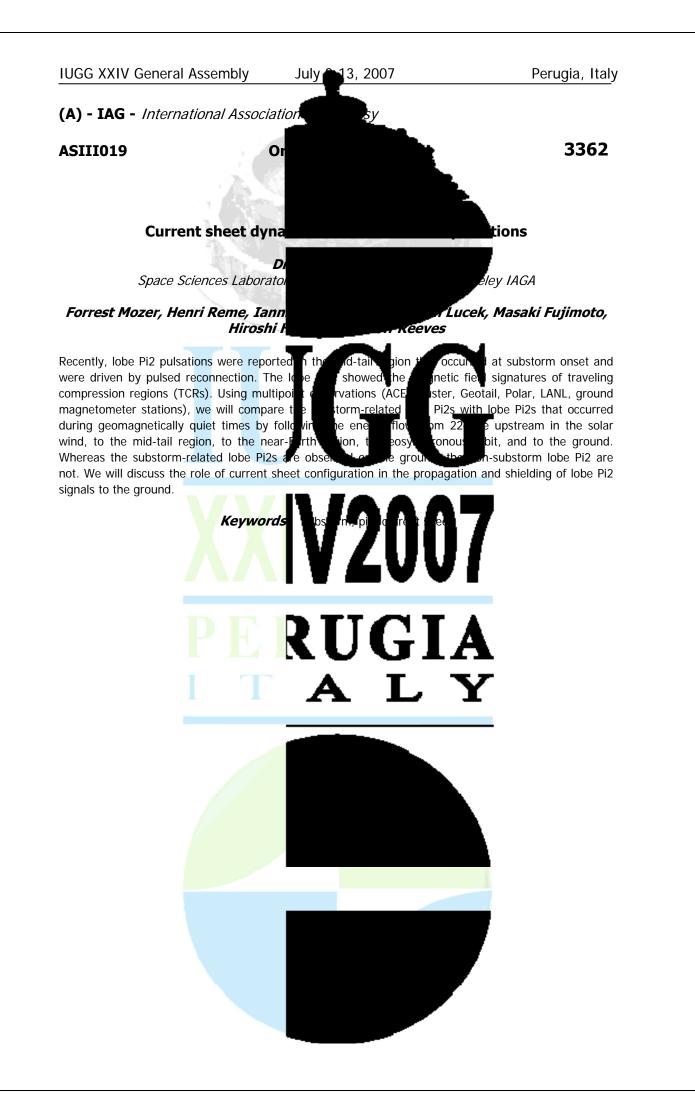


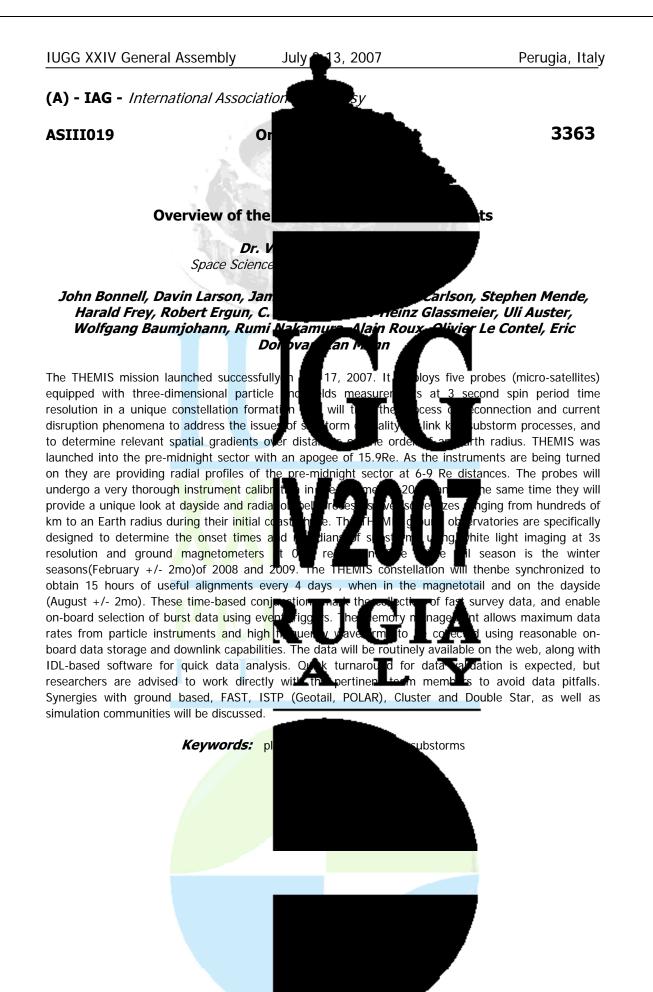
depends on such TCS parameters as the temperature ratio Ti/Te, average pitch-angles of electrons and initial anisotropy of ion source eps=vT/vD. Therefore, our analysis or del describe both the multilayered structure of TCSs and their dynamic behavior, which might have numerous implications for substorm physics.

Keywords: magratotail, stability, structure

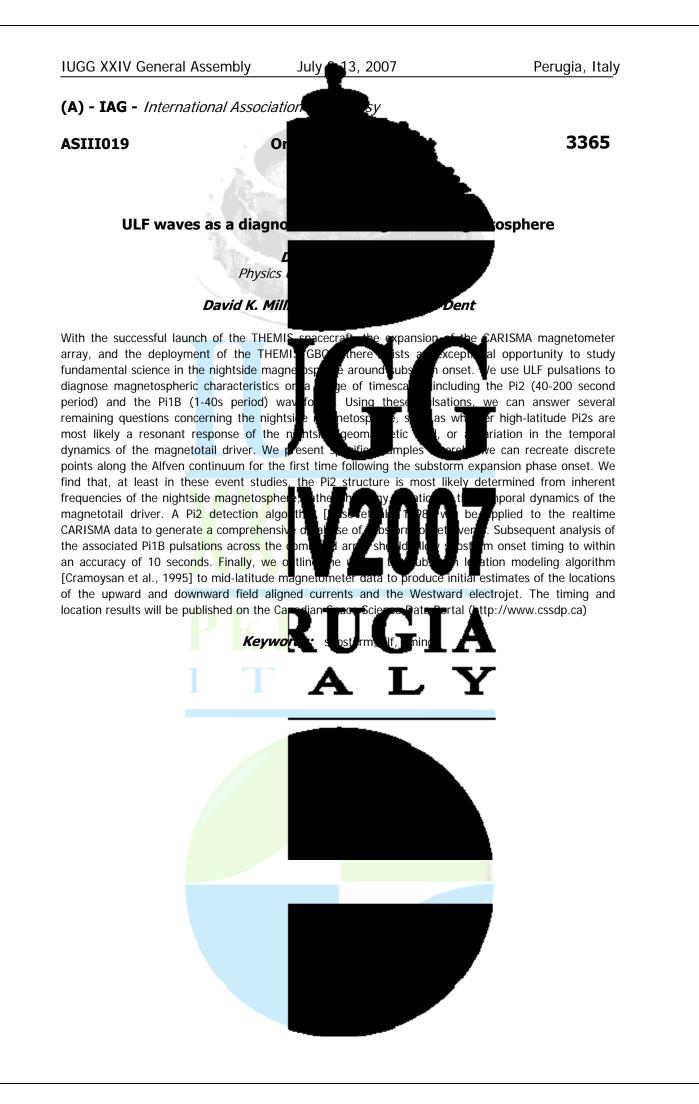




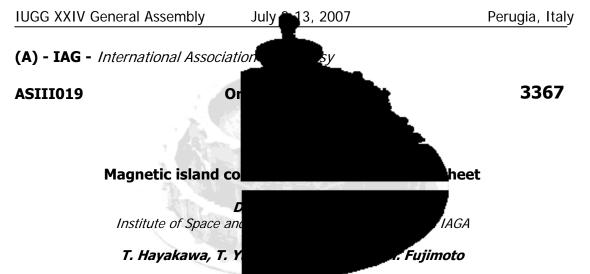












Magnetic island coalescence process in a thin current dimensional full particle simulations. Previou magnetic islands due to the non-linear evolution current sheet thickness. The size correspon observed sizes of plasmoids are longer than island coalescence really occurs in the magr a thin current sheet crossing event. (Reting feature, such as the density dip and the strong core

t has been sim s sha ón re the tearing out 0.5 Re fo (le<u>da et a</u>l Recen Clu Q06) nis j l, by m

y using two- and threenitial scale length of the hat th bility is about twelve times of the e magnetotail cases. However, the 8) Thus, we expect that magnetic d a magnetic O-point in to explain the observed nd coalescence process.

To compare the observed features to numerical simulation results, a systematic survey has been done varying the initial number of magnetic islands, the initial current sheet thickness and the strength of the

guide field. As a result, we found that only thickness can explain the observed charac magnetic island evolution process in a ma Another interesting feature relating to elec will also be discussed.

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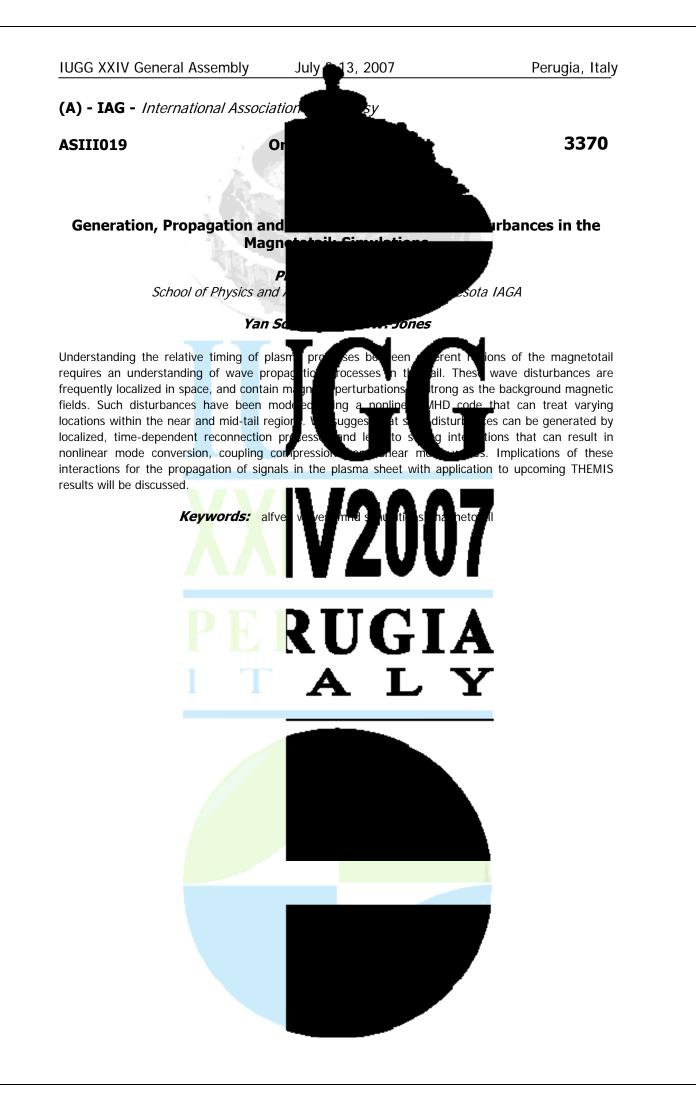
, we

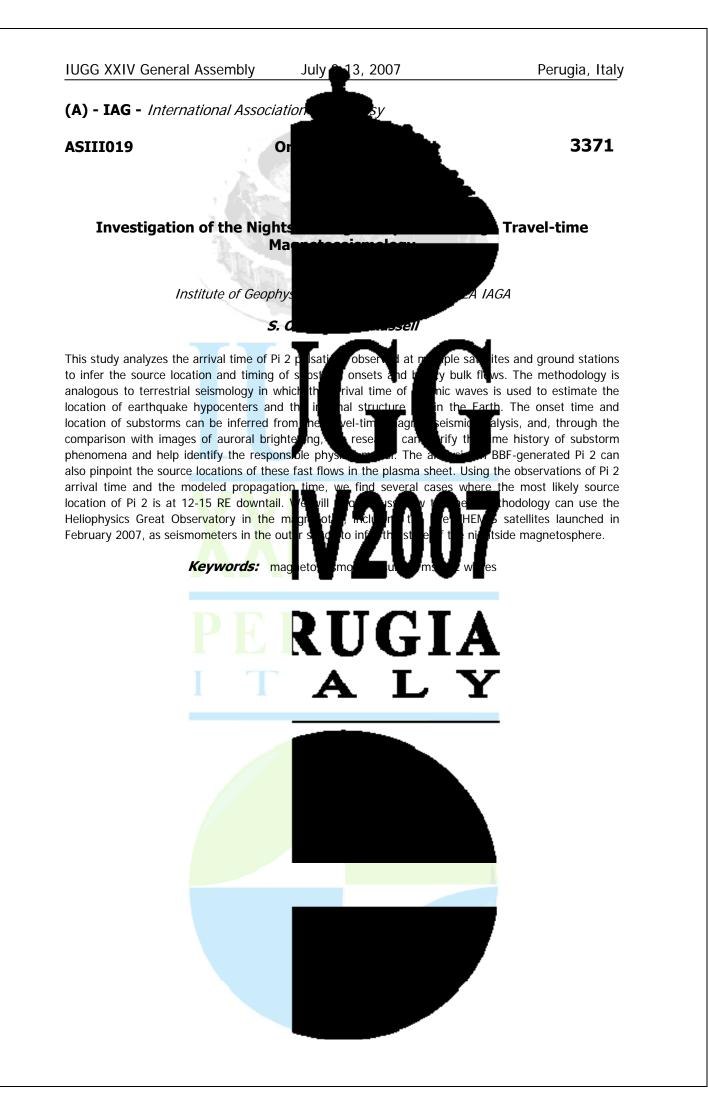
nds and current sheet a possible scenario of n our comparing study. gnetic island coalescence

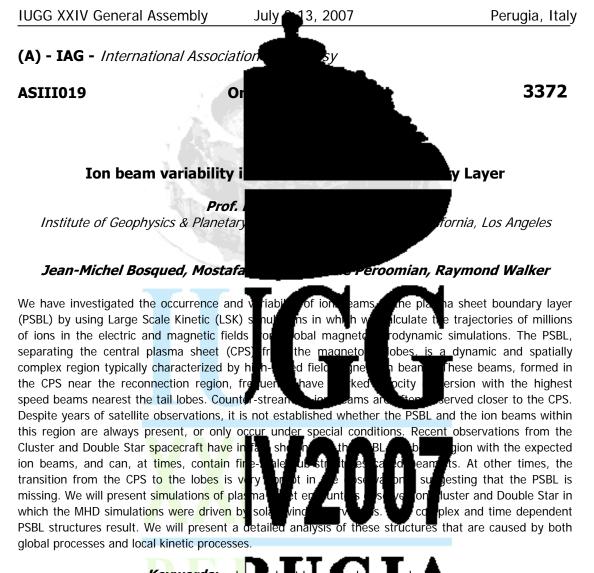
Keywords: reconnection, coalescence, magnetic island



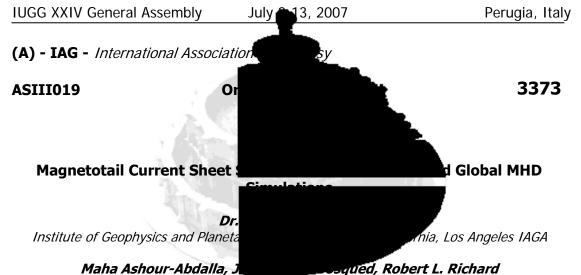












Single and multi-spacecraft observations ha the key dynamic regions of the magnete structure. These current sheet structures ar study of an event observed by Cluster, a ma structure existed in the magnetotail current minimum value the current sheet exhibited density in the center of the plasma sheet that we

thin, intense currents. At other times, almost the entire cross tail current was bifurcated. Local current filaments were often seen inside the central area of otherwise weak current. At the same time, wave like undulations across the tail can be see maximum is normally located. As the IN association of the bifurcated current shee flux rope formation suggests that all these bro a substantial southward IMF rotating towa d d place the local observations into a global context

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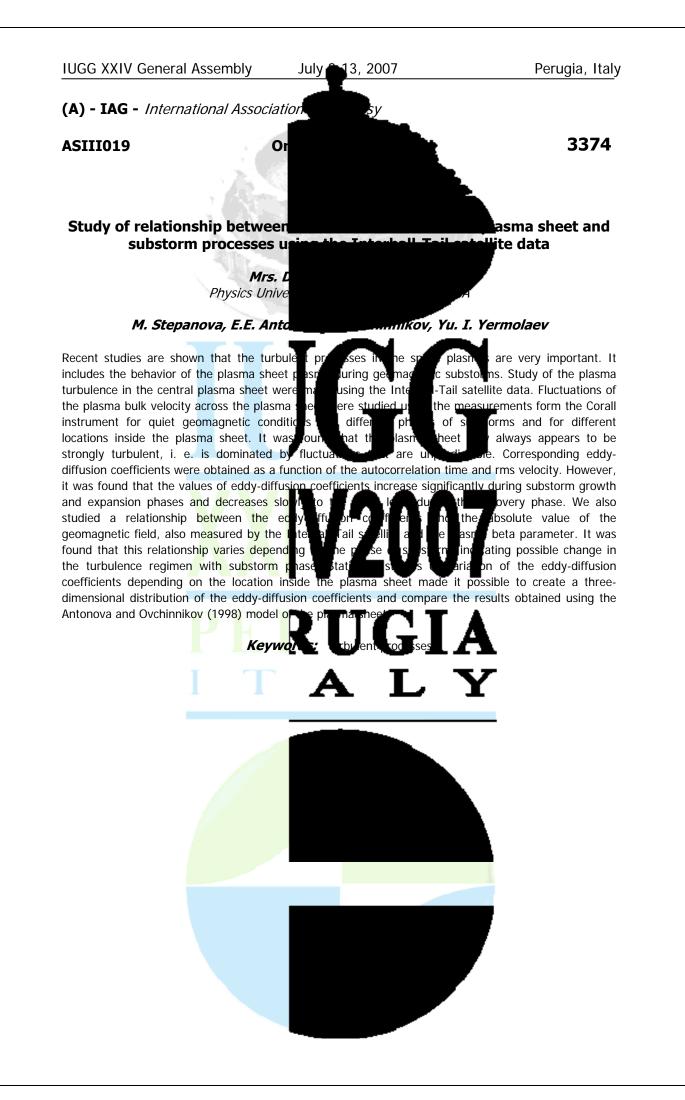
rea

ail current sheet, one of hagn meso-scale spatial and temporal magnetotail reconnection. In our lation showed that a great deal of ortly the IMF Bz reached its high ma pressure low current and southern fringes by

> here the current sheet sheet reformed. The alized reconnection and ng conditions seem to be c simulation allows us to

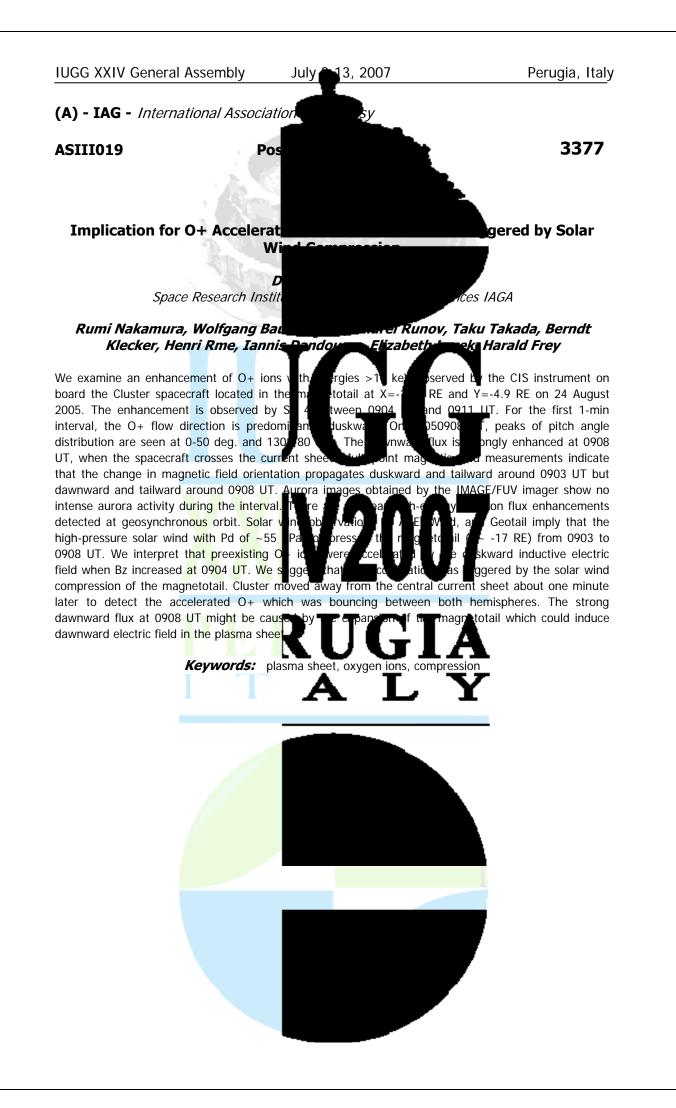


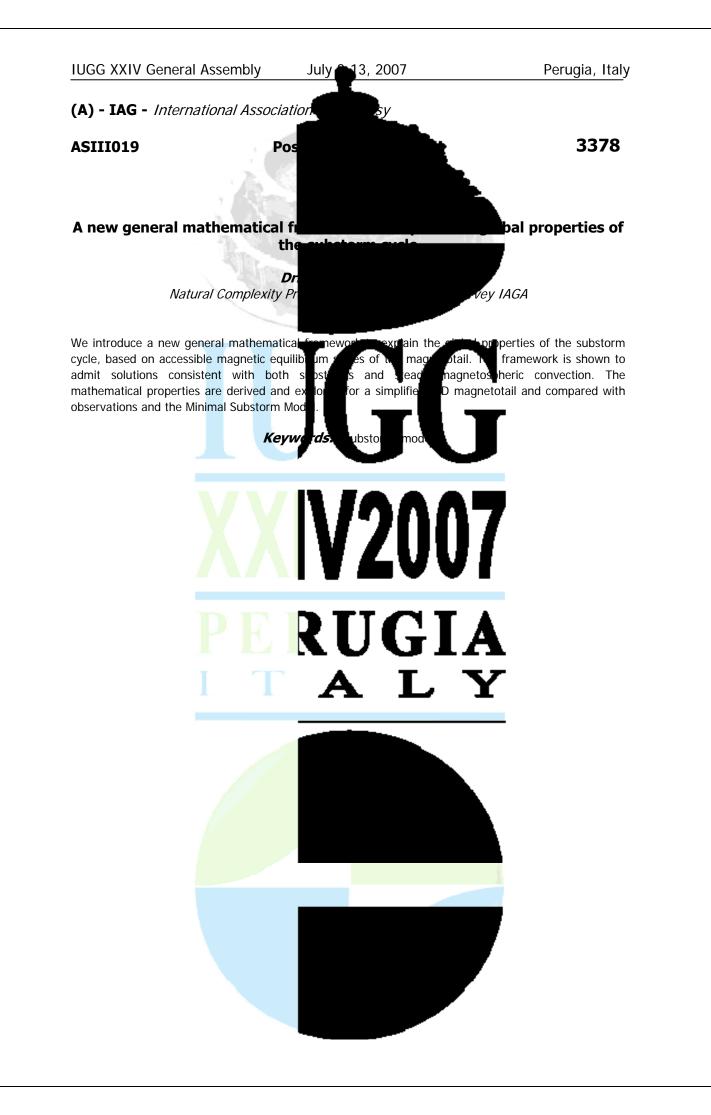
qued, Robert L. Richard

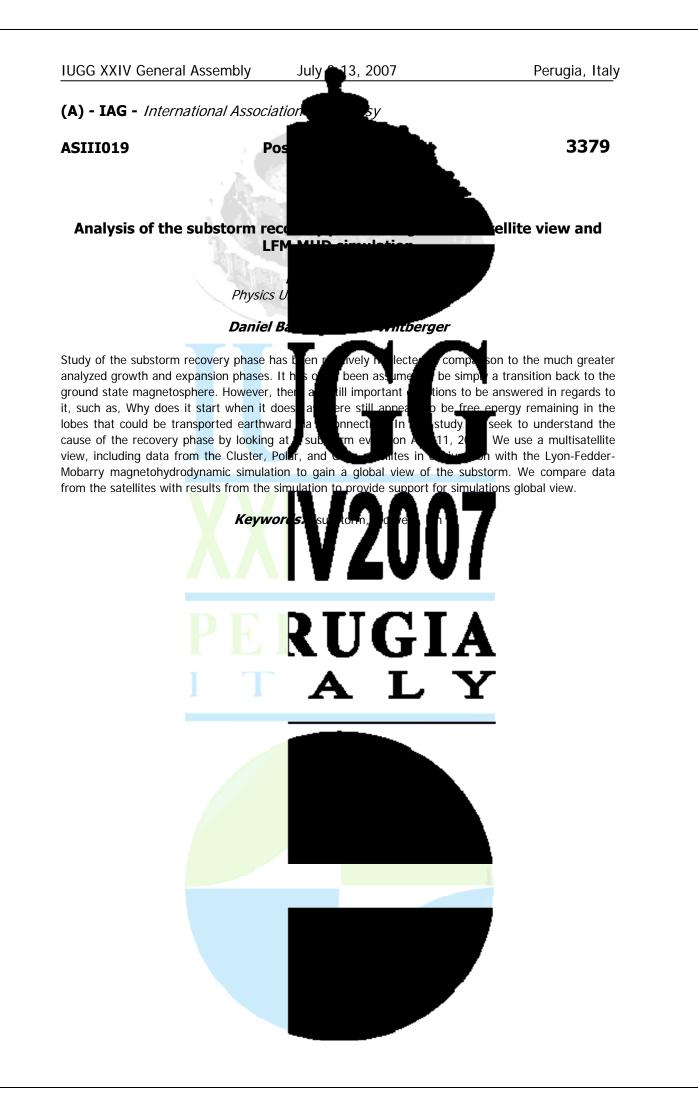






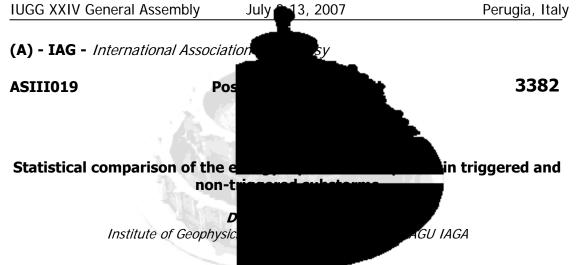












Hsu and McPherron [2003] and McPherron frequency of occurrence of substorm trigge associated with either a northward turning 40% occur during steady southward IMF. difference in the probability of triggering at for the time the spacecraft spends in eac satellites in the solar wind IMP-8 and ISEEsubstorm triggers are not seen at both spacecraft

structures are responsible for all substorms that appear to be untriggered is not likely to be correct. The main conclusion from Hsu and McPherron [2003] is that both triggered and non-triggered events are substorms and that the conjecture that convection bays is not supported by the that triggered substorms seem to have a response than non-triggered ones. This investigation. In this report we will use a energy loading and dissipation for both triggered and non-triggered substorms. The solar wind energy

el., [1 ormed that ing. y fou sitive flud uati d McPherron tion <u>in the I</u>N bin g d McF on

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studies to determine the of all substorms can be ut 60 h the IM Bz while the remaining 3] demonstrated that there is no orbit<u>when proper account is taken</u> o the th-Sun line. Using two 4] fou that less than 14% of all sis that small scale IMF

pseudo breakups or ained in this work was tronger magnetospheric thus worthy of further 1979 to investigate the input during substorms will be evaluated by integration of epsilon or VBs during the growth phase,

veen energy input and

derstand why previous

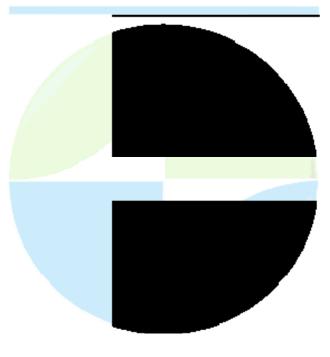
bnosmere will be estimated by

expansion phase, and recovery phase. The integrating the AL index during the dissipation in different phases will be example studies have found such a difference between triggered and non-triggered substorms.

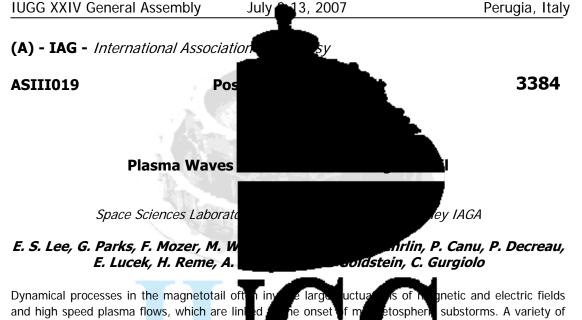
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free energy sources associated with these br different type of waves. Various models of ULF/VLF waves. It is important to study t understand the roles they play in the dynan tal flow events, which are accompanied by large flux

spacecraft in the magnetotail, and investigate the occurrence of various plasma waves during the events. Preliminary results show that during these turbulent events, a broad frequency range of plasma waves is observed. They include pulses of mode turbulence, broadband electro-static waves, electrostatic waves near lower hy electron plasma frequency or upper hybrid fre Alfven waves occurred in the turbulent pla ma amplitude of these waves suggested that they may carry substantial energy and propagating away from the source region. They may play important role in transferring energy from the tail source region

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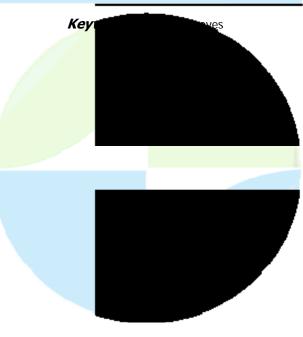
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on occurs through the growth of included some of the effects of hese waves in order to mine several high speed observed by the Cluster

> es, broadband whistler by electrostatic solitary atic emissions near the ized pulses of non-linear super-Alfvenic. The large

towards the earth. The generation of these eeds urther investigation. High nced during entire high frequency waves (whistler waves and vari s) er speed flow intervals indicating that the generation clos ay lated to the high speed ar flows. The properties of some of these waves, which include the propagation direction, polarization, the wave energy they are carrying, and their relation with pa frequency Alfvenic waves (near or lower that the ion cycle iicles' beha or especially for the low frequent, will be presented and discussed.



Perugia, Italy

(A) - IAG - International Association

## ASIII020

Symposium Magnetosphere-ionosphere int III and II)

Convener : Prof. William Lotko

The dynamical evolution of magnetosphe mediate the exchange of mass, momentur Energetic particle fluxes, currents, and P

populations, and waves carry energy from the map processes can modify ionospheric conductivity instabilities; and dissipate energy through pillis ionospheric modifications feed back on the manuf radiation/reflection of waves, plasma outflou, quasineutrality. This symposium invites control of including: How do magnetospheric flows and cu What is the temporal evolution of the globationo What are the processes involved in plasma inflow

the mad phere into ivitv pheria d id bllis and w ve-i o-sphere<sup>®</sup>thr developmen s on¶ eas 🖣 nt syst ev liond eric c nt s under w

ared with magneto-spheric flows, plasma re into the imporphere. These dynamical pheric durrent systems; excite plasma ve-imped heating processes. Moreover, three alteration of the current system, near parallel electric fields to maintain genereas respect to coupling dynamics even when a pled to the ionosphere? Int system in the context of M-I coupling? under when another and they occur, and

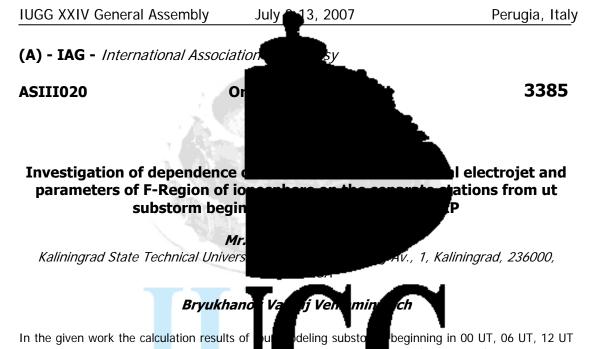
related to processes that

how do they couple the magnetosphere and ionosphere? What role do waves and plasma instabilities play in M-I coupling? Papers presenting observations, theory, simulation and modeling are all welcome.



## 3385 - 3441

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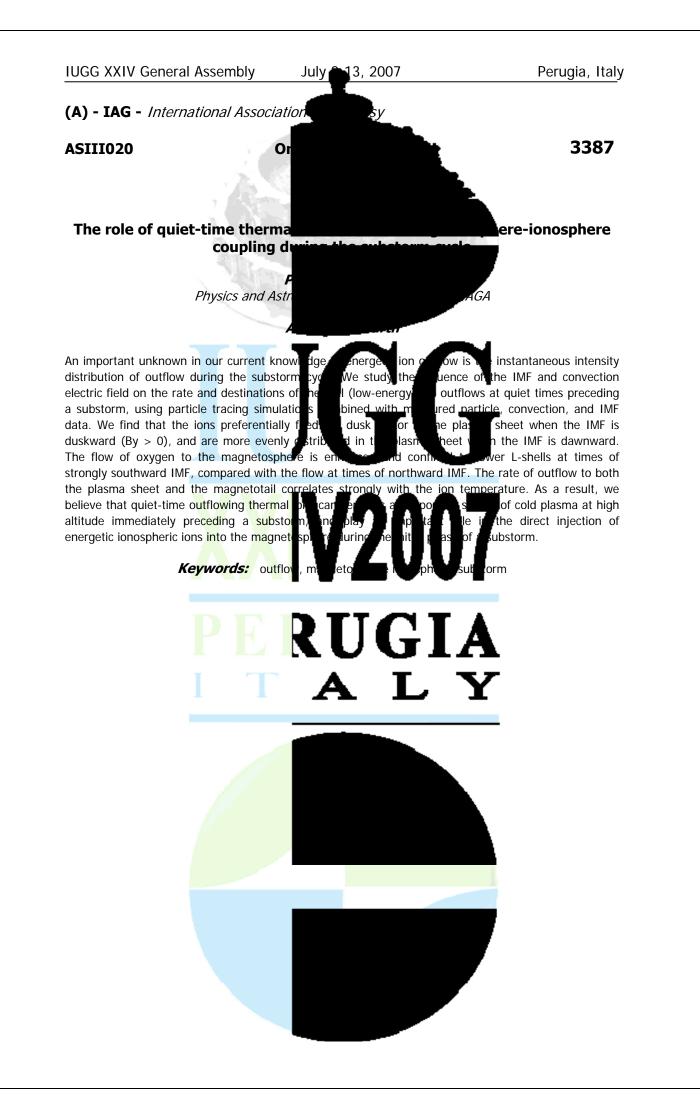


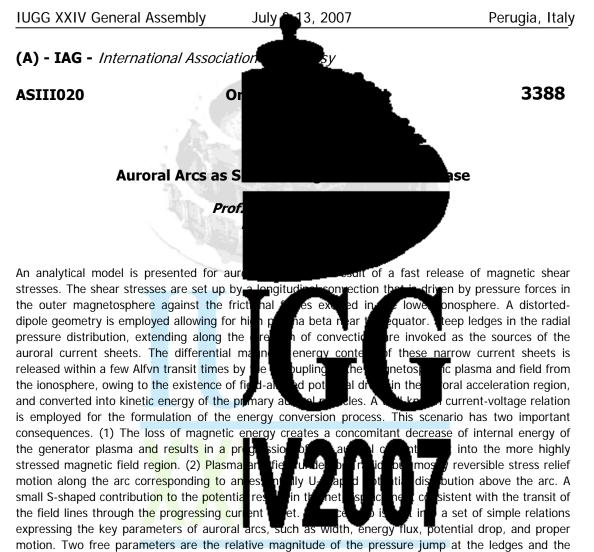
and 18 UT for spring equinox conditions in (E10.7 = 76) are submitted. imum ivity Calculations were carried out on Global Se phere, Ionosphere and stent I The Protonosphere (GSM TIP), developed in W new culation block of electric ΊΖΝ wi se fields of a dynamo and magnetospheric Forigins. time course of auroral ur subs electrojet from which the intensity time course of westward and eastward auroral electrojet has been constructed was calculated. Calculations ha that during substorms there is very strong growth show of westward electrojet from - 20 A/km in g e substorms beginning in 00 UT, 06 UT and 12 UT, and up to - 4 in 18 UT. At the same inni time there is a strengthening of eastward A/km in quiet conditions up to 120-150 A/km for the substorms beg nni 00 and up to ~230 A/km for the substorms beginning in 18 UT. Calculation ults ex rimental data from which follows, that in quiet conditions the eastward auroral electrojet intensity is higher, than westward, and during disturbances there is auroral electrojet strengthening, and westward electrojet grows more strongly and surpasses on eastward one in perturbations calculated itio of fo for the substorm which has begun in 18 U ourse during a substorm npor and after its termination is analyzed. Calcu tt/es storm initial stage the ion' positive (negative) disturbances arise in auroral zones and polar caps with maxima in post-midnight (post-sunset) hours. The absolute maximum of a sitive (negative) disturs ces is formed in auroral zone of a southern hemisphere. Further there the a of disturbar ees, is especial in auroral engther zones and in a southern polar cap which practically is completely occupied with positive disturbances. Gradually the maximum of positive disturbances drifts from southern auroral zone to a polar cap. Negative ionospheric disturbances are o ght from subauroral latitudes up to geomagnetic equator. After the substorm tive disturbances in auroral zones at pre-midnight hours with a maximur And the amplitude of these disturbances exceeds a disturbance rang urbances are explained by action of disturbance dynamo field. Calcula urse during substorms are submitted and analyzed for high-altitud Leningrad, Sant Jone, Saskatoone, Meanook, Lulea, Dixon, Cha Yellowknife, Reykjavick and Sondrestrom.

Keywords: ut variation, electrojet, substorm



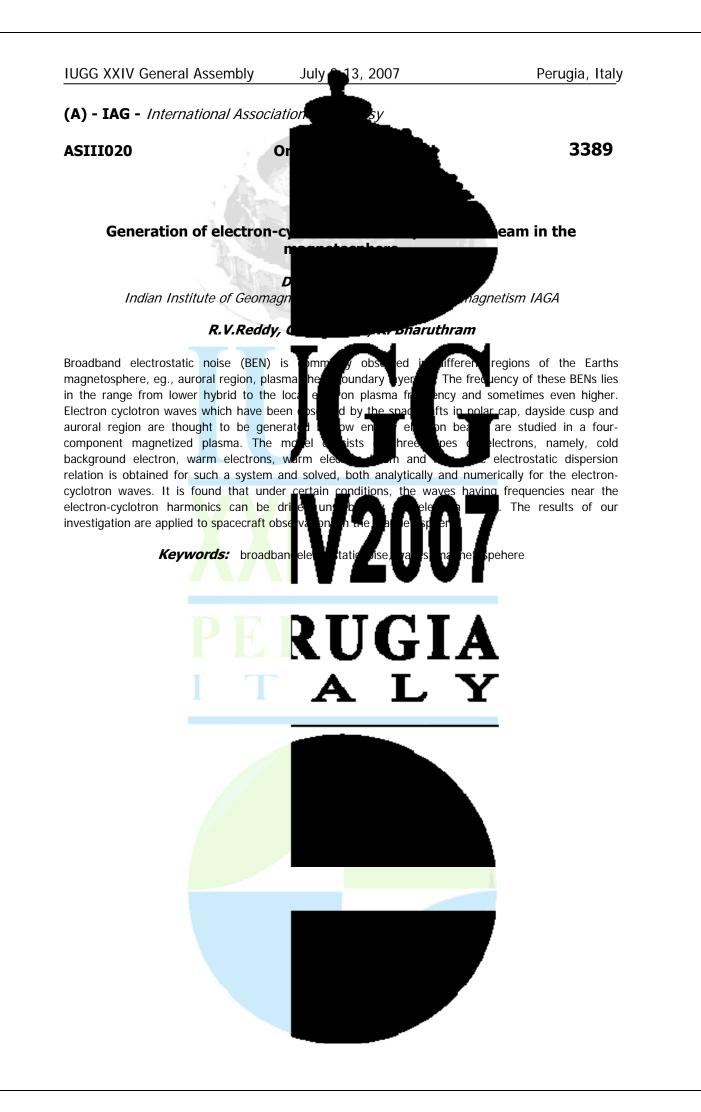




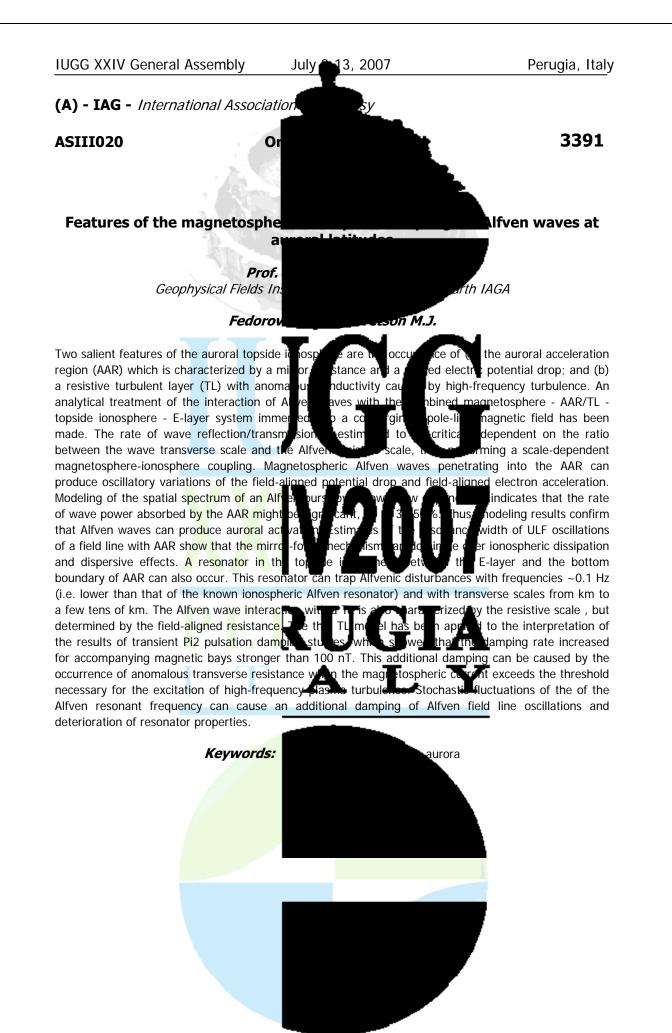


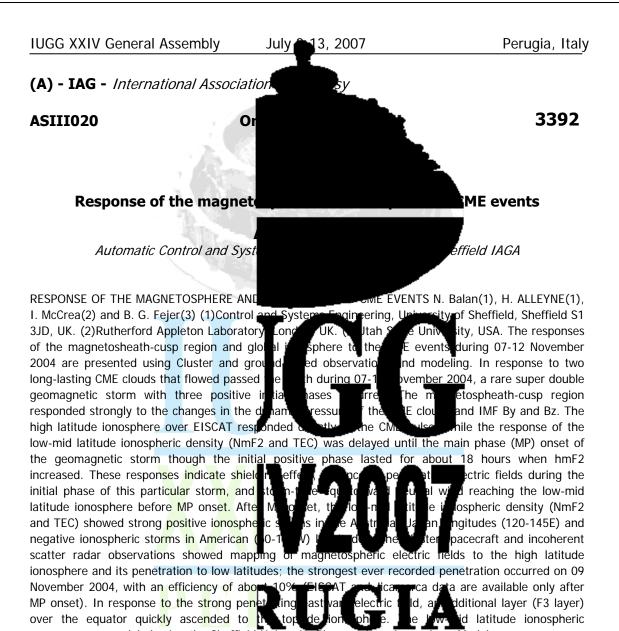
plasma beta in the source plasma. Matching the relation with abserved values suggests pressure jumps of order ten percent and beta values between 1 and .

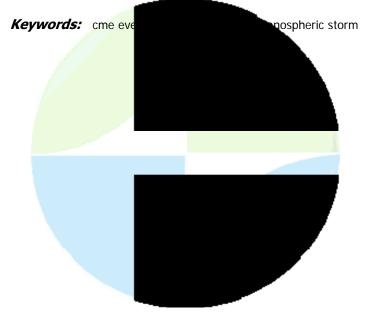
Keywords: auroral arcs, stress release, key parametres derived

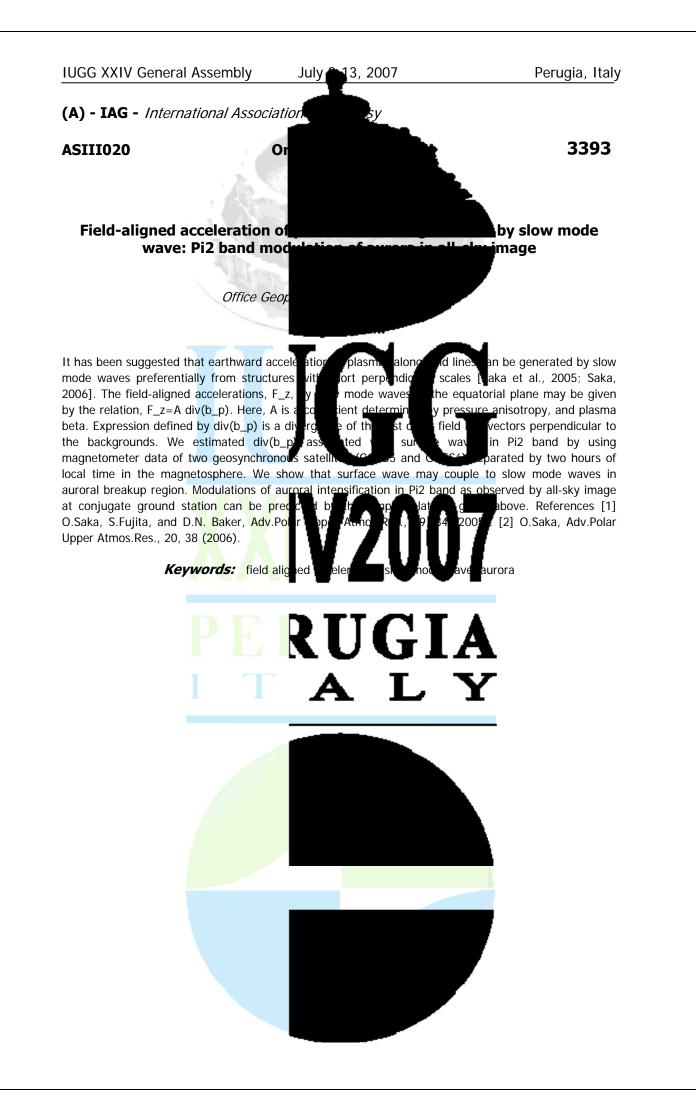


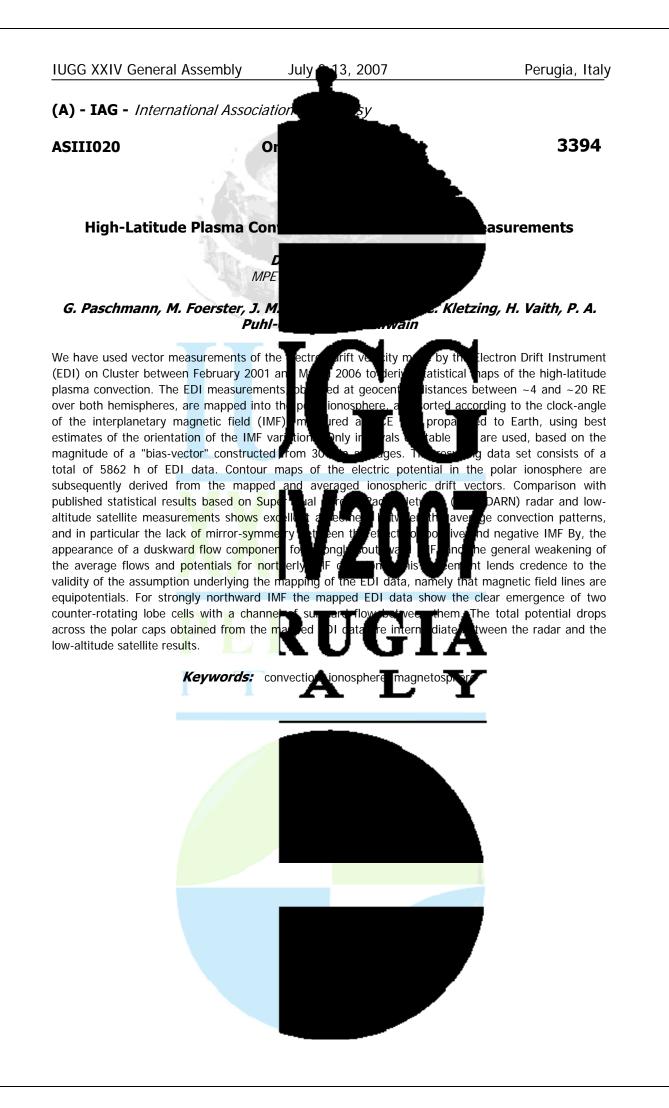


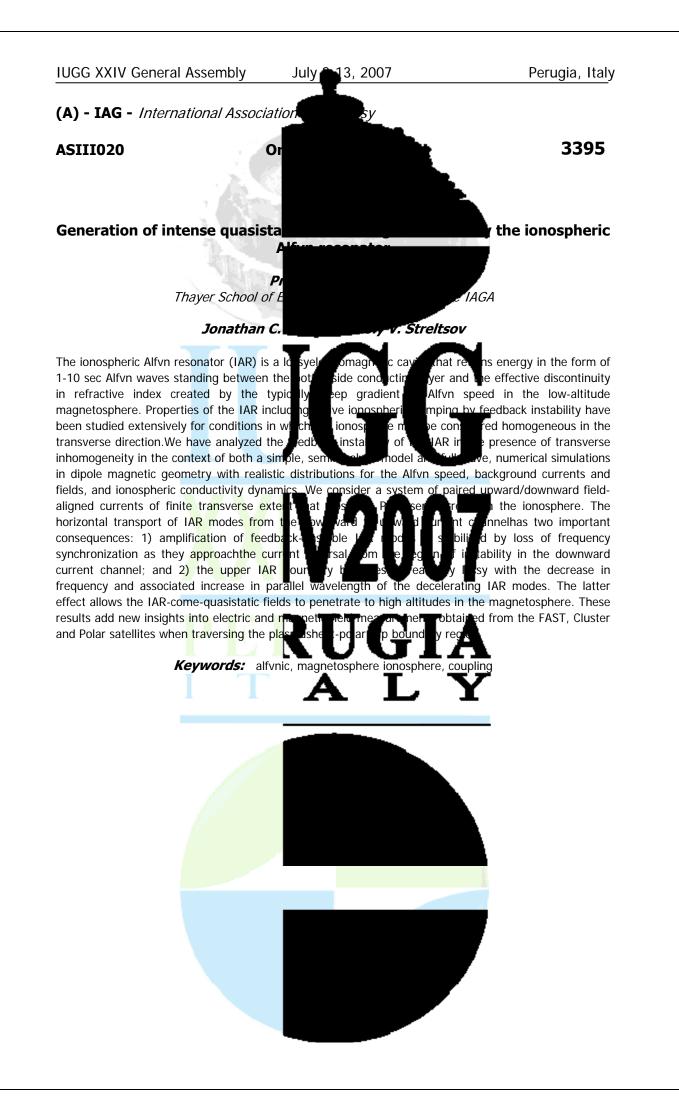


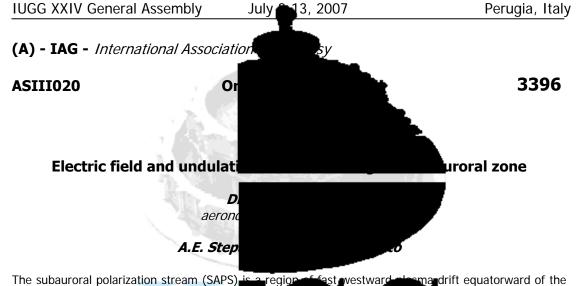












auroral electron precipitation zone covering event of December 12, 2004 to study the ge SAPS formation. Ground-based ionospheric were supplemented by DMSP (F13, F14, F15 During the event, magnetic activity was mo north-directed electric field was almost sy DMSP F15 (~0910 UT) measurements in the eve

electric field and diffuse undulations were localized near a discrete auroral arc related to the electron inverted-V structure. In contrast to the typical SAPS event, on the basis of DMSP satellite data the westward plasma stream with large velocit and electron precipitation zones, i.e. not i F13 and F14 data, undulations with the propagated with the velocity of ~0.5 km/ and satellite measurements are in close a fields in the diffuse proton aurora zone are discussed.

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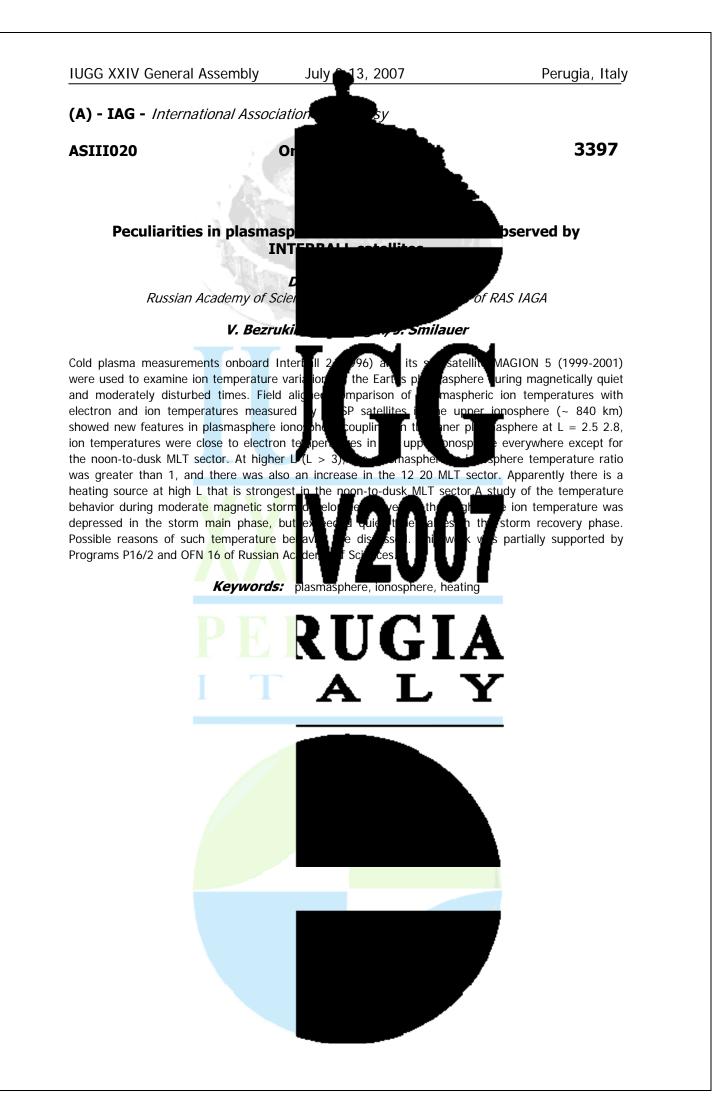
present data from the ense electric fields responsible for at Tixie (71.6 N, 128.9 E, L=5.6) atellite field line passed near Tixie. The appearance of the pheric (~0900 UT) and e maximum intensity of

energetic (>1 keV) ion gh. According to DMSP plitude of ~50-150 km e undulations by optical to generate the electric work was supported by RFBR grant 06-05-



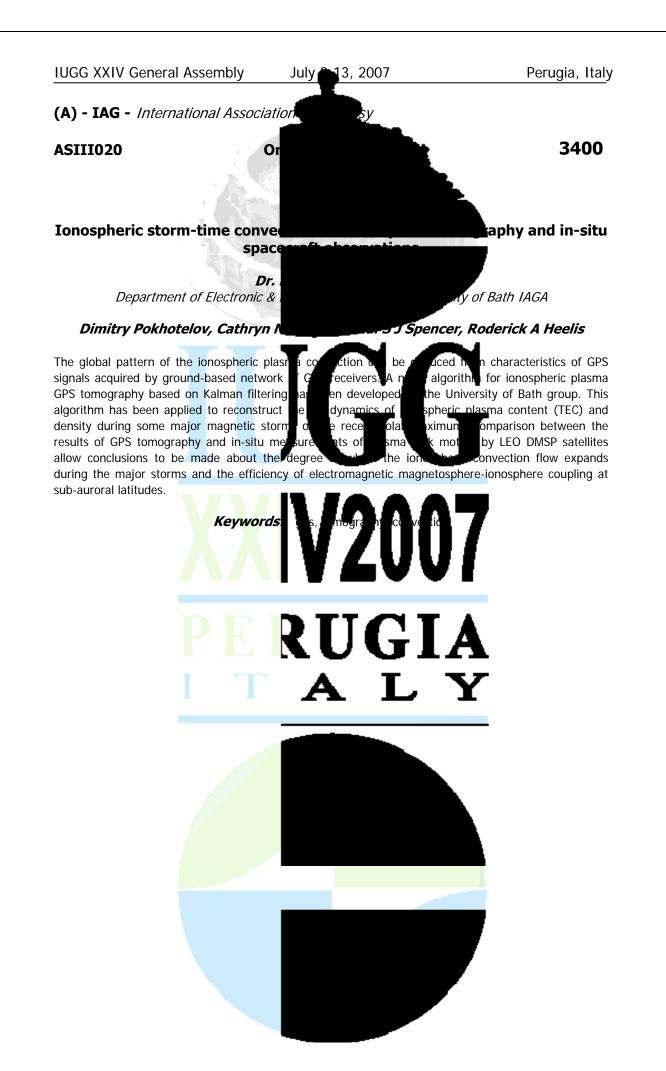
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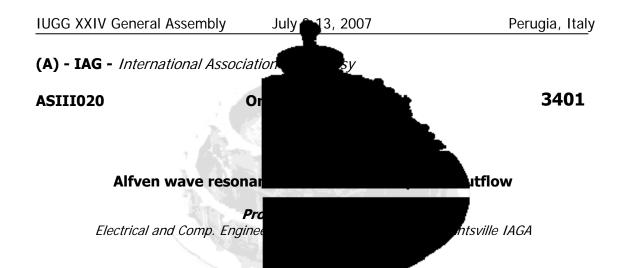
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It is now well established that shear Alfven wayes (S in the topside auroral ionosphere. How is the have latitudanally narrow structures. How a having long transverse wavelengths created when long wavelength SAWsencounter loo cavities due to the divergence in the ion po Alfven waves like the inertial Alfven waves patterns are the Alfven wave resonance

dump a larg 6 en ed? ( diss narrow 1 ilan distant parts densi<u>ty cavi</u>ti n curi d fror eja cones nstrate

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punt of electrognatic power also show that the SAWs vatio ary) structurescreated from SAWs e magnetosphere? We report that hey induce electric dipoles inthe ate narrow structures of plar. The radiated wave ral satellite and rocket

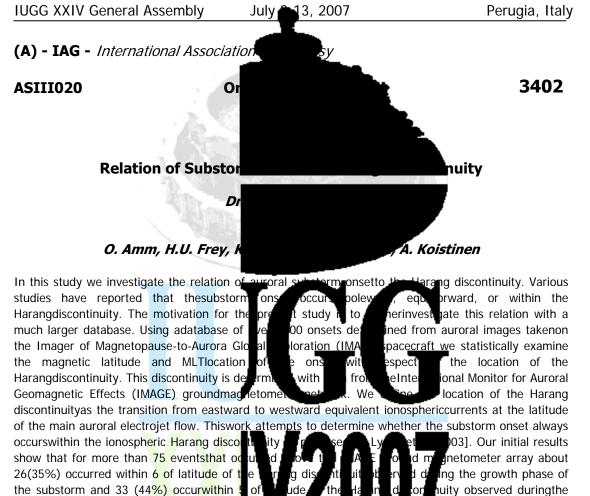
experiments, the narrow structures of the inertial Alfven waves are effective in transverse ion heating. The density cavities themselves might be generated by double layers, which are an integral part of the

auroaral acceleration processes. Thus w dissipation of SAWs; the chain involves cavities, generation of nature made elect inertial Alfven waves, whichfacilitate the tr plasma ions. Results from theory, simulation

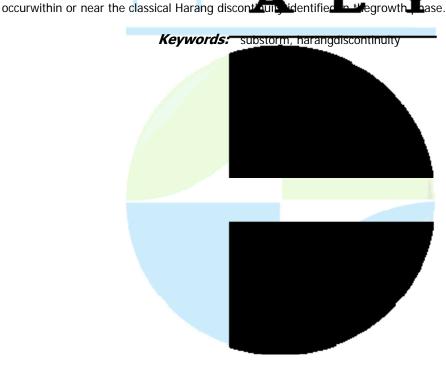


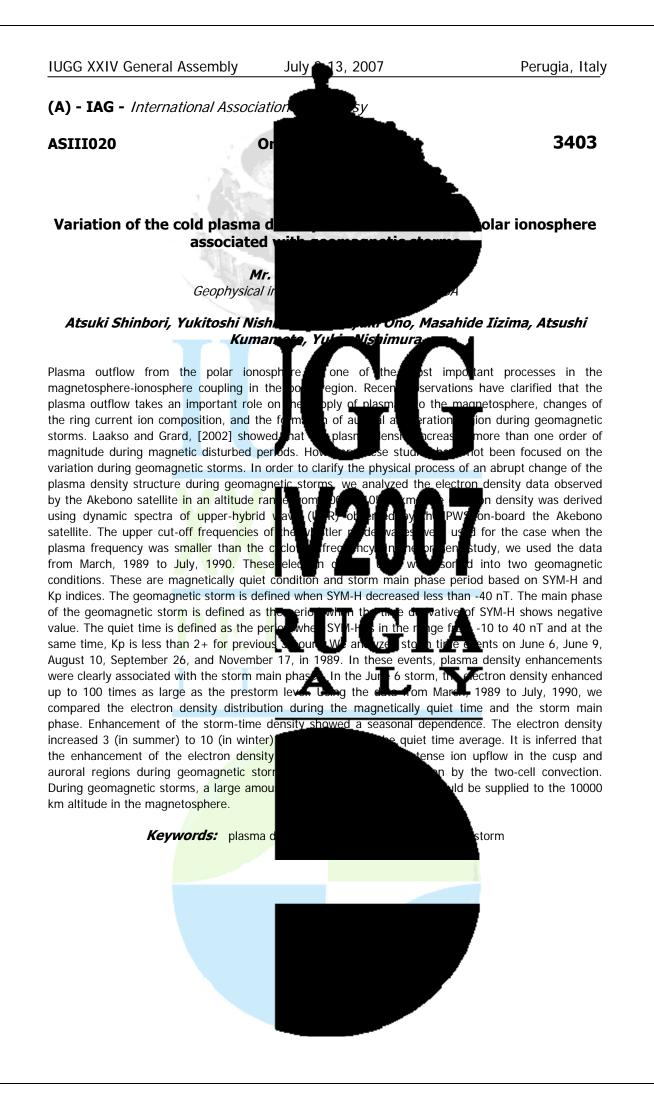
esses involved in the ocalized plasma density radiation of short scale the kinetic energy of the

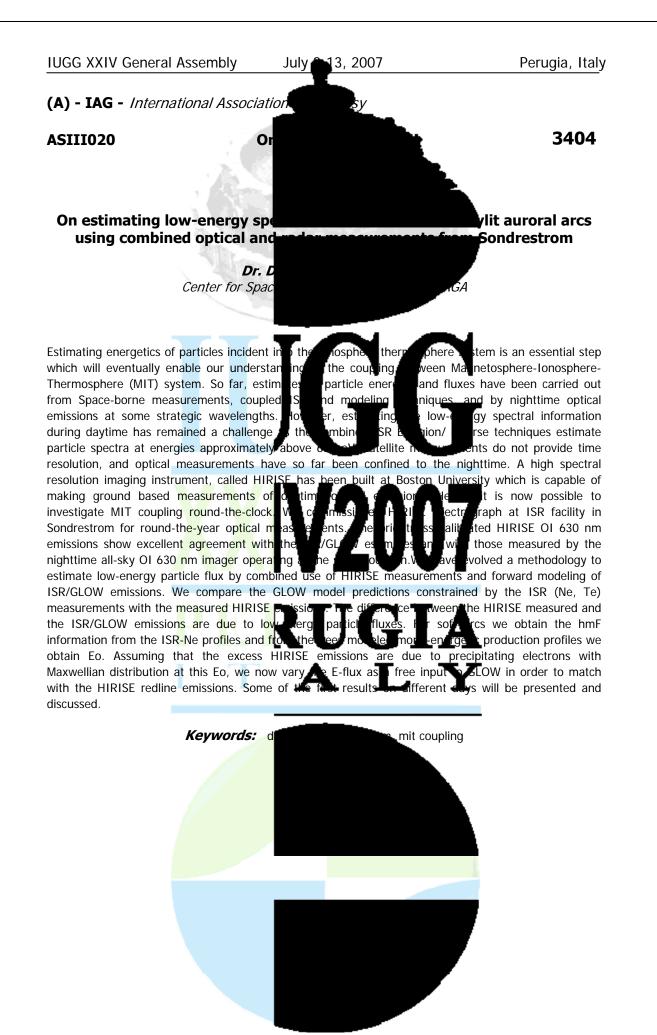


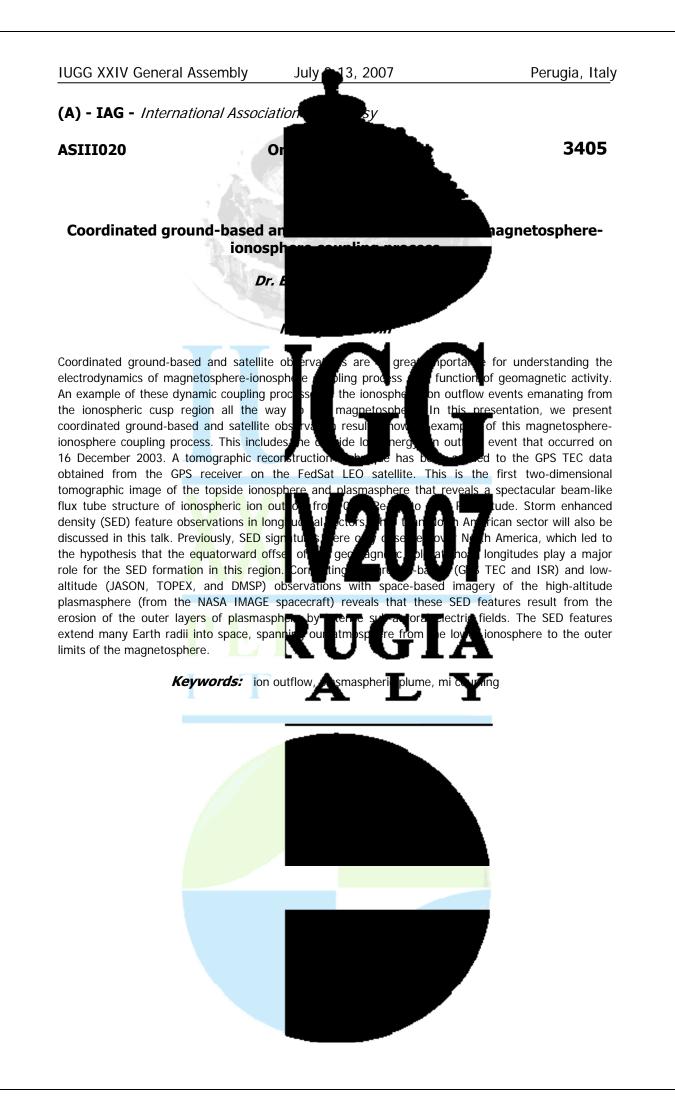


expansion phase of the substorm. We also al hsets occur in association find with vortices of equivalentionospheric current observed during the growth phase and 41 (55%)of the onsets occur near equivalent ionospheric current vorticesobserved during the expansion phase. The remaining 25 (33%) onsets donot appear t neous Harang discontinuity ora vortex during the growth phase and 14 (19) soci with either phenomena st likely misidentified during the expansion phase. Ten (13% aj inse substorms. One of the primary goals of this study is to test the statement in Lyon et al. [2003] that the substorm onset occurs within the Harangdiscontinuity. We have **27** of the initial 75 onsets e found the

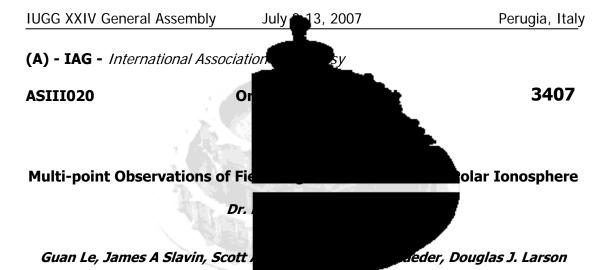






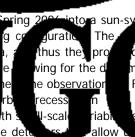






The three ST5 spacecraft were launched in Spring 20 apogee) polar orbit with a pearls on a str months of high resolution magnetic field da aligned currents (FACs) in the polar ionosph structure. The ST5 observations also comple the ST5 spacecraft, although the FAST conjunctions between ST5 and FAST show b structure. Furthermore, FAST includes particle det

of current-carriers. In particular, FACs are carried by keV energy electrons (inverted-V), low energy upgoing electrons from the ionosphere (return currents), and wave accelerated electrons (Alfvenic aurora). Thus FAST can provide additional FAC structures observed by ST5. Last, we and ST5 observations into a global context between externally-driven variability, suc changes in the solar wind, and internally-d

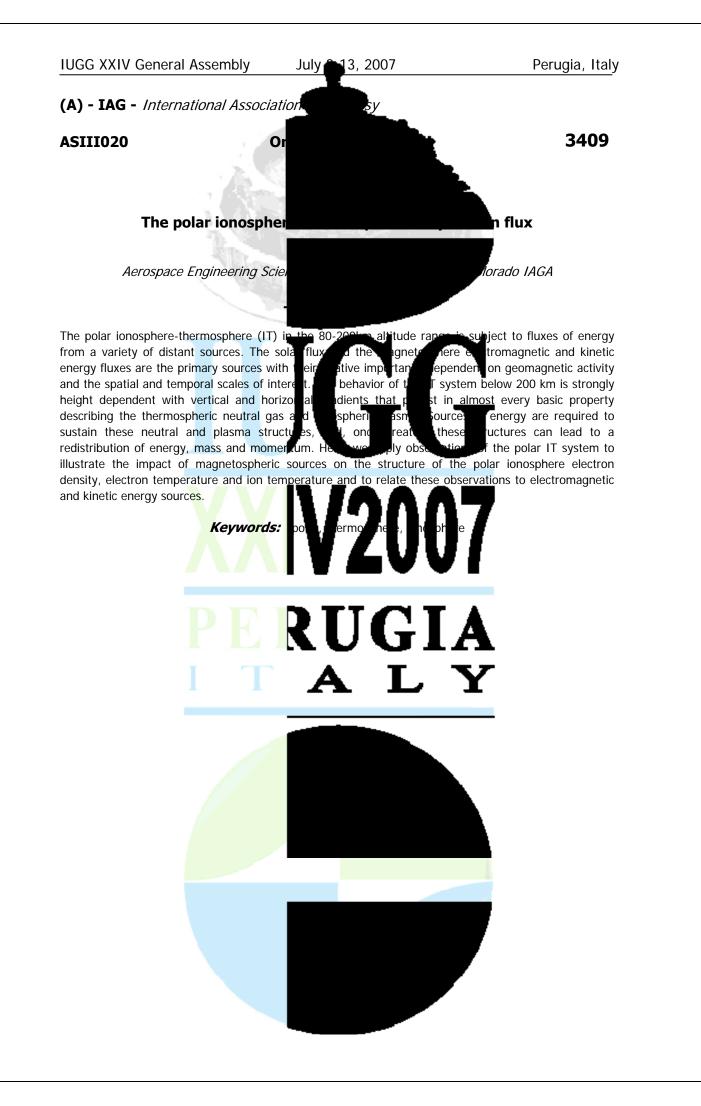


Keywords: polar, ionosphere, currents

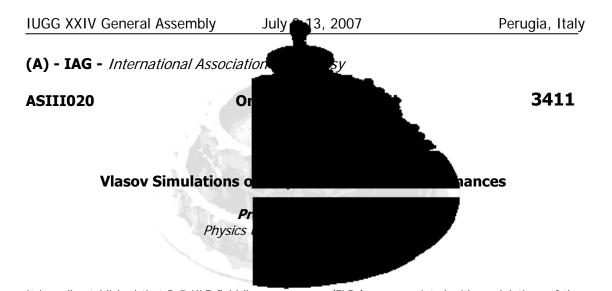
ous low altitude (4000 km cquired just over three cecra d multipent observations of fieldnination of temporal versus spatial FAST, which is in a similar orbit to time ata from several close and la scale persistence in FAC mine the different types

e temporal and spatial to place both the FAST allow us to discriminate and intensity related to



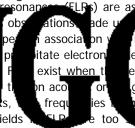






It is well established that Pc5 ULF field line resonant optical aurora, as demonstrated by numerol and all-sky cameras. Discrete auroral arcs a parallel electric field that is strong enough t to a number of keV. Parallel electric fields comparable to the electron skin depth and/ be demonstrated that for low frequency F MHD theory estimates of parallel electric fields

magnitude,) to explain the electron precipitation that is observed in association with FLRs. The reason is that two-fluid theoryunderestimates electric fields because of the nonlocal nature of the current-voltage relation in FLRs. This requires a fully-kine relating the field-aligned current and paral we consider the excitation of FLRs cover parallel electric field kinetically, and consid way, we are able to provide quantitative es is sufficient to explain temporally modulated d minutes.

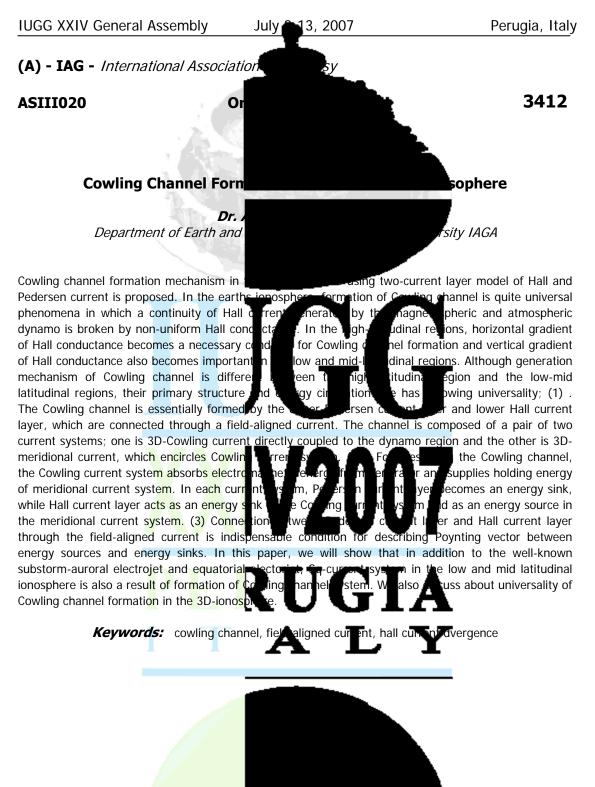


ed with modulations of the n scanning photometers mer FLRs, implying the existence of a energies ranging from 100's of eV erpendicular scale of the waves is gyrora . However, it can easily of a few mHz, two-fluid e ran more than an order of

generalized Ohm's law axwell simulation code. mHz.. We calculate the tion of electrons. In this , and demonstrate that it periods ranging over a few 10's of



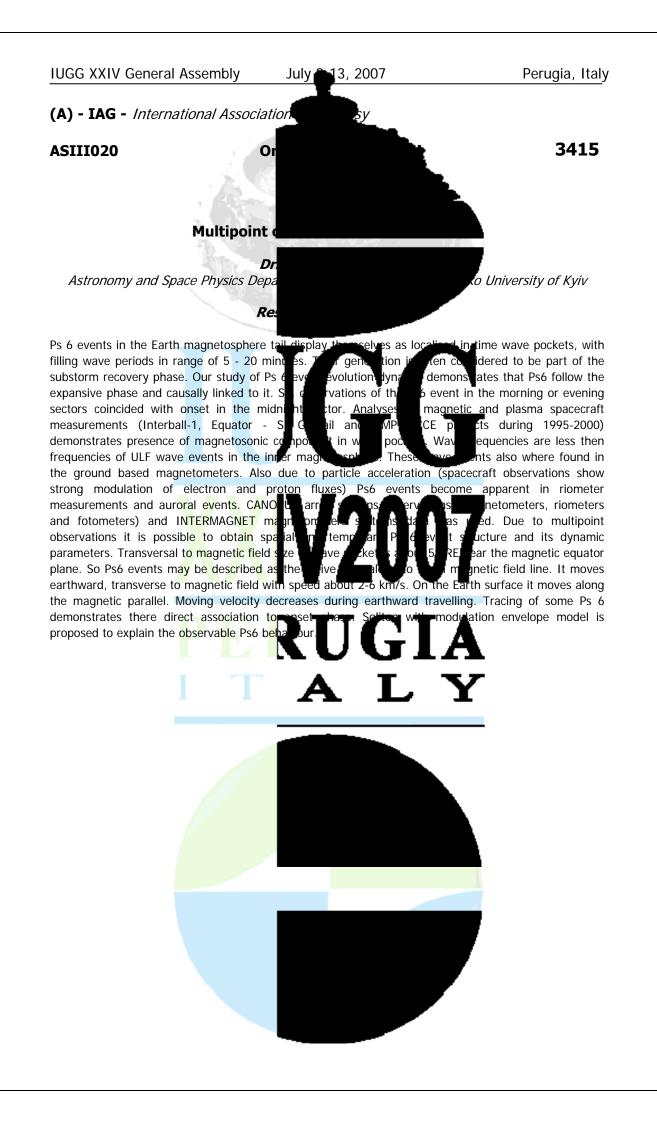
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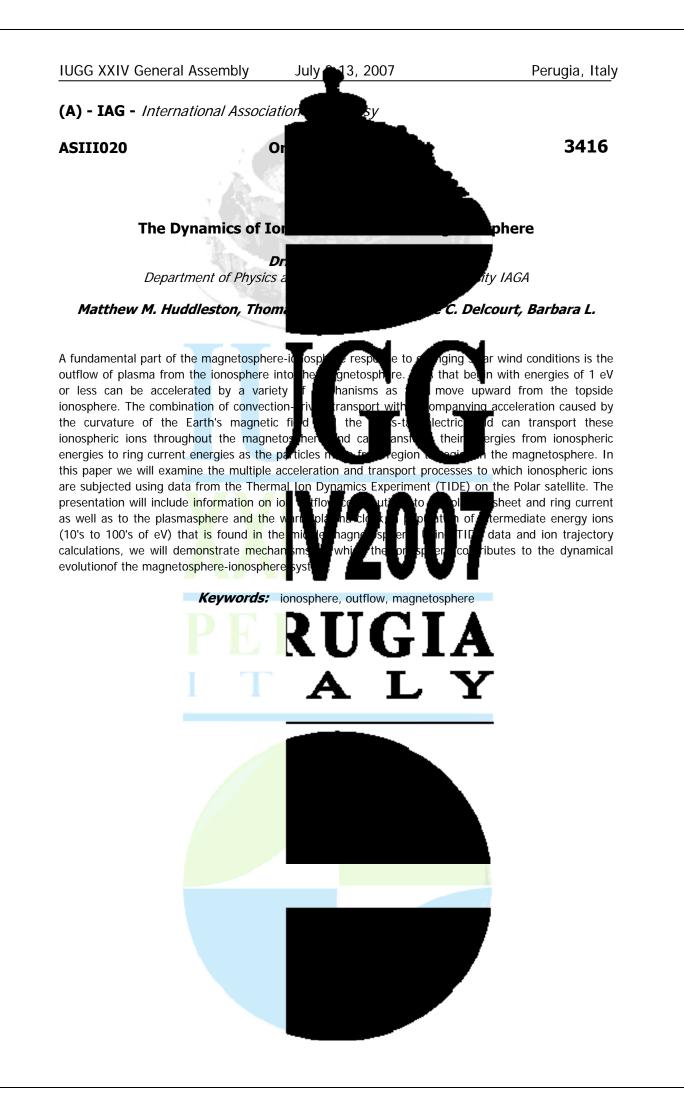










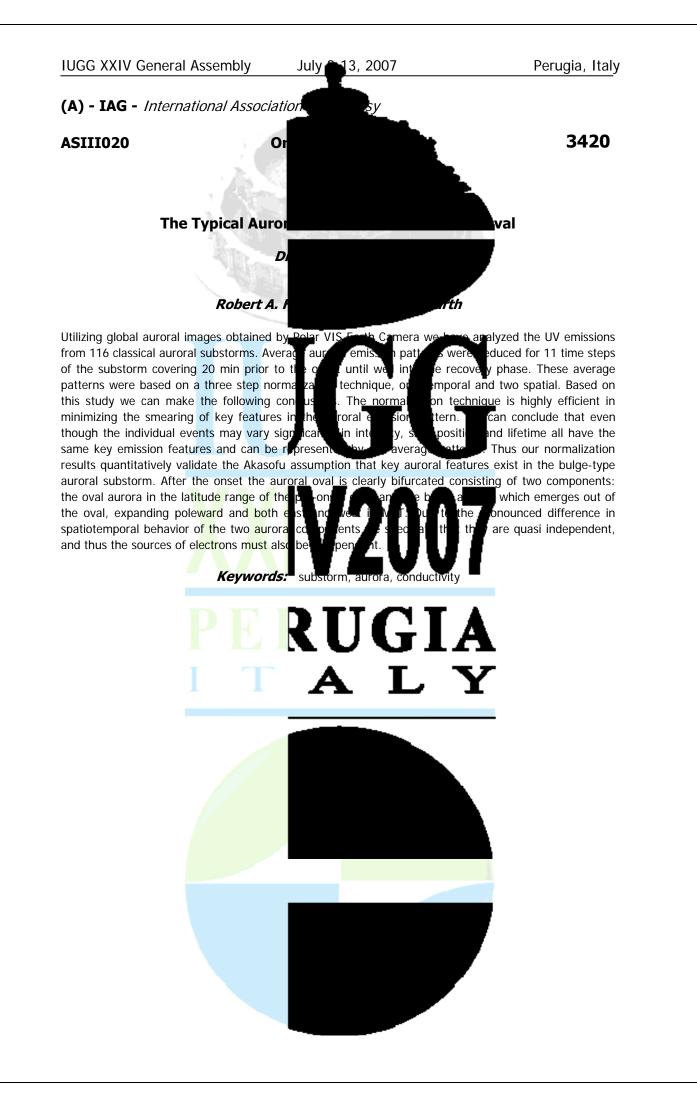






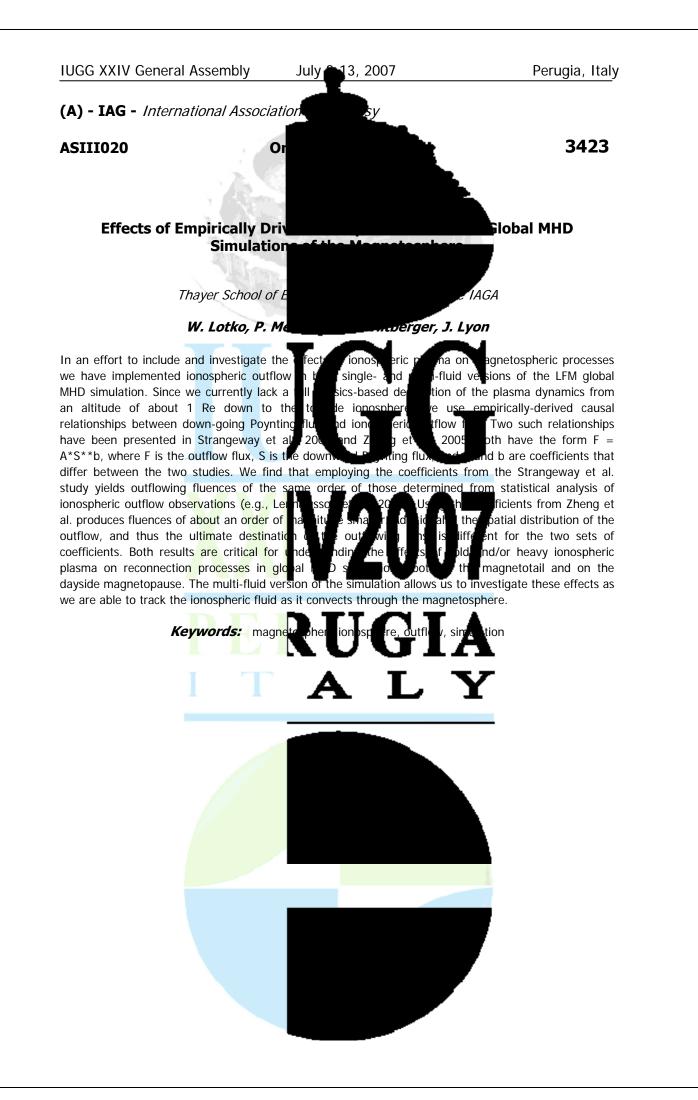


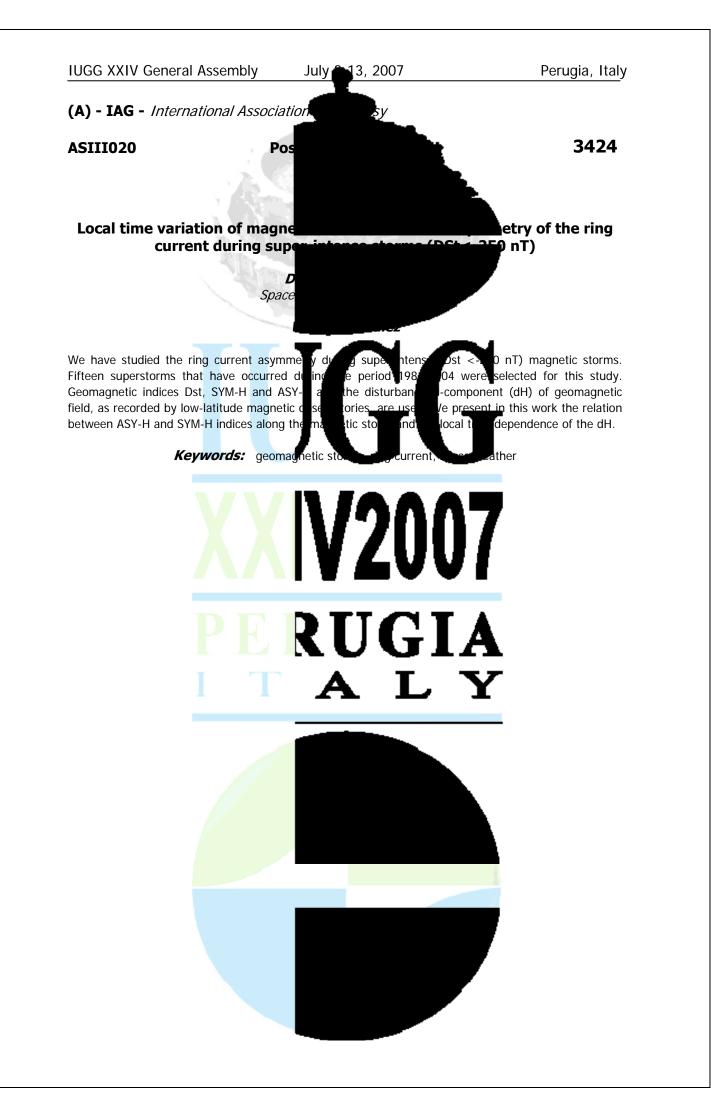








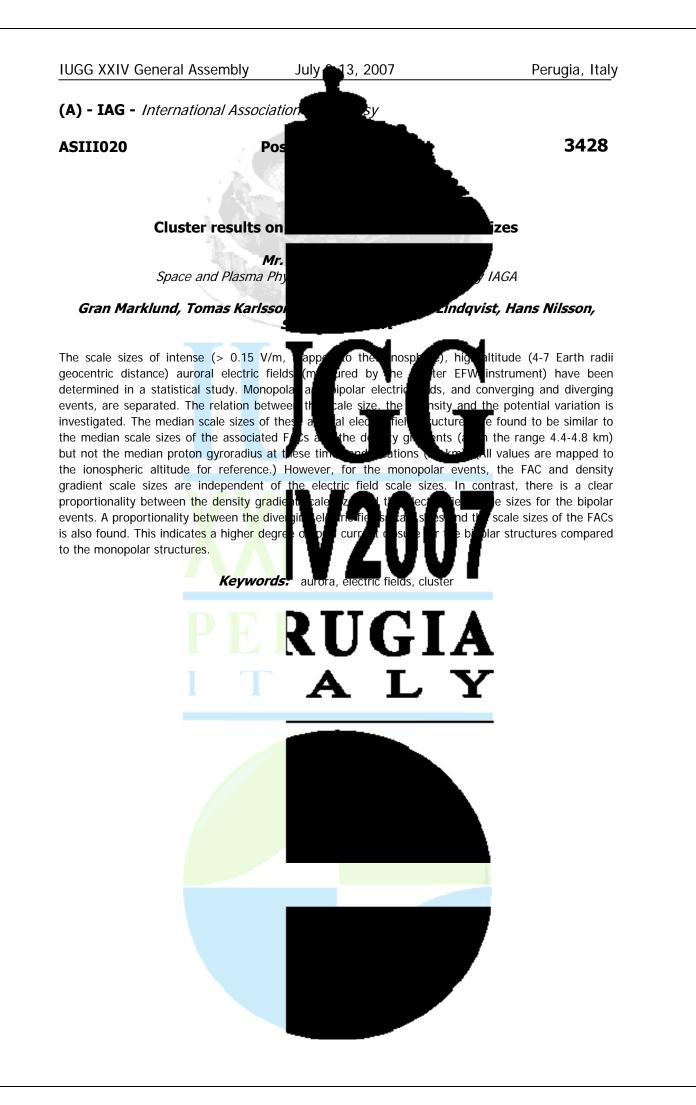


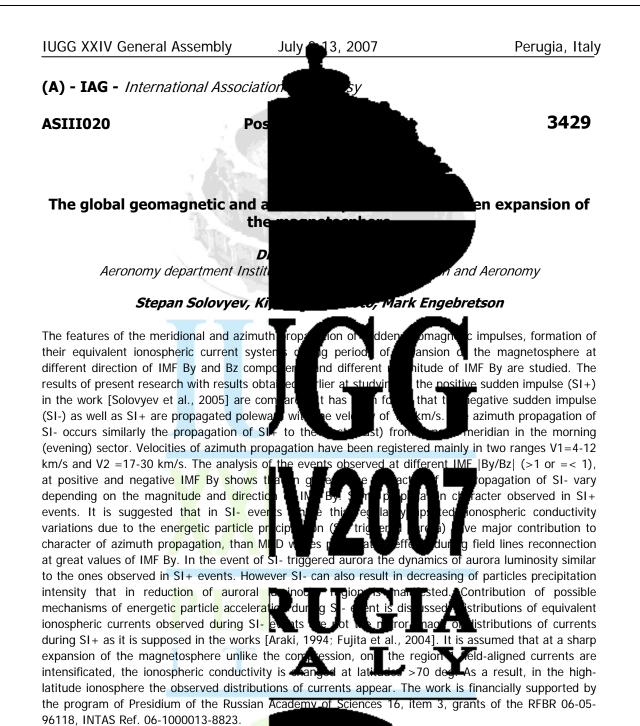


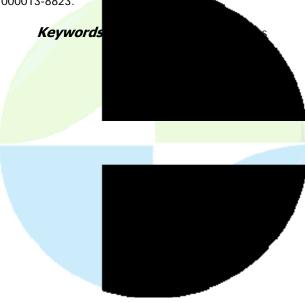


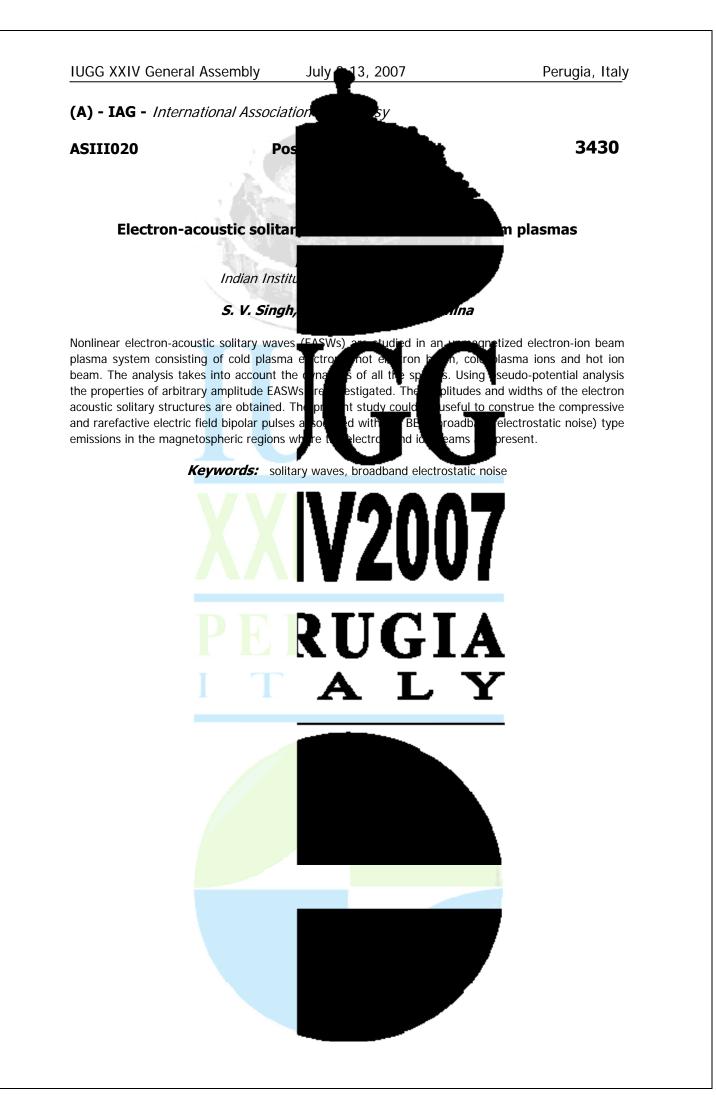




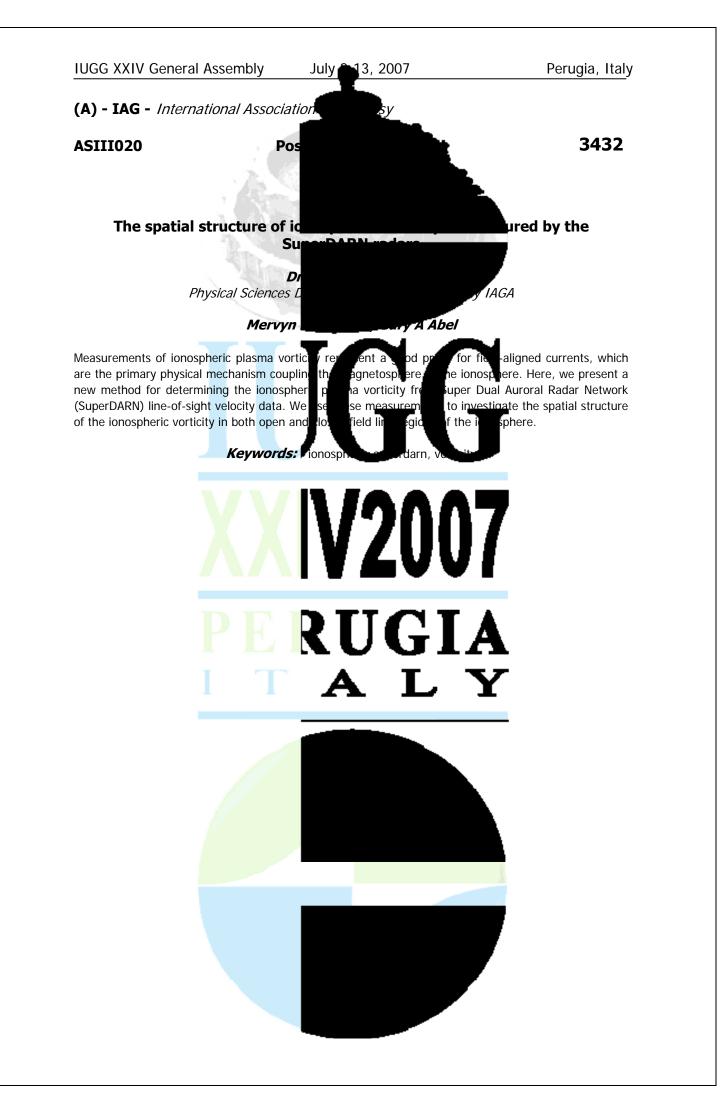


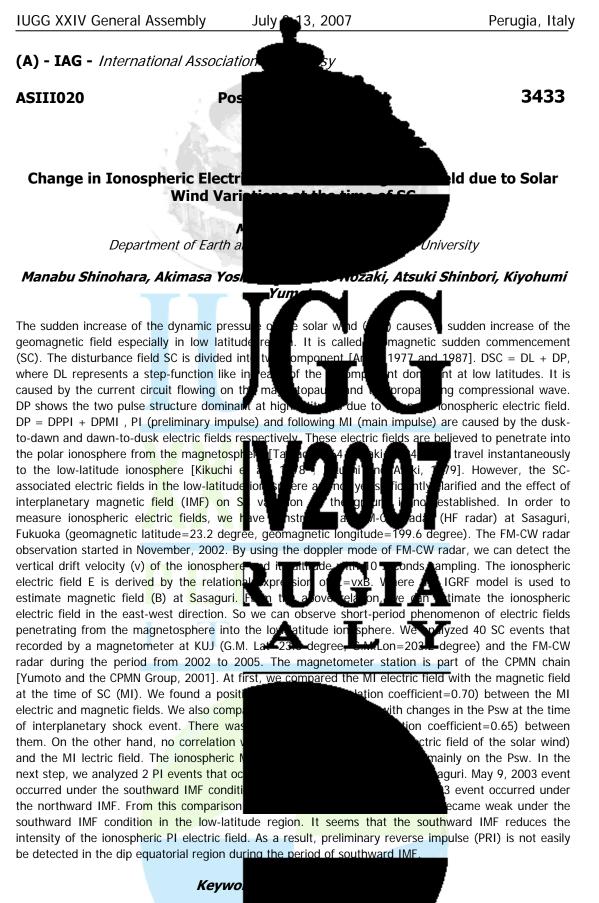




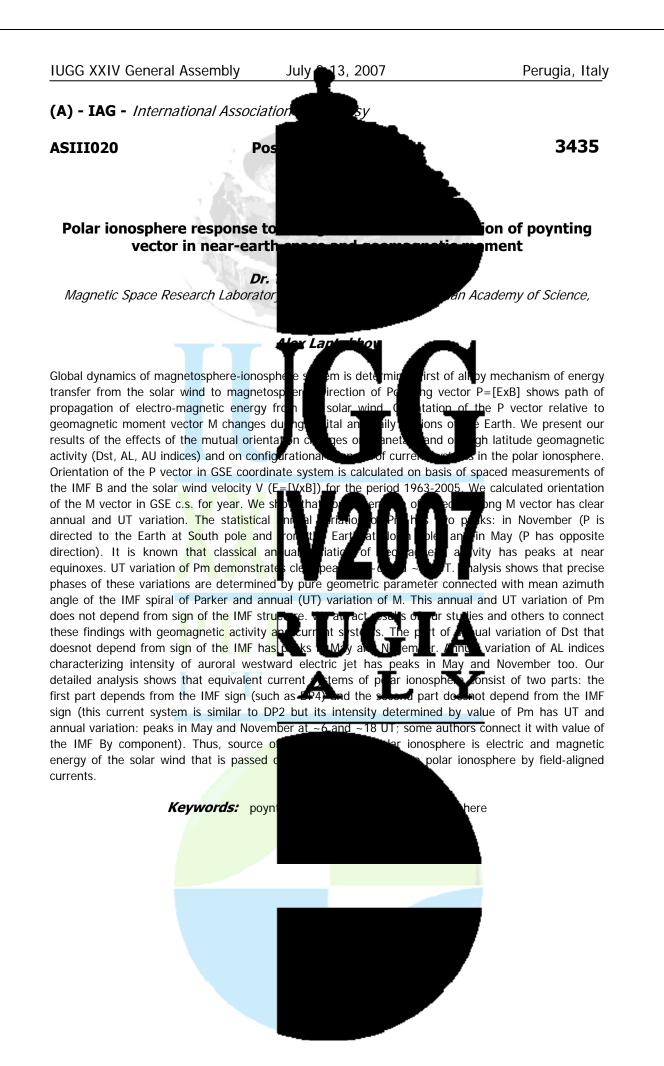




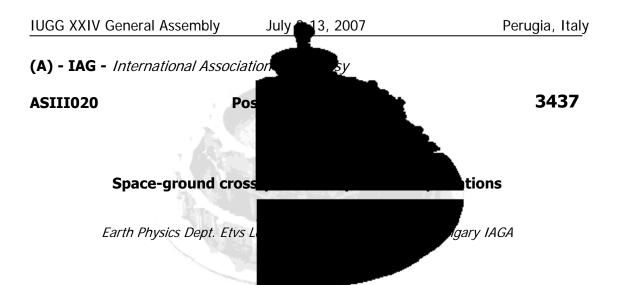












Space-ground phase difference of magnetospheric fa to be one of the key parameters from determined. However, the observations an authors established a constant 180phase frequency, and interpreted this observation mode. Others found that the observed ph conductivity of the ionosphere. From the lig they concluded the propagating mode and arg ionosphere. Theoretical approaches, however, suggest that a proper interpretation of phase relations should take into account all the possible wave modes reflected in ground signals and in the wave activity in space, as well as the role of the

satellite CHAMP and the MM100 ground m ground phase difference in the Pc3 range primarily on the longitudinal (or MLT) sepa the ground reference station also plays a r draw some conclusions on the possible sources of

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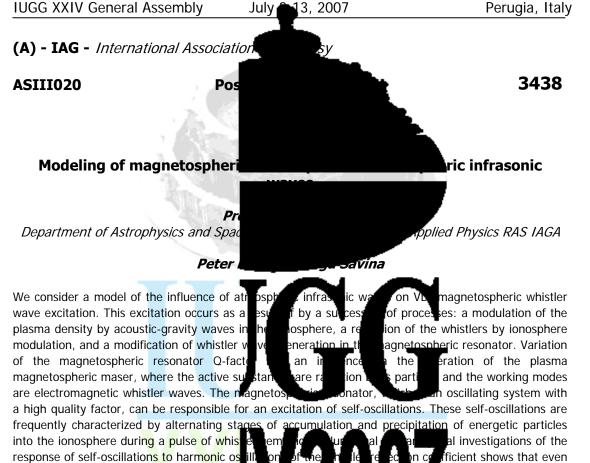
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ground Pc3s is considered ospheric waves can be mag r are ramer controversial. Some 2-3 range, independent of wave a plasmaspheric cavity resonance ave frequency and the on the wave frequency duced by the dayside

> easurements from the al distribution of spaceat this quantity depends d station, but the MLT of new knowledge we try to



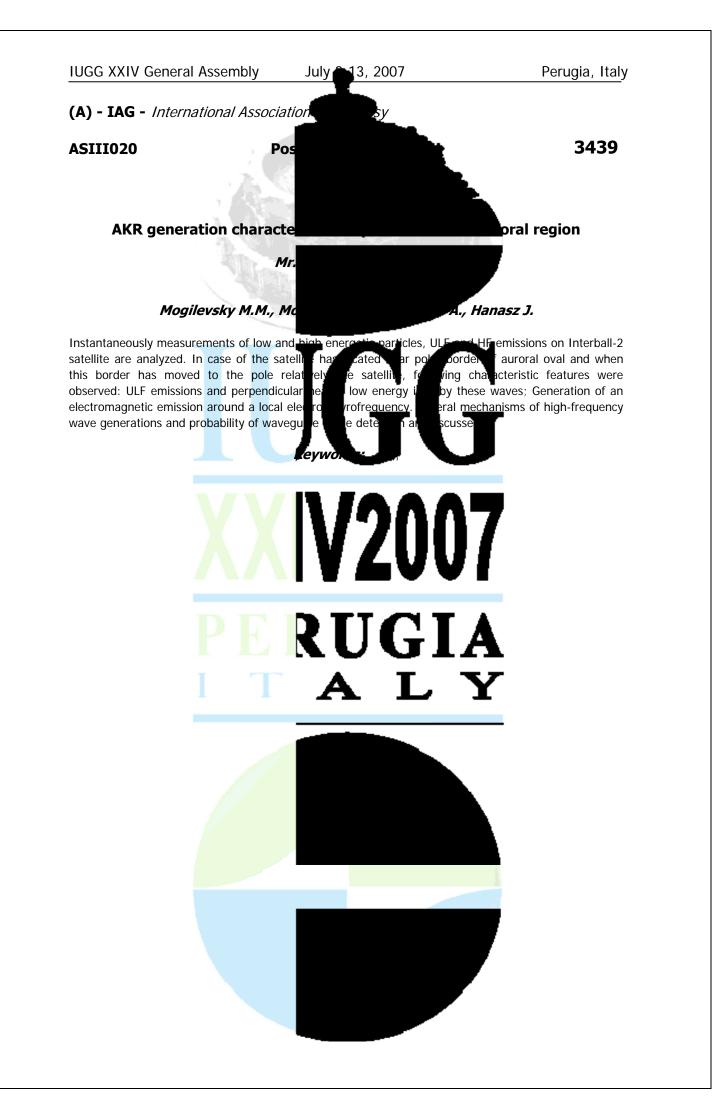


a small modulation rate can significantly explain the causes of the modulation of en scale from 10 to 150 sec in the dayside r observed in the sub-auroral and auroral magnetosphere of the space weather phenomena.

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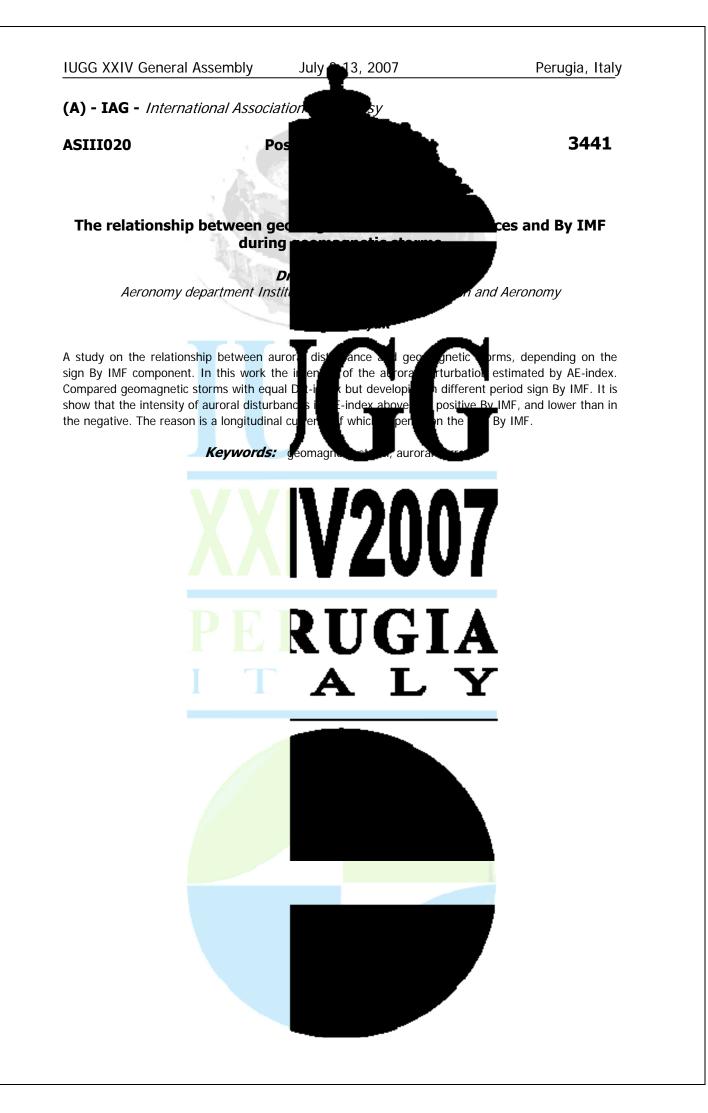
issions. Our results can ave intensity with a time VLF emissions are often and have a noticeable effect on the formation

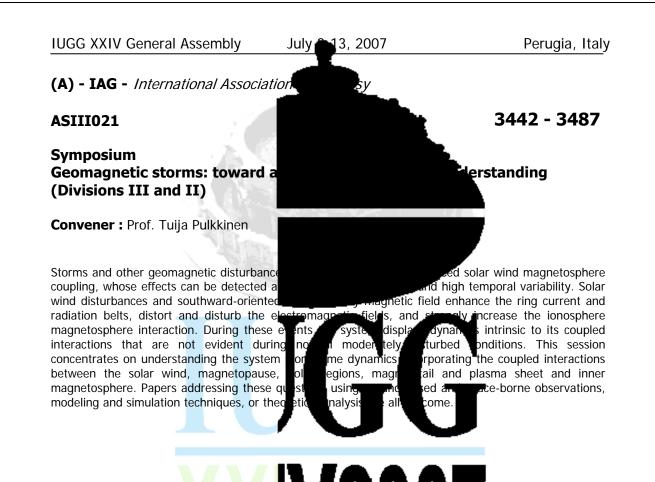




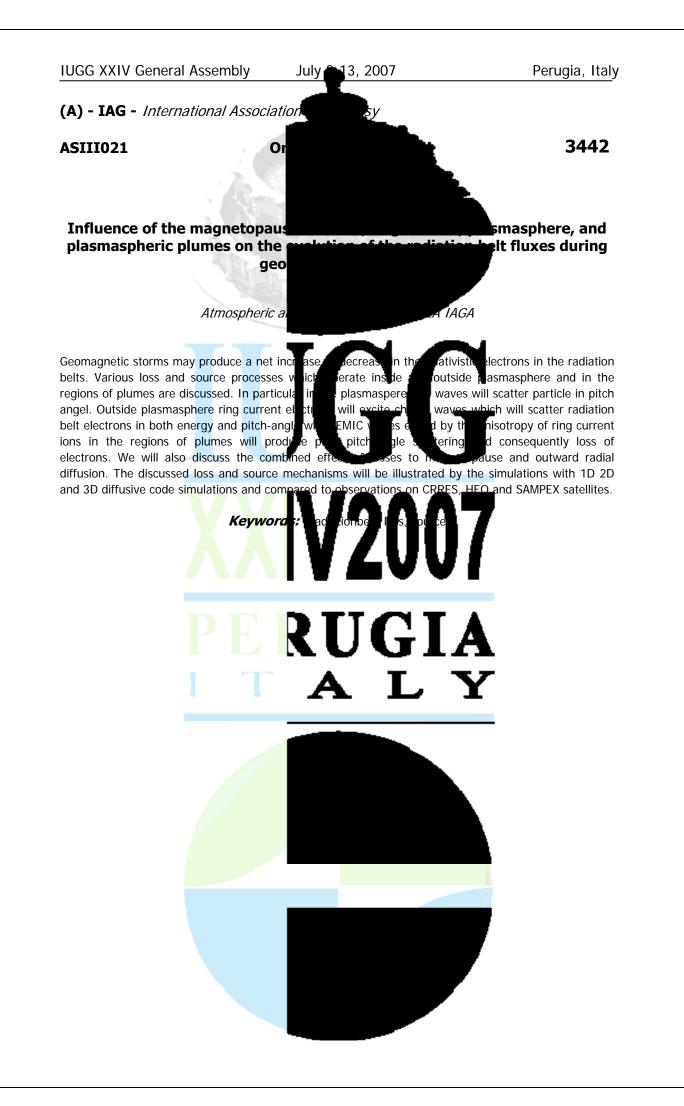


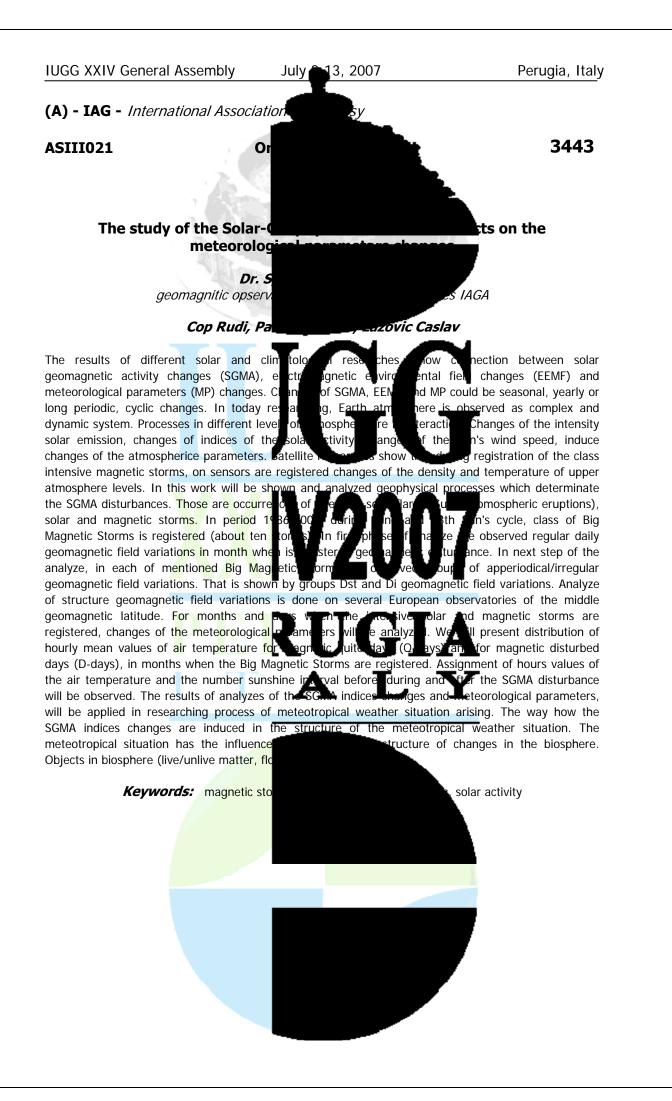


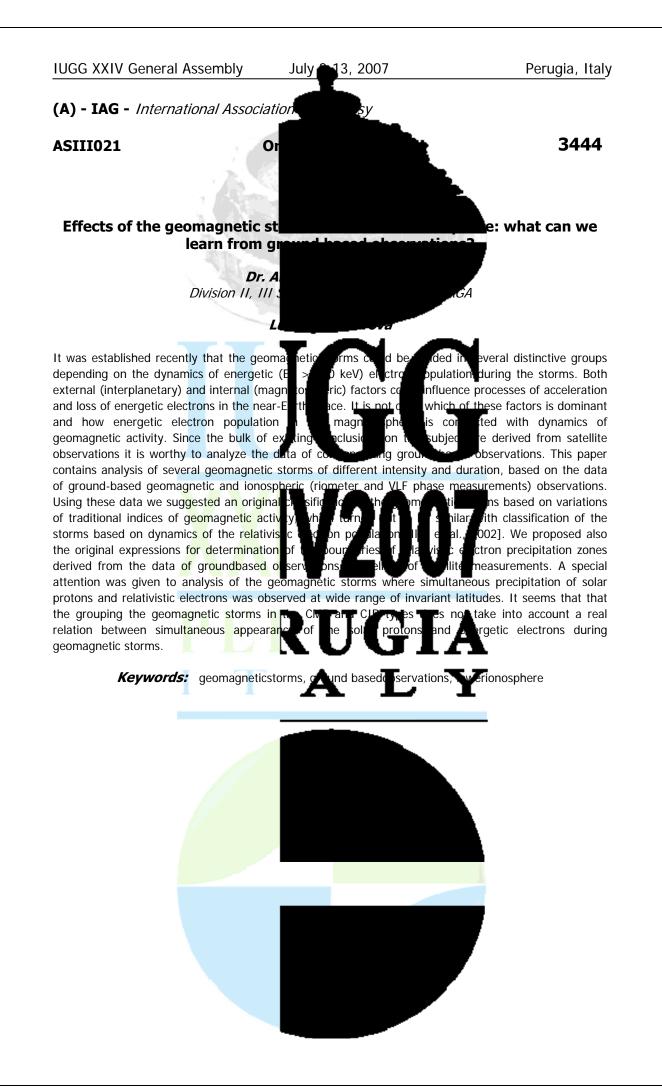


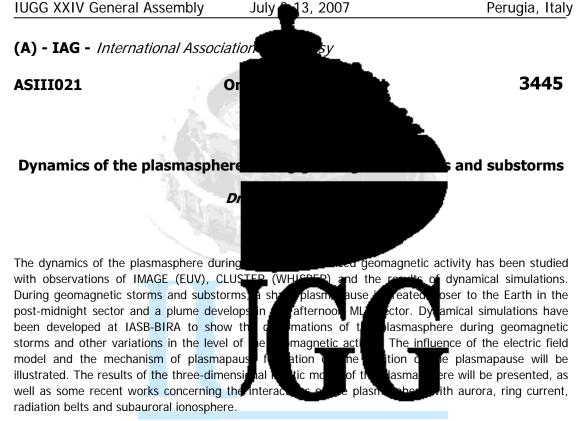




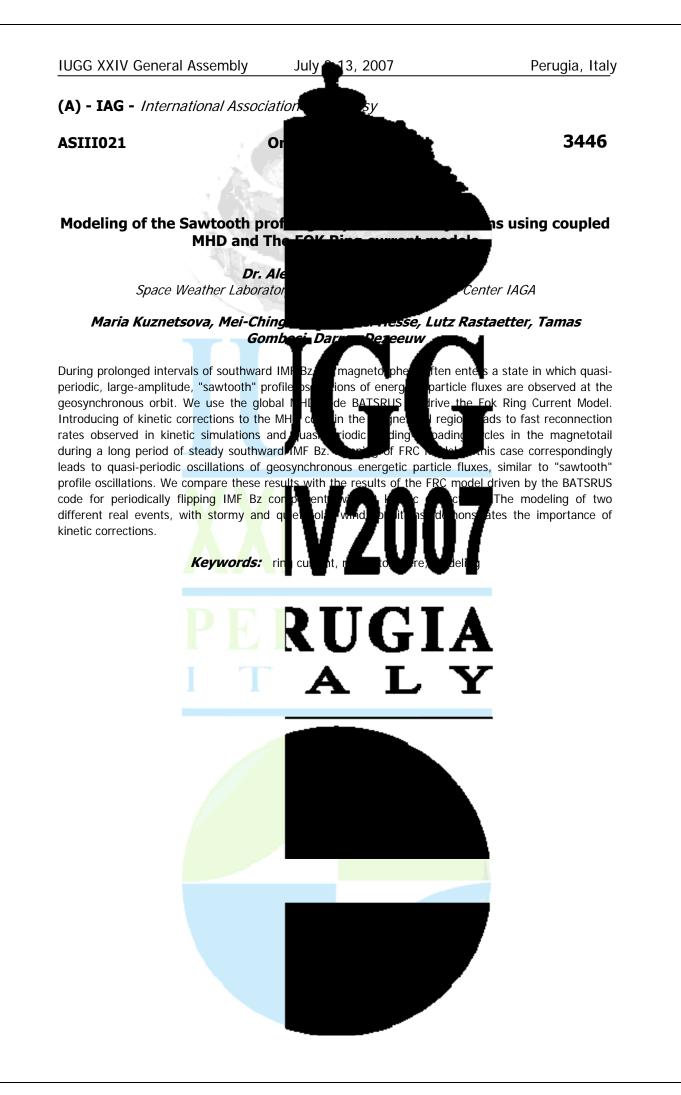


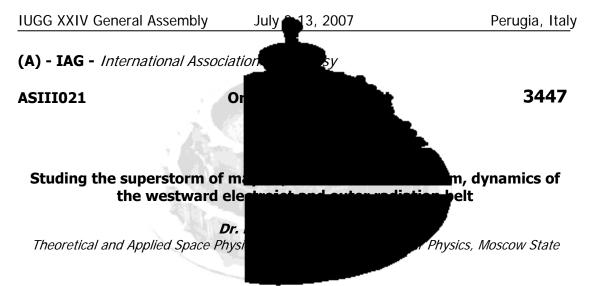












## Ginzburg Eugeny, Ivanova Tatyan avlov Nikol Svidsky Pavel

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We use the data on 0.17 - 8 MeV electron fr altitude), the data from GOES-10, LANL-84 Meteor data, the main phase of the superst made the outer radiation belt almost to v During those 2 hours, geomagnetic dynar substorm. Signature of that substorm given in

shows the westward electrojet made an excursion to the same L~3. At geosynchronous orbit, 2 MeV electrons did not appear for almost a day of early recovery phase while the intensity of lower-energy electrons of 0.3-1.5 MeV showed gradual i during a substorm on May 16, at about 06 was about -120 nT. All the studied effects 10^4/Lmax^4, where Lmax is an L-position belt, or the trapped radiation boundary, relativistic electron acceleration are discussed.

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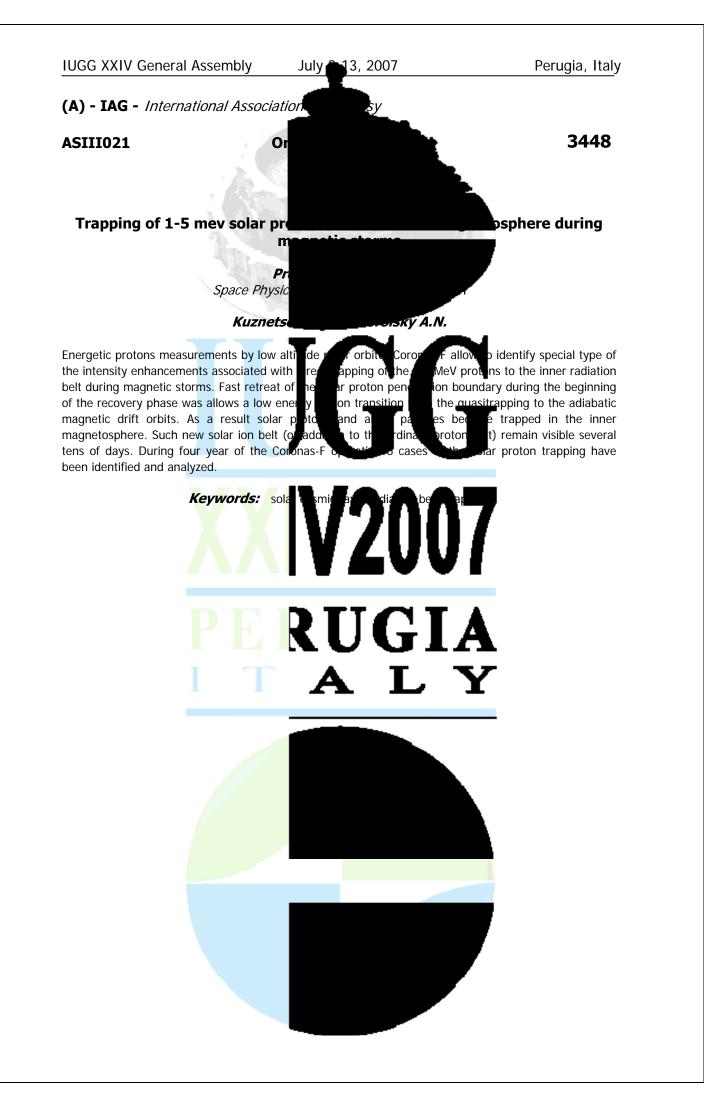
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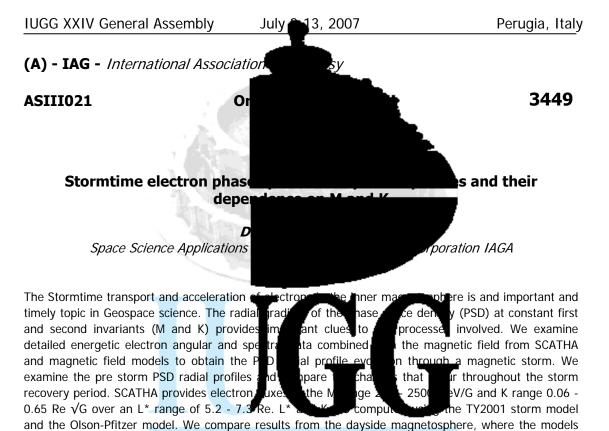
nd the

or-3M (circular orbit at ~1000 km netic stations. As seen from the nich lasted for about 2 hours only, ntside ndary occurred at L~3. e substorm, the "main" omagnetic observatories

> rons has been formed 4, and Dst at that time bnship |Dst|max=2.75 \* ected relativistic electron Possible mechanisms of







well represent the observed field, to those taken on the night side, where the field models do not match field observations as well. The PSD radial p and M even during the pre storm period recovery. During the electron PSD enhance from those with positive radial gradients t differences strongly dependent on the valu profiles for small and intermediate K values at constant M with the profiles at small K much flatter than those for K > 0.2 during the early recovery period. For example, the PSD profiles were

flat or negative for M > 1000 MeV/G and 0.2. After the post storm PSD's maximized relatively flat at small K or had negative able to measure the near equatorial pitch angle distributions so as to obtain the correct view of the radial profile structure of PSD. The results will be transport and acceleration processes.

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D radial profiles ranged

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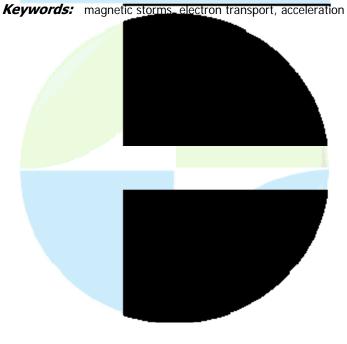
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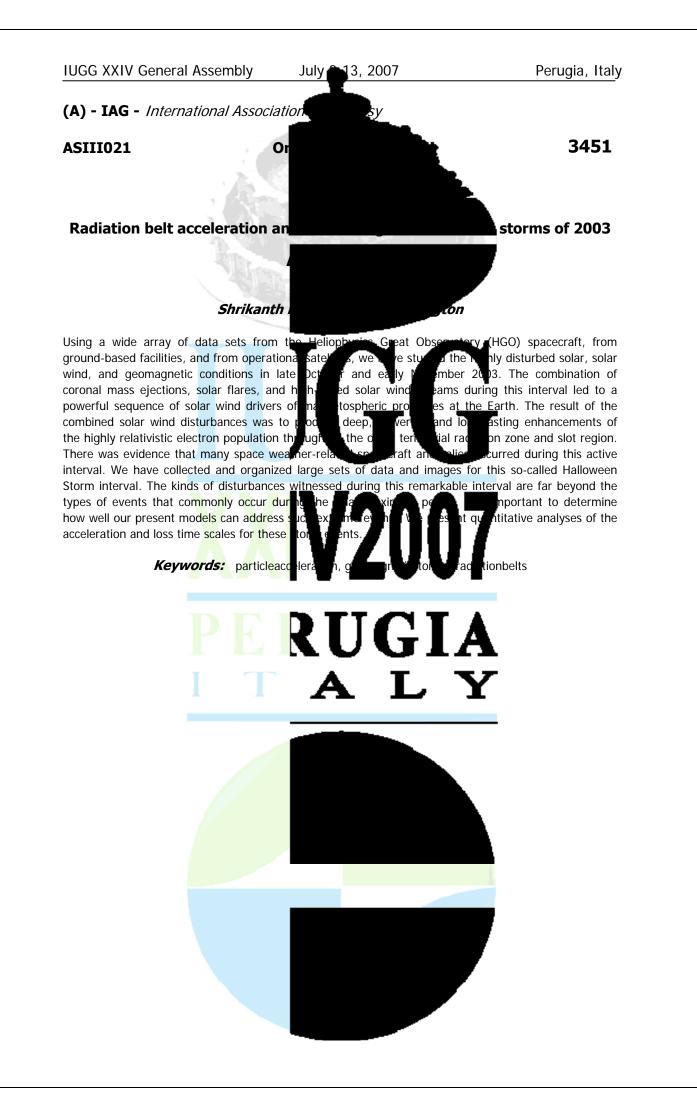
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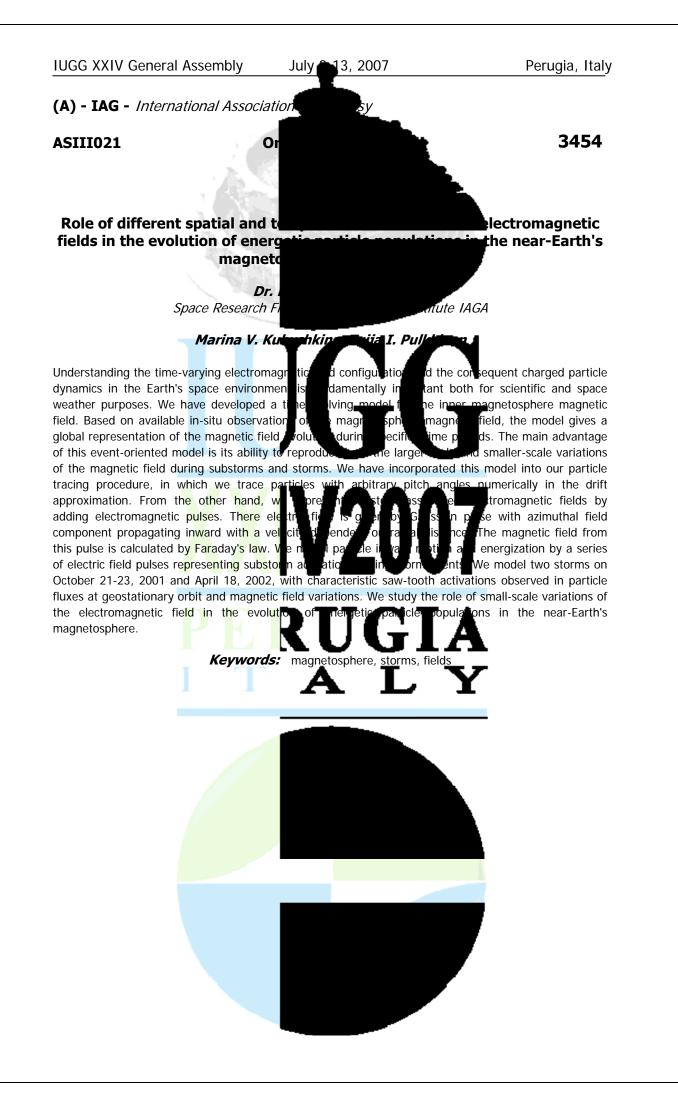






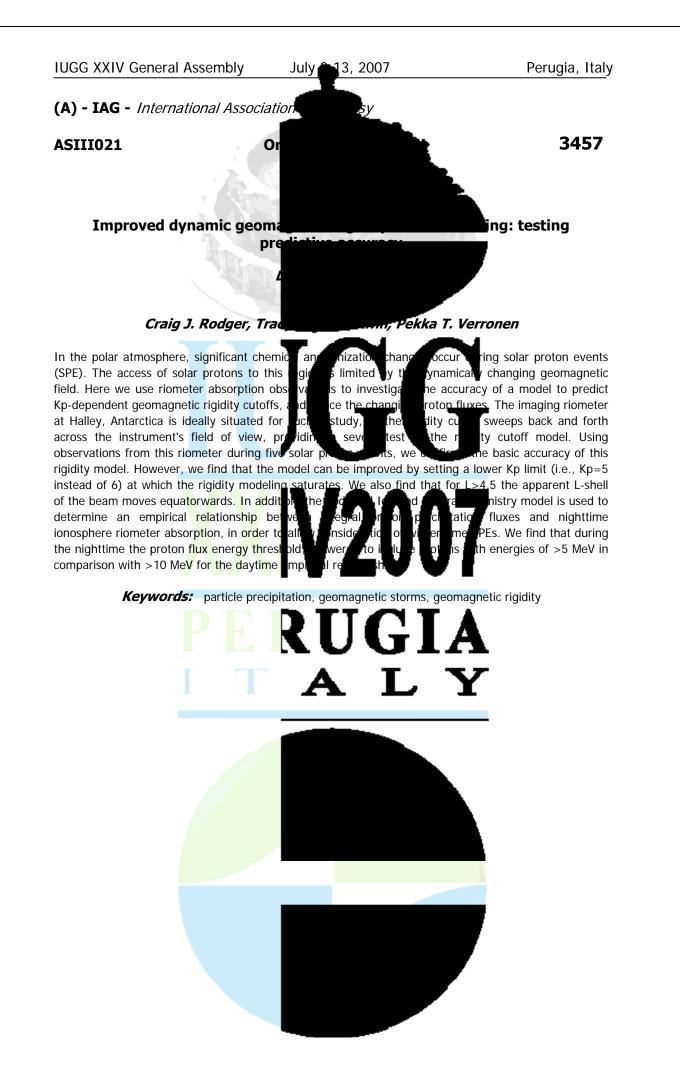




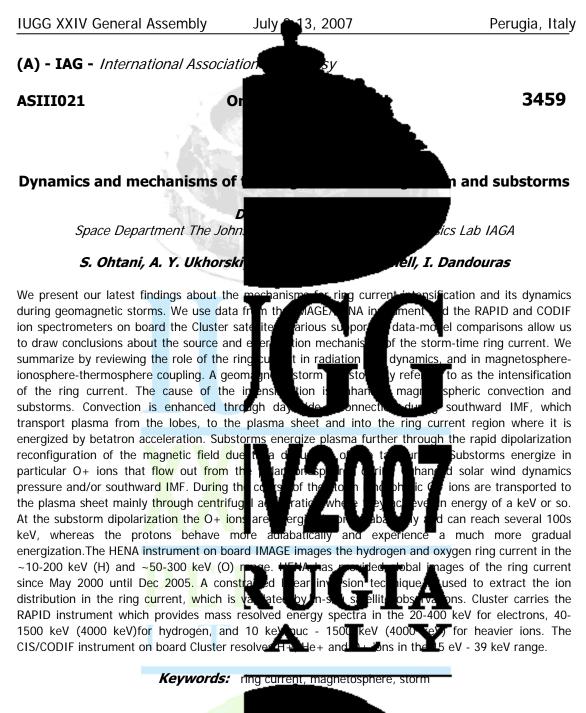


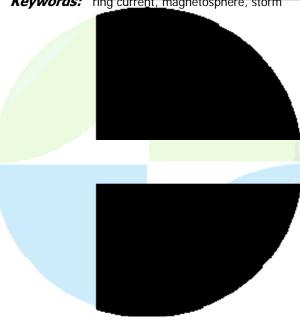


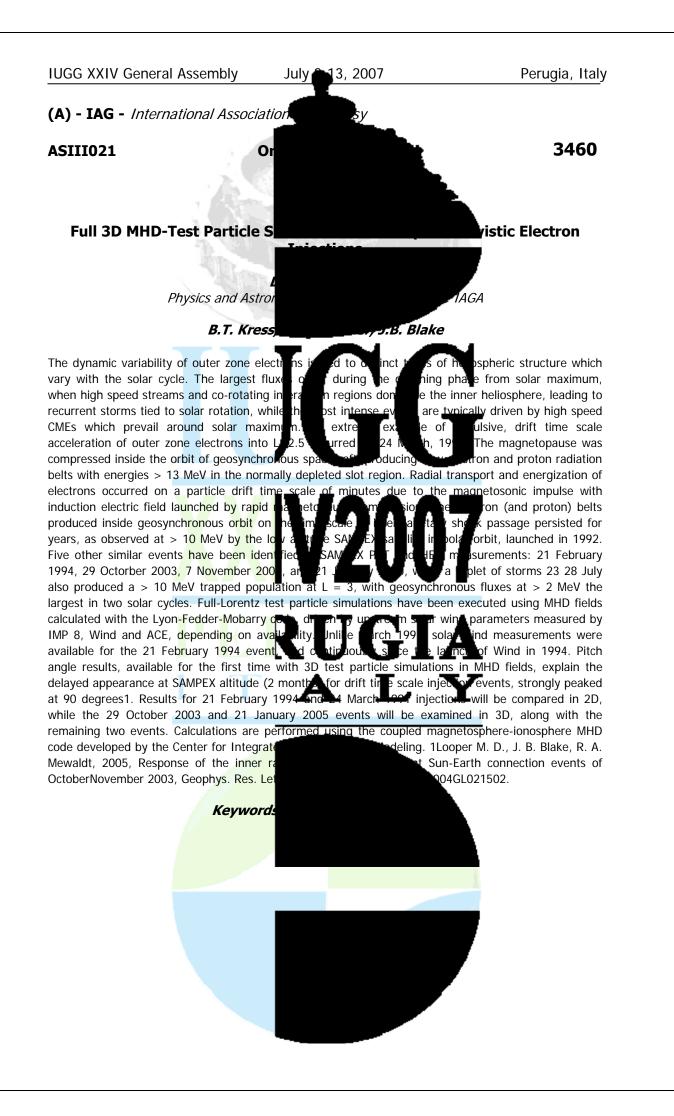


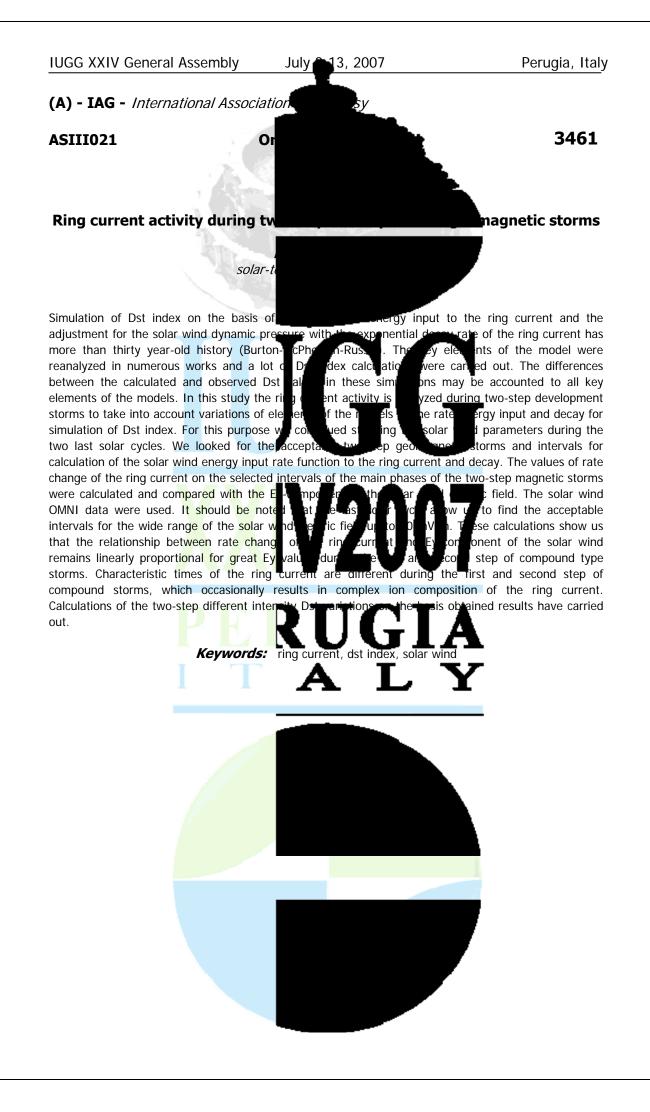


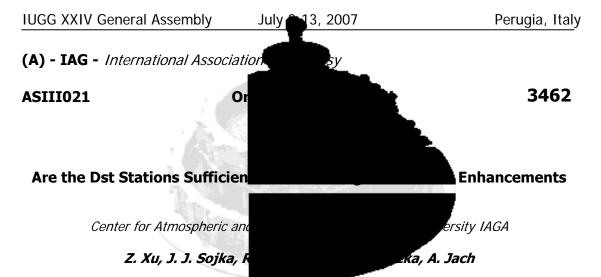












It has been a consensus of the space so derivation procedure, what the Dst index symmetric ring current and actually it refle storms, in which significant local-time (LT) of developed Wavelet-based Index of Storm stations are sufficient for describing the s station distribution based on the existing s that during guiet times, the H component variation

with four conventional stations is sufficient for monitoring the quiet-time magnetic variations. During storm times, there are significant LT-dependent current enhancements in the main phases and the early recovery phases and the present Dst stat direction, are not sufficient for describing underestimates these variations. To better that a set of 8 specific low-latitude static longitudinal direction actually reduces the ffe This optimal number may indicate that the small dependent currents during storms could be about 3 LT hours

hat with e com hea are t ius global d rrei nt componen (WISA), we ne en er at is nal itude

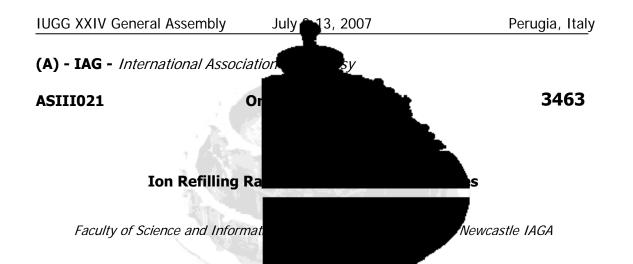
st longitudinai

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egific data processing and time variations of the st hancements during geomagnetic ist. In this work, by using a newly ntitatively assess whether the Dst ther there is a specific uch a rpose. Our results show symmetric and the Dst

ibution in longitudinal the Dst index normally ents, our results suggest creasing stations in the ent currents in the index. spatial scale of the major enhanced LT-





Measurements of the eigenfrequency of geomagnetic mass density near the equatorial plane of the of ground magnetometers therefore allows be remotely monitored. Using cross-phase a the equatorial mass density during a mode following several days of magnetically quie recovery phase (Kp = 6+), the field line e corresponds to very low mass densities, indicating flux tubes were depleted. Over 10-13 March the eigenfrequency at these L values progressively decreased, indicating refilling of the flux tube to pre-storm levels, superimposed upon diurnal variations. By comparing density measurements we h km level for the L = 2.34, 2.63, 3.26, a

increasing L-value, being 3.9x108 amu, respectively. These are in excellent agree previous authors, and the L-value dependent production rates.

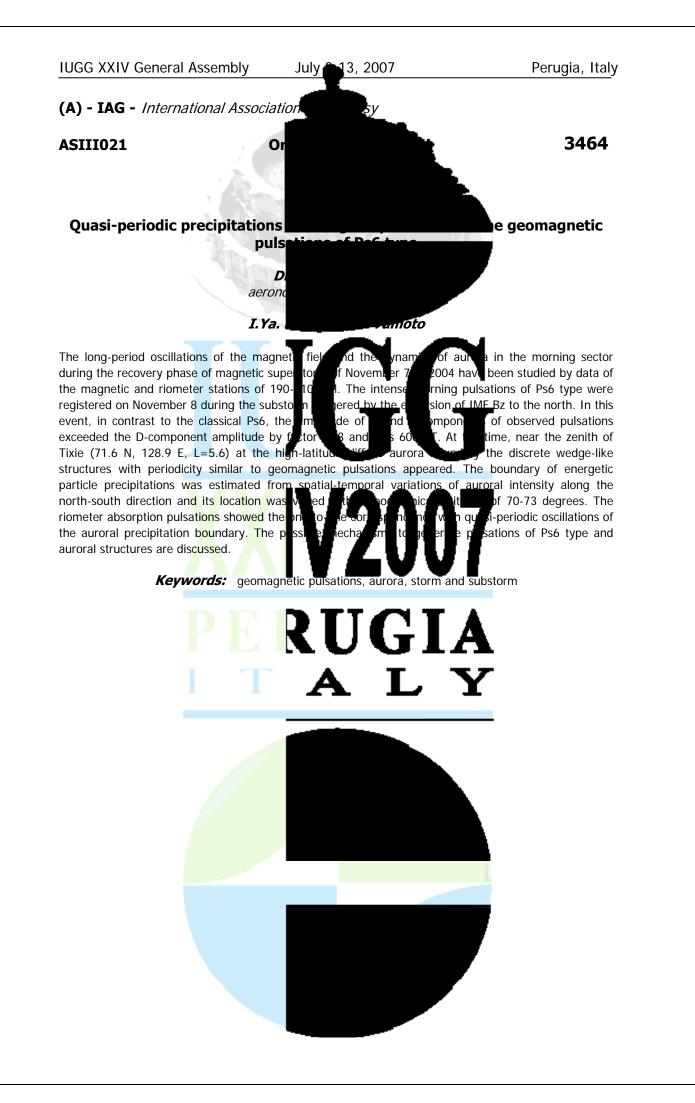
lines can p ma Data lospf al density dist of ground ma oma<u>gnetic st</u>o ions. n ency L lasmā

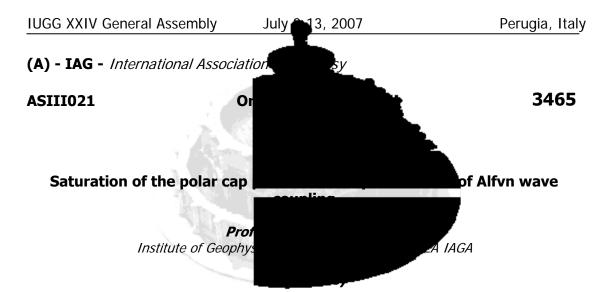
h, at

information on the plasma tended meridional array óm ar ion, and ts temporal variation, to ometer array data, we determined hat commenced on 9 March 2004 beginning of the storm 34 3.8 vas unusually high. This ed Earthward and these

> and fluxes at the 1000 fluxes decreased with amu/cc/sec at L=3.83, on fluxes calculated by nith angle control of ion

Keywords: plasmasphere agnetic storm





The cross polar cap potential varies roug conditions but asymptotes to a constant impedance of the solar wind across oper ionosphere, Alfvn waves incidentfrom the s polar cap. The ratio of the cross polar cap. ratio of twice the Alfvn conductance of th Pedersen conductance of the ionosphere. The Alf

speed of the solar wind. As the magnitude of Bsw increases, the polar cap potential first increases linearly with Bsw but ultimately (during major geomagnetic storm intervals) saturates at a level that depends only on the Pedersen conductar (plus a small viscous contribution). Qua observations made during 13 storm int changing reconnection efficiency, specific d the bow shock on the reconnecting plasr previously proposed, our arguments place magnetospheric geometry.

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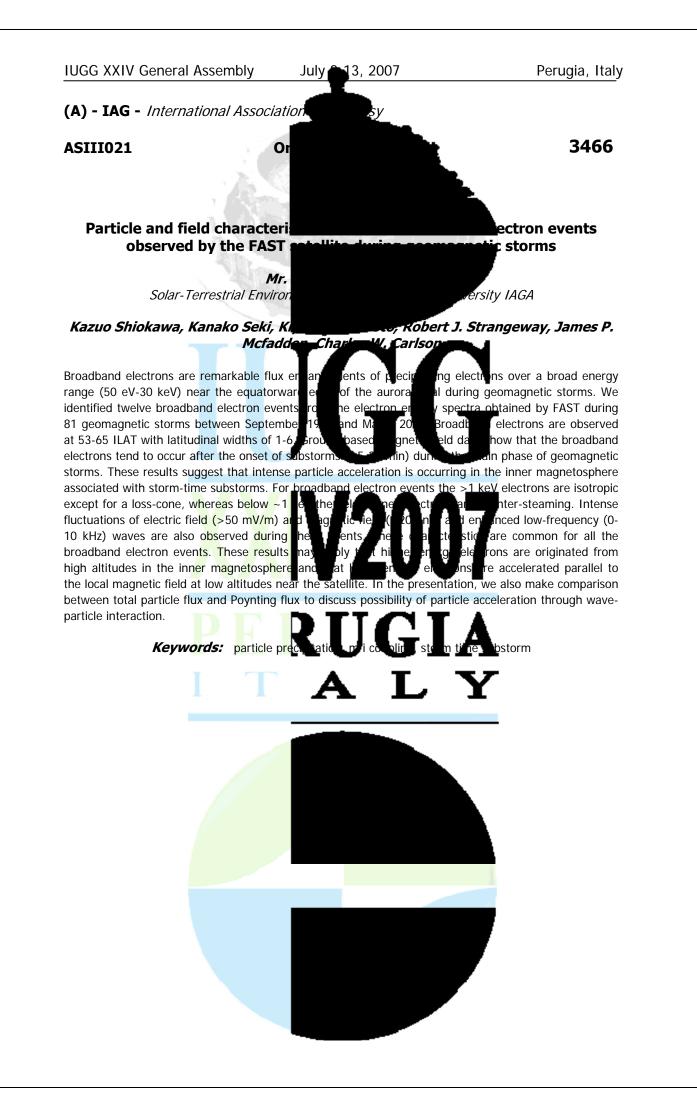
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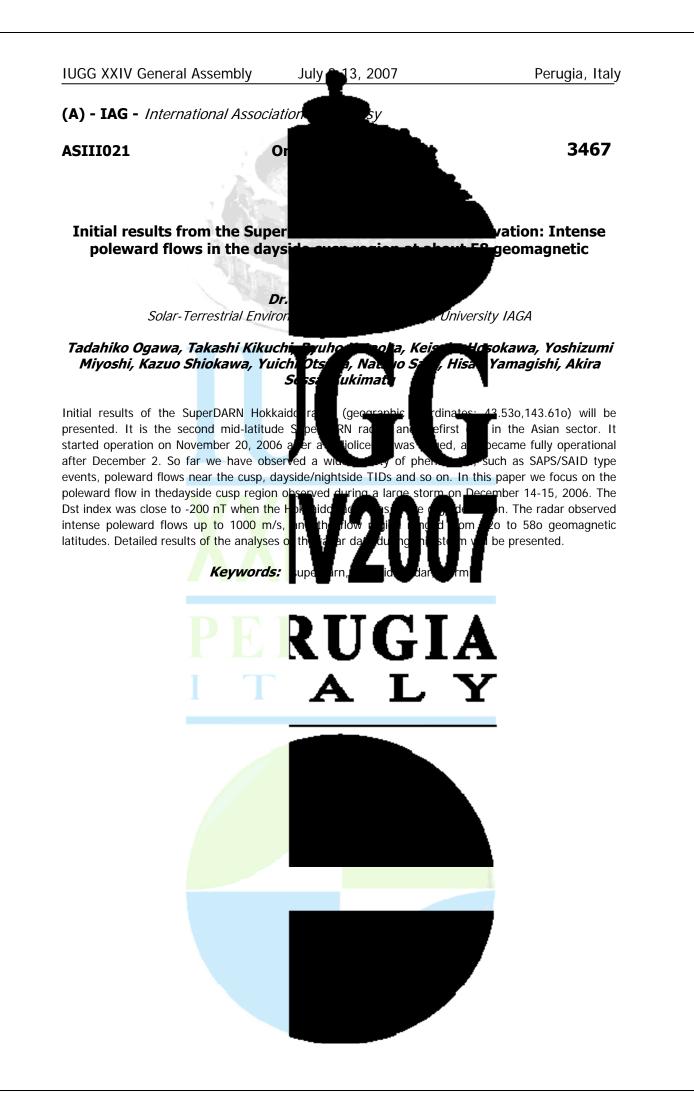
ectric field for nominal br large electric field. When the dominates the impedance of the flected reducing the signal in the impos by the solar wind is the of the vn conductance plusthe proportional to the Alfvn

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vind dynamic pressure levels consistent with aturation have invoked t system, or the effect of matically similar to some reconnection efficiency or on









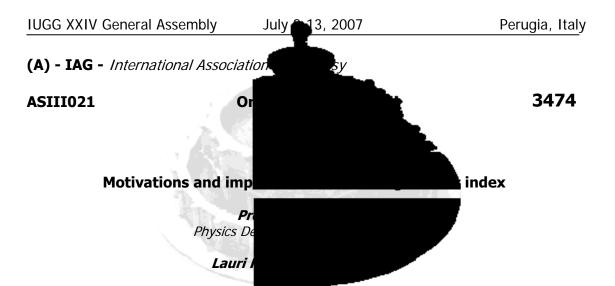












The Dst index is one of the most useful geomagnetic most dramatic events in the near-Earth space some time that the Dst index includes an e "non-storm component" which is unrelated have recently calculated a corrected and ex 1932-2005. Here we review the rationale for the Dcx index and the consequences of rethe time evolution of individual storms remains the

to 44 nT. The correction has a strong seasonal variation with maxima around the equinoxes, especially in the vernal equinox. The largest monthly correction of about 12 nT is found for March. The average increase of the Dst index is 6.0 nT for a average 7-day storm level, and a 14% col SSC storms. Thus, the correction affects m to the different intensity levels. Dcx has es the Dcx index correlates better with both other implications of substituting the Dst index by

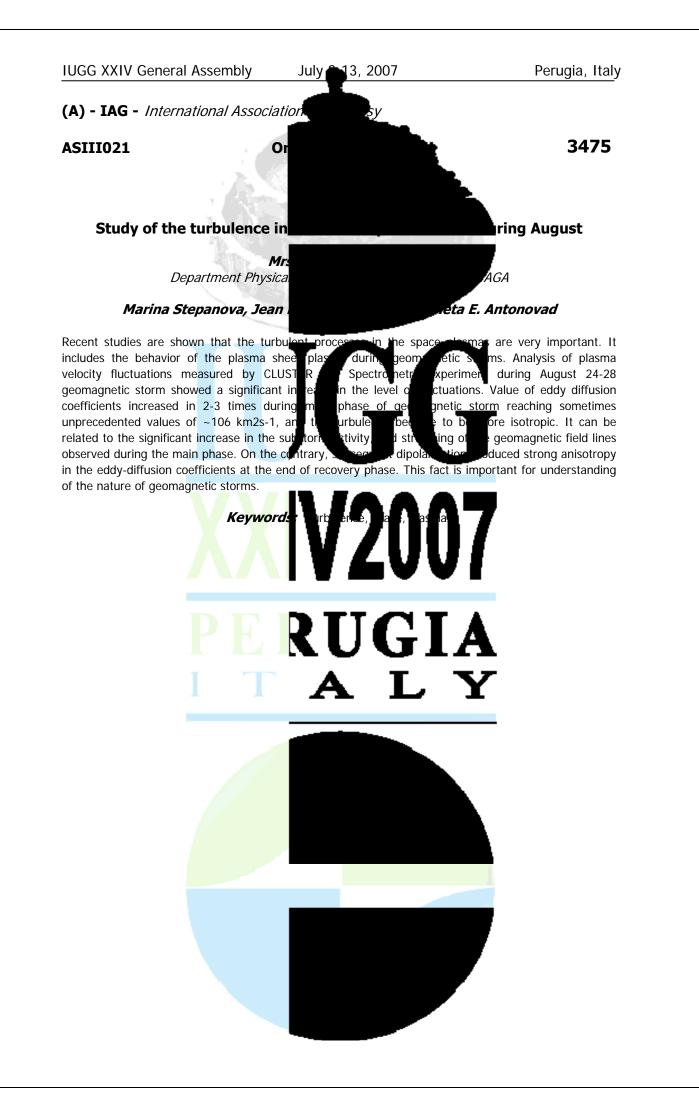
hich has the c sto Smad seasonally ntensity of th versi<u>on of th</u>e lucing Da ie Ds ex correct

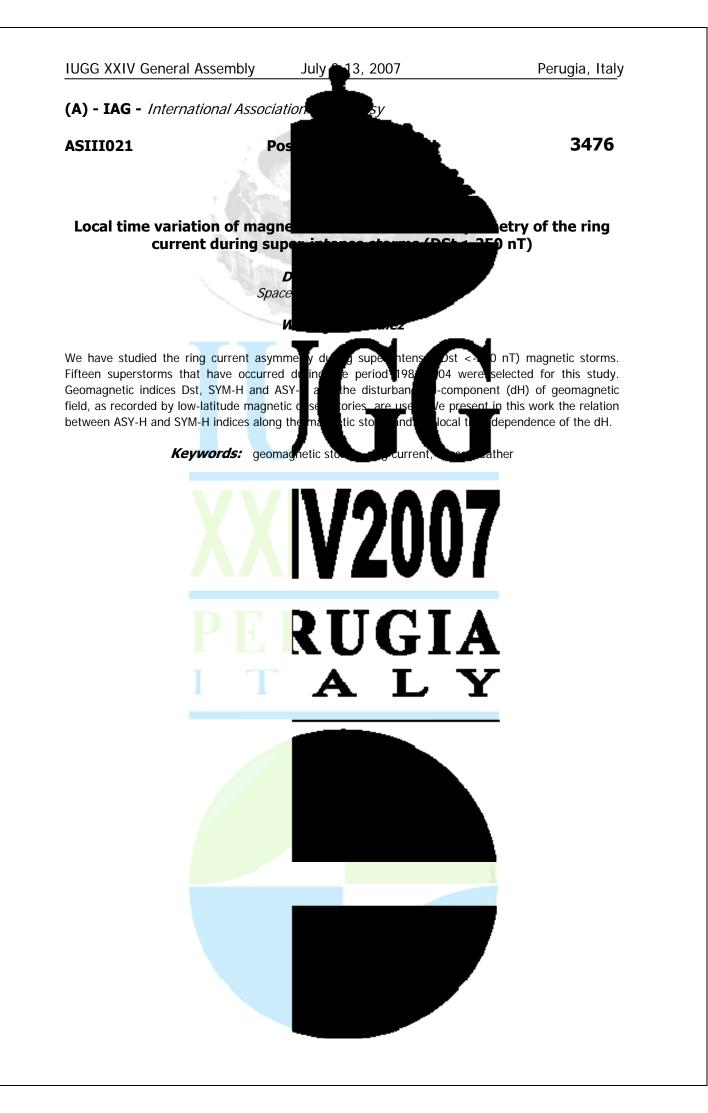
constructed to monitor the r, it has been known for How ng quiet ime level, the so called g current or magnetic storms. We index, the so called Dcx index for iscuss the properties of lex, a orrect Dcx index. While ne mo se their Dst values by up

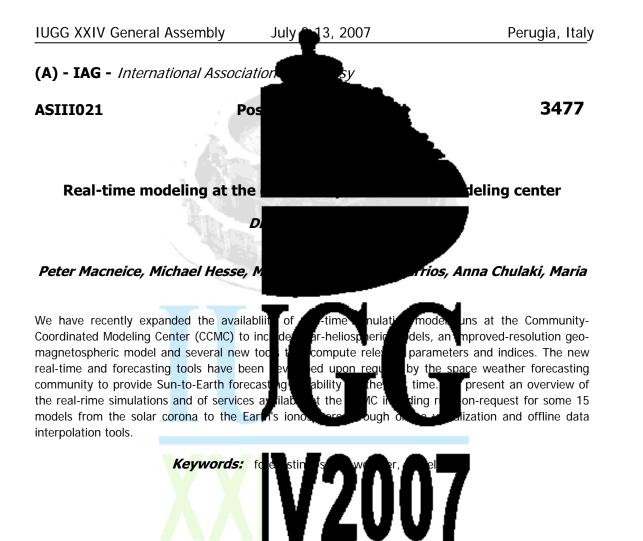
> of about 23% to the value of 42.3 nT for all e classification of storms ed to the Dst index. E.g., We discuss these and



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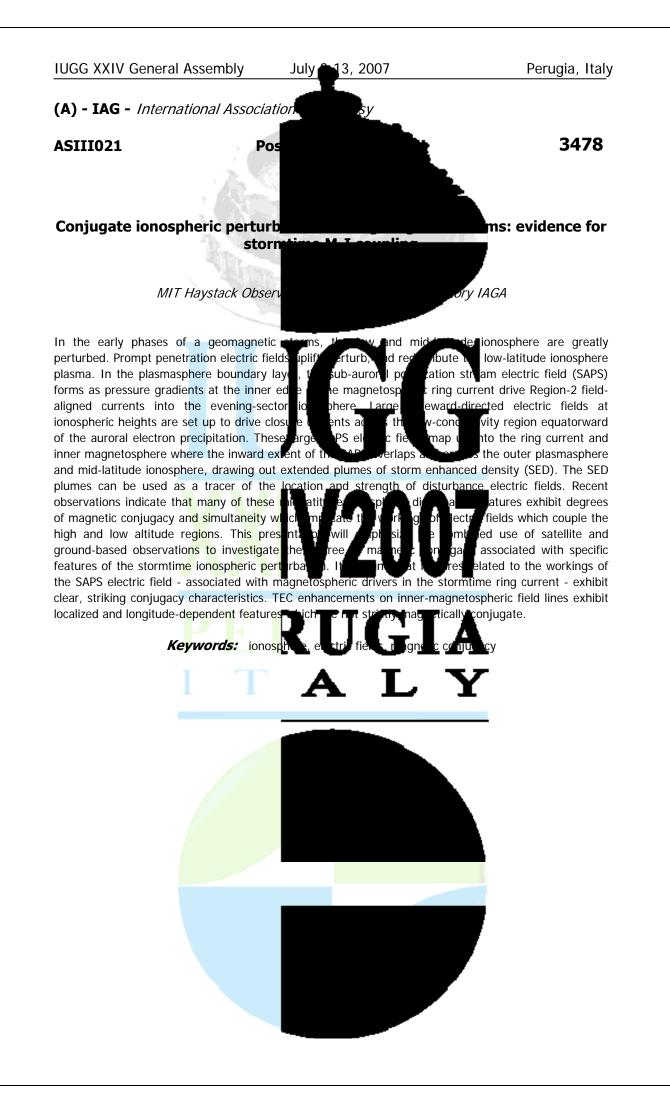


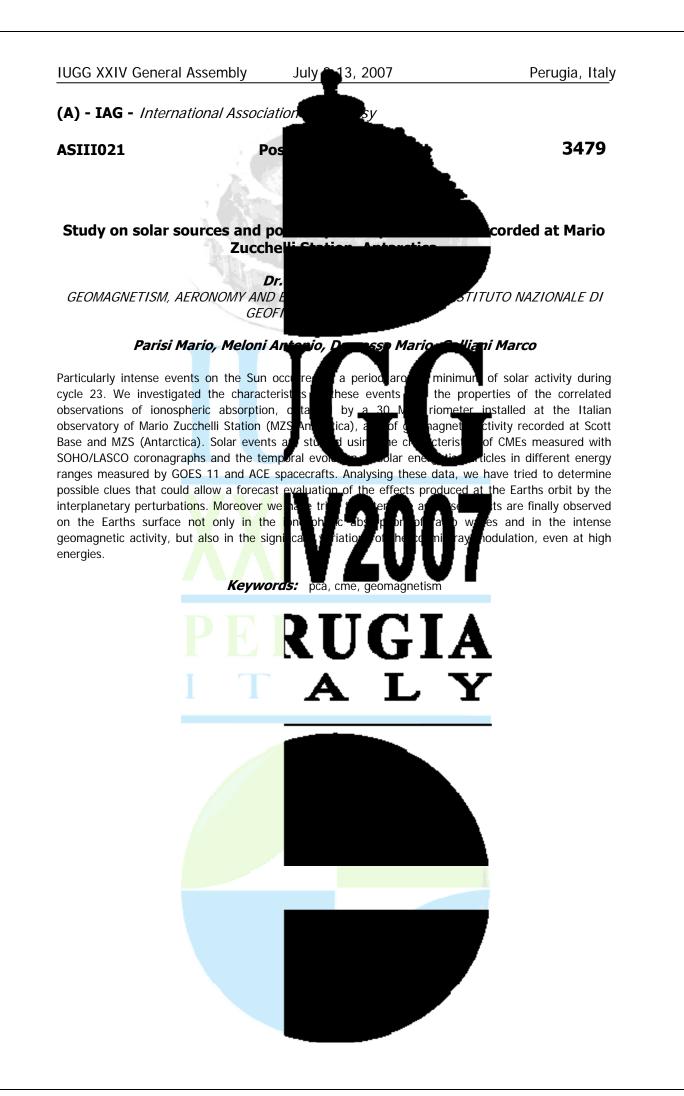


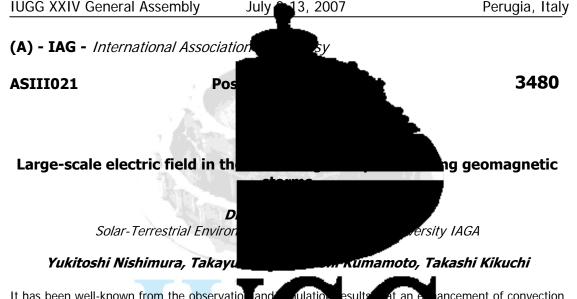












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It has been well-known from the observation and electric field in the entire region of the inr main phase of geomagnetic storms and the plasmasheet into the inner magnetosphere CRRES [Wygant et al., 1998] and Akebor observations reveal that a strong large-sca near-Earth inner magnetosphere in this period. How

observation in the middle-latitude and sub-auroral region, details of time and spatial evolutions of the electric field distribution in these regions during geomagnetic storms have not vet been clarified. In the present study, in order to clarify time and sub-auroral and polar cap ionosphere dur analysis of the long-term electric field of March, 1989 to January 1996. In the pre field disturbances indicating the minimum va

geomagnetic storm, and selected 1725 cases of the geomagnetic storms during the above period. Here, we defined the periods of dSYM-H/dt<0 and dSYM-H/dt>0 as the main and recovery phases of geomagnetic storms, respectively. Moreo periods when the SYM-H values give less # and lately recovery phases, respectively. when the SYM-H and Kp indices represent more than -10 nT and less than 2. On the other hand, in the electric field data analysis, we used the mapping [1970], using the IGRF90 model field. During distribution and the potential structure in the high-latitude region of more than 600 show a typical structure of the electric field indicating the two-cell convection pattern. In the polar cap region, the dawn-to-dusk electric field appears with th

potential drop in the polar cap region car electric field intensity in the auroral zone a polar cap region expands into the low-latit condition. In this case, we can estimate component of the poleward electric field between 18 and 24h with the averaged n On the other hand, the potential distributio

ancement of convection phosphere takes place during the s are injected from the nightside nve<u>ction ele</u>ctric field. The recent Nishi et al., 2007] satellite i inh peneity is formed in the h s to the

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ionospheric electric field in the middle-latitude, ve performed statistical

ry phase into two stages: the

for about 7 years from phenomena of magnetic he SYM-H index as the

-40 are defined as the early net all quiet condition periods m to the ion offere proposed by Mozer 🖌 quiet ce dition, the electric field e of 10.0-20.0 mV/m. In this case, the kV. During the main phase, the y 2-3 times amplitude and the uring the magnetically quiet 80 kV. Moreover, a new in the local time sector

ve potential stricture in the dawn sector between 03 and 06h with the potential drop of about 4-6 kV. During the early recovery phase, the polar cap boundary moves into the high-latitude region from 70 to 74o and the poleward electric fields clearly appear with the double structure in the auroral zone and sub-auroral region in the

dusk sector between 18 and 23h. The pole as the SAID/SAPS phenomena. Moreover, shielding electric field appears with the n these electric field distributions and potenti

egion can be identified eward electric field, the le lately recovery phase, cally quiet level.

e azimuthal component.





coefficients was observed. The decay coefficients for storms with Dst greater than -3 range -100 to -300nT and the coefficient linear decay coefficients have negligible eff

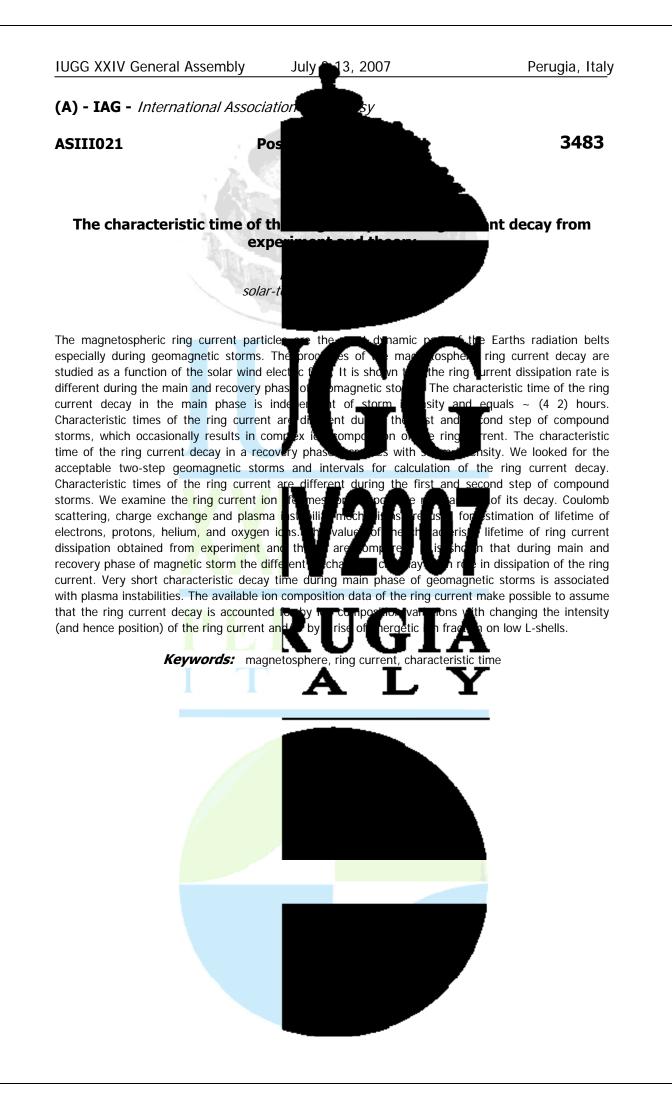
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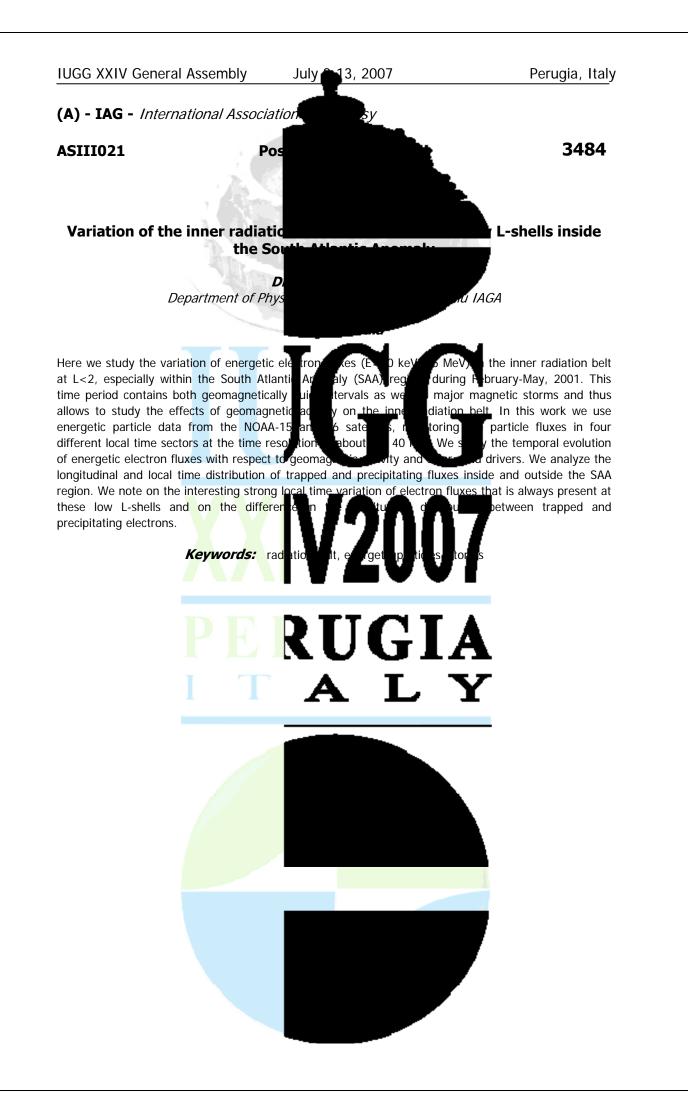
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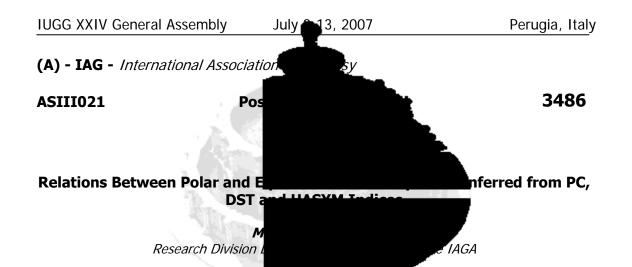
e diversity in the decay a duration of 7 to 15 f 3 to 40 hours for Dst y events. However, the ted storms.











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Transpolar ionospheric current systems gen the central Polar Cap. The recorded deflections (North) and PCS (South) indices, which are oth merging electric field (MEF) measured in m speed and the magnitude and direction of the for the occurrence frequency and the leve equatorial ring current. The magnetic distur the Dst index which is often used as an indicato

indices also derived from low-latitude magnetic recordings provide 1-minute samples of the symmetric as well as the asymmetric magnetic distu relations between PCN, PCS, and the Dst between the transpolar current and the interplanetary merging electric field. The p of the total coupled magnetosphere-ion conditions.

olane<u>tarv ma</u> turbar bf 0 hnc ssocia with bal ma values reflect hourly averages of the symmetric ring current disturbances, while the HSYM and HASYM

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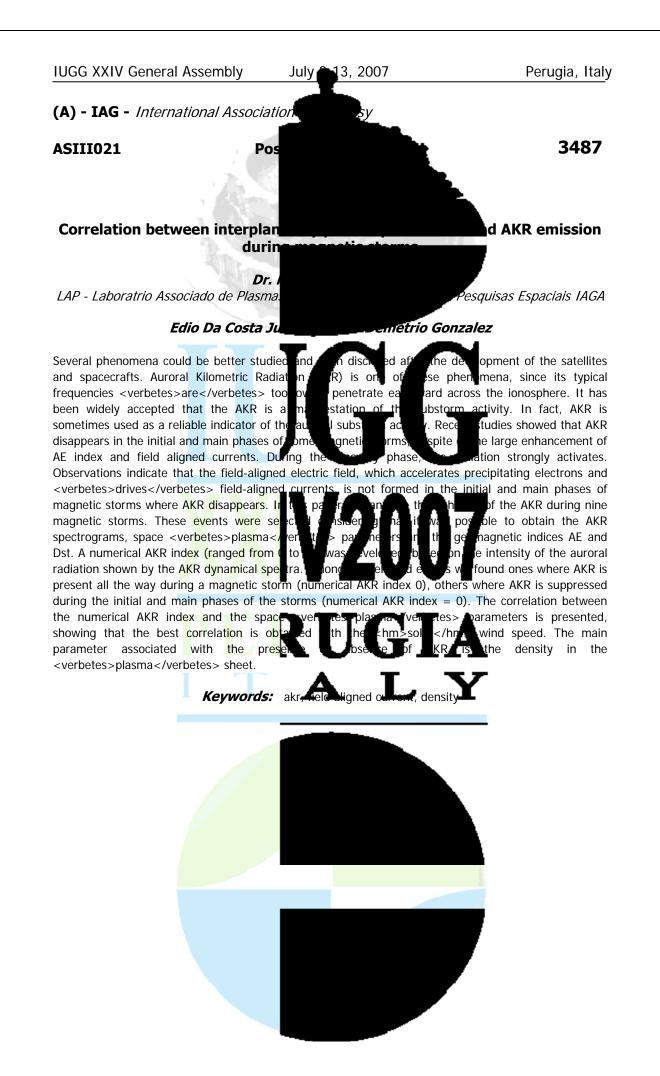
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etil deflections observed in he di hsionless Polar Cap PCN statistical sense the interplanetary : field derived from the solar wind c field is also a decisive parameter orms for the growth of the ent are used to produce ring m level. The Dst index

> nt. We have used the ate the close relations being activated by the nd illustrate our concept during magnetic storm

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(A) - IAG - International Association

## ASIII022

Symposium Perspectives from global mode and II)

Convener : Dr. Stefan Eriksson Co-Convener : Dr. Jesper Gjerloev

The dramatic and ongoing improvemen capabilities allow more complete and strin our understanding of fundamental physid

retrieval, and communications, new space-based image efficient sensors make collecting more data fom. the framework of worldwide virtual arrays an modeling community is constantly improvi instruments and the assimilation of the resymposium will highlight research using gl study the global and meso-scale system d particular, we will focus on synoptic observ ions instruments and the integration of these data to p

complete spatio-temporal evolution of the magnetosphere-ionosphere system.

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space based observational al models and simulations to test mological advancements in data storage, we more cost effective and

sk. In a dition, the international ate data from disparate types of

sical and empirical models. This

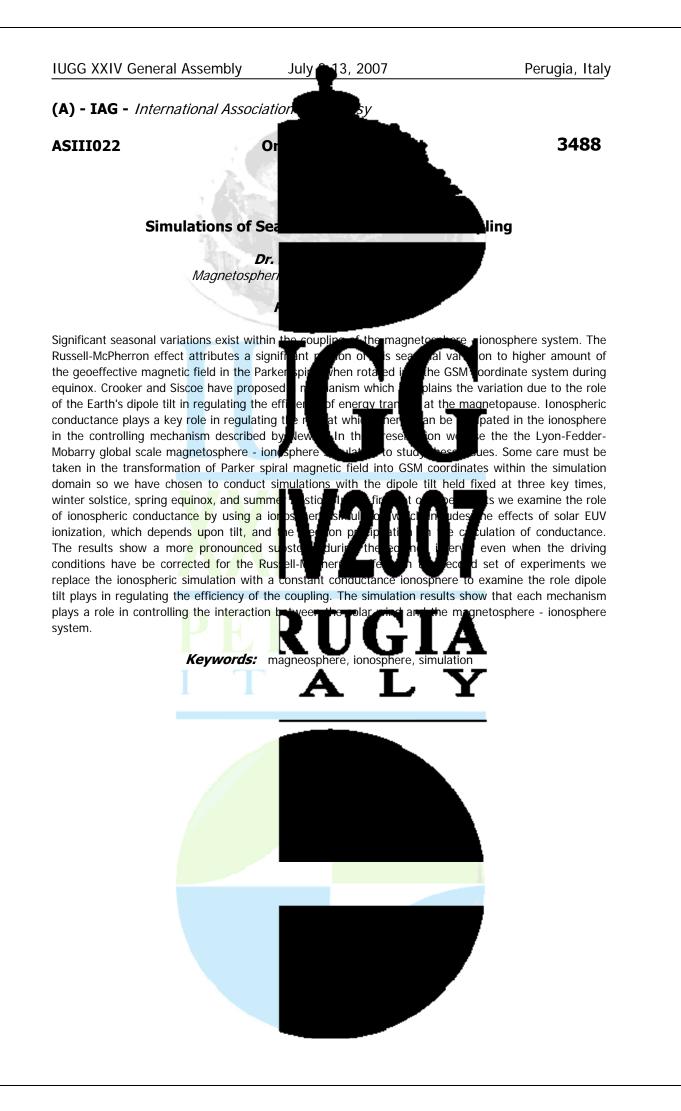
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based observations to

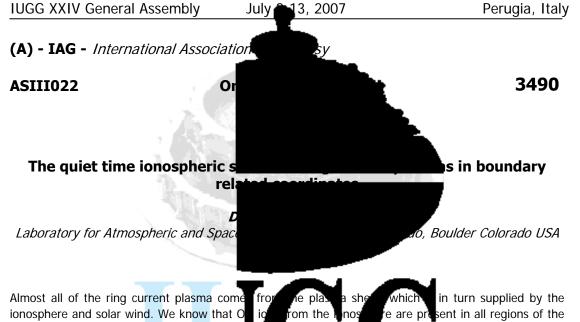
with global models. In

struments and arrays of

ble a specification of the







magnetosphere at low levels even during ionospheric ions such as O+ play a role in exactly what that role is. Large-scale mode path forward to increasing our understand information about ion outflow to constrain large

information about the distribution of the ion outflow in relation to large-scale magnetospheric features such as the auroral oval. We have used data and energy fluxes of escaping energetic ( coordinates during geomagnetically quiet is determined from the ratio of energy characteristic energies in the dayside Characteristic O+ energies in the dayside a For H+ the energies are 280 eV and 1.2 keV respectively. We found the most energetic and variable characteristic energies in the polar cap region. Comparison with other observations, including those of

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intervals. We also know heavy netic storms, but we are not sure ions provide the fastest ely using the extensive s has been the lack of

from the Polar satellite to determine the average number hs in boundary related energy of escaping ions hes, we found that the moderately uniform. re and 700 eV respectively.

ing on auroral field lines

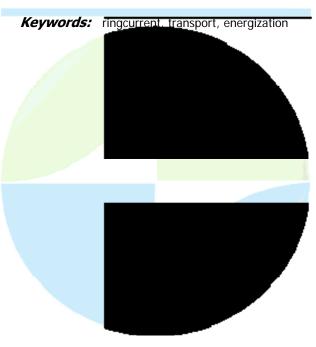
orm intervals, the data

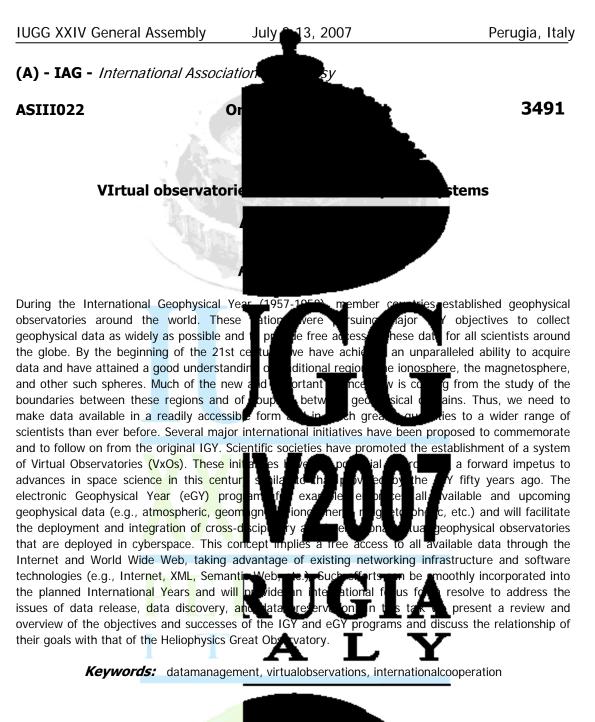
e-scale magnetospheric

r cap are a small fraction thermal O+ from Akebono show that the e le po (2-3%) of those escaping from the aurora sses above our 1 RE observational altitude are in agn tic in presented here almost completely characterize the magnetosphere's ionospheric plasma source during geomagnetically quiet times thus providing an portant c hstraint on models including mass composition that are in

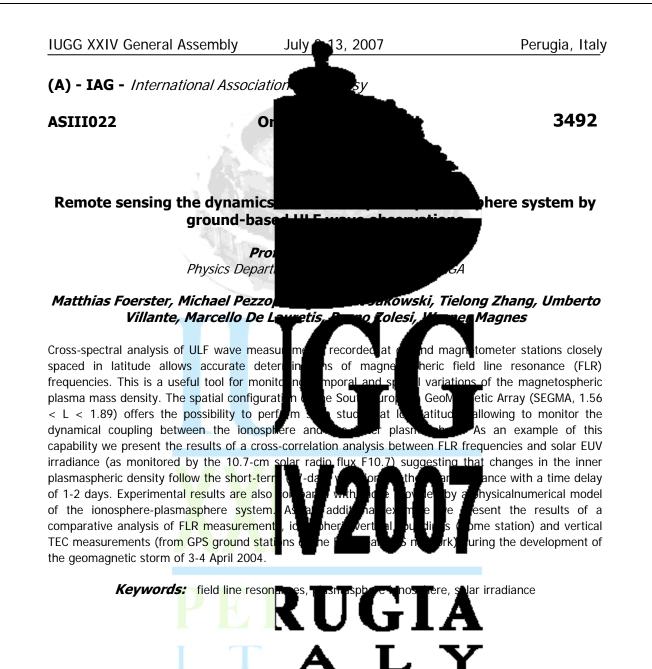
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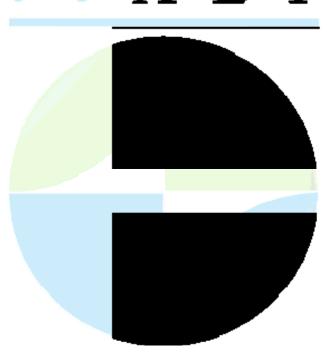
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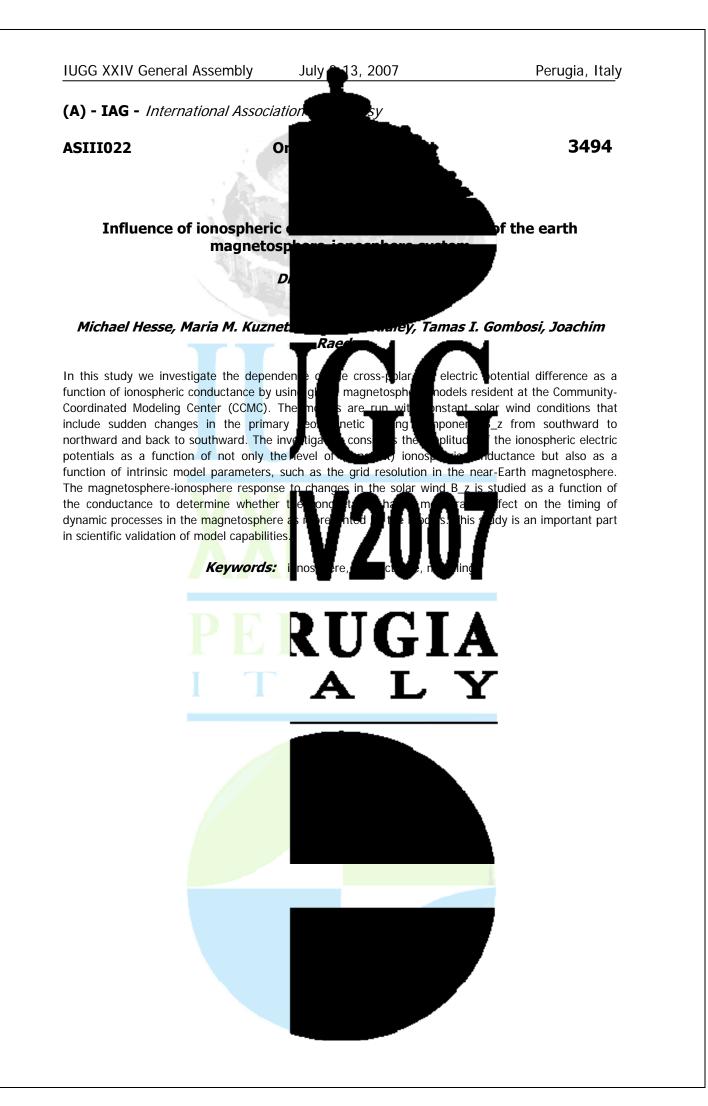








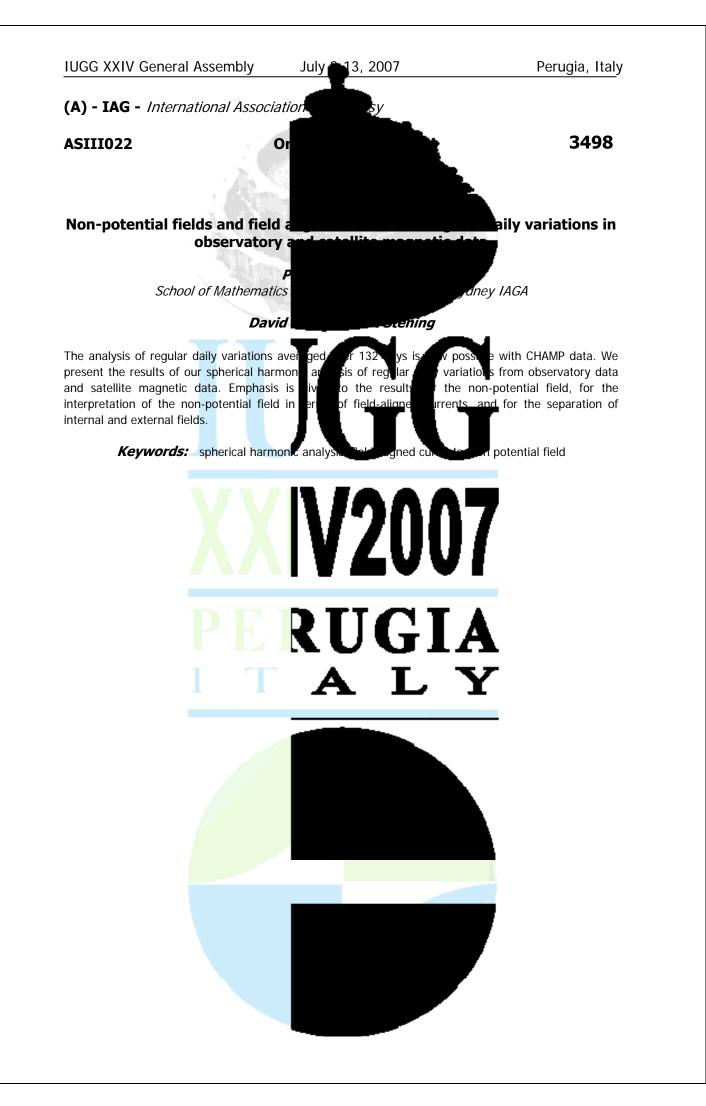


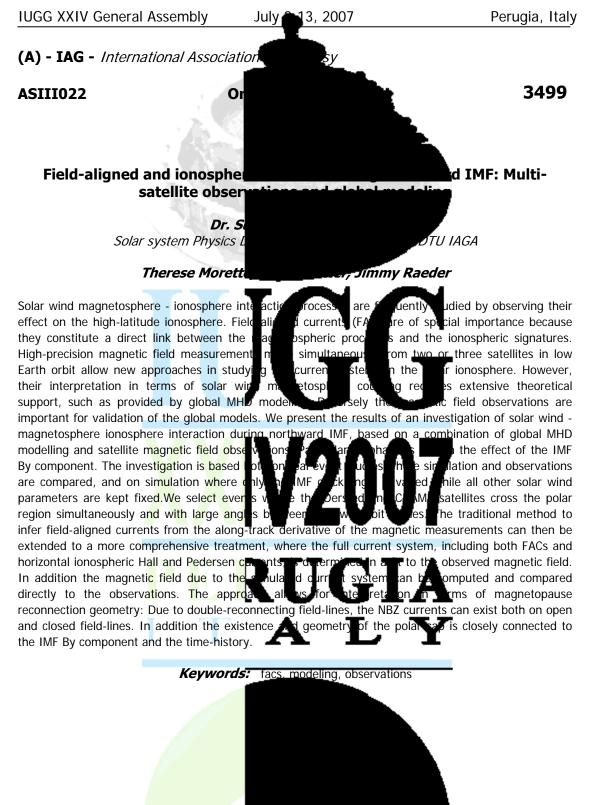


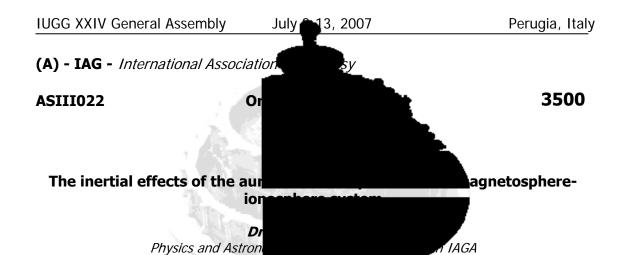












The neutral atmosphere can only respon neutral collisions with the ionosphere; while instantaneously to the magnetospheric dyn up to a few hours, and depends on the ior density and relative velocity of the plasma v invert this situation and consider what magnetosphere-ionosphere coupling. Inert previous several hours of geomagnetic history. As

geophysical parameters are the same just because the geomagnetic driving forces are the same. The instantaneous response of the ionosphere underlying temperatures, composition and conditions. Thus the measurable conseq significantly from those under steady state Perot Interferometers, radars and mag Plasmasphere model to demonstrate the magnetospheric energy in the ionosphere-thermosphere

direct nges in wit the a al he largecale ho collision fre pect <u>to the r</u> he in that the mè ence,

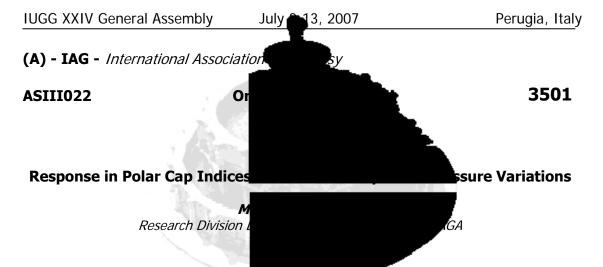
gagnetic forcing via ionthe ic sphere responds almost rmosphetic response time can be cy, which depends on the plasma gas. However, it is interesting to e the sphere could have on spher arries a memory of the rect to presume that all

to magnetospheric driving may be the same, but the previous geomagnetic e conditions will differ bservations from Fabryermosphere-Ionosphereon the redistribution of



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Polar Cap (PC) index values are derived fr such that the polar cap index approximate values in "geo-effective") electric field (MEF) convered by

influence from the solar wind density level hd range of values little or no effect from variation from MEF changes. Furthermore, the short discontinuities in the solar wind flow have a the previously published analyses, which at bu dynamic pressure variations, and have found inac

results. Our main conclusion is that the PC index values respond little to solar wind density or pressure variations except for short-lasting variations at the arrival of solar wind discontinuities, which cause global sudden impulses (SI) or storm sudd been studied extensively in the past, it is solar wind density or dynamic pressure between different solar wind regimes.

rariations calibrated on a statistical basis of mV/m of wind he so le hà level of *cynar* hese parame variations in analy /e exa W ge va ons he po the da

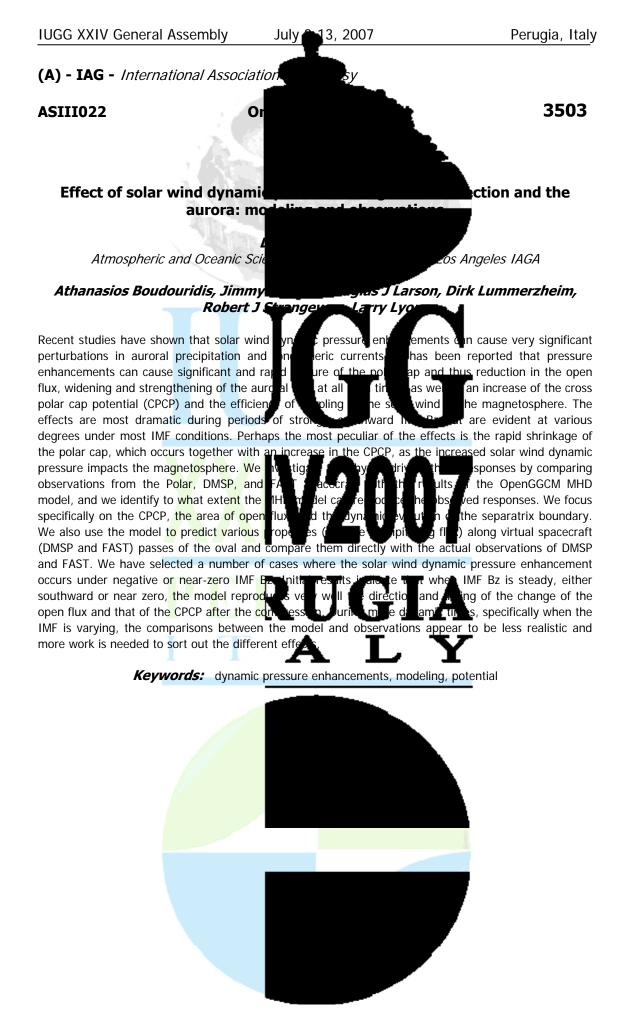
interplanetary "merging" (or examined the possible pressure and observe over a wide above what could be expected just Polar Cap indices at the arrival of ed the basis for some of ap indices to solar wind that cast doubt on the

> se events, which have ects are related to the perties of the interface

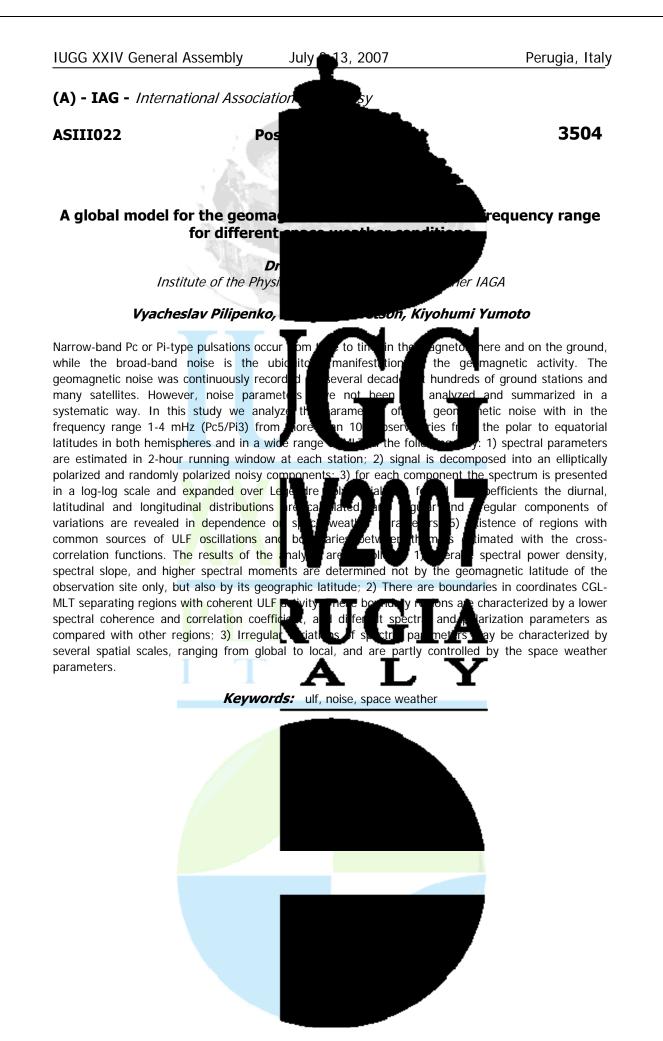
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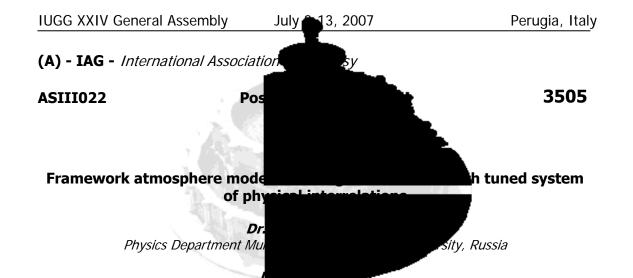




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The Framework Atmosphere Model (FrAM) research of interrelation of the broad ra atmosphere.Atmosphere is a complex natura computer models of various atmospheric do alone models use simplifying assumptions a the system. For the reliable description and to take into account such interaction including fee

based physics models in closed coupling with statistical and/or phenomenological models and satellite and ground-based observations. Because of the complexity of the system it is practically impossible to join all physical domains in a monolithic mo that would provide the simple integration of phenomena for studying of the coupling ar the data flow between the data sources a being dependent on the internal structure and last years there are several frameworks under development in the area of geophysics. But mostly they represent programming kits to build a model system from scratch. Other ones require powerful

supercomputers or distributed multiproces ready-to-run instrument with moderate researcher.Our system should fill this gap. model UAM, which describes the upper atmosphere, ionosphere and plasmasphere of the Earth as a coupled system. The already adjusted system of hysical interelations pro physical modelling environment in which interdependence of the investigated phenomena. Besides, our framework system can run on the

the open framework, including the control Models of separate atmospheric regions an stage. These sub-models exchange da Functionally each Model is a method of parameters in certain spatial grid nodes. A formal definition as well and they can be thermospheric and ionospheric models su incorporated in the FrAM. It allows u

I modelling tool for the and plenomena in the upper nnecting elements. The amount of recent decades. But these standdomain with the rest of partici r eve however, it is necessary y to use first-principles-

> mework tool is needed different processes and This tool should control models, as well, without a particular model.During

ilable for the common

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conventional desktop computers, what expands the applications scope of use. The FrAM is organised as nd the set of subordinate independent er during the model configuration ing the unificated interface. of certain set of physical data sources fall into this Additionally the empirical 3 and the IRI-2001 are els jointly in various

combinations to eliminate some of physical feedbacks in order to study their importance. The features of FrAM system organisation and data structure are discussed. This work was supported by the grant N 05-05-97511 of the Russian Foundation for Basic Research.

Keywords:

#### IUGG XXIV General Assembly

3506 - 3522

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## ASIII023

## Symposium Causes and evolution of plasma

**Convener :** Dr. Larry Lyons Co-Convener : Dr. Sorin Zaharia

This session will be devoted to recent fin mechanisms by which they develop and distributions are one of the key physical el instabilities. They control the large and me

they are the source of the Dst disturbance and they are a major contributor to storm-time auroral energy deposition. The ionosphere and the olar read are insider was some sof equal importance. Either one is capable of supplying the obse spectrum. The results of particle measureme from remote sensing of energetic neutral a structure, stability and dynamics of plasma that discuss magnetospheric plasma sour theory and simulation/modeling.

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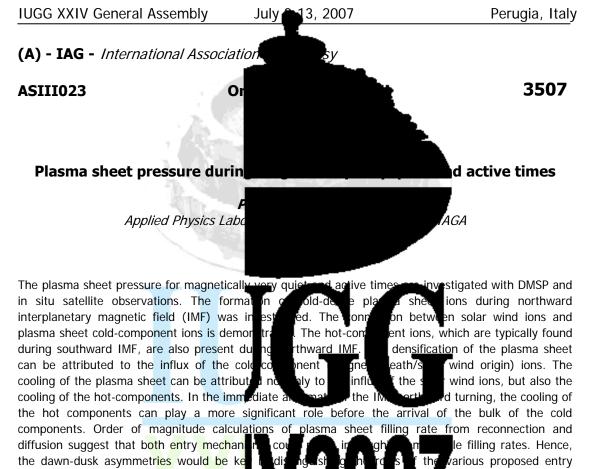
essure distri-butions, the dynamics. Plasma pressure -spheric structure, currents, and arrents including the Birkeland currents,

sma over a broadband of energy te missions, including observations nely important information on the nd s ms. Papers are solicited and t port using experiment,

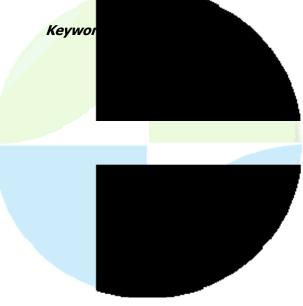


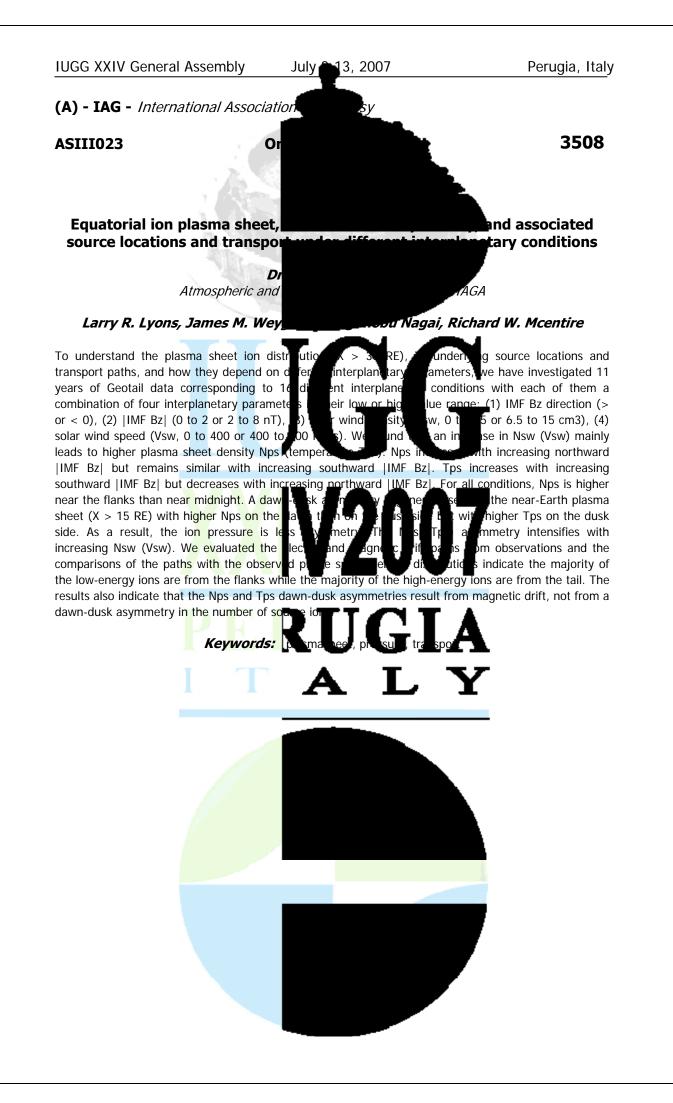


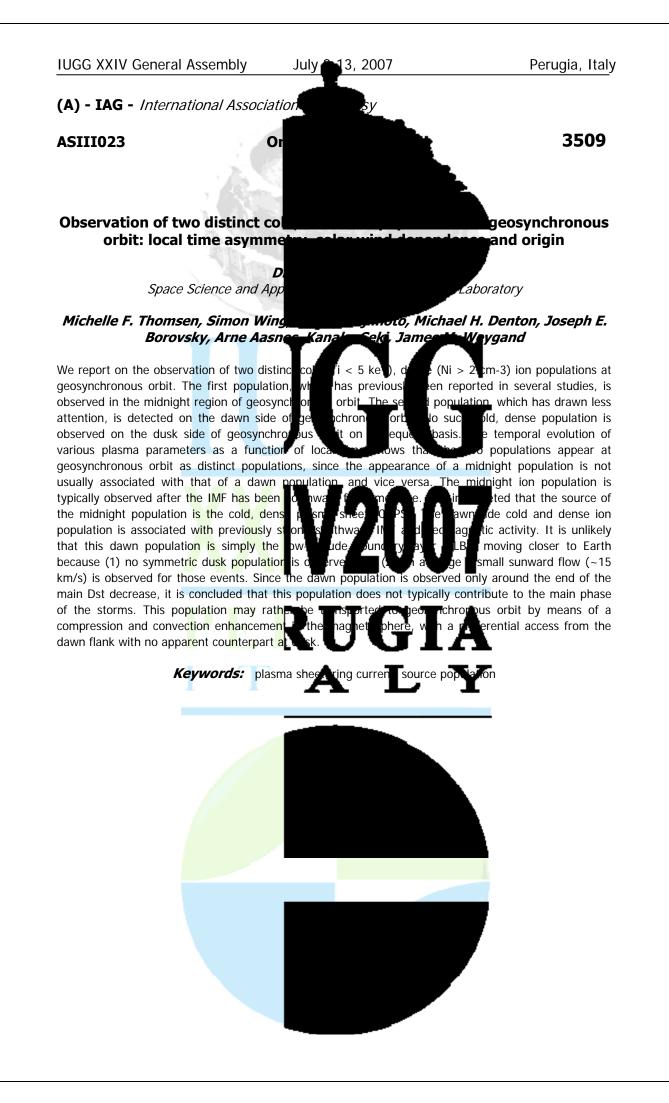




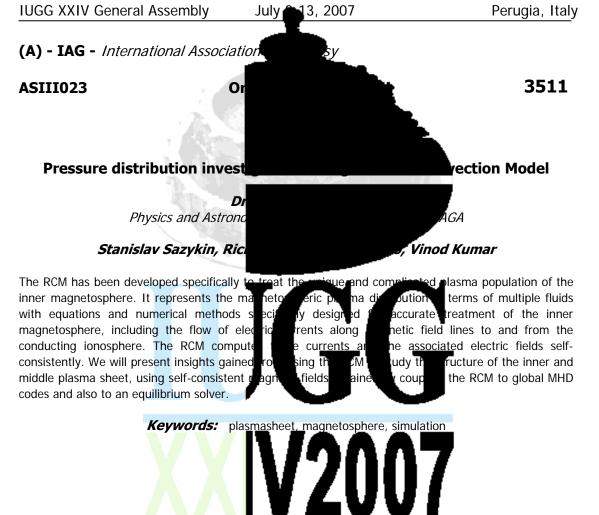
mechanisms. The specific entropy of the net and current generations hth are discussed. To investigate the plasma s rm phases were defined, eet namely, growth, expansion, early recovery and se profiles show that the ion pressure is higher in the inner edge of the plasma sneet. The premidnight pressure enhancement can be attributed to the temperature enhancement while the postmidnight pressure enhancement can be attributed to the density enhancement mentat premidnight has been previously reported and attributed to the adient t of ions. The postmidnight ofiles s w that the ion pressure density enhancement may result from the anc ĥe. ve on! near the midnight meridian in the midtail region increases right after the substorm onset, during the expansion phase. The pressure subsequently defines during the early N solery phase and declines enhancement during the expansion further during the late recovery phase. This near m night pre and recovery phases can be attributed to the temperature enhancements. The 2-D pressure, temperature, and density profiles can provide observational constraints to the competing substorm theories.



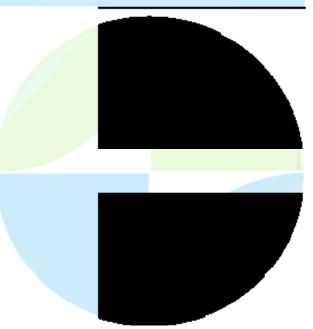


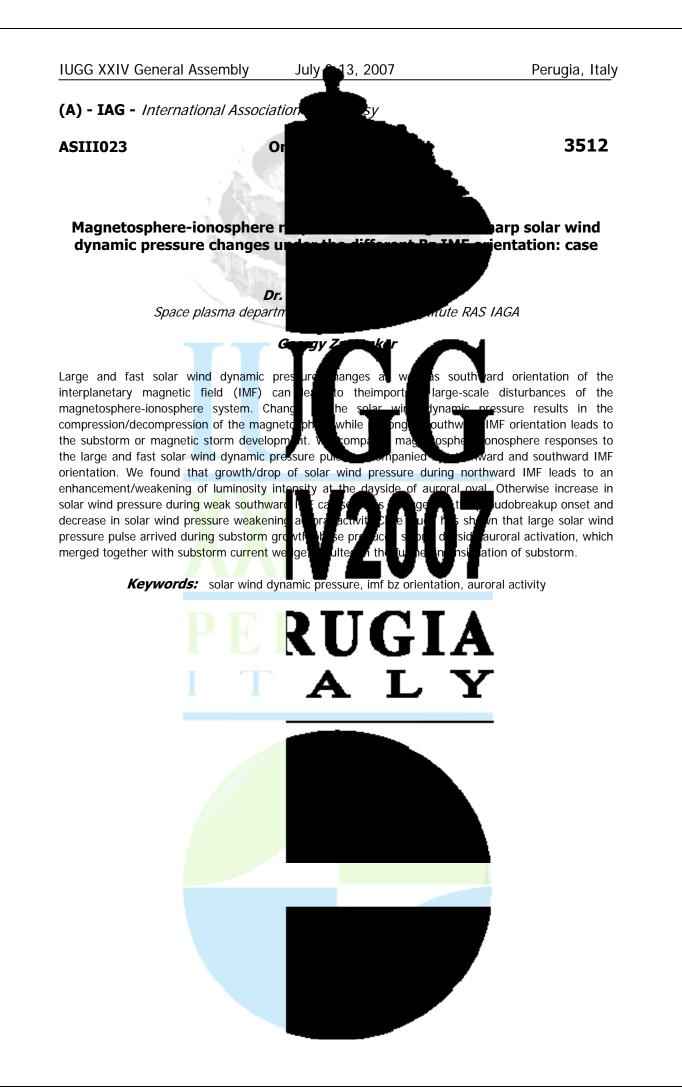


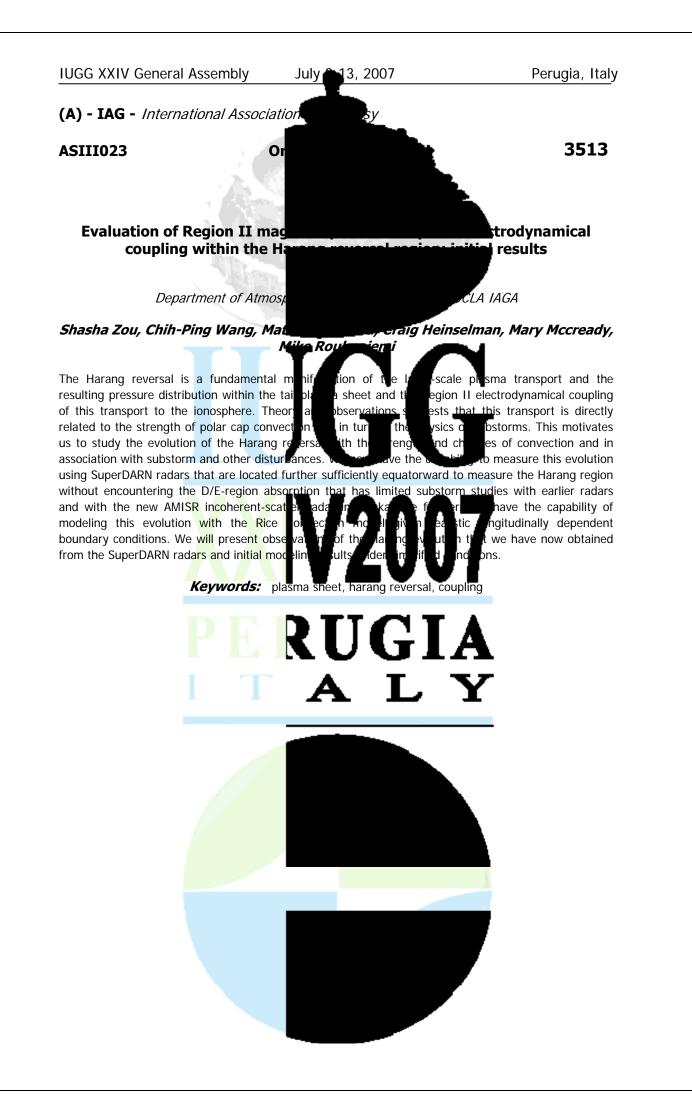




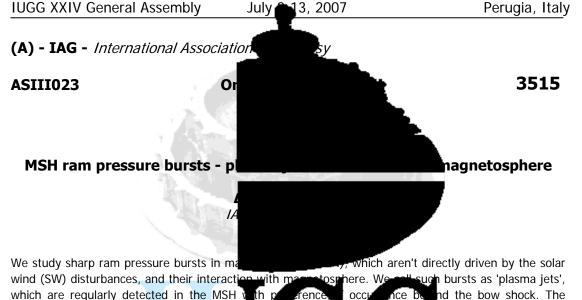












which are regularly detected in the MSH with g typical duration of the jets is up to several en their main feature an increase in the ram p About 20% of the bursts impact magnetopa geomagnetic tail or are reflected backward, path is smaller or greater than their ram pr opposite to the predictions of gasdynamic and N thermal energy at the BS since in the jets the dynamic pressure is rising instead of falling. We infer

supporting of the local energy conservation by the standing electric structures, stored the energy at intensity maximums in the interference r geomagnetic obstacle waves. We disscus t interaction with geomagnetic field along impacts inside the magnetosphere. This we

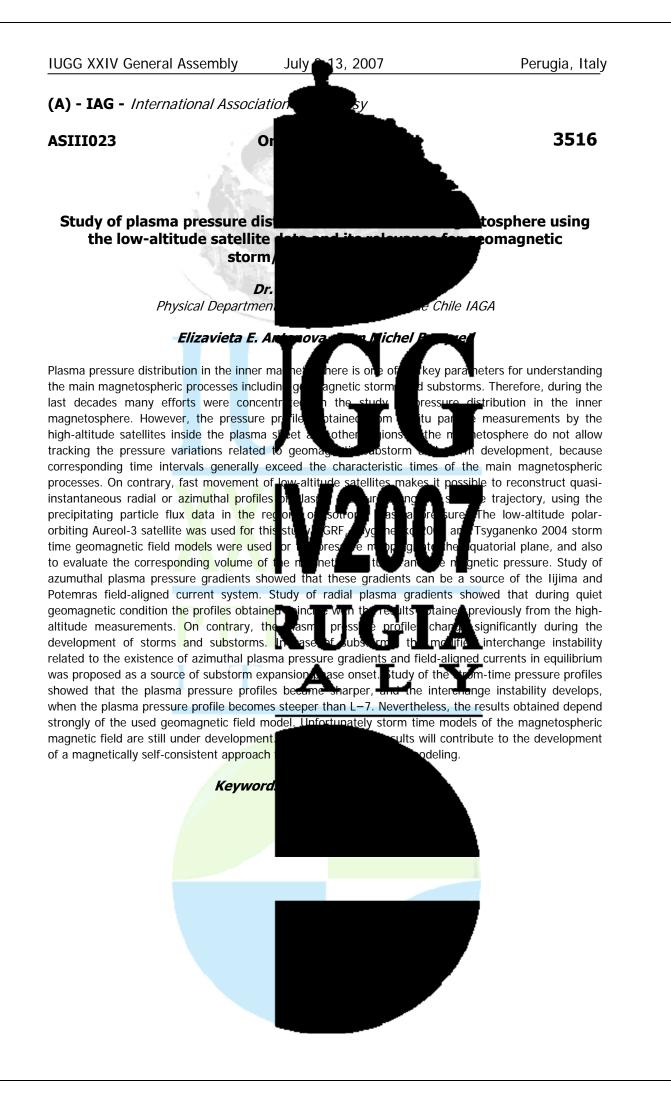
OCCL rence seconds The of 2-3 times either come ding of imum he hese mit trans

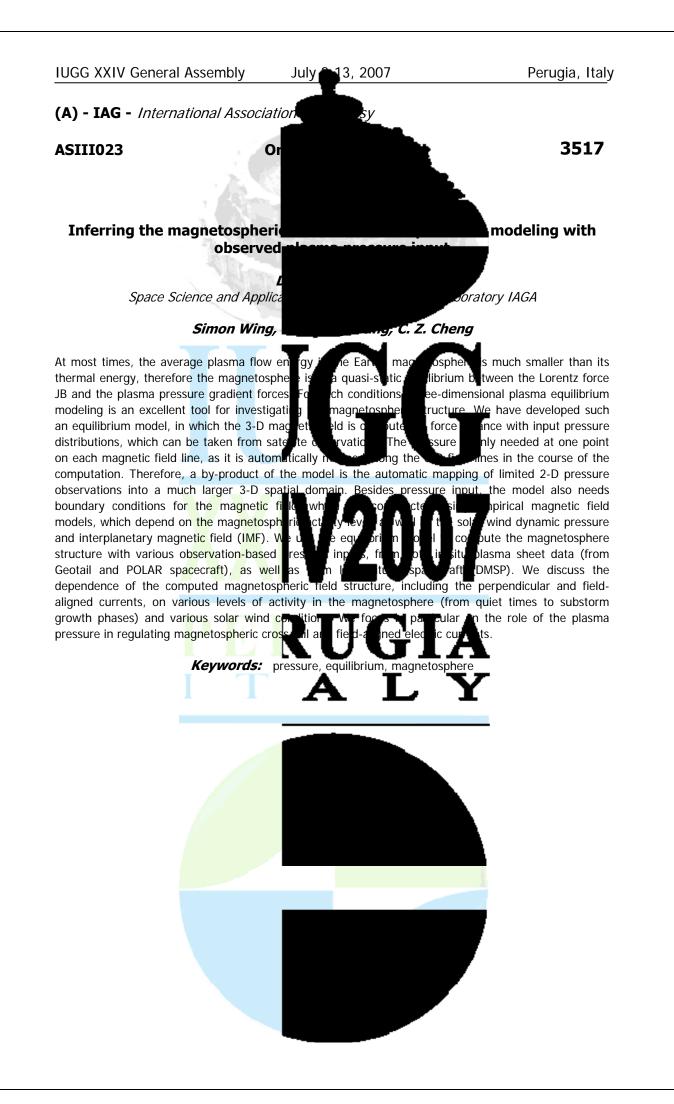
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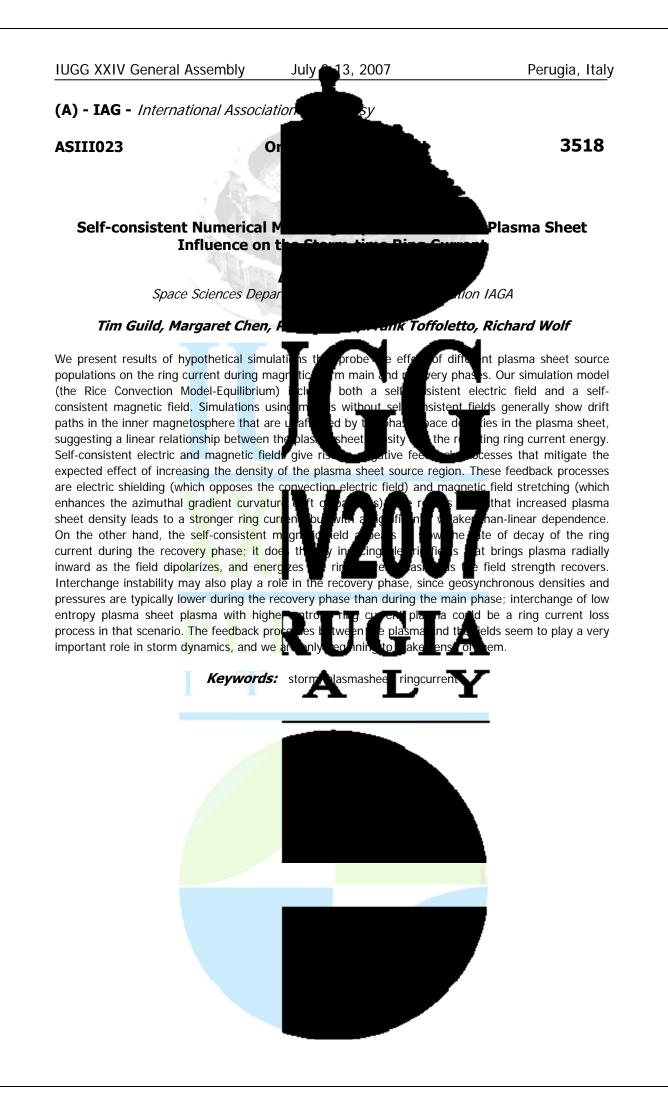
nd the bow shock. The ppear intermittently, exhibiting as e SW and average MSH pressure. ugh the magnetic obstacle into the gnetic pressure on their flow concentrations are SW kinetic energy into

> nd reflected from the cities in the prossess of ure reactions on the jet grant 03-50-4872.

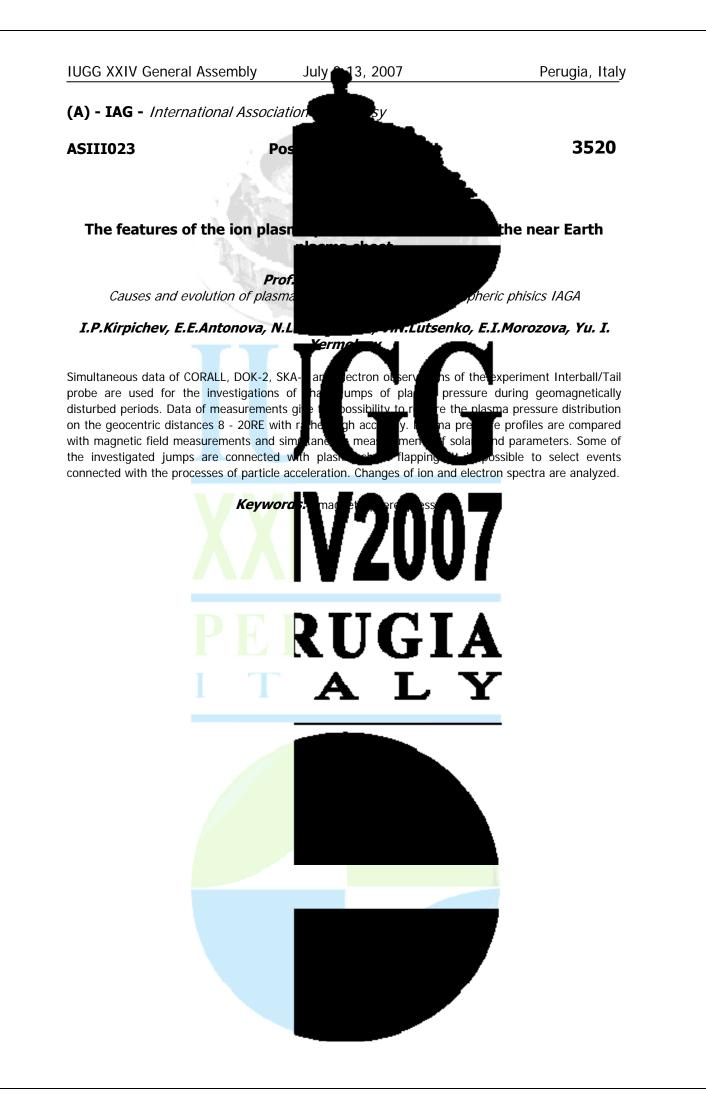
Keywords: pressure bu transport















# IUGG XXIV General Assembly

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## ASIII025

## Symposium Techniques and instrumentation

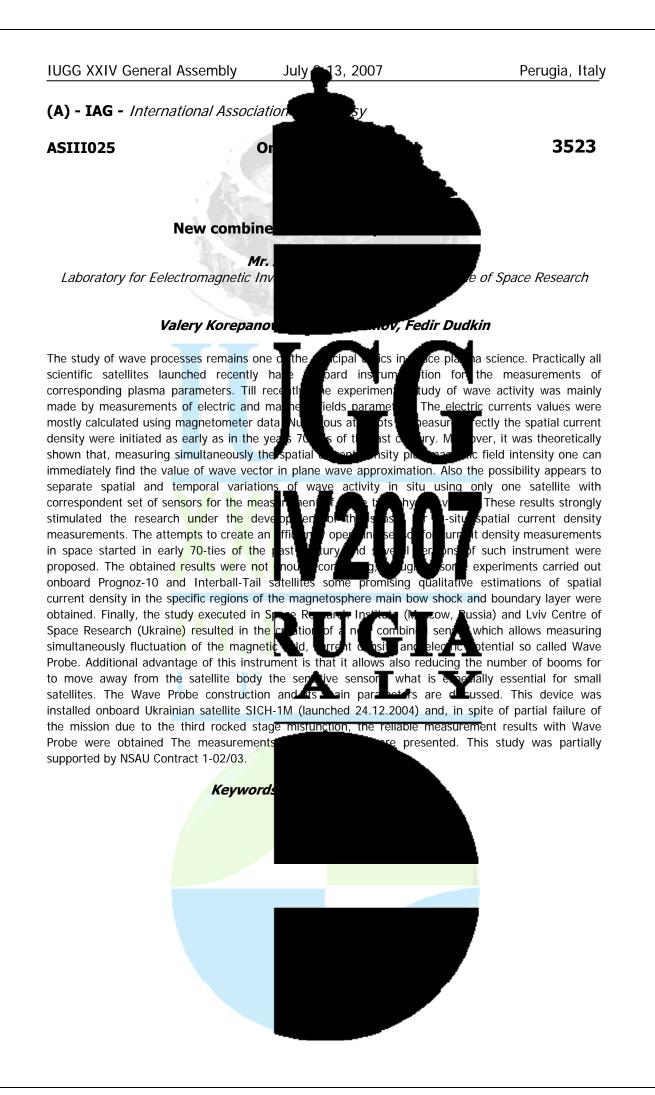
**Convener :** Dr. Alain Hilgers **Co-Convener :** Prof. Hermann Luhr

Space and ground based instrumentation I These developments enable a new gene logistical support for ground based instru performance of individual instruments, for

systems used for ground based systems to enable improved reliability networks of sensors. With these technical cove-locatents rev technical data have been developed to take full adva session invites papers describing instrumen including both space and ground based as and data analysis.

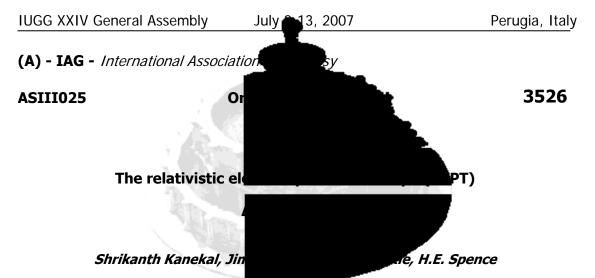
chnology in recent years. ind of data acquisition and dvances been made to improve ased imagers and sensors but also in autonomy enabling large and peration and analysis of Jes urements provided. This of mea d r opments applied to space physics ologies and d

new techniques of measurement









In order to measure the crucially important high-ener radiation belts, there is a need for a caref highest energy particles are a source of gre Their production is the least understood as fluxes and energy distributions be accurat (REPT) consists of a stack of silicon soli collimator, and a thick case surrounding radiation and bremsstrahlung that would cluse bad

a circular cone of 30. The instrument will point nearly perpendicular to the spin axis of the Radiation Belt Storm Probe (RBSP) spacecraft and will sample all pitch angles of particles during normal (or nominal) magnetic field orientations. REP Radbelt Experiment (MORE) onboard t Transport, Acceleration, and Loss Satellite measure high-energy electrons (up to ~20 E~100 MeV. The REPT will be used in Spectrometer that is part of the RBSP proposed payload. The goal for the REPT design is to measure

outer radiation belt region. To do this, the

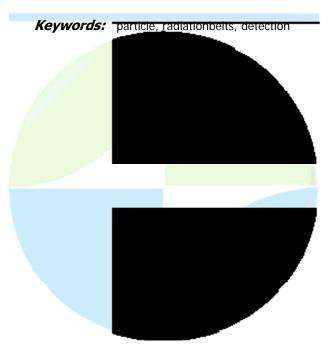
ecteon (and hed ] icle t n from e s radiation bel ermined. The detec 'in ctor ne RĒ

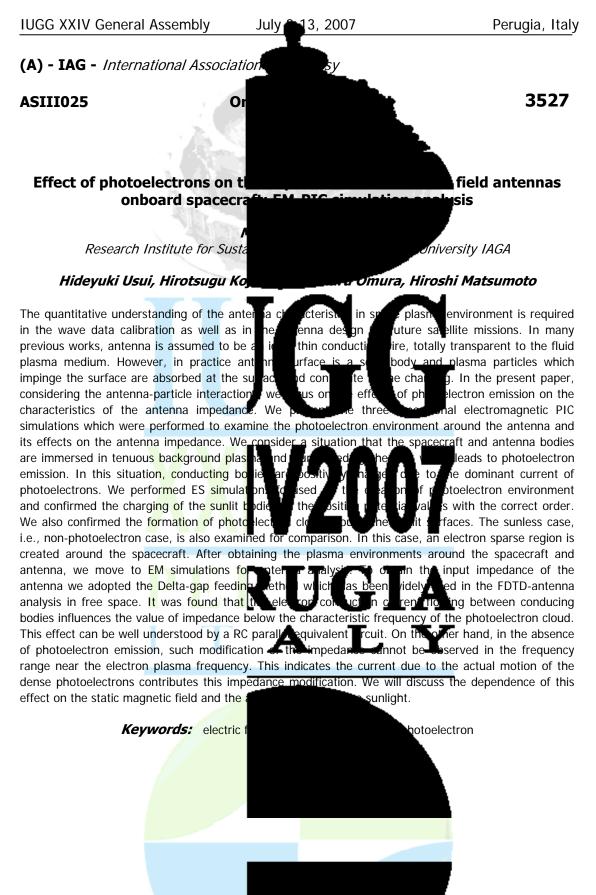
n) gomponent in the Earth's is is required since the cope weather and climate perspective. ence and it is important that their ativistic Electron-Proton Telescope elesco configuration, a conical eld th ensor from penetrating OV (field of view) that is

e Mission Opportunity diation Belt Injection, lime as RBSP. REPT will also measure protons to e Magnetic Electron-Ion well the directional intensities and energy spectra of  $\sim 2$  to >10 MeV electrons throughout the slot and uatel large geometric factor to must not saturate at the

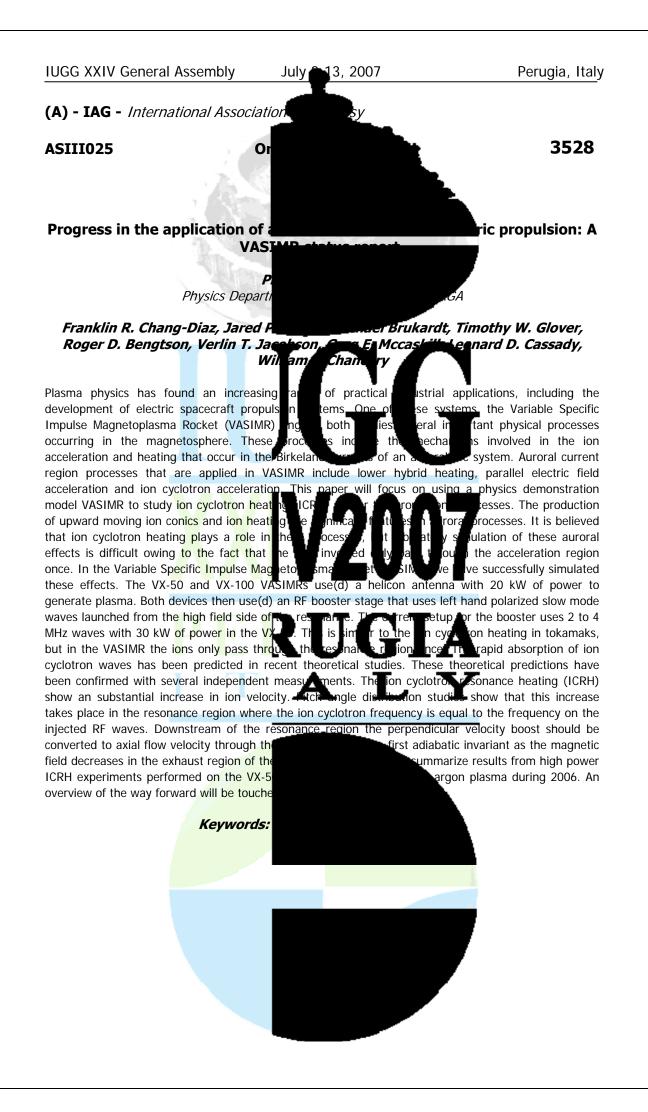
get reasonable count rates (above backgrou energie and y lower energy ranges. Thus, there must be balance letvien in regulard satiration on the one hand and background dominance on the other. There must be fast enough electronics to avert undue deadration on the one hand **Esting show that a good** time limitations and chance coincidence effects. esent simu tions and design has been attained for the RBSP needs.

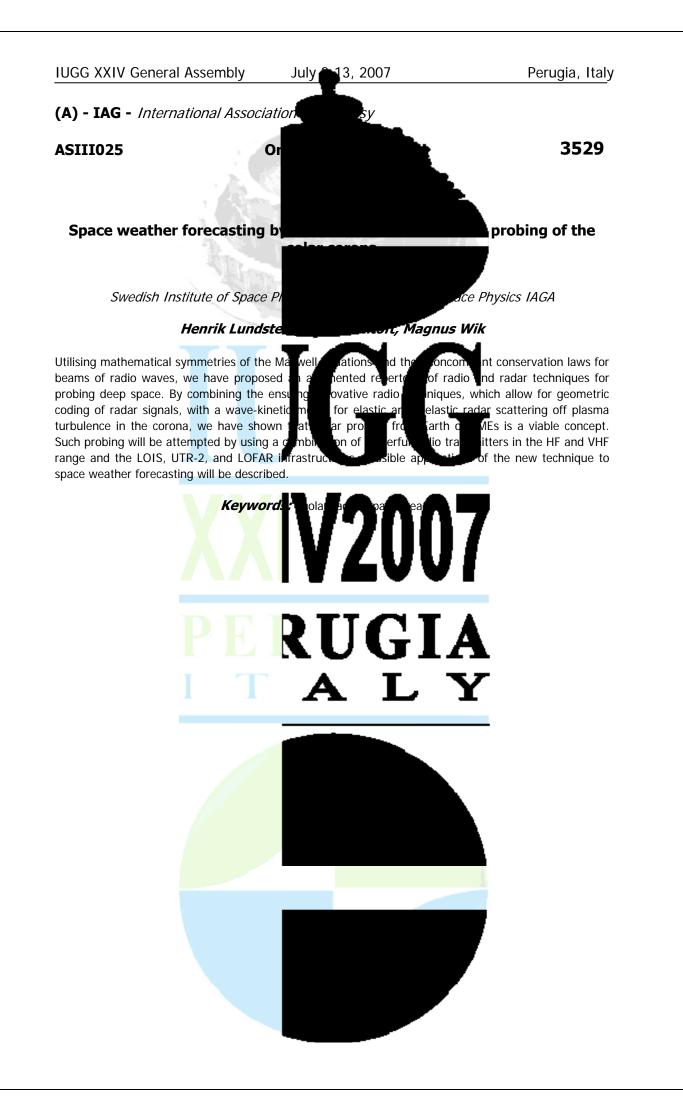
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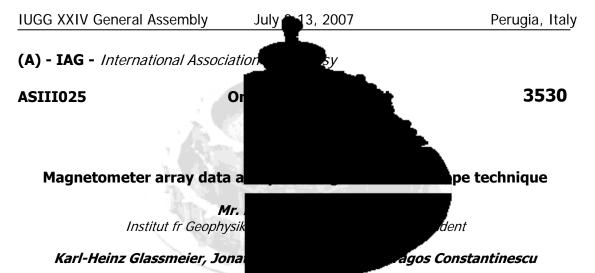












We present theory and first results from the field data from the canadian ground-based nag array processing technique, also known a spectral power density in frequency and way positions in space. This powerful tool has I physics, and its application to ground-bas ď properties of coherent plane-wave-like si application of the wave telescope to ground-base

events are a 180 degrees phase shift of the measured signals in latitudinal direction and a tailward propagation with low azimuthal wavenumb phase shift can be derived from the output quantities from the power spectrum we in measured on the ground during FLR ever good in wavenumber space, several sup frequency band may be distinguished.

applica ne wave metē rav beamfd me C er domain of ccessfully use ope In field

ope technique to magnetic e wave telescope is an nich enalles us to calculate the ne wave field measured at several seismology and near earth space studies of propagation first results from the of field-line resonances

(FLR) in the Pc5 frequency range excited in the Earths magnetosphere. Characteristic for these FLR

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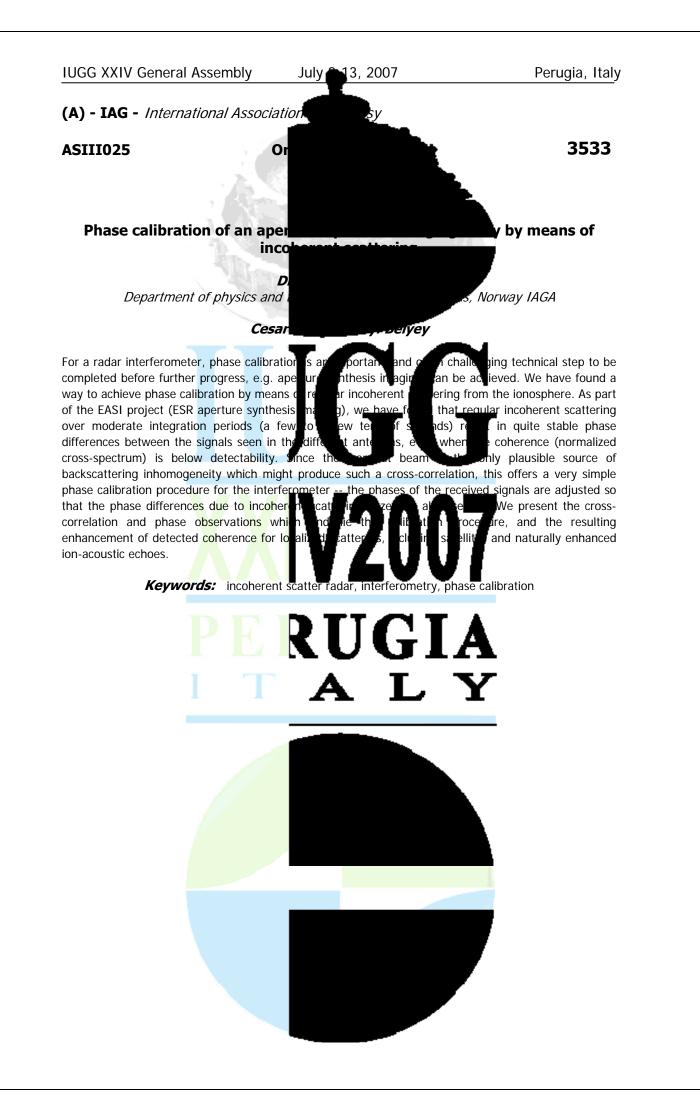
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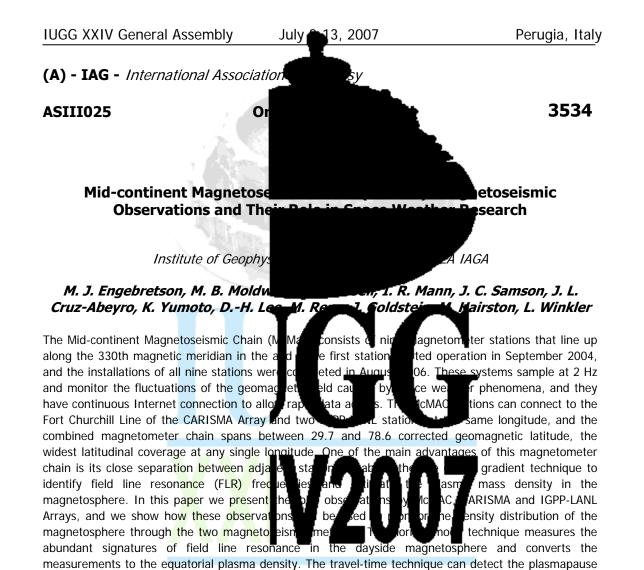
width of the latitudinal rder to compute these ved wave-like structures telescope is sufficiently ictures within a narrow



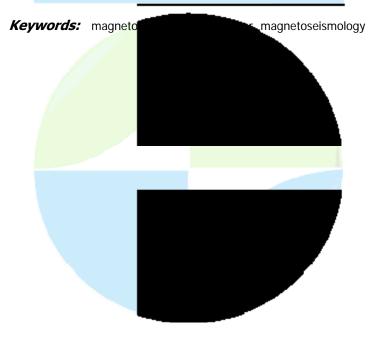




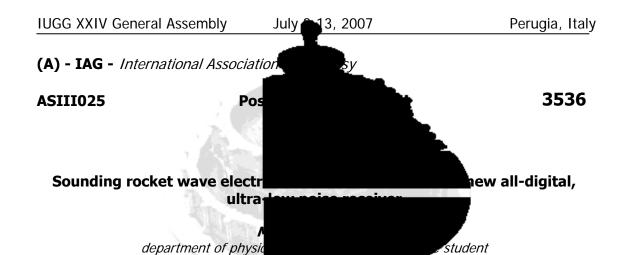




location in the nightside by finding the disca acrosathe magnetometer chain. By examining the data intervals at different ctivit we find that the results etic obtained by both magnetoseismic methods plasmapause location. łh t ex ect The vast amount of data made possible by the joint observations at the 330th magnetic meridian can Tionospheric conditions. enable the studies of plasmaspheric dynamics wher differen solar, IMF, Also discussed are other applications of the MMA data in weather esearch and the possible joint observations with satellite missions.







In February/March of 2007 the sounding Roar Measurements) will be launched from Dartmouth High-Frequency wave Electric fie Langmuir waves with the auroral electrons wave electric field receiver (RX-DSP) which auroral roar. The RX-DSP will feature a hig input and flexible programmable all-digital using mutually perpendicular double probe antenn

axis, which is aligned with the earth's magnetic field. Each receiver will be tuned with an extremely sharp band pass filter to the typical frequency range of auroral roar observed at ground level in northern Alaska, 2.6-2.9 MHz. These ins electric and magnetic field allowing estima well as its amplitude along all points of the electron distribution functions and wave r will serve to answer several outstanding question of whether the intermittent nature of auroral roar observed on the ground is due to

ionospheric effects or to actual temporal or spatial variations of the auroral roar source. Because ionospheric absorption of these waves is required to estimate the global power lev CHARM measurements will allow ray tracing. amplitude data will reveal the source of the intermittency of the ground based observations. Another question CHARM measurements, specifically the section find source sizes of the roar emissions and their tempo of the electron distribution function in conjunction with the auroral roar measurements, we also hope to

electron bursts or certain segments of inve in the upward current region or downwar region of the roar, the RX-DSP would give hybrid waves. Answers to these questions emissions, as well as highlight the capabilit et CH relations Flat, er (HFE) a v new all-digit mpt <u>the first</u> 66 M 16 . For ١RN le bot

frequencies and Auroral will carry the standard rock particle orrelator to correlate the Iltra-low noise, precise-bandwidth ern rocket-borne measurements of digital conversion at the nalog o of t receivers will be flown, ular to the rocket's spin

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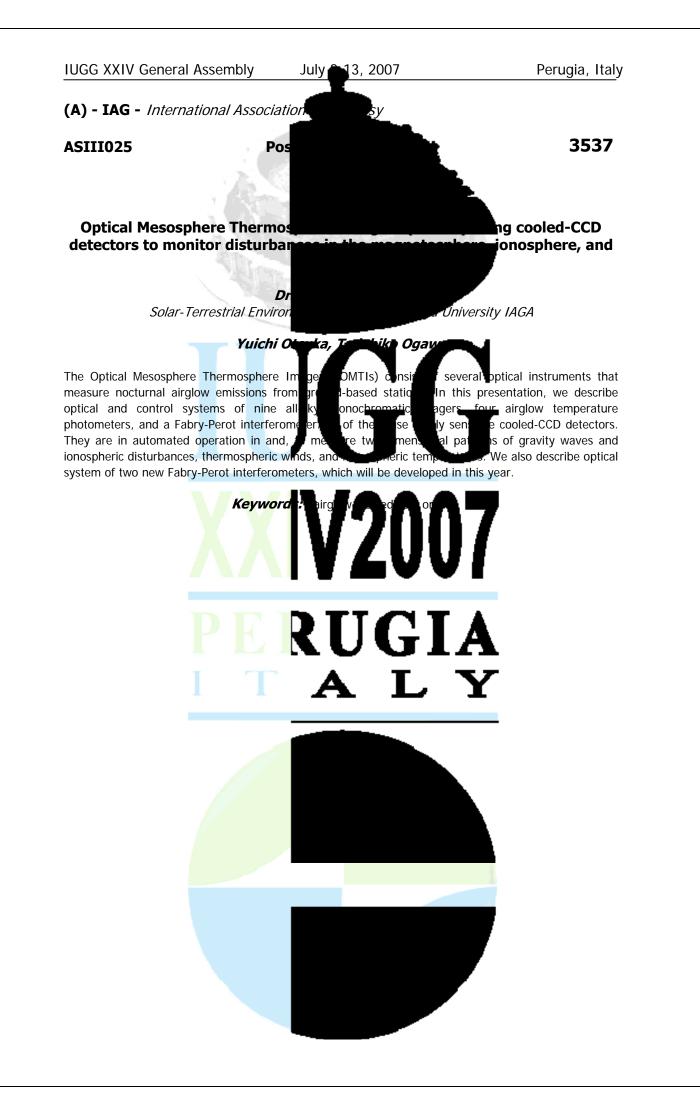
nts of both the wave f arrival of the roar, as urements, together with , this rocket experiment ons. Among these is the

rements with rockets are

finding capability of the lirect ocation which together with the To answer concerns the lg, will allow arthermore using the measurements determine whether auroral roar is associated with auroral precipitation events such as suprathermal ther the roar is more favorable emitted the rocket penetrates the source ic fields of the causative upper

nderstanding of auroral roar RX-DSP.

Keywords:

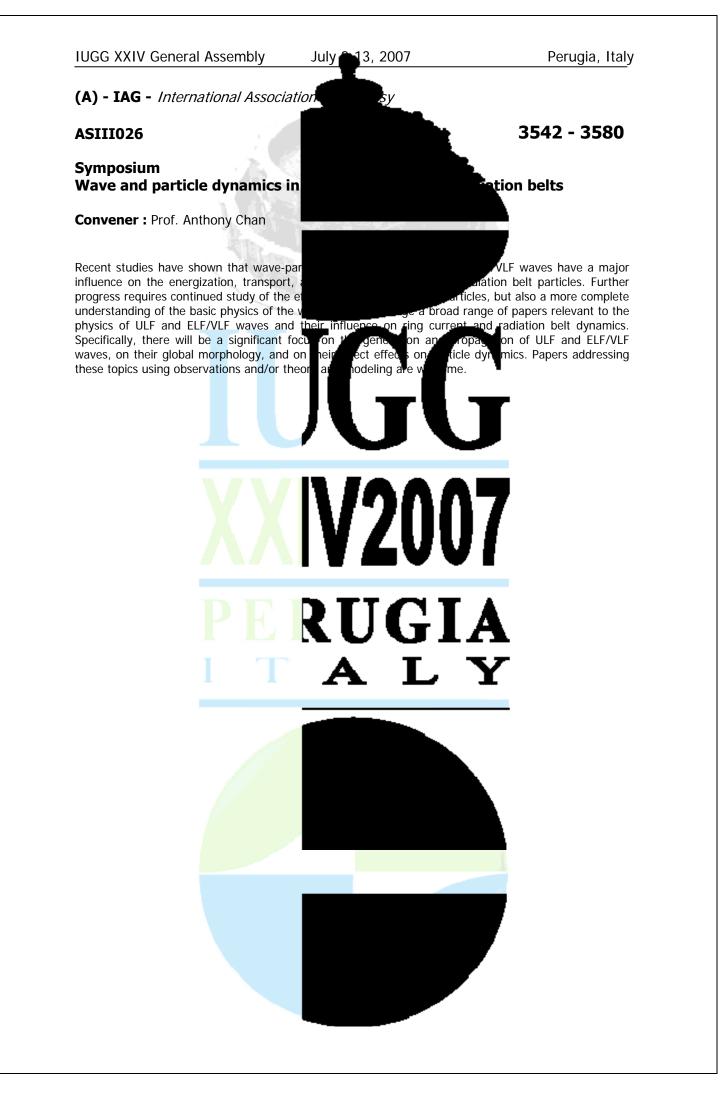




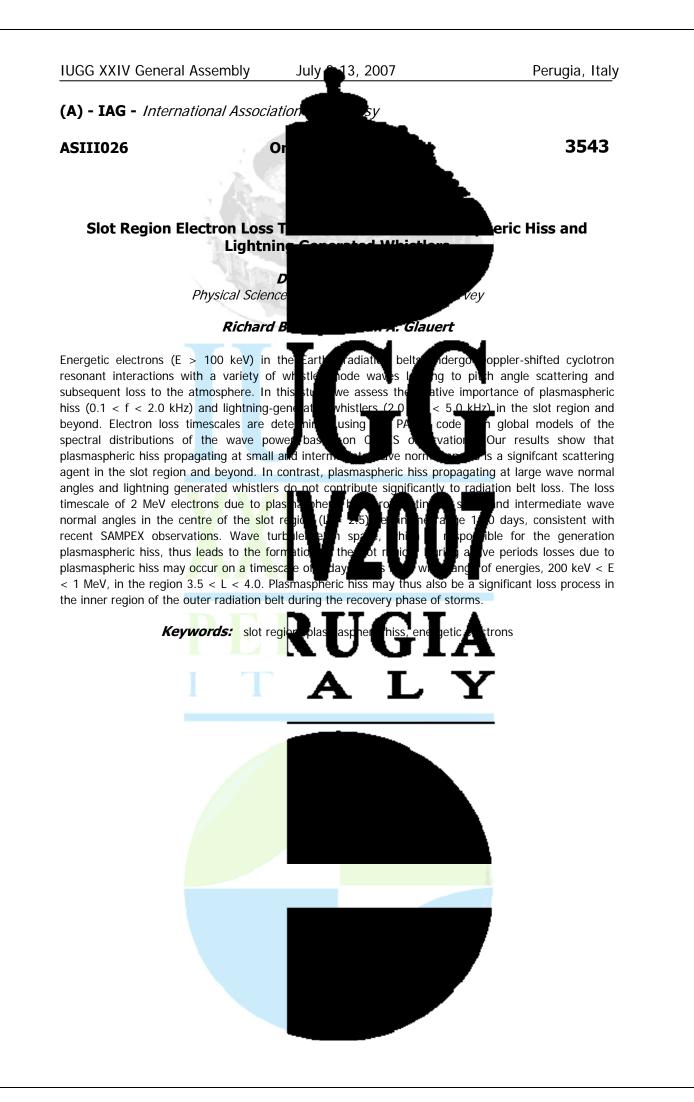


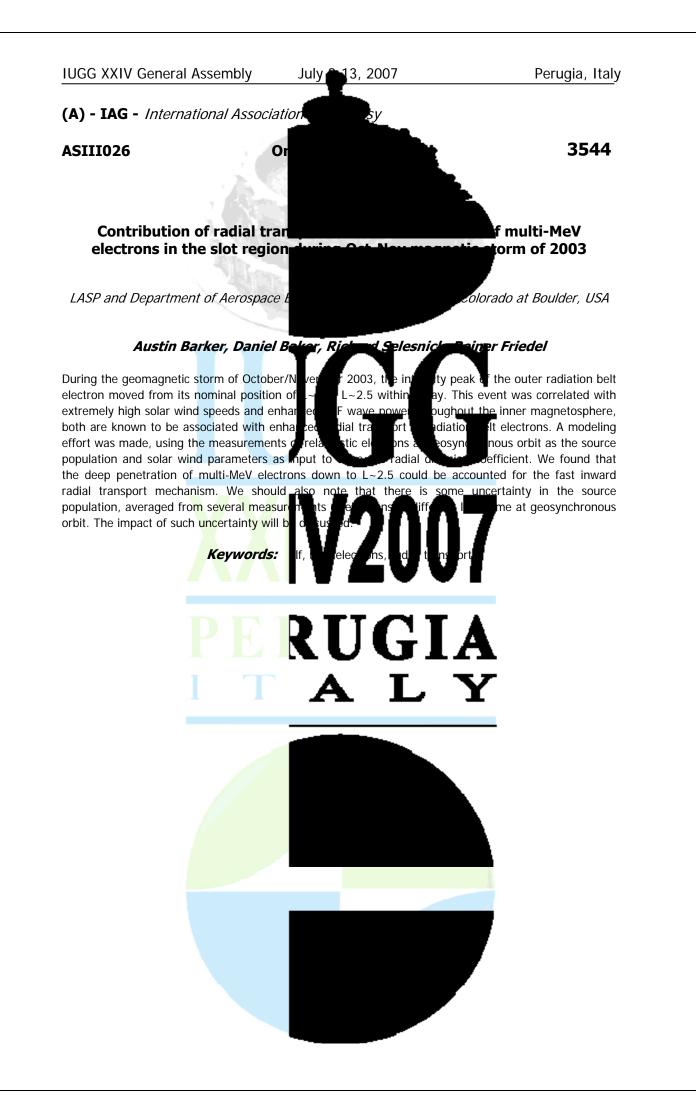


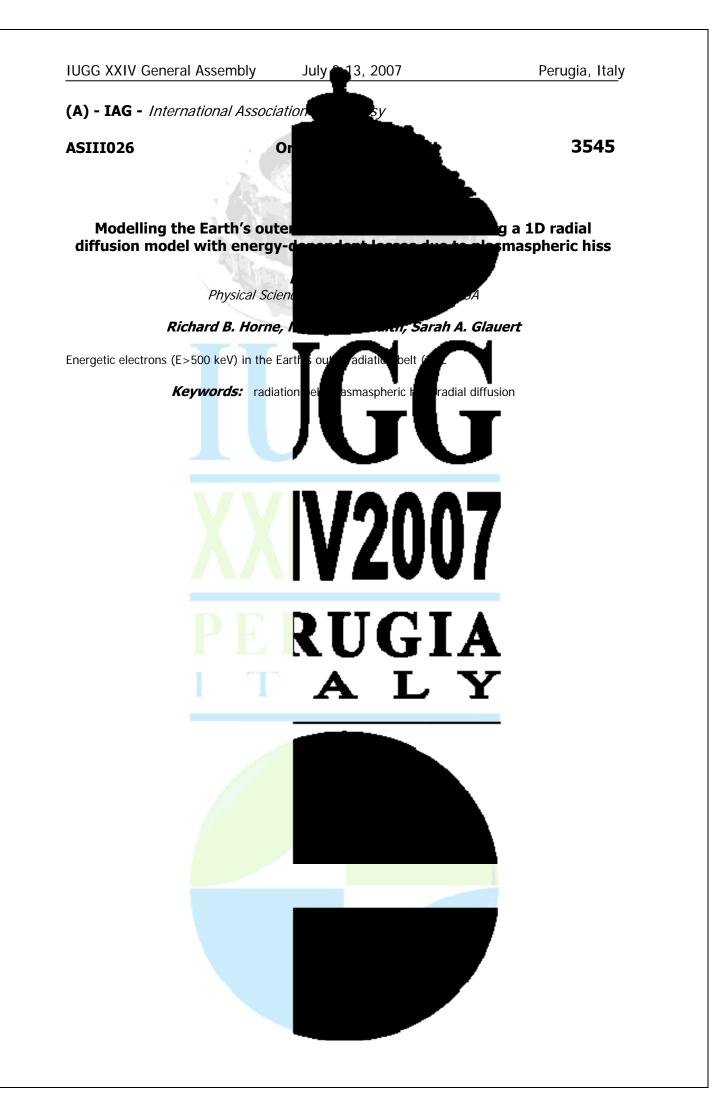


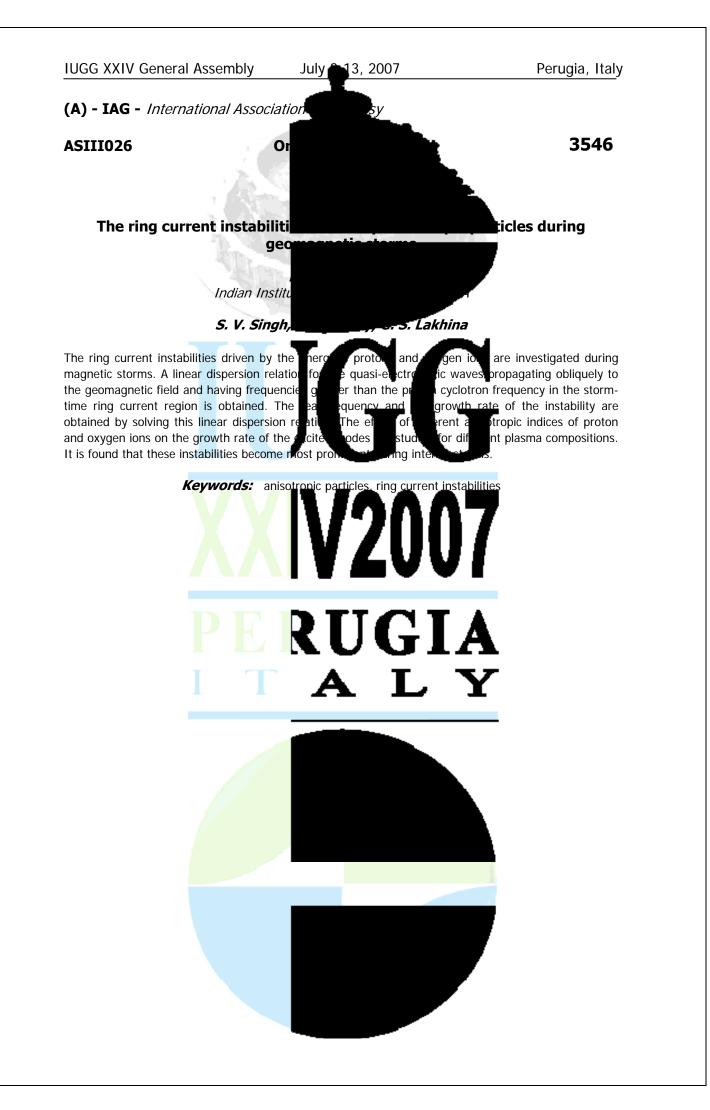




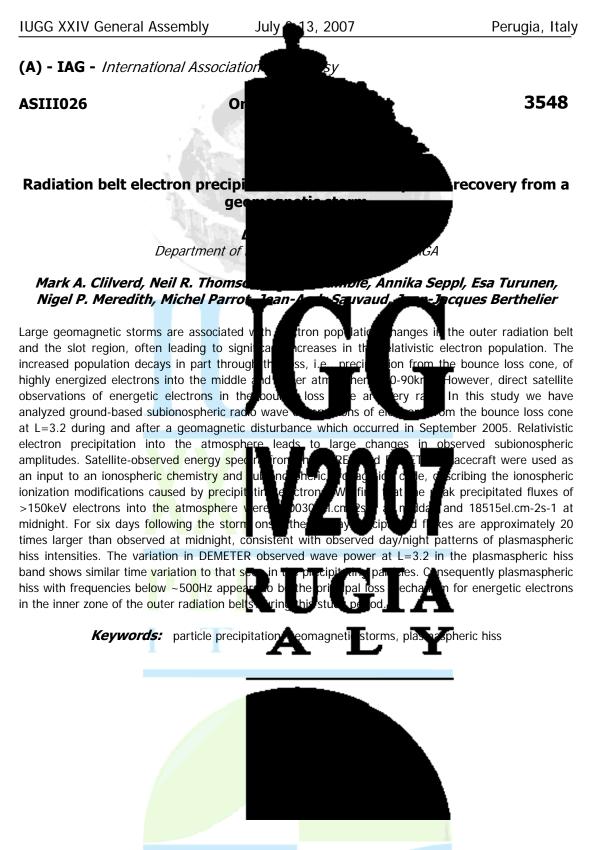








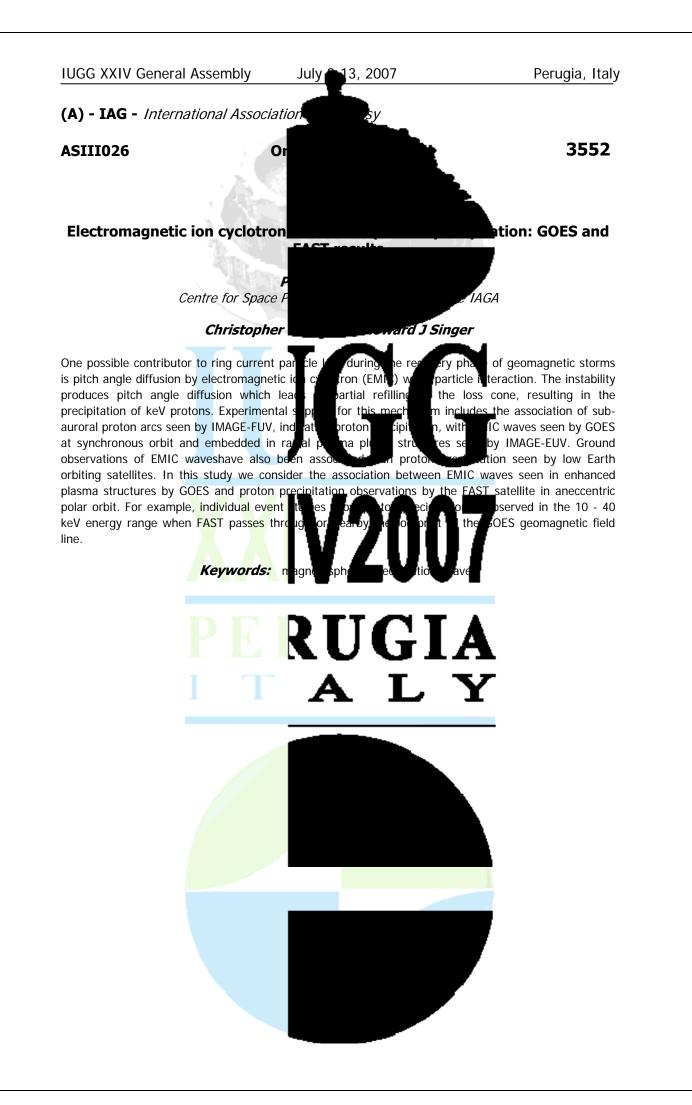


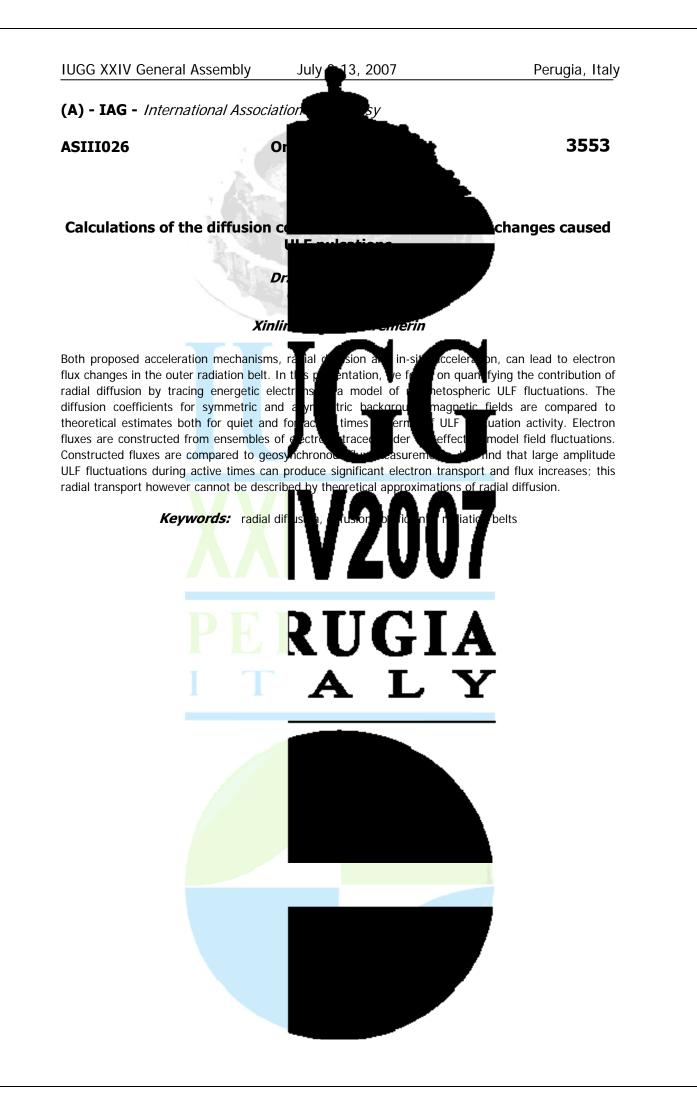


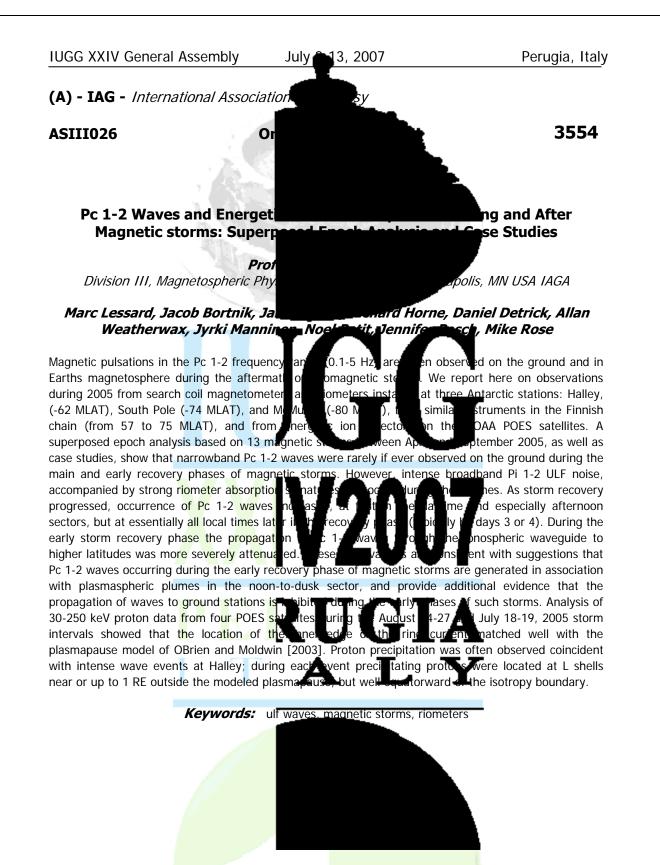


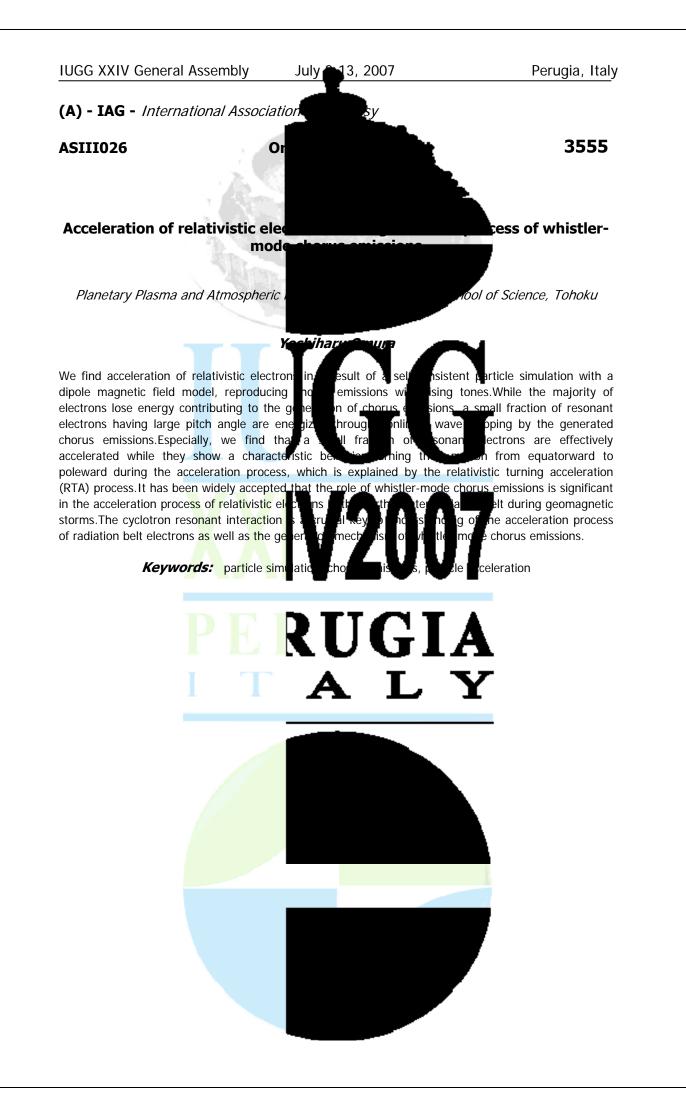


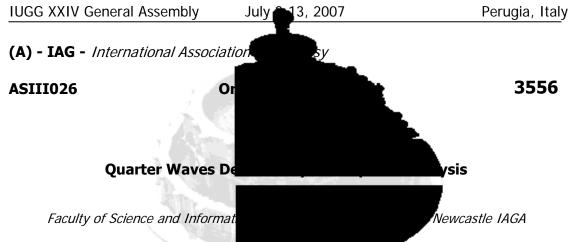








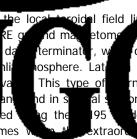




Fred W. Menk, C

We have examined the diurnal variation of the log cross-phase analysis of SAMNET and MEASURE g eigenfrequency was remarkably low near th dark ionosphere and the other end in a s gradually increased to the normal daytime found in both European and American meric Ionospheric Pedersen conductivities calculation between both ends of the field line at rimes

ionospheric conductivities are asymmetric, reverting to half-wavelength mode as the dawn terminator passes both conjugate points. Ground-bas eigenfrequencies are often inverted to inf half-wavelength mode standing field line depends the ionospheric Pedersen condu interhemispheric conductivity ratio for th therefore show that cross-phase techniques c inferred mass density may be over-estimated.



genfrequency at L=3 using ta. On several days the arra one end of the field line was in a the morning the eigenfrequency rnal <u>eigenfrequency</u> variation was ons (M , June, and December). pronounced asymmetry lel sh eigenfrequency events

J. Sciffer

appeared. Our results therefore suggest that quarter-wavelength mode waves are generated when



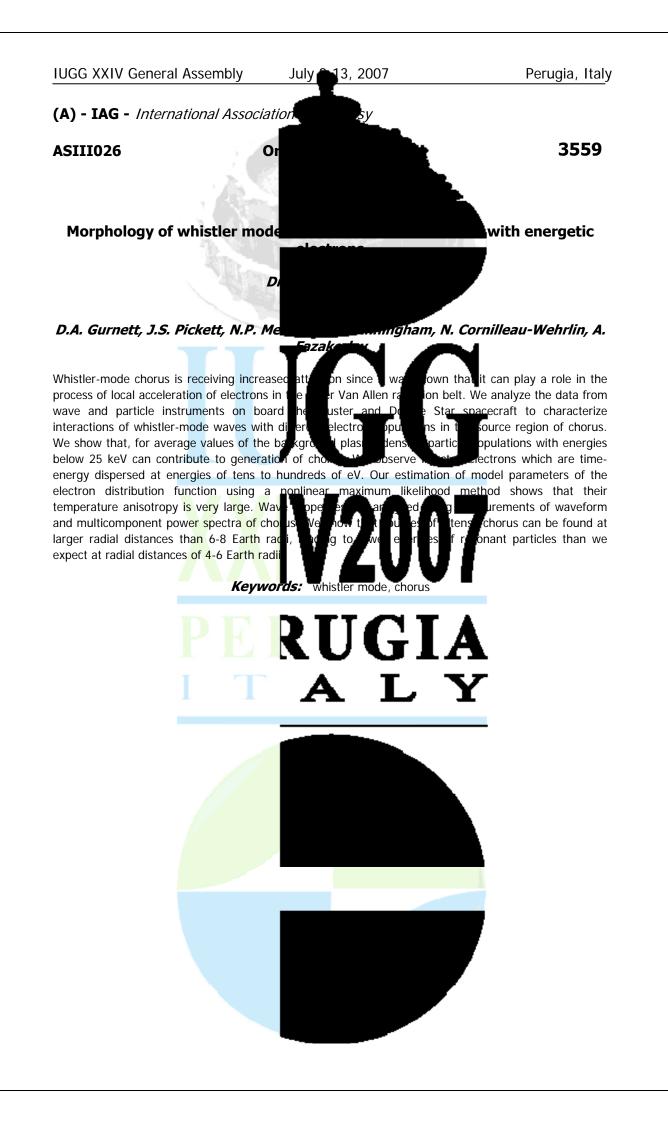
ocal toroidal field line etosphere by assuming he eigenfrequency also there is a threshold of established. Our results elength mode waves, when the



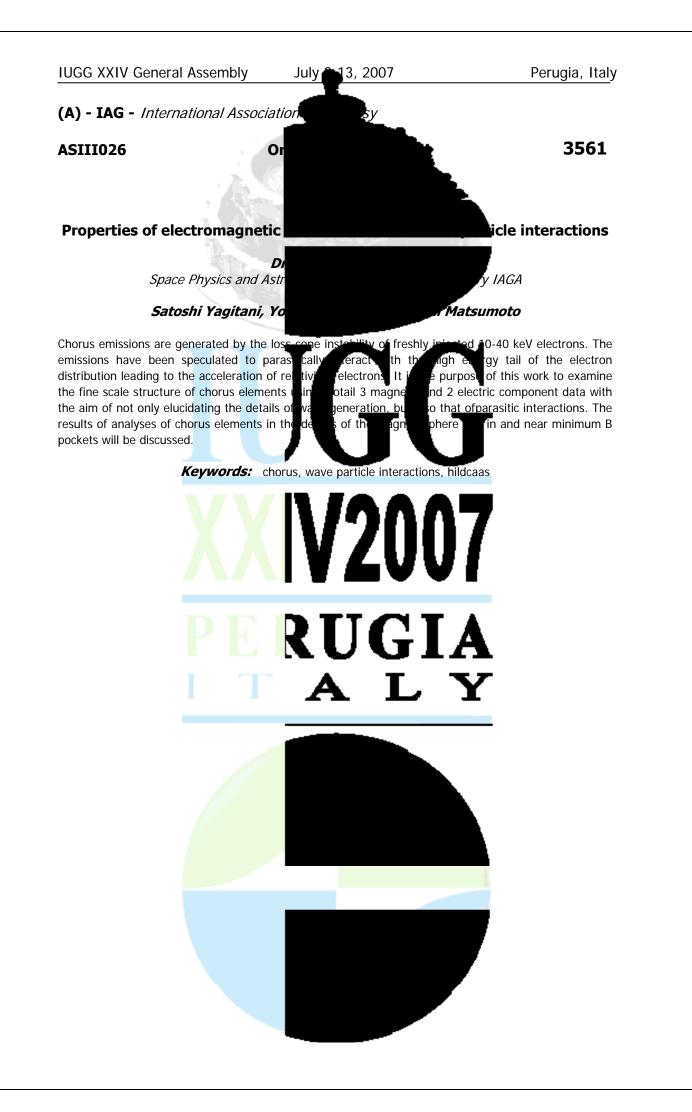




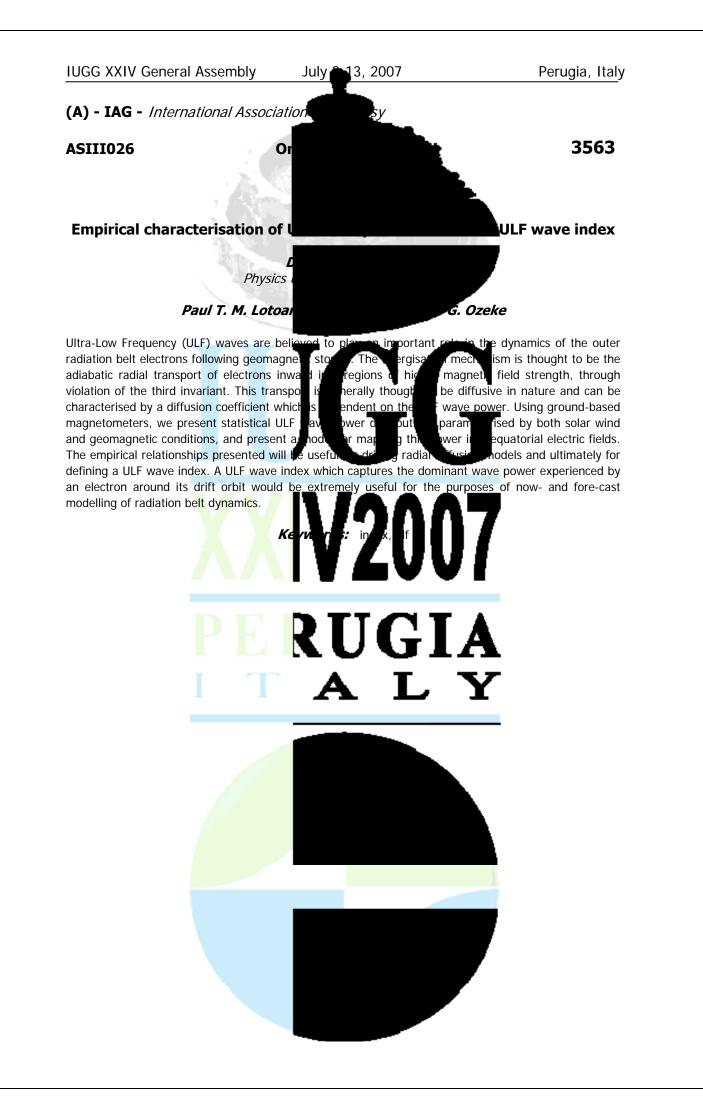


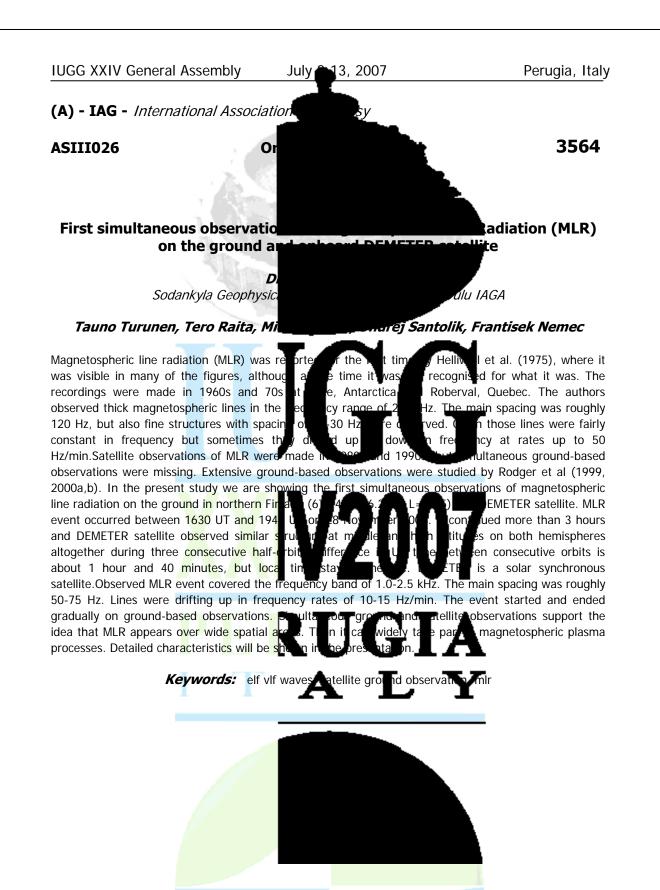


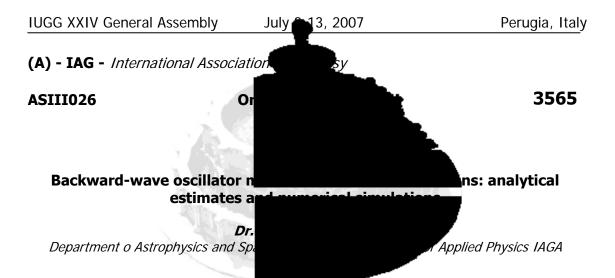












We review recent results of studying the generatio the basis of the backward wave oscillator reame whistler-mode waves. This regime correspond equatorial region of the magnetosphere. Fir parallel-propagating whistler-mode waves an distribution function of energetic electrons. Th source region, the growth rate, amplitude chai chorus elements. These analytical estimates are

model, we can also assume certain feature source region. In particular, the source reeven if the position of this minimum signit The model also suggests that different generated at different distances from th individual chorus elements can differ not region. These features seem to be confirm particles, and geomagnetic field. intion of the us emssion imericane cycle ron in once to the absolute resistic fluxes of the intercome absolute The odel are successful charteristic field of s are configured by num-

action is energetic electrons with hstability of waves in the nearergetic particles, the instability of step-like distortion exists in the estimate the scale of the chorus uccession, and frequency drift of mission mulations. Based on the

model, we can also assume certain features of spatio-temporal variations of chorus parameters in the source region. In particular, the source region should remain near the local magnetic-field minimum

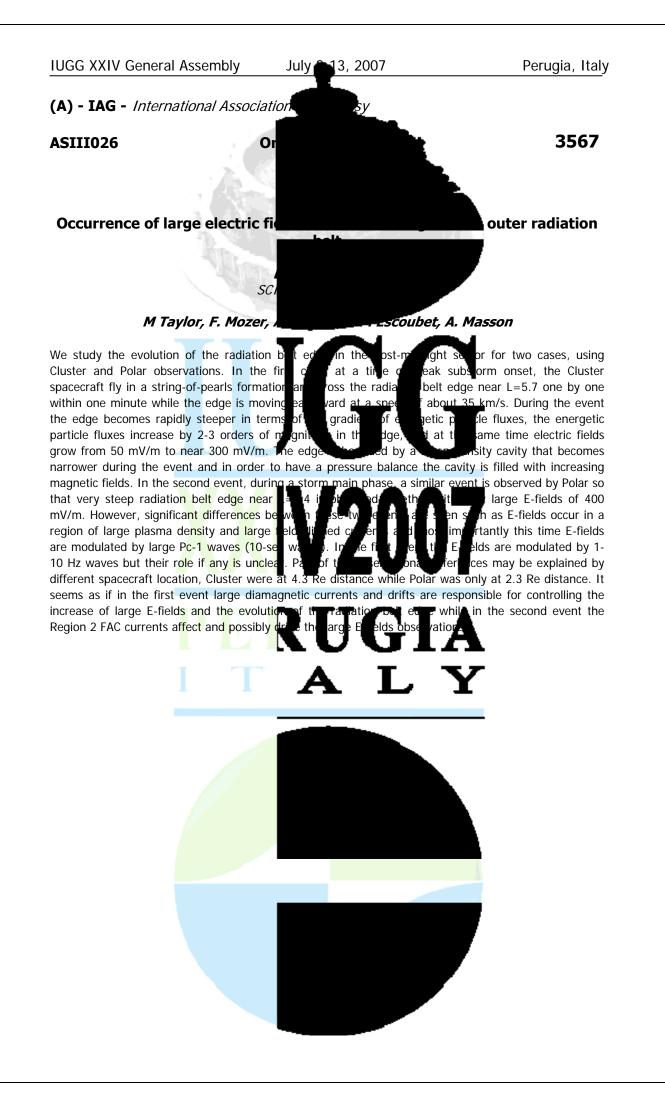


agnetic-field wariations. horus element can be e dynamic spectrum of on points in the source on VLF waves, energetic

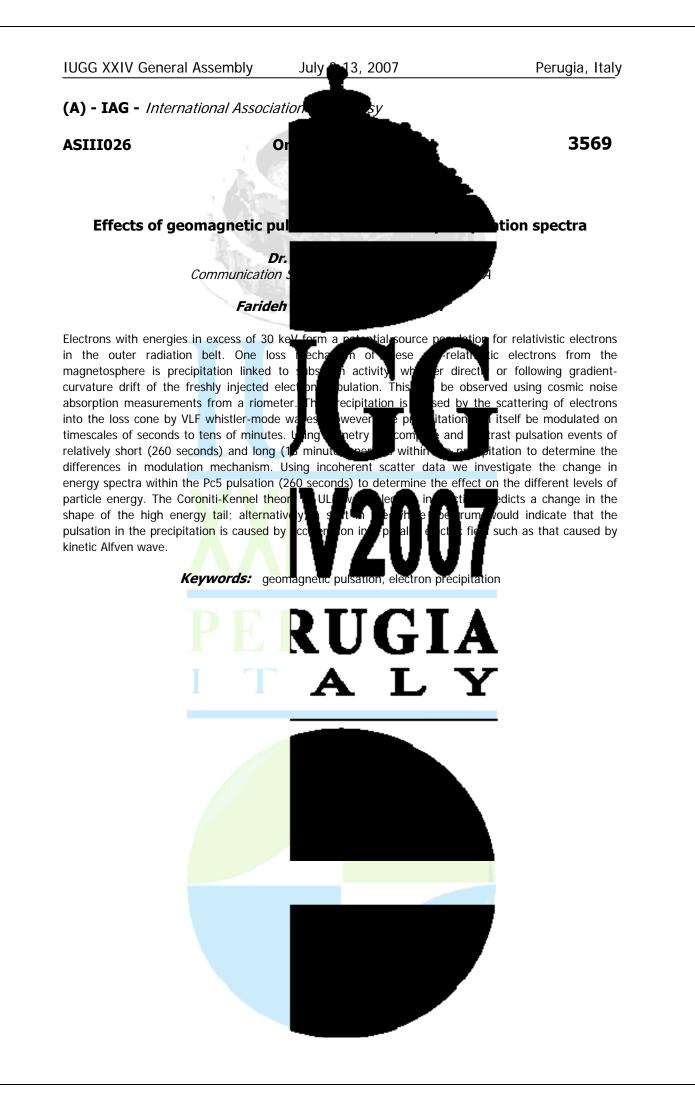
Keywords: vif chorus emissions, roussonateliterations, radiation belts

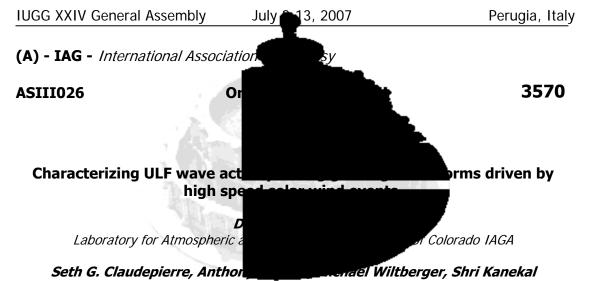












or

Magnetospheric ULF waves, global magnetic can effectively transport and energize radia leads to enhanced radial diffusion. Importan mode structure, radial penetration, and azi single-point in situ measurements typically information necessary to quantitatively d dynamics. In this effort, we use global, 3 magne

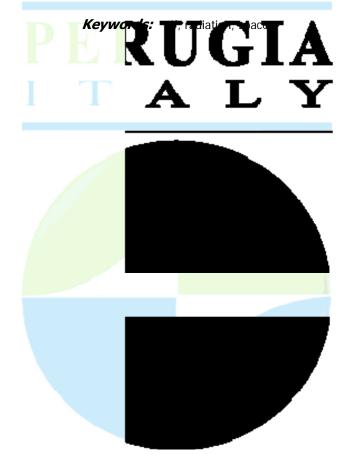
storms driven by high speed solar wind (HSSW) events, commonly observed during the declining phase of the solar cycle. Such storms are associa and often repeat on the 27 day cycle of th that beganon January 28, 1995, using MI the storm, and suggest diffusive time sca Results are compared with ULF activity ind the ULF waves discussed.

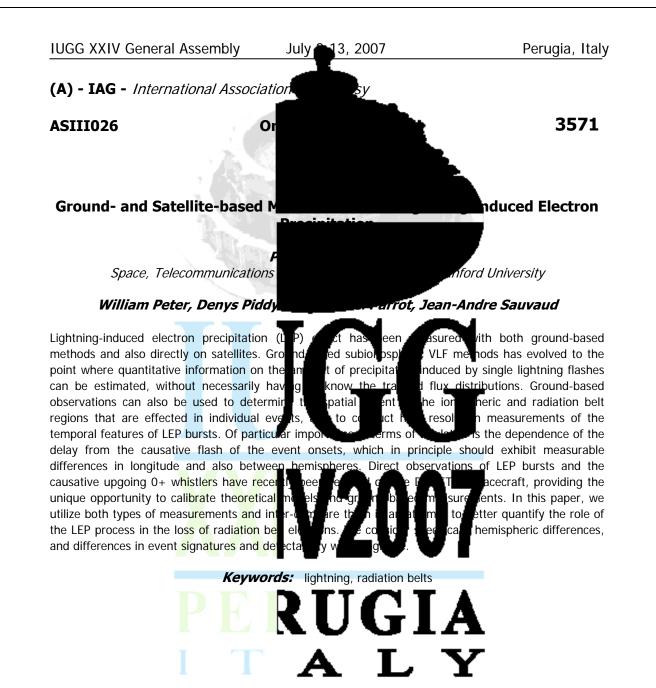
field illatio particle, the eters governi occur<u>rence</u> from the eff lamic

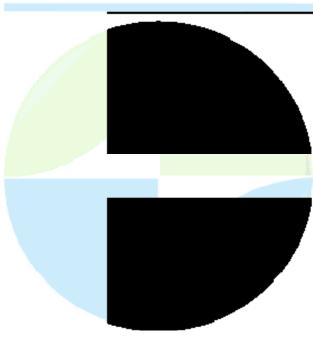
few to several minutes, a drift esonant interaction that his transport include the azimuthal driving ULE waves. However, the cecraf h't provide the range of of UL vaves on radiation belt lations of the sun-Earth

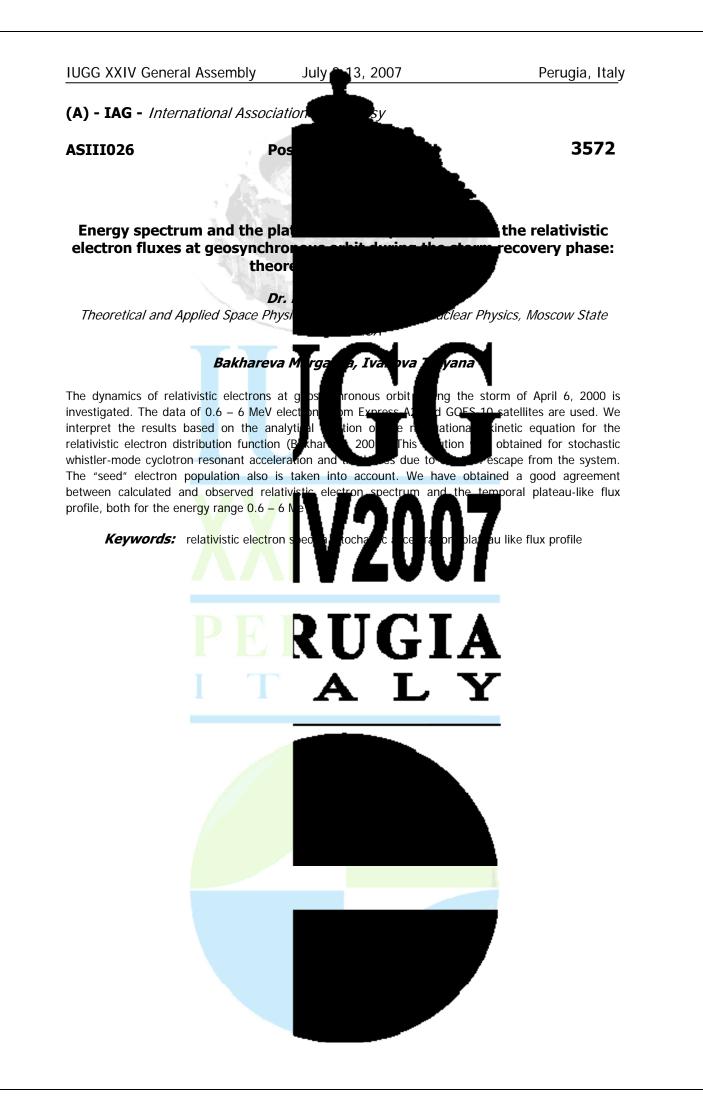
system to examine the generation and characteristics of magnetospheric ULF waves that occur during

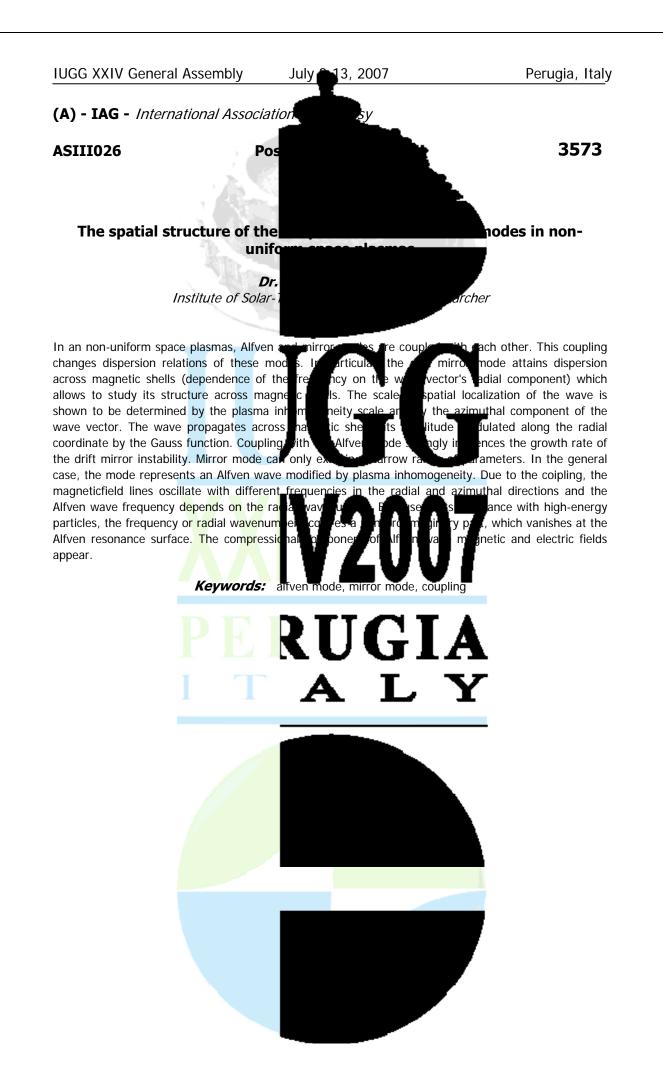
adiation belt electrons, detail the HSSW event vave activity throughout ter zone radiation belts. trasting characteristics of

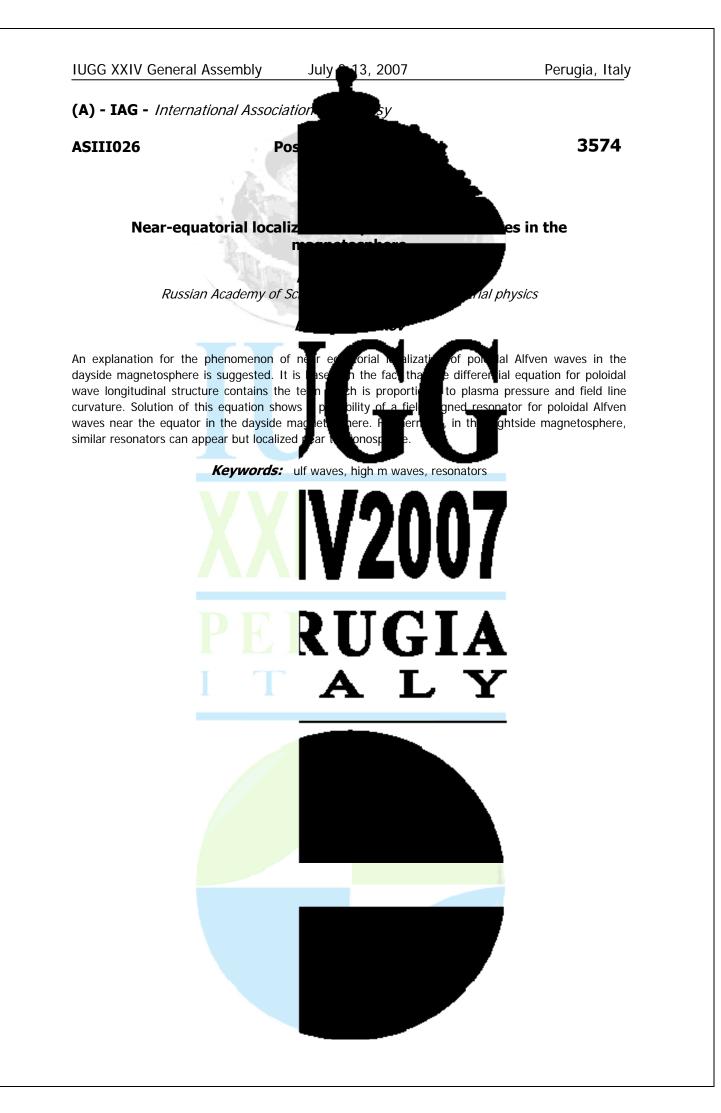


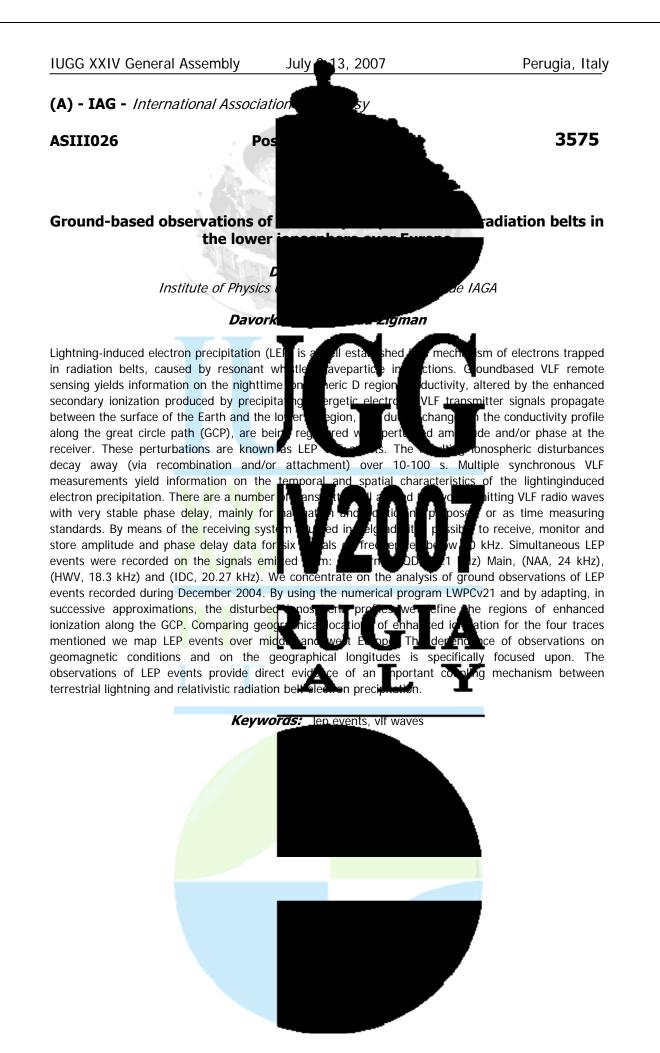


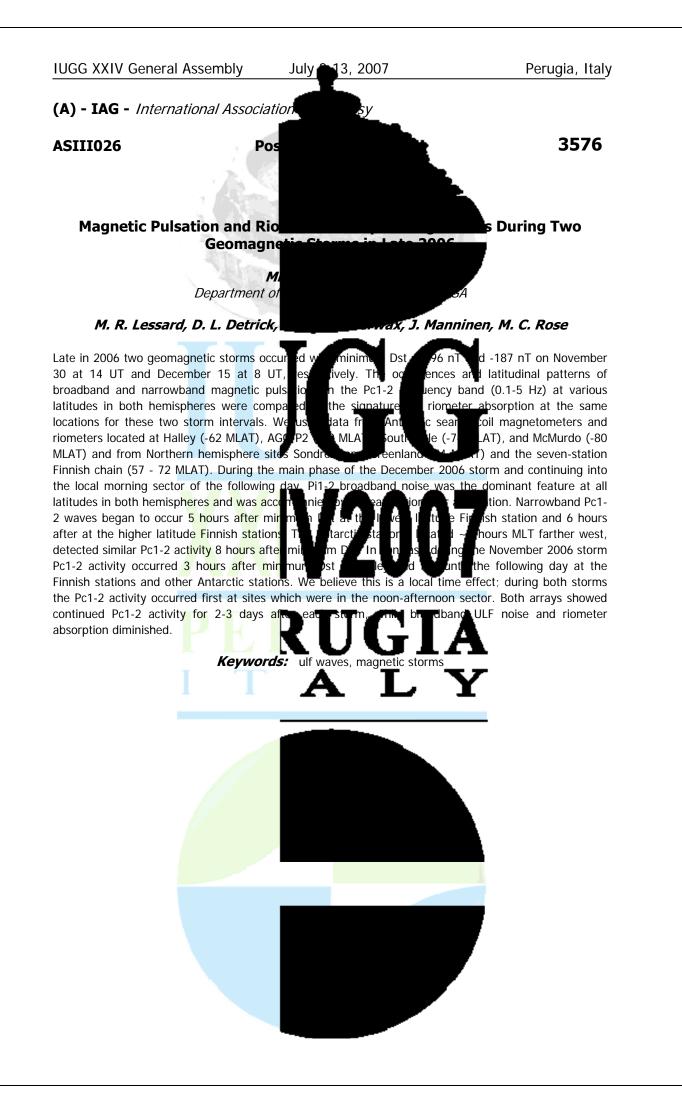








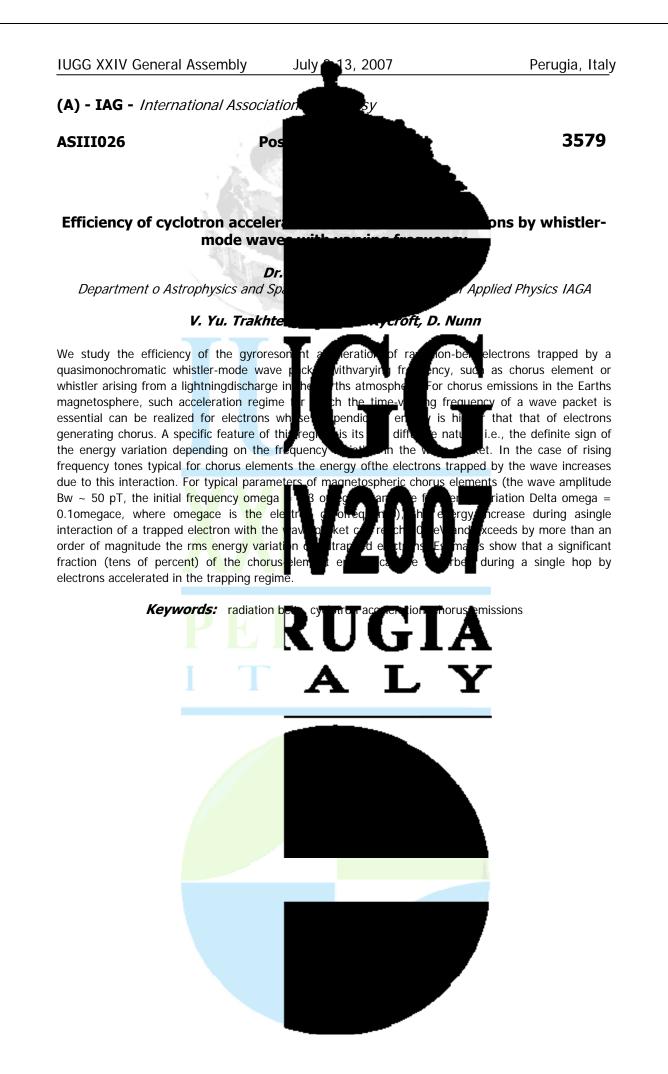


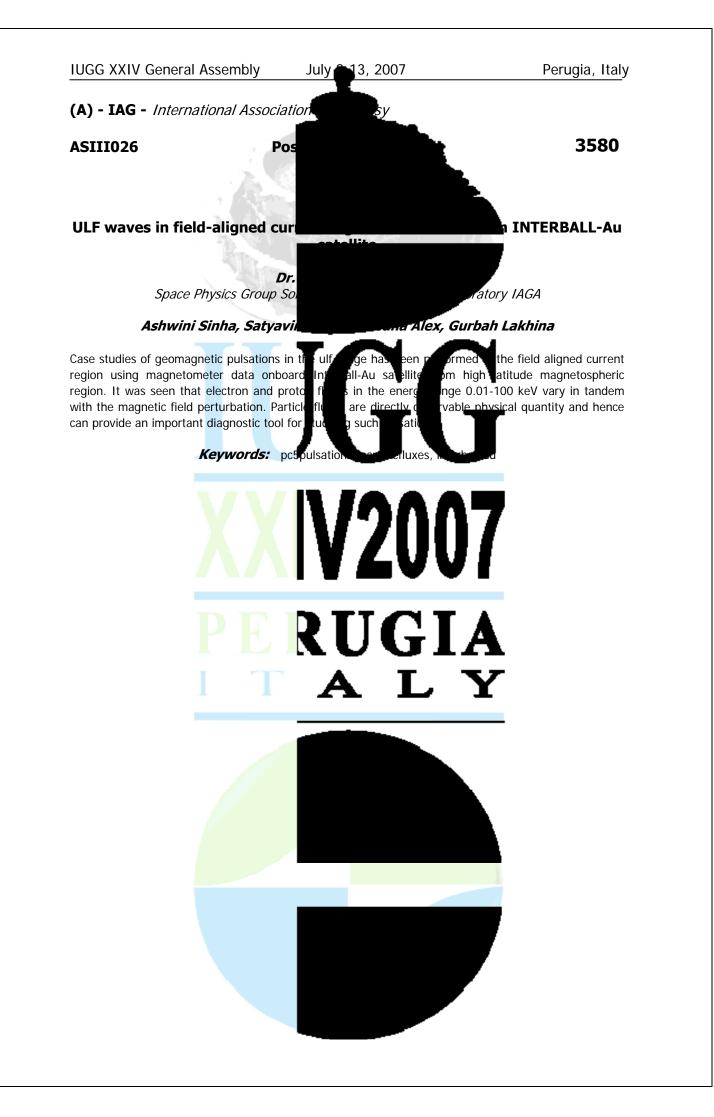












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## **ASIII027**

## Symposium Other magnetospheric worlds thermospheres (ASII014 merg

Convener : Dr. Pontus Brandt Co-Convener : Dr. Emma Bunce

While the terrestrial magnetosphere shar they display enormous variation from the inform our understanding of the fundament

with space plasma environments. Given that planetar and high densities of neutral gas imbedded processes of transport, auroral generation, and which processes are unique only to Ear from remote and in situ investigations of ot although results from studies of the Jovian the wealth of knowledge of other systems t are also welcome as are papers which disg including the MESSENGER and BepiColombo missio

others.

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and

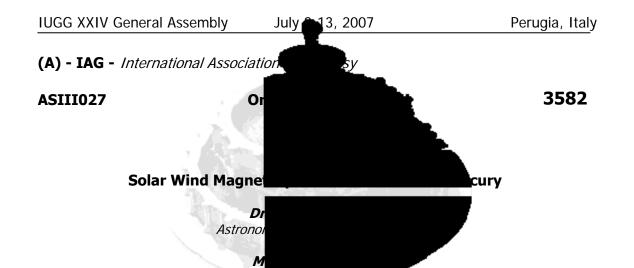
n planetary magnetospheres, angtosphere there n the huch ers are aint some planets gnetospheric er sy ost 🗤 y broa releva th he co at kn dg∈ Sury, the

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ng a broad range of systems to ing the interactions of magnetized bodies have satellites, rings, dust, be gained in asking how d in these different environments ir focus will be on lessons learned ms, including in particular Saturn, Papers that draw on o astrophysical systems kt of upcoming missions aper Belt Missions among





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Mercurys magnetosphere-exosphere-surface Mercurys orbit (0.31-0.47 AU). Large are precipitating along open fieldlines that mapped and loss (via photoionization) of neutrals magnetosphere with the solar wind. The va affected by long-term variations in the sola aphelion) and solar wind activity (solar min induced by solar energetic particle events or CME

magnetopause is sufficiently close to the planet to allow direct solar wind impact on the surface even around the subsolar point. Photoionization of heavy atmospheric neutrals provides an important population of magnetospheric ions. Such i The manner and extent to which pickup convection and affect the large-scale to old processes is a critical question that will req particle and hybrid simulations have reve times expected at Mercury may critically limit their

the interior field and substantially affect the p

fluctuations and produce substantial ion cyclotron resonances. The electrodynamics of Mercurys magnetosphere are expected to be equally and the pick-up of recently ionized exosph However, these field-aligned currents do no ose

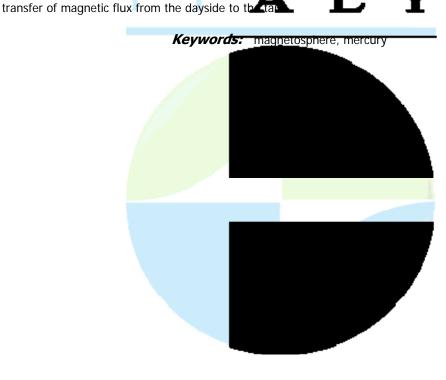
to ext ทด ard and high lat hus partially of exospheri magr dition such

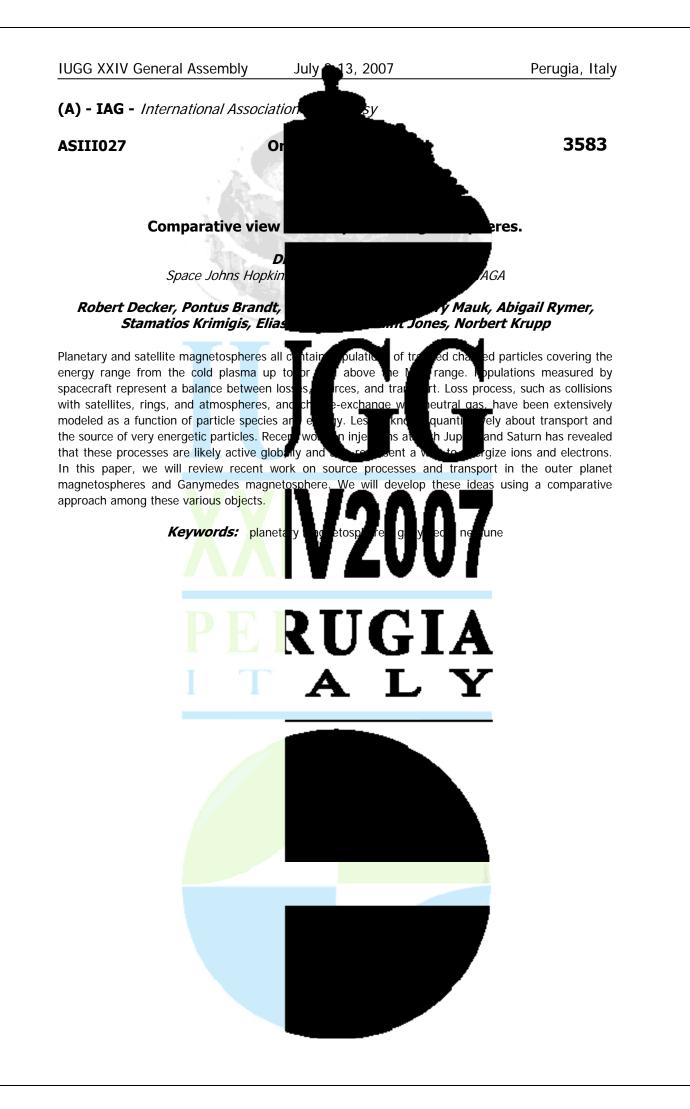
driving forces prevailing at pen to solar wind ions s. Production (via ion sputtering) ulated by the interaction of the oduction and loss is systematically field IMF (perihelion to brt-term fluctuations are models predict that the

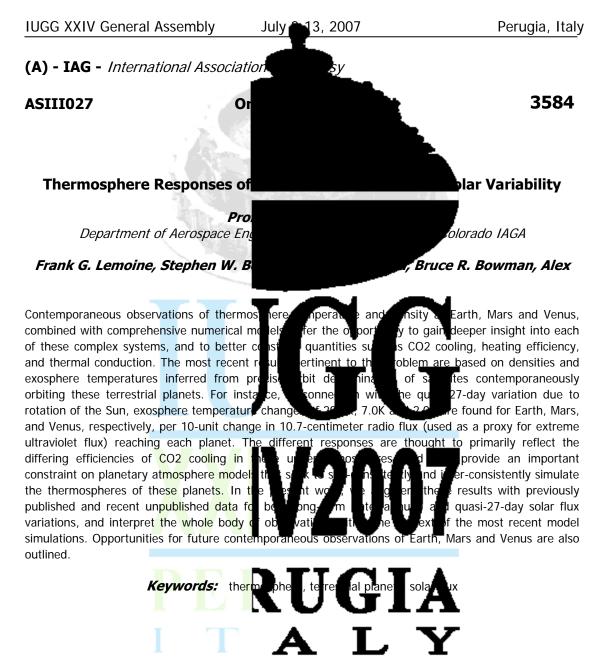
ape to the solar wind. slow magnetospheric related magnetospheric

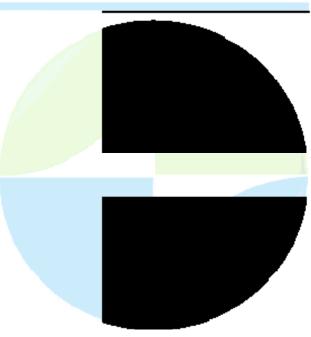
R and BepiColombo. Test cts. Short ion residence ability to draw free energy from magnetic

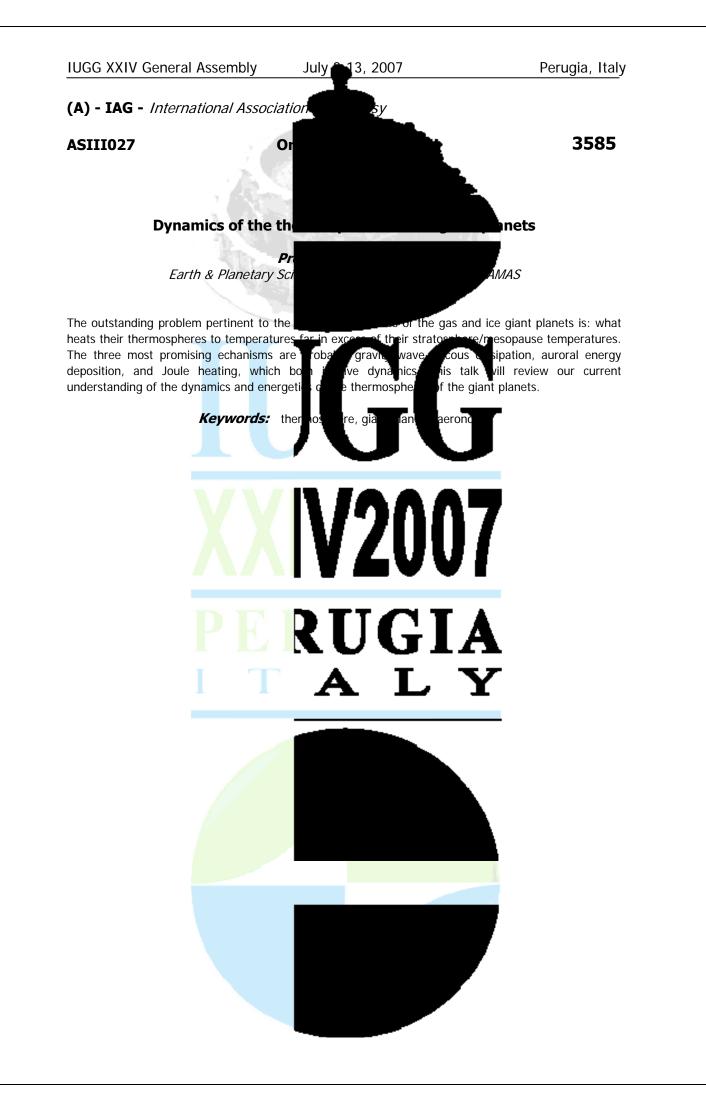
onnection at the magnetopause o fie aligned electric currents. Hermean surface likely stea I, U ties the magnetosphere to the regolith via induction currents. These currents may contribute 10% of c topology dynamics, limiting the



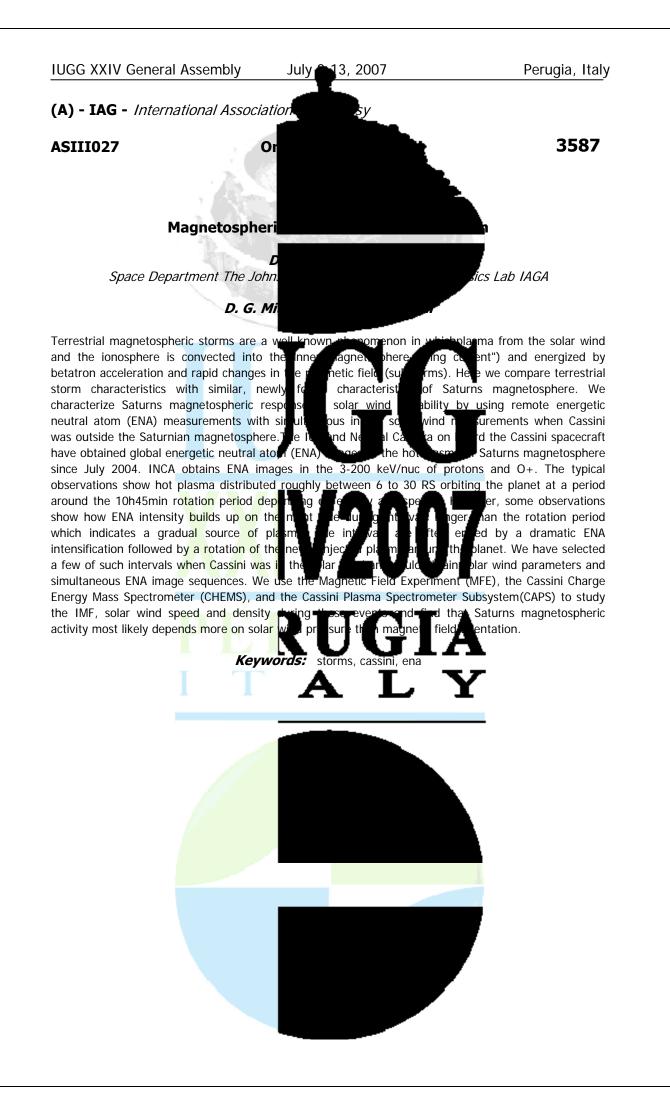




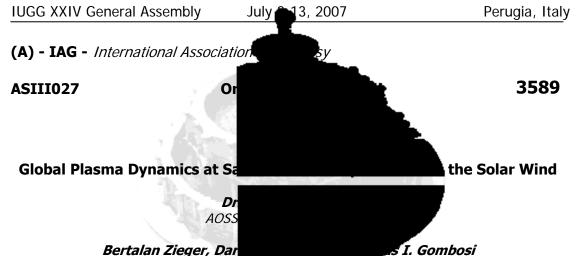












## Bertalan Zieger, Dar

The dynamics and plasma circulation of somewhere on the continuum between the strong the solar wind driven magnetosphere of Earl demonstrated that to some extent this is tr magnetosphere, its current systems and it magnetosphere increases, discoveries suc Enceladus have tended to push our underst the spectrum. In this talk we will explore the

3D global magnetohydrodynamic (MHD) simulation of the magnetosphere of Saturn we have previously found that the magnetosphere may be u plasma that are the main mechanism for la release of plasma is modulated by the so dipole axis relative to the Sun-Saturn line circulation of plasma in Saturn magnetosph

Satūrns netosphere. allv d rotat hi and Hi bble h the rotation ion p<u>atterns.</u> ne ap htl ge pl Satu ma na dy

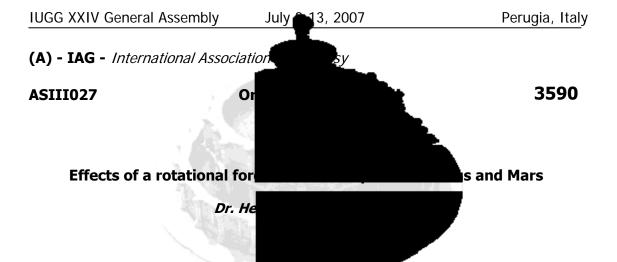
often referred to as lying tosphere of Jupiter and í ma ce Teles ope measurements have the solar wind play a role in the ever, as our understanding of the a source at and near ward the Jupiter end of Saturn and the relative

importance of the internal drivers versus the magnetospheres dependence on the solar wind. Using our

sphe

n periodic releases of tosphere. This periodic s the tilt of the Kronian hey relate to the global

Keywords: saturn, mhd, plasma



Rotational motion of a planetary ionosph dynamic force (Magnus force) directed transverse to, of the ionosphere. The Magnus force results from the difference in the speed of the plasma v hei are in the same sense to that where both rotation motion of the Venus ionosphere m the cross-terminator ionospheric flow in the region where most of the ionospheric hole plasma channels carved in by the solar wind near

terminator flow comparable to that implied from the PVO measurements and are consistent with the difference in the ionopause altitude that is terminator. Similar conditions could be a prograde atmospheric rotation. If that is th magnetic polar regions would be deviated

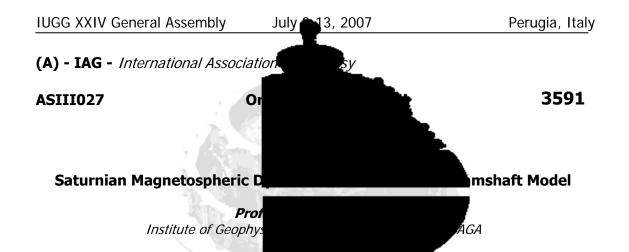
with the solar wind may produce a fluid lar wind vel differ that ressi th the rotation are opposite espo<u>nsable\_f</u>o le hen the ρr asure are i stream

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and to the rotational vector set across the planet by btion and the solar wind direction each other. The retrograde supere dawnward-directed deflection of dawnward offset of the preted as resulting from magnetic polar regions).

The results of a calculation of the Magnus force lead to a dawnward-directed deviation of the cross-

awn side of the Venus the latter follows the the solar wind from the



Periodic modulation of magnetospheric ph of the dipole axis relative to the rotation axis Saturns moment is tilted by less than 0.5 from the pin

orientation of the magnetic field, and many close to the period of planetary rotation. H detected in the magnetospheric regions insi non-axisymmetric system of field-aligned where the signals are seen. There is also with the field and currents, which however is on

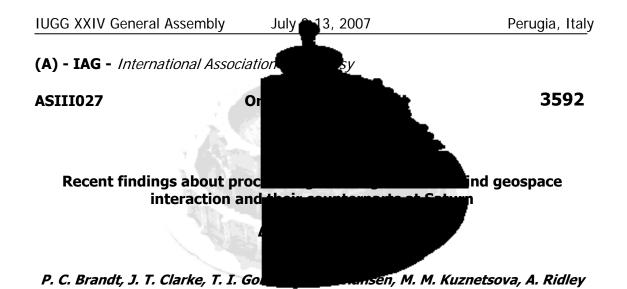
would develop if the ionospheric conductance in one hemisphere were a function of planetary longitude. On magnetic shells beyond the sheets of field-aligned current the magnetic perturbations generate an effective rotating equatorial dipole mom produces, in net effect, a dipole moment t overt source of the north-south asymmet conductances that result from non-uniform although we can elucidate much, the original same basic period, such as the Saturn kilometric

and Jupiter results principally from the tilt anetic field is pow yet bro ma ies of th examine pro 15 RS. We sh flowi netic rn in lasm ected

to axisymmetric. Its dipole requency emissions, the 「rad tospherid plasma vary at a period es of the periodic magnetic signal hat it is associated with a rotating s bounding the region h ionosphere associated misphere. The currents

> etary dipole moment gle of order 12-15. The to different ionospheric urces are discussed but, her phenomena with the





Three emerging aspects of solar wind - ge will be explored in this presentation using of (1) response to corotating interaction region global configuration, and (3) consequences shear. A new understanding of the geosp coupling to the middle atmosphere) has d stream activity in the descending phase of solar

and into early January 2004. There is a developing awareness of the importance of different solar wind flow regimes (from supersonic to margi geospace configuration and dynamics. Also wind flow conditions nonlinear Kelvin-I magnetopause boundary play an importan Since this plasma is cooler and denser that pla neutral line, its presence has far-reaching consequences for the global geospace system response. Potential counterparts at Saturn for each of these terrestrial solar wind-magnetosphere interactions will

that fpad ferac ons and t e r effect of diff -linear Kelvir ponse со from elo /hich 🖡

sting parallels to Saturn from simulations. These include: t solar wind flow regimes on the mholtz vortices in regions of flow ng in ction regions (including duri he powerful high speed e largest yearly auroral

energy inputs at Earth in 4 solar cycles. This peak in high-speed stream activity extended through 2003

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ficant changes in the specific IMF and solar velocity shears at the Earths magnetosphere. e through the near-Earth

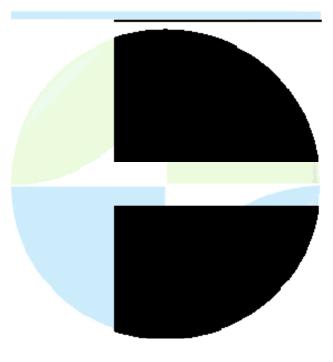
drivers from the Cassini

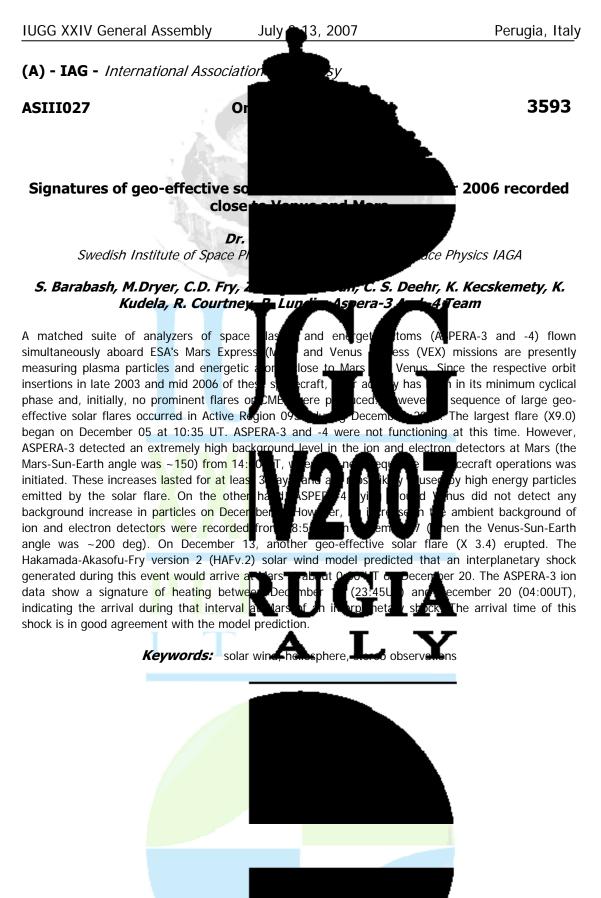
ge-scale simulations of

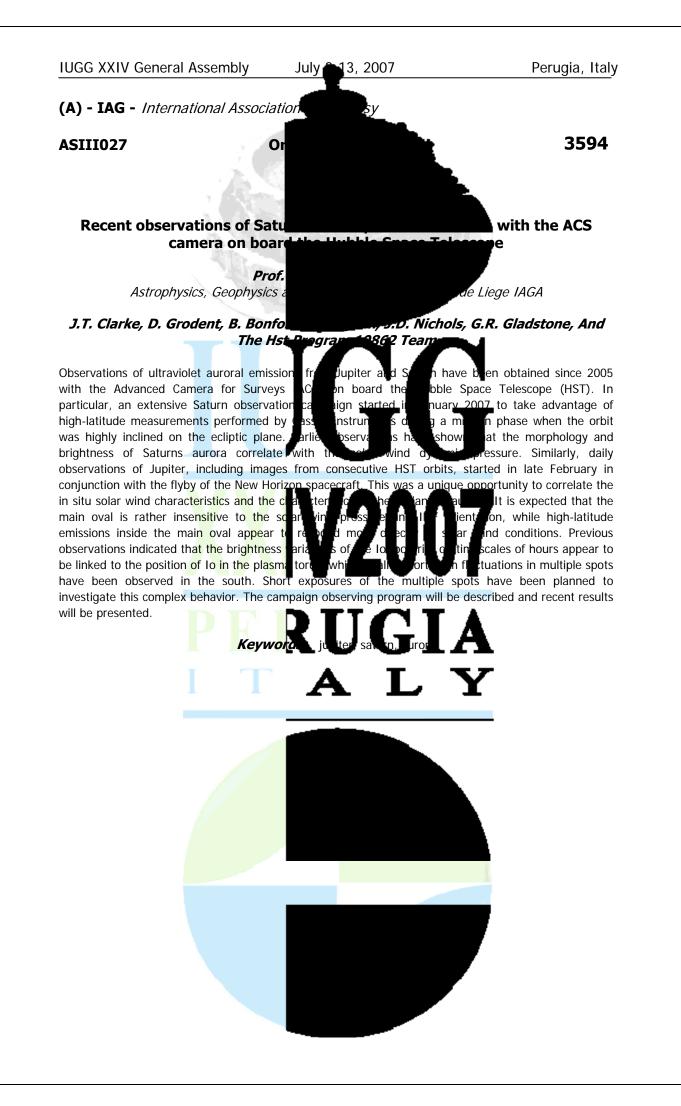
be explored based on new understanding mission and the Hubble Space Telescope magnetospheric responses to solar wind driv

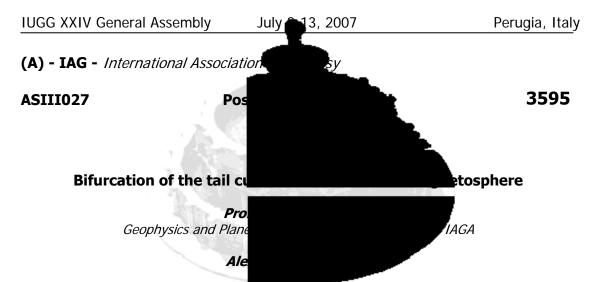
> Keywords: comparative magnete eres, saturn ary magne

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Multiple crossings of the magnetotail current between two types of electric current densit double-peaked (bifurcated current sheet). Voyager-2 and Galileo reveal 14 cases of density possesses minimum at the point o where the magnetic field strength reaches magnetosphere, double peak current sheet plausible, that the occurrence of bifurcated curl

formation. Solution for self-consistent magnetic field in the geomagnetic tail is obtained in a simple model. Magnetic field configuration is created by ion drift current in non-uniform magnetic field. Ion trajectories are such that the electric curre sheet. Positions of the maxima correspond to finite gyroradius. We arrive at the cond the electric current density is an equilib anisotropic in the plane perpendicular to th

sheet le space ind dist ale-pe tion: ic field i Лас eas gnetotail curr mpon<u>ent rev</u>e its va omm no atı is de

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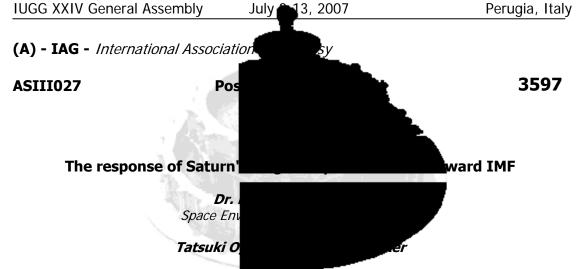
Jovia

verpossibility to distinguish type current layer) and hents in Jovian magnetic tail by sheet bifurcation. Electric current and two maxima at the distance contrast to the Earths agnetosphere. It seems the mechanism of its

> th sides of the neutral the magnetic field due eet with two maxima of when ion pressure is

Keywords: magnetosphere, magnetic tail, current sheet





We have used a global magnetohydrodynamic, magnetosphere may frequently contain interaction of the solar wind, corotation and na magnetosphere can be very different the northward IMF the simulated Kronian magn Earth or Jupiter. When the IMF turned reconnection. It took less than 10 hours for the tail neutral line had a U-shape being clusest to

of the tail. Eventually the magnetosphere evolved to a state in which small scale plasmoids were ejected tailward every hour. This sequence of events was independent of the solar wind dynamic pressure or the initial condition of the magnetosphere reconnection occurred along two neutral lin equatorial plane. This resulted in a magne will show the time evolution of the Kroniar at the dayside magnetopause and the dyna

D) simulati frtice ulent and ospheriction er the Joviar re reached a /ard, onned id gneto ſе midr

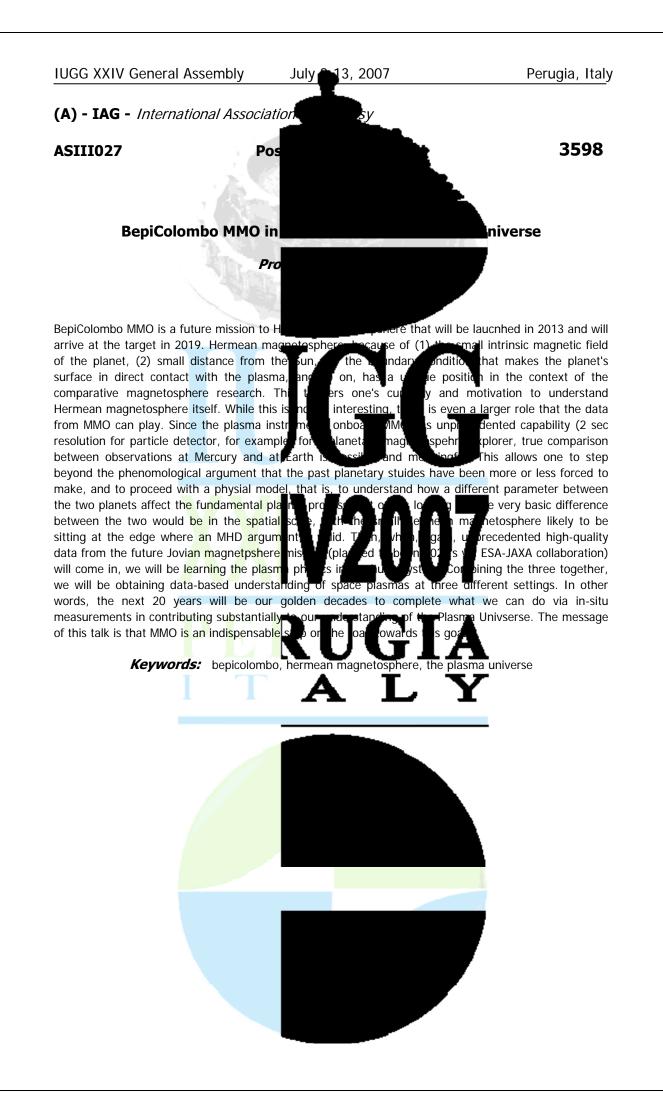
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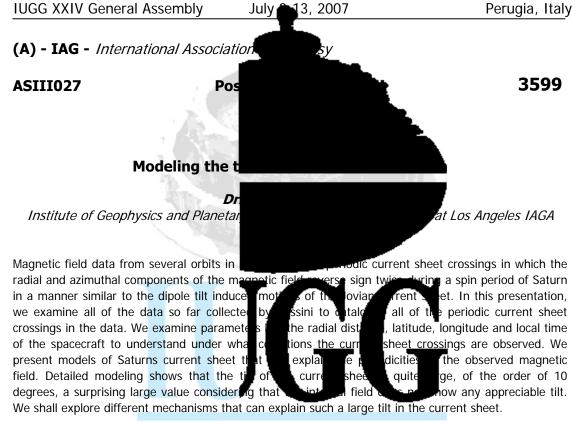
ach a

now that the Kronian that result from the on. This suggests that the Kronian terrestrial magnetospheres. For si-st<u>eady sta</u>te unlike those at the was followed by tail si-steady state in which ther away on the flanks

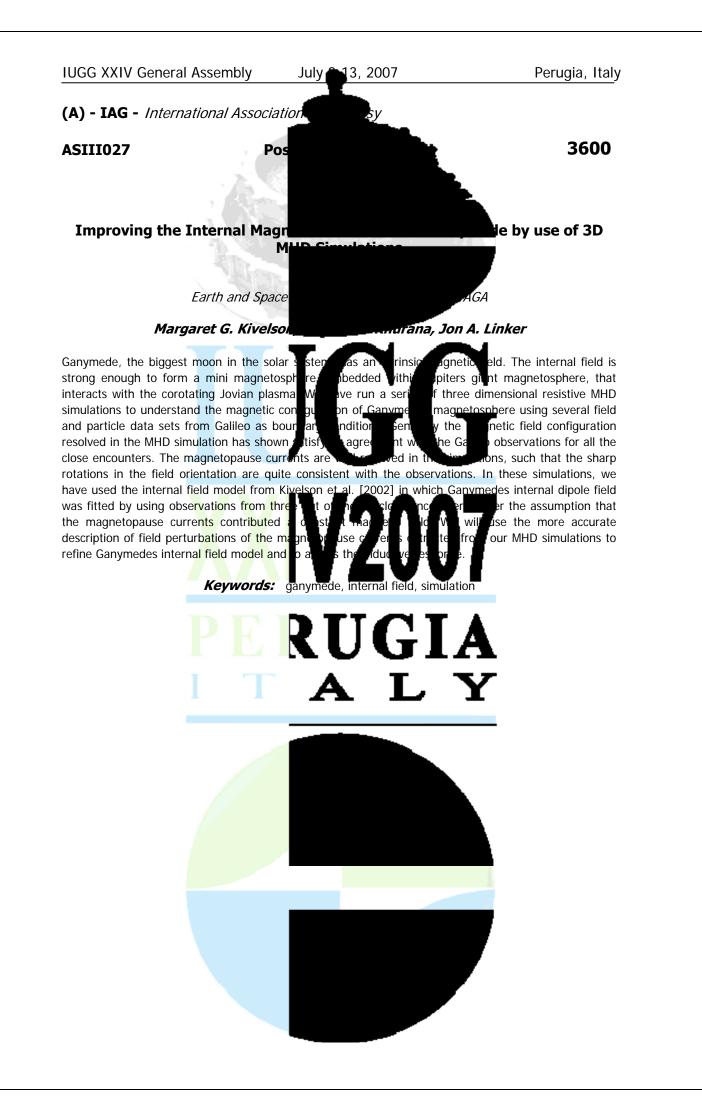
> the dayside magnetic ator rather than in the In this presentation we ation of magnetic islands

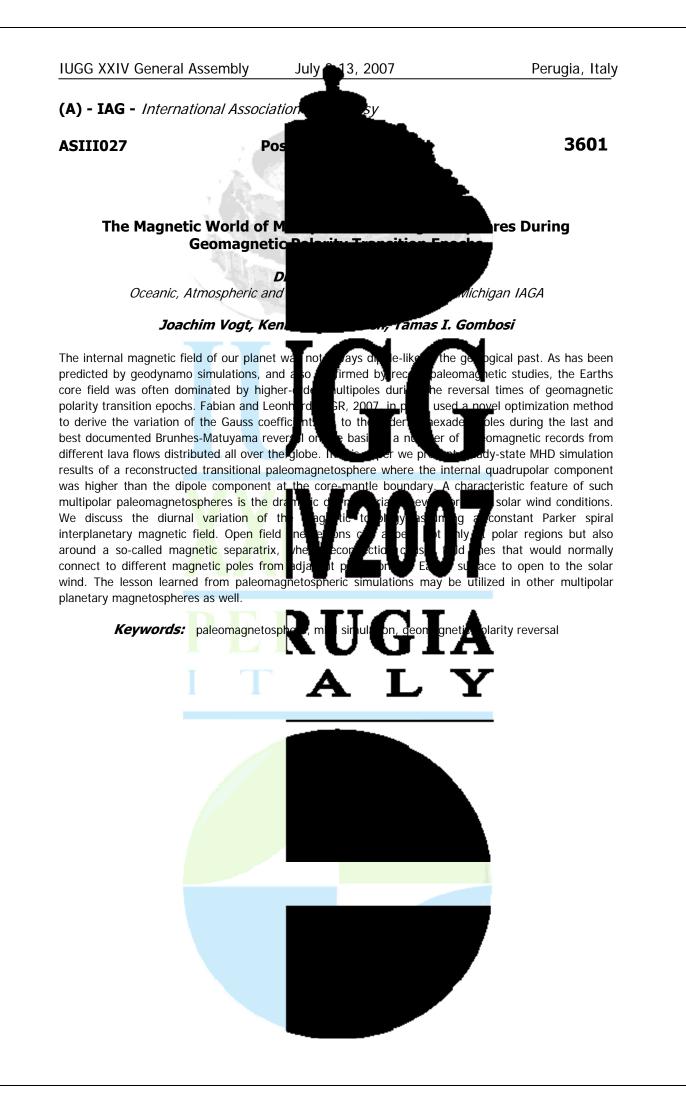
Keywords: saturn, magnetosphere, simulation

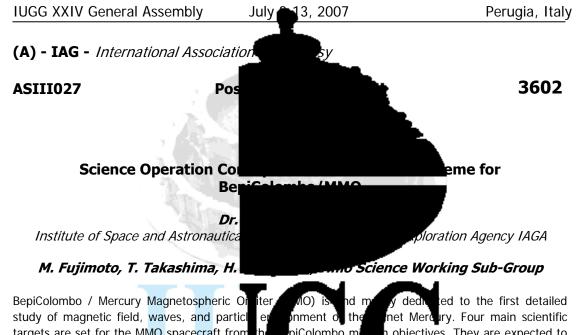












targets are set for the MMO spacecraft from significantly advance comparative studies planets: 1) Structure and origin of Mercu processes in Mercurys magnetosphere, 3) S The inner solar system. The MMO payload select

instrument packages, wide-range observational capabilities for charged particles and energetic neutral atoms, magnetic field, electric field / plasma\_waves\_/ radio waves, dust, and exospheric constituents. MGF (Magnetic Field Investigation) for ma Particle Experiment) for plasma and neutr Investigation) for electric field, plasma way by large consortia of world-leading scien Those payload packages will perform in-site me of Mercury and its solar wind environment. MSASI (Mercury Sodium Atmosphere Spectral Imager), an

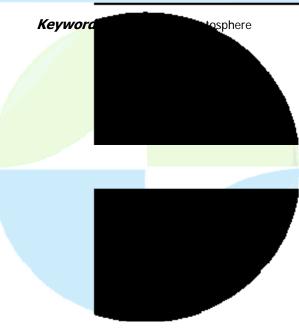
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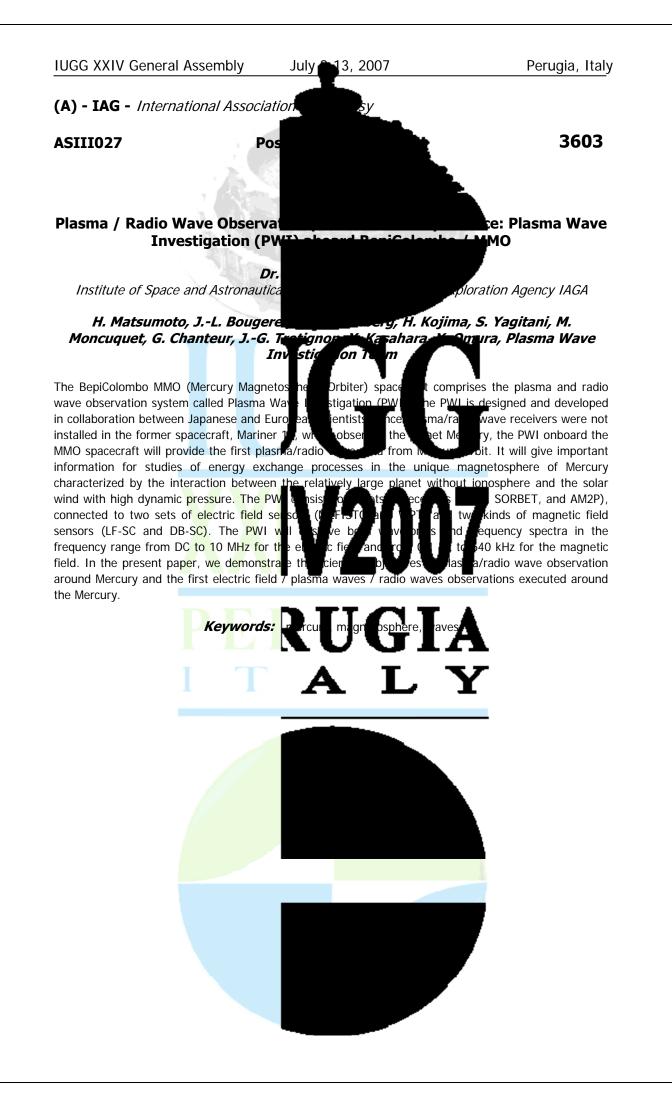
h objectives. They are expected to nd magnetospheres of terrestrial dynamics, and physical tructu in of curys exosphere, and 4) sts of 5 instruments /

> IPPE (Mercury Plasma and PWI (Plasma Wave nts uments will be provided pe and other countries. ds in the magnetosphere

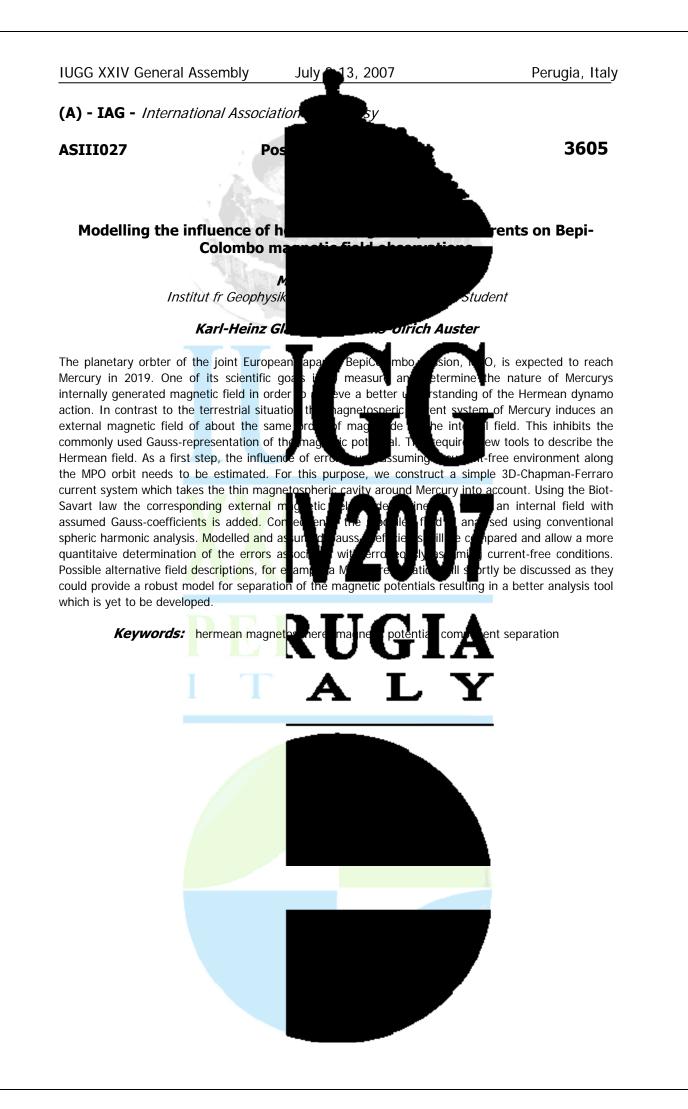
imaging system is also included for the study of the sodium exosphere. MDM (Mercury Dust Monitor) covers the dust information around Mercupare under unified and coordinated controls (Mission Data Processor) provided by JAXA ord ulfi talk, this science operation concept based on the MDP scheme is presented. It is based on the conceptual, scientific, and technological studies in IAXA and N IO colleague in the MMO Science Operation Working Group, which is a par (MMO-SWG).



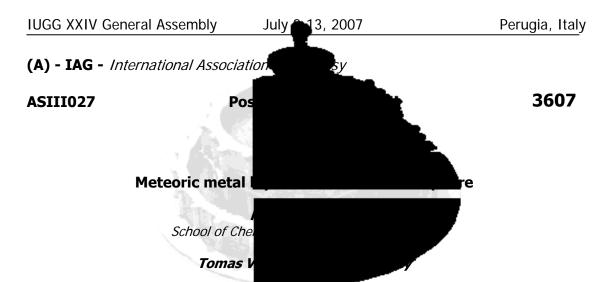
Those scientific payload groups de a time resolution by MDP ob ecti s of this mission. In this Including the discussions 🖬 e MMO 🕹 ence Sub Working Group











The ablation of interplanetary dust particles metallic atoms and ions between 80 and occurs around 90 km, a similar altitude to t Mg that ablate in the Mars atmosphere? Rad Science, 2005) show that there is a sporad attributed to a layer of metallic ions (Fe+ ar metal layers. In this paper, the features thermosphere of Mars are predicted by adapting

ontering arths atmo 60 I brak The s. What app tation observ layer of ions How la an

gives rise to the layers of f the Mars atmosphere regio to the metals such as Na, Fe and s from Mars Express (Ptzold et al., wee<u>n 70 an</u>d 110 km, which was ervations of the neutral pper mesosphere/lower terrestrial atmosphere.

These models contain: a meteoric ablation code with a detailed treatment of sputtering, the

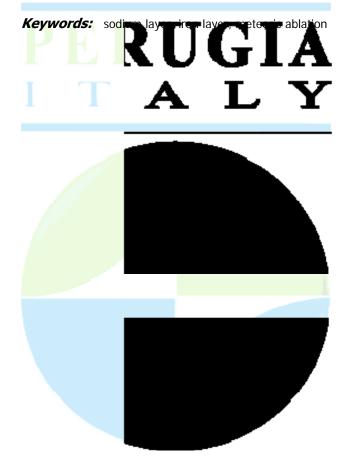
are no

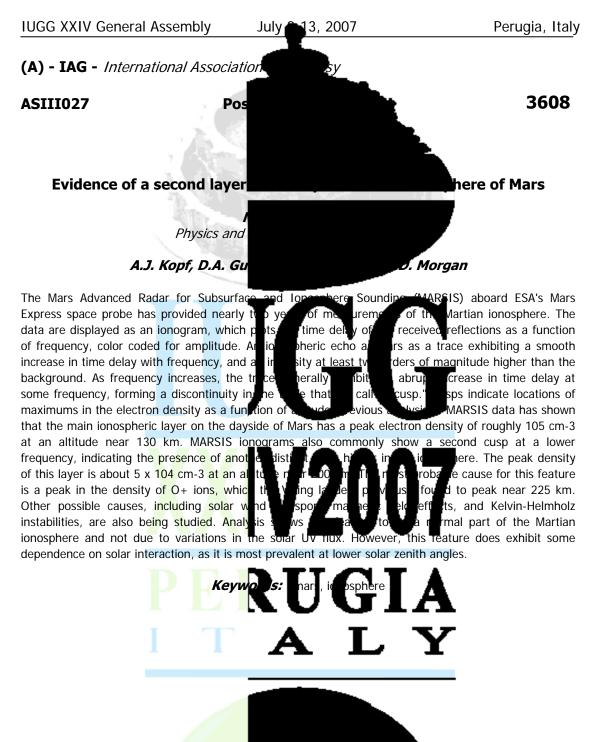
in th

phase neutral and ion-molecule chemistr pertinent elementary reactions, adapted f found to be much broader on Mars, althout In particular, the Na layer appears to be between 50 and 100 km. Such observation aerobraking region.

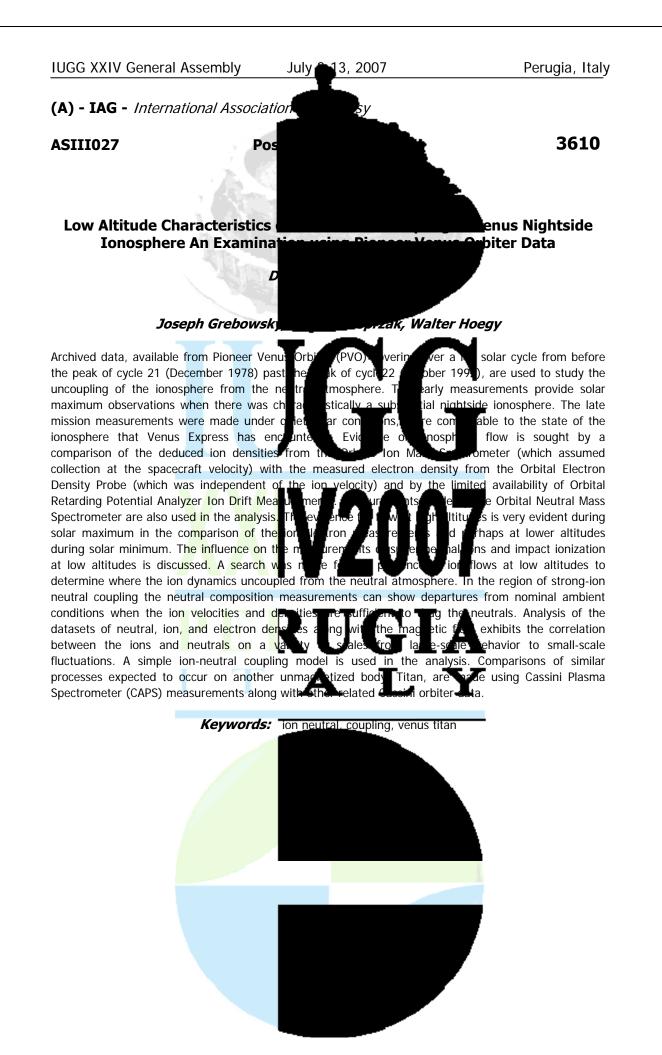
thermodynamics of high-temperature melts, evaporation kinetics and impact ionization; and the gas-

ratory studies of the atomic Na and Fe are to the terrestrial layers. urbulence in the region ecraft entering the Mars







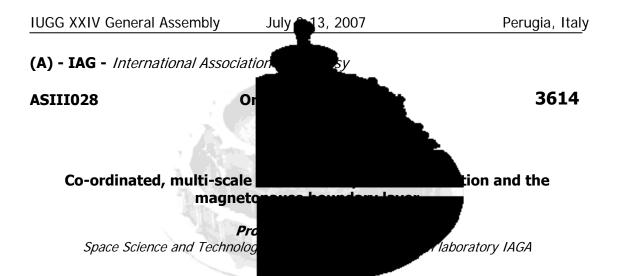






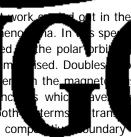






The present review will summarise the require structure, dynamics, behaviour and related by the four spacecraft measurements provi with the two Doublestar spacecraft will be evolution by providing measurements elsew on coordinated CLUSTER-Double Star conj signatures observed at different locations ropes during intermittant reconnection, and comp

magnetopause transitions, and on the flanks. Comparison can be made between a number of related techniques for combining the 4-spacecraft information to uniquely determine morphology. This provides the context for comparative DSP measure the equatorial magnatopause and LLBL (T in the structure and dynamics of the mag Selected topics include: the issue of whe reconnection by tracking FTE occurrence



f the magnetopause: its pics resolved specifically repor Cluster spacecraft in coordination rovides direct confirmation of FTE se.The review will therefore focus estigat econnection associated FTE rising from opened flux atures during cusp and

Helmoltz waves on the

ude cusp (TC-2) or at to quantify differences the spacecraft locations. ging dominates dayside

of Keivi

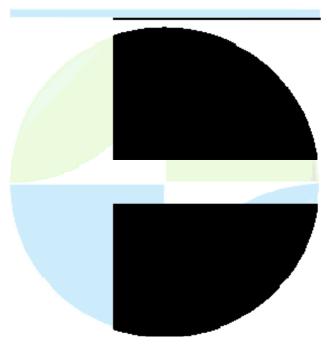
whether dayside x-line and formation is predominantly located near the sub-solar point and its (local time) extent; properties near the diffusion region during a series of direct reconnection events (for northward IMF and strong By); the high atitude and cusp regions; composition of the electron BL and its exten th rocesses governing the lolo

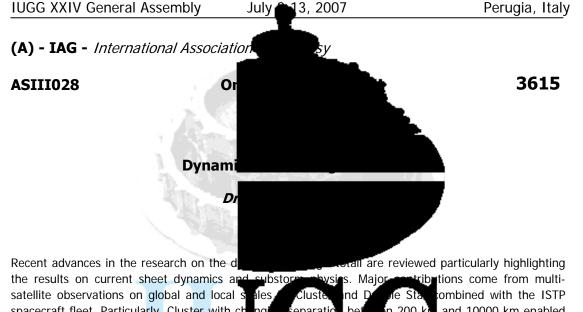
the solar wind control of cusp and MP formation of the cold dense plasma sheet flanks and EMIC and mirror waves in the upstream magnetosheath adjacent to the cusp and MP.

Keywords: magne

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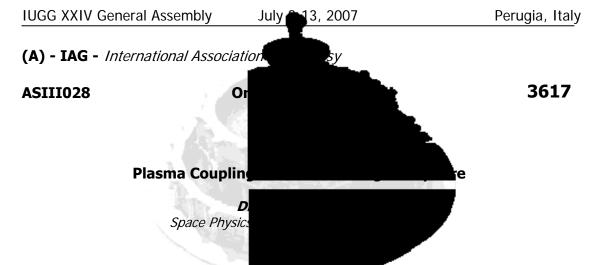


spacecraft fleet. Particularly, Cluster with ch na to study processes at different scales cov methods for analyzing multi-point measur observations. Large scale multipoint observa ground-based observations and global ima es magnetotail responses to the enhanced splar win stimulate new simulation studies and theoretical studies on local as well as global magnetail processes.

separation be n 200 ki and 10000 km enabled article physic MHD-scale processes. Advanced loped and applied to these new have been ong th ction d e tail combined with the dial vided to t substorm dynamics and in observations allowed to ese n







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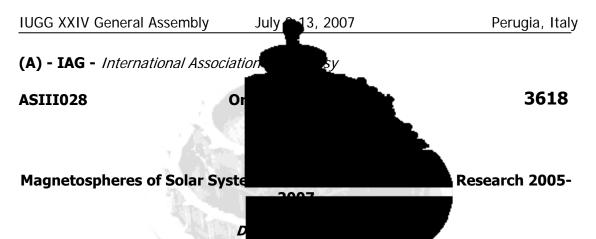
bleward motio

In this review, I present an overview magnetospheric plasmas are coupled to the Earth's have been investigated via various measurement very low frequency (VLF) wave sounding, ir sity Global Positioning System (GPS) radio si outward motion of plasmaspheric plumes support the idea that the dynamics of t plasmaspheric plumes at the magnetopause idea that some plasmaspheric material may magnetotail. The importance of these details of the global system's behavior are critical for fully understanding the inner magnetosphere. The formation and evolution of the ring current and radiation belts are closely tied to the presence of col plasmaspheric erosion, including enhance causing range errors for users on the g coupling, so that to study any one part o th the system as a whole.

ars of research concerning how inner asphere. Th arrics of the plasmasphere w-frequency (ULF) and g ultr total electron content (TEC) from spatial and temporal) between f ionospheric TEC enhancements timate onnected. The fate of terest d evidence supports the e polar cap, into the passa

> ther effects arise from uption of GPS signals, o a strong inter-region equires consideration of

Keywords: plasmasphere, ionosphere, coupling



Planetary Department Max-P

forschung IAGA

Magnetospheres are huge and unique entitie laboratories to study various physical pheno auroral processes, plasma wave emissio magnetotail dynamics, substorm-like proces used as a baseline for the processes obse intrinsic magnetospheres and induced mag years especially Cassini/Huygens to Saturn, flyby of the New Horizon spacecraft on its way

dramatically. Results of missions to Mars (Mars Express.) and to Venus (Venus Express) are also guite numerous and gave as a new picture of exospheres/atmospheres. In addition new have been developed which serve as a too future missions, i.e. to Mercury or furthe science highlights in planetary magnetosp Toulouse 2005.

n our em. Th hen ticle th as /dust in erad e best studie compare eres ( analy combir

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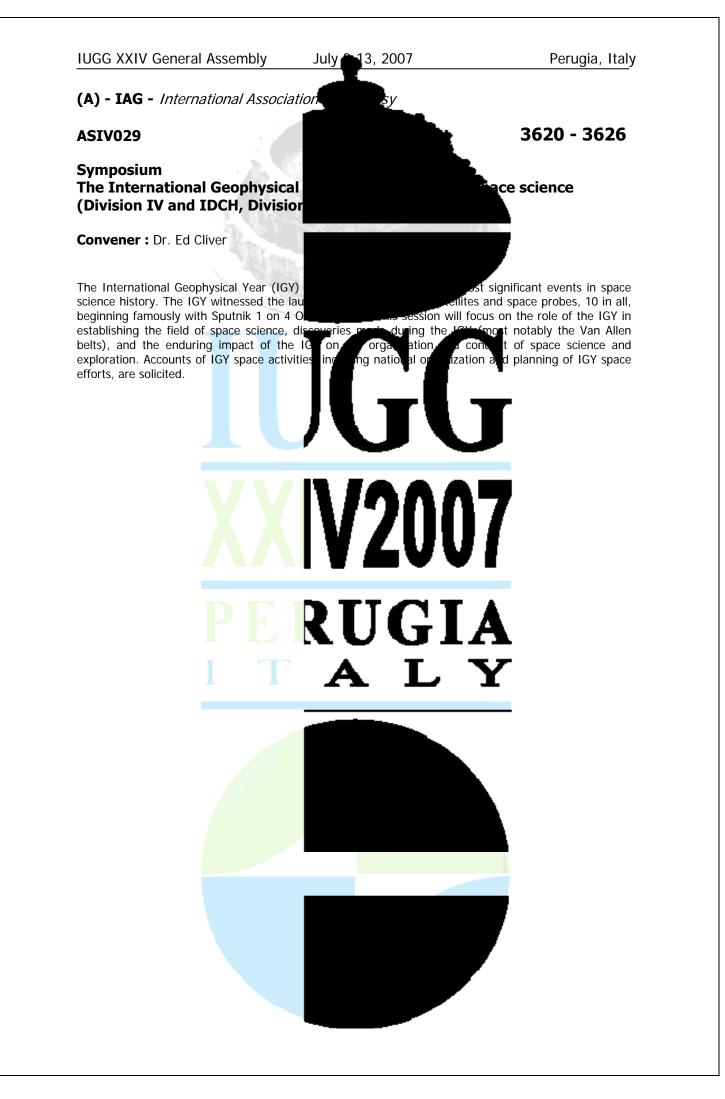
Earth-orbit based observations enhanced our knowledge about outer planets magnetospheres

e unprecedented plasma celeration mechanisms, isport with hagnetospheric plasma, agnetosphere is that of the Earth ose found in all the other known and n). During the last two to J er as well as the Jupiter new ground-based and

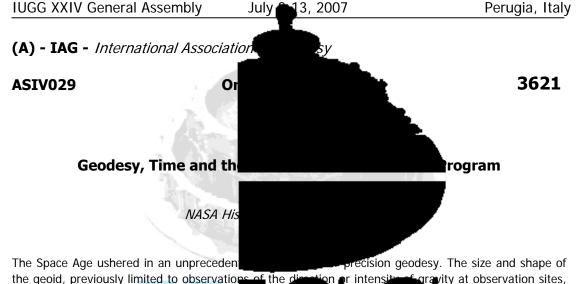
> en the planet and its hetary magnetospheres a sets as well as to plan paper summarizes the IUGG/IAGA meeting in

Keywords: magne anets





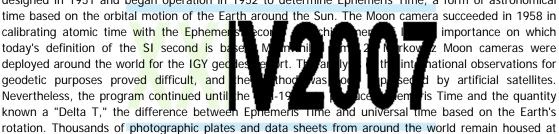




could now be supplemented by the dete artificial satellites. Such a program was und its Moonwatch program combined with the "geometric method" to determine geocentri the Latitude and Longitude Committee of Observatory implemented a program using time and geodetic data. What became ki

designed in 1951 and began operation in 1952 to determine Ephemeris Time, a form of astronomical time based on the orbital motion of the Earth around the Sun. The Moon camera succeeded in 1958 in calibrating atomic time with the Ephemer today's definition of the SI second is ba deployed around the world for the IGY ged geodetic purposes proved difficult, and Nevertheless, the program continued until known a "Delta T," the difference between Ephemeris Time and universal time based on the Earth's

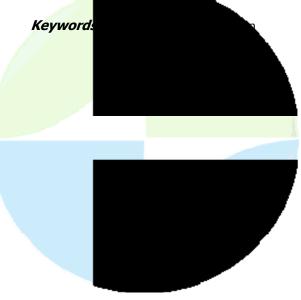
etion or intensi hina of g entri by he Silliths rta r-Nunn came nates by obs astro te Mo du am lown as

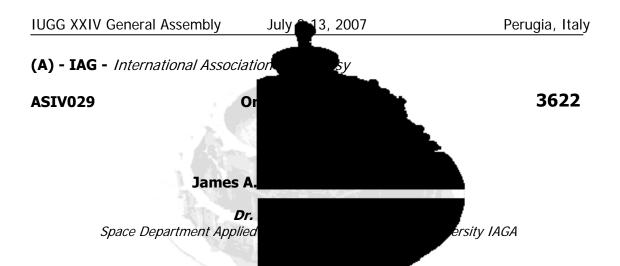


s from observations of ordin n Astrophysical Observatory, with There was, however, a second g th<u>e Moon</u> itself. As Chairman of am M witz of the U.S. Naval to provide more precise inten ra" had originally been

> importance on which z Moon cameras were hational observations for by artificial satellites. is Time and the quantity

the U.S. Naval Observatory. This paper for shormonings of the Markowitz Moon camera program, but also places this ntext of e his of the determination of time and polar motion (particularly the Intel elations of these efforts tior itu Sē lice) and шe to NASA and the space program. The challenges of this early program makes an interesting contrast to the Smithsonian's better-known Moonwatch/Bale--Nunn pro early role in geodesy with the launch of geodese shallites like ram, and signights NASA's important Aprila 1B (1922), LAGEOS (1976, 1992) and others. NASA remained very much involved in geodesy with its programs in Satellite Laser Ranging (SLR) and Very Long Baseline Interferometry (VLB), as well as its use of data from the DoD's Global Positioning System (GPS).





The idea for establishing a program for an organized by James and Abigail Van Allen at their hom Allen was still leading the High Altitude Rese Johns Hopkins University, where they had it to study cosmic radiation with altitude, amo the visiting Sydney Chapman to meet scient Lloyd V. Berkner, J. Wally Joyce, S. Fred conversation ranged principally on the ion Berkner suggested to Sydney Chapman that it mig

(the first and second IPY were organized in 1882-83 and 1932-33, respectively). By the end of the evening, the group, with Chapman, Berkner, and Joyce taking the lead, had mapped out a strategy for proceeding with the endeavor. Van Allen v enabler and participant during the ensuind Van Allen group throughout this period w They pioneered rocket flights from balloor innovative spirit that later helped the low contributions to todays space science.

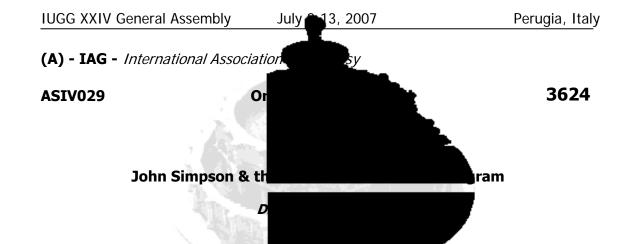
Keyword

mysical Year (IGY) germinated at a dinner Silver Spring irch. App úp at nted several ltrı er things. The ha he Washingto and lar eoma tism he time

land, on April 5, 1950. Van aboratory (APL) of The Phys ockets in the preceding few years pose of the dinner was to enable ea with similar interests, including estine llowing the dinner, the rays, whereupon Lloyd d cos International Polar Year

> IGY and a determined nd contributions of the heir early observations. d the inventiveness and era and make seminal





John A. Simpsons Neutron Monitor Prog Geophysical Year (IGY). Studies of energetic cosmic flights in 1911-1913 where Hess noted the balloon clearly this radiation came from ab ionization chambers and emulsions. Thes component of air showers initiated by co energies (≥ 10,000 MeV). Simpson was ho energy (≥ 500 MeV) nucleonic component monitor design on work which he had done on

Chicago during WWII. His neutron monitor design, originally called a neutron "pile" and later to become the IGY-NM, used BF3 gas surrounded by moderating lead to detect secondary neutrons resulting from atmospheric interactions of the primary observations of the cosmic radiation increa His observations showed detailed time vari origin. His work, and that of other in the the majority of the cosmic ray physicists. I formulation of investigations in the IGY. According to Jonn Simpson it was the meetings during the 3rd

great successes of the International diation date the ation of of tial studies of ods responde diation, and build ent wh hst ic ray uce ion ď

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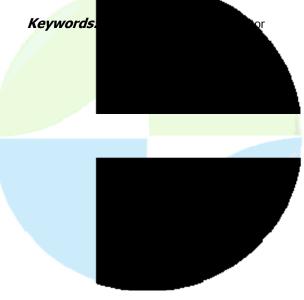
ictor Hess famous balloon s he rose higher in his fease mic radiation used electroscopes, hainly to the mesonic (or hard) had response at relatively high responded to the lower He based his neutron hile at the University of

> itron monitor design, ver the older methods. as clearly of geophysical t first largely ignored by cluded in the preliminary

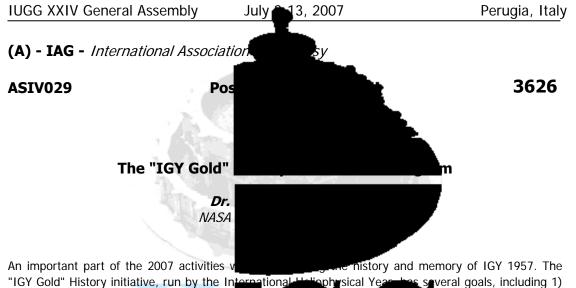
ICRC which were the beginning of the significant influence which cosmic ray research would have on the IGY. In 1953, at Gregor Wentzels invit a group of about 20 interested scientists at the 3rd International Cosmic Re Badher de-B rre, France in discussing C the interest in these the geophysical aspects of cosmic ray obse atio е 3га п geophysical observations had grown to more than 50 people, and was so great that their inclusion in the IGY program was virtually guaranteed. The was parti Monitor design in association with the standard rate of cosm housing Simpsons Neutron Ilar interes. ray recordin equipment a key goal of the IGY. His neutron monitor was also simple and inexpensive to produce and operate. With his energetic input the IGY Neutron Monitor program soon became a world-wide effort and a success for the International Geophysical Year.

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identifying and recognizing planners of and partic photographs, and all items of historical sig history of geophysics. To achieve the first g IGY (gold symbolizing the 50th anniversary Gold Anniversary" certificate of recognition. collected so far and will discuss plans for timeframe.

first fs in ific for the IGY IGY "Gold Clu l Clu<u>b" indu</u>c sentat will rec tior

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erving memoirs, articles, 2) p d 3) spreading awareness of the dentifies participants from the first are rewarded with a special "IGY ide ex les of historical artifacts vities bughout the 2007-2008





## **IUGG XXIV General Assembly**

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(A) - IAG - International Association

## **ASIV030**

## Symposium New results from solar and hel

Convener : Dr. Mari Paz Miralles Co-Convener : Dr. Jorge Sanchez Aln

Continuous observations of the Sun ob provided detailed information on the solar observations offer a unique capability to in nature of the Sun and the Solar Wind. Th

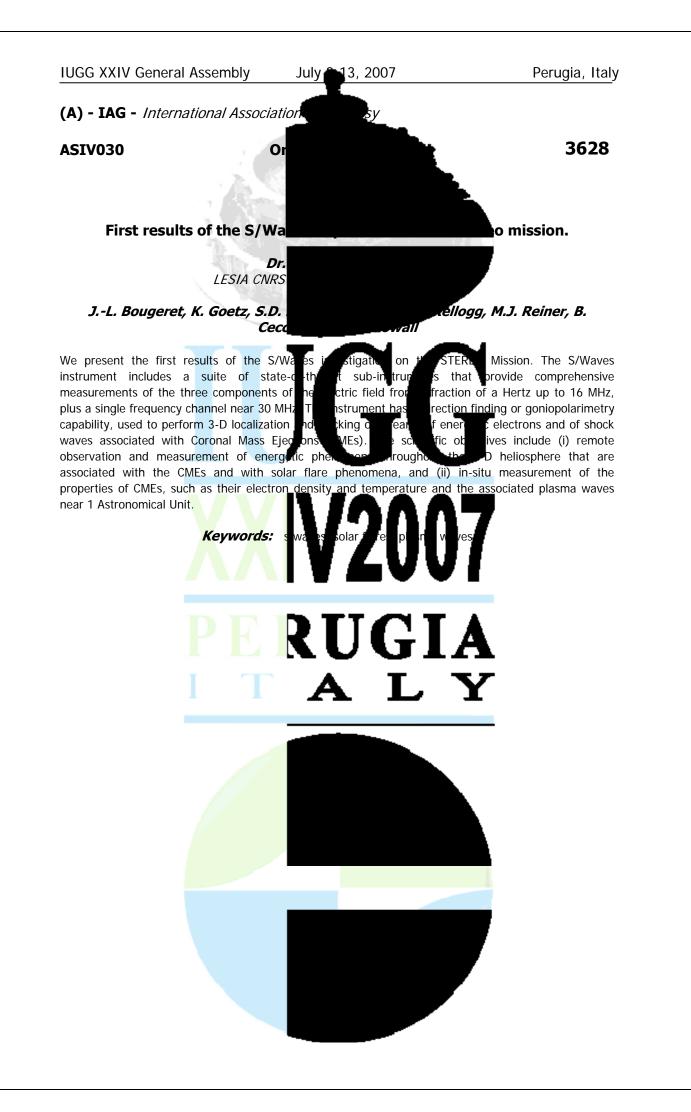
observations from existing missions (e.g., SOHO, TRACE and new missions (e.g., Solar B, STEREO), neor and including its interior, atmosphere and win promoting discussion on the recent develop in the field.

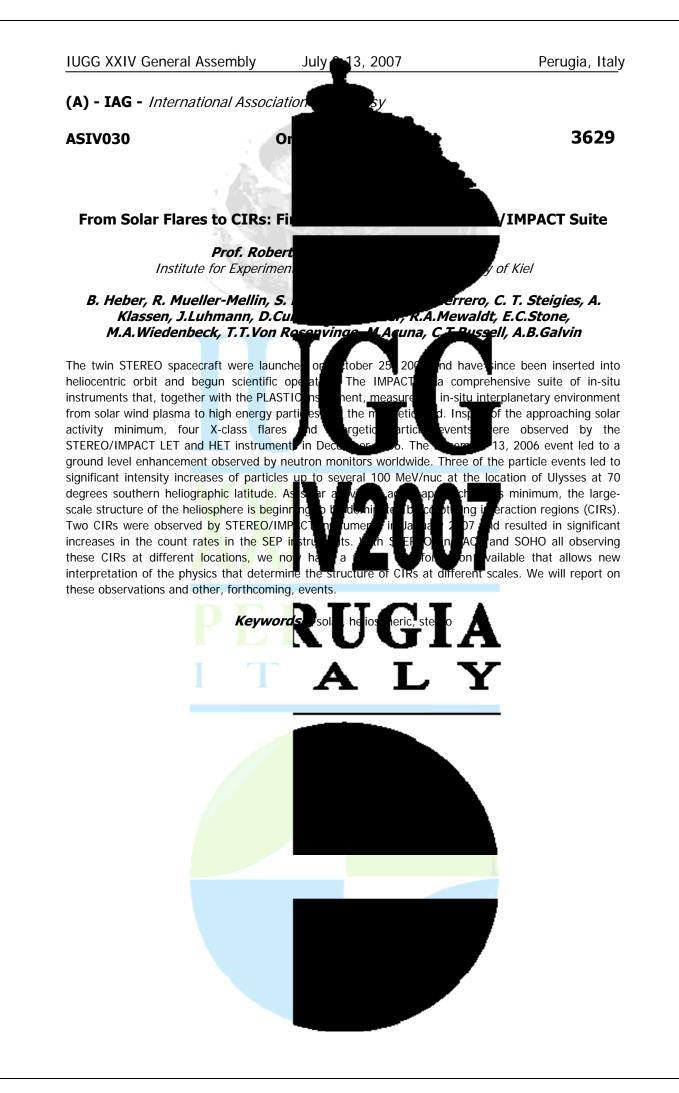
d instrumentation have orona and solar wind. These ses responsible for the dynamic contributions covering new results from RHESSI, Ulysse ACE Wind, Genesis, Cassini) ent aspects of the Sun, eling ie o mulating exchange and led at Symposi n is servations and the latest research erived fro h tł

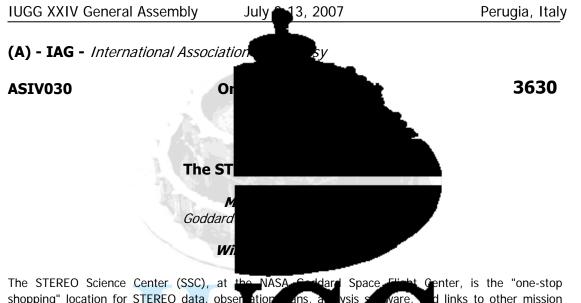
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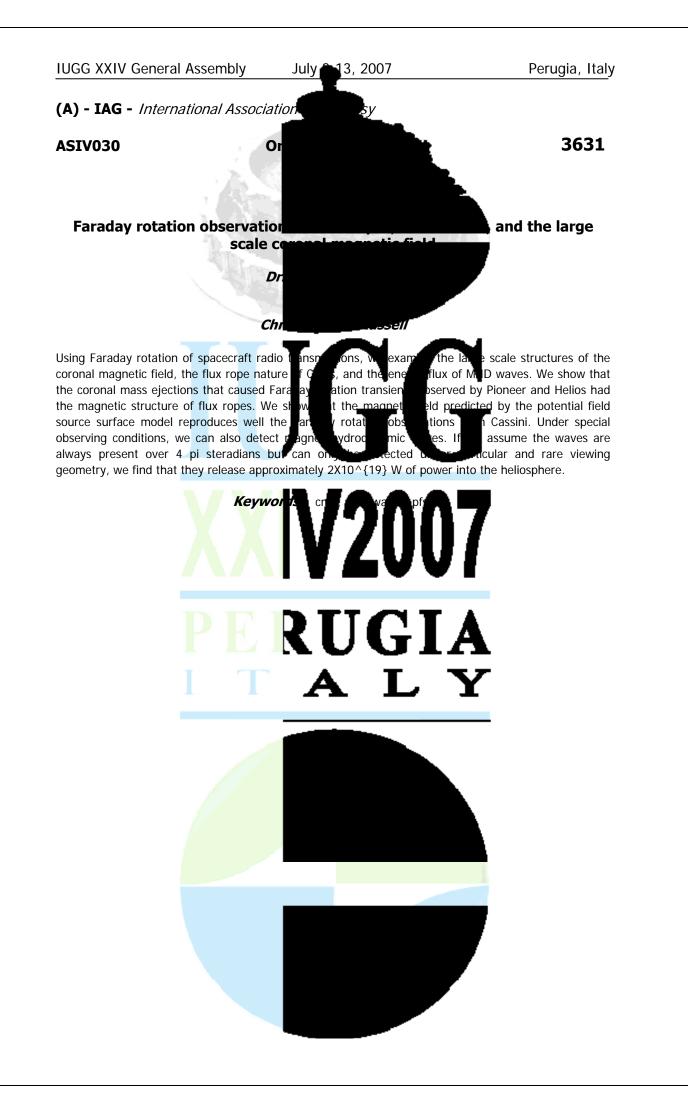
m

shopping" location for STEREO data, observation resources. Along with the other data products relayed through an array of antenna partn and will soon also provide near-real-time Software library, the SSC also acts as a integrated with the Virtual Solar Observator to the SSC will be given and examples of the variou

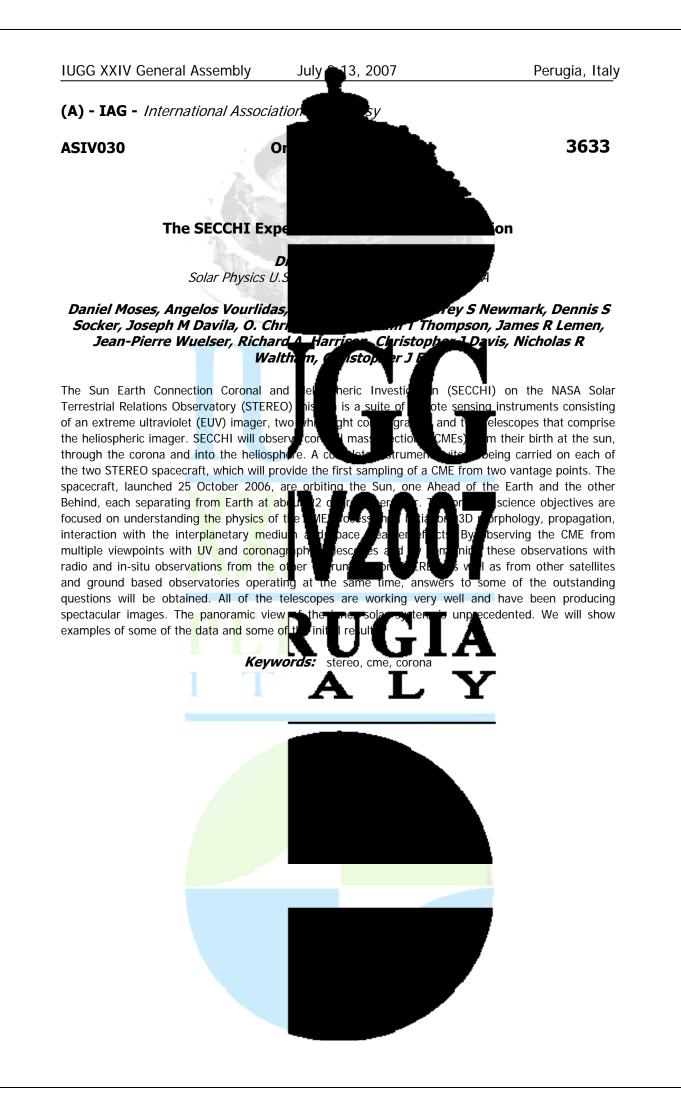
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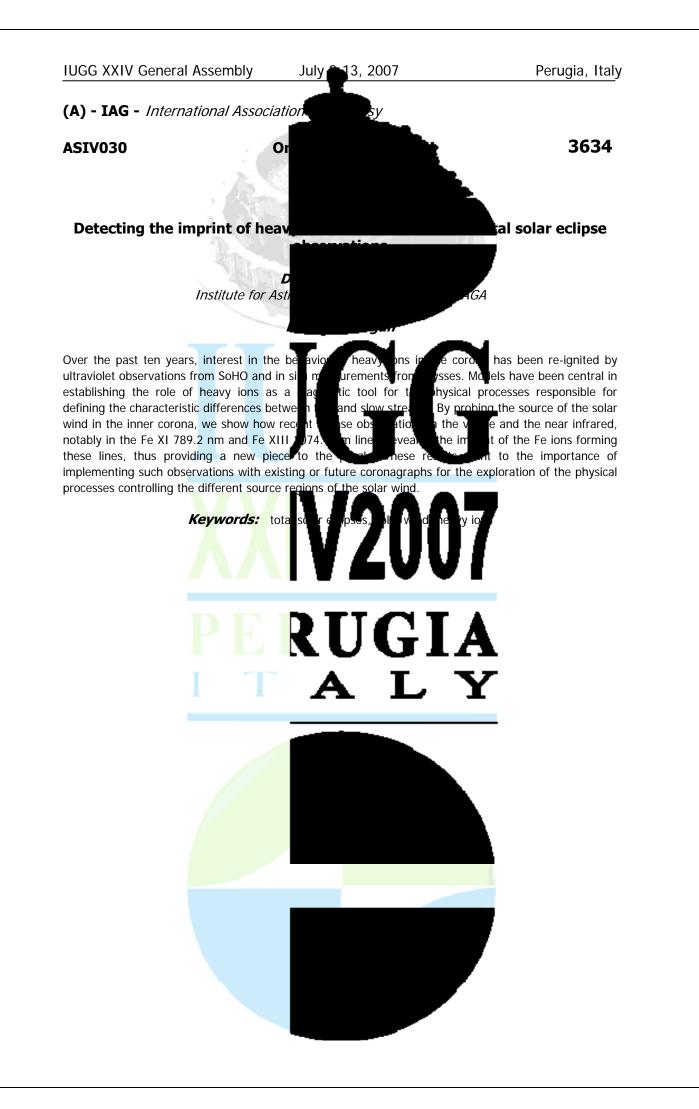
d links to other mission ather Beacon" telemetry stream, , provides near-real-time images, hrough interaction with the Solar coord on. The SSC is closely ssible users. Details on access he SSC will be shown.



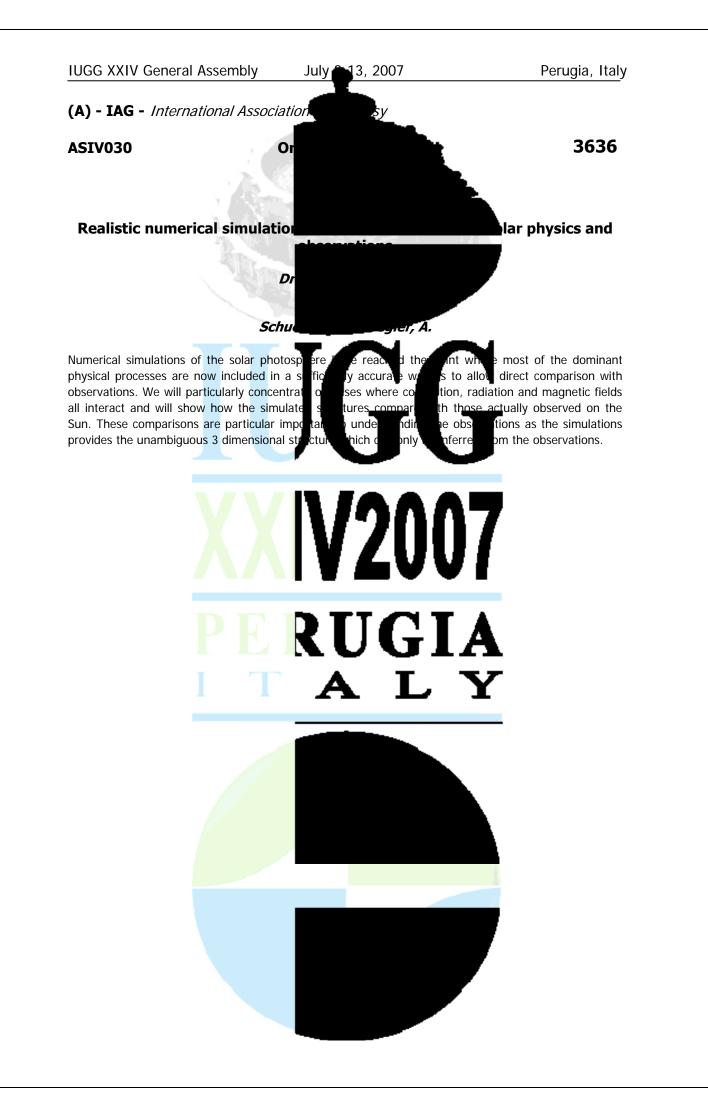


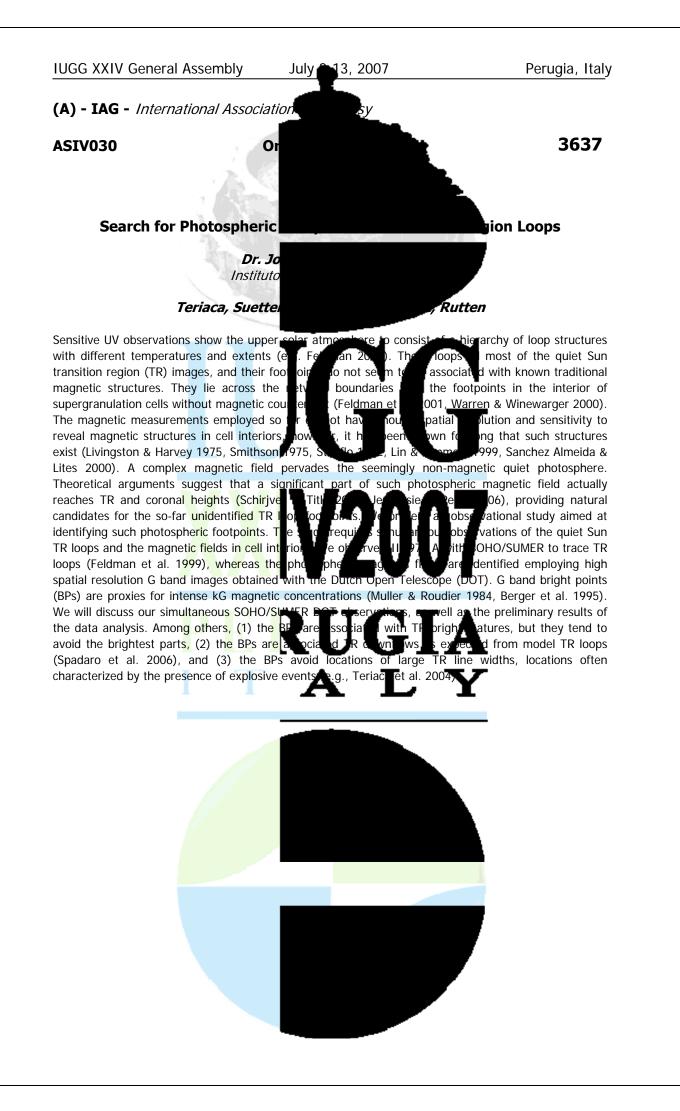


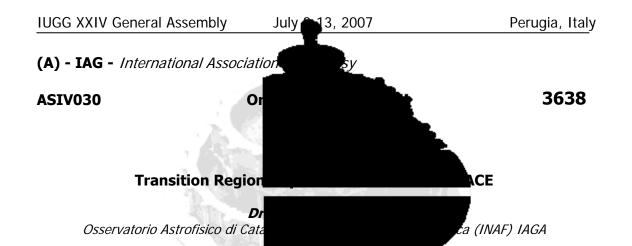












The most recent space missions devoted to the Sun have provided a very detailed picture of the

MK range. These observations have demonstrat components of the quiet transition region IN change considerably within a period of about Therefore, the emerging picture is that of a composed of interacting, continuously evol frequent, with lifetimes of the order of 1-2 r energetics and dynamics of magnetic loop struct

particular of the temporal ad spatial character of the associated plasma heating, a key ingredient in the determination of the physical properties of the solar atmosphere plasma. Time-dependent heating is suggested by the transient nature of the explanation for the observed line shifts, chromospheric evaporation and coronal co contributions given by the coronal instru ne investigation of the physical properties of the ofthis region has been updated on the basis of t

observations of the outer atmosphere of a atructures (hat ` scale over, the ma minutes, in so dynamic upp gnetic ures. All thi ted a st transi

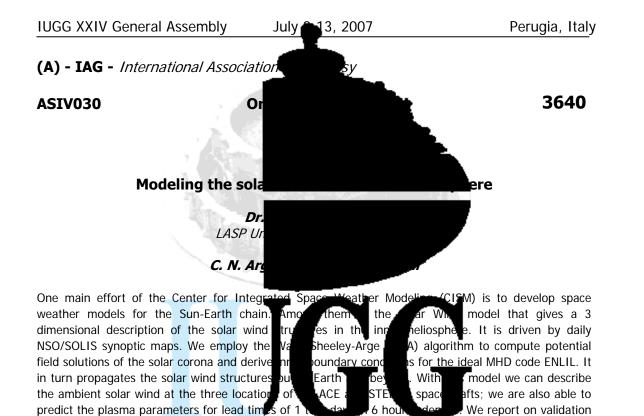
tructures are the basic ignet of the small-scale structures cases reappering every few hours. nromosphere and transition region visalong these loops are ter understanding of the and low corona, and in

mperatures in the 0.2 - 0.8

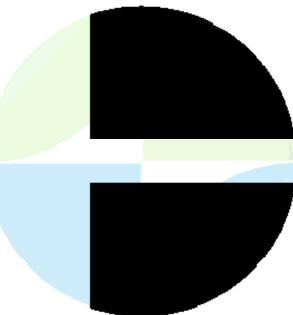
presents an attractive ic phenomena through k is to review the main RACE spacecraft to the illustratehow thepicture



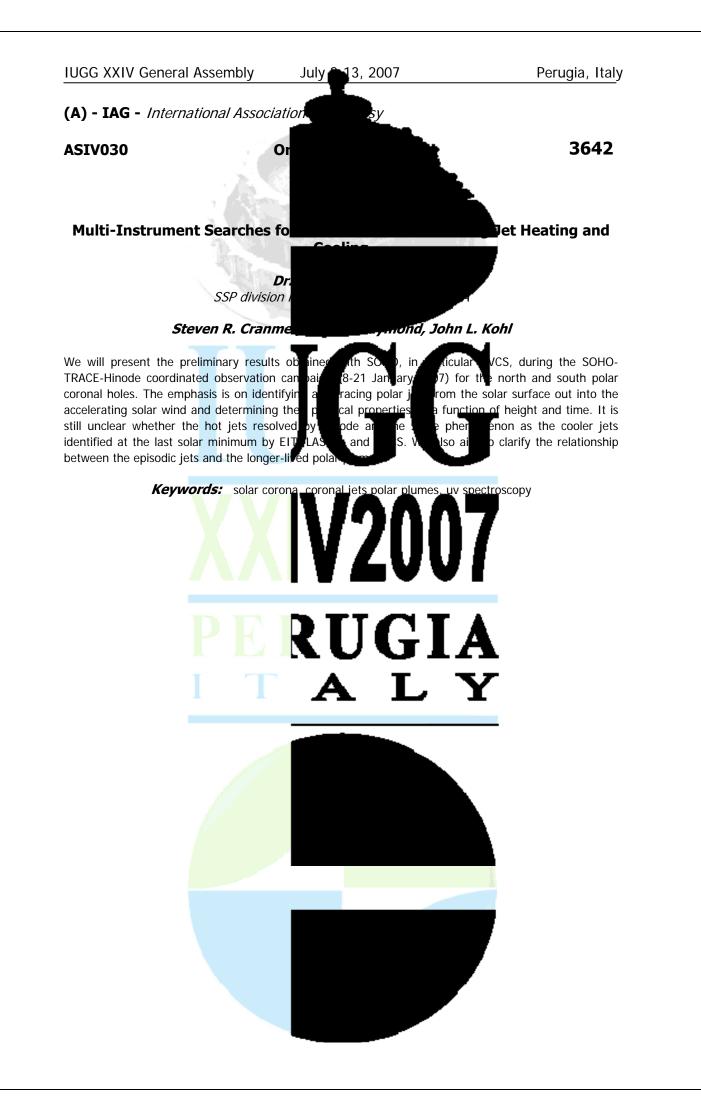


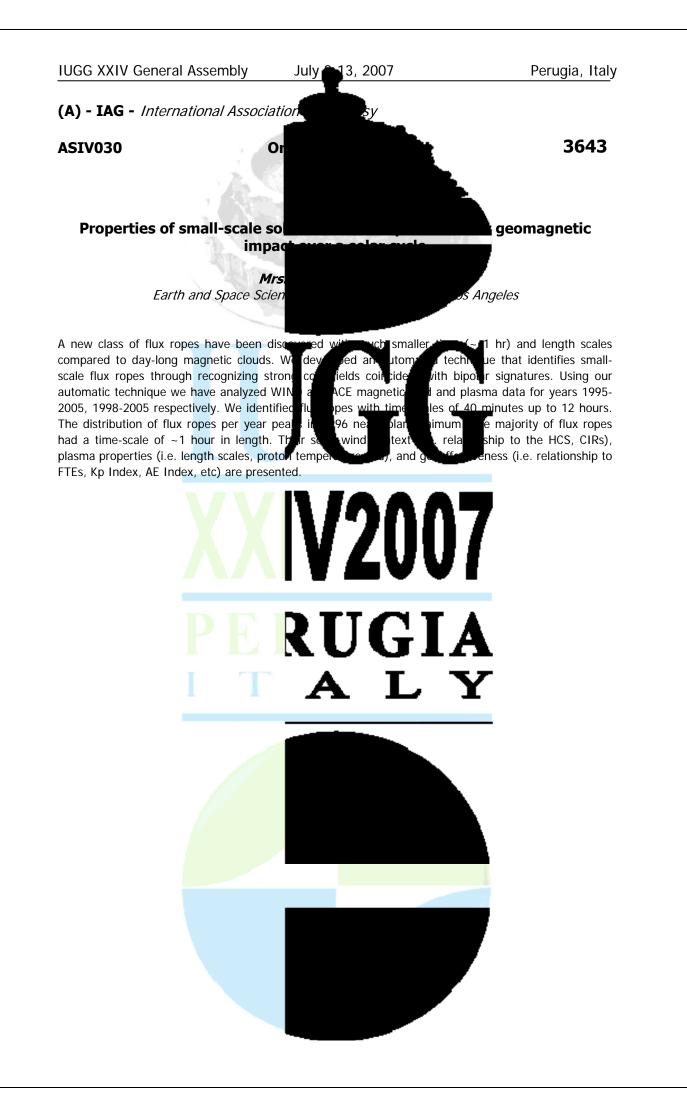


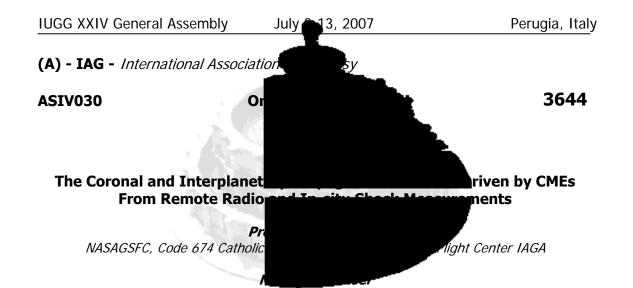
efforts and prediction performance.











The kinematics of CMEs are well characterized to space-based and ground-based coronagraph decelerate as they propagate through the CMEs is not well quantified or understood shocks as well as the measured shock sp characterize the interplanetary propagation emissions. The statistical analysis of these data ha

fast CMEs decelerate. Our results show that while there are wide variations in the kinematics for the individual CME events, there are some notable statistical correlations between the parameters that characterize the deceleration of these CME between the initial CME speed and the initi and the deceleration time. These power a\ weather algorithms that predict the propa lat and white-light STEREO observations will b

ugh it is vell anetary medi ave <u>used re</u> 1 A ed me o ist d new

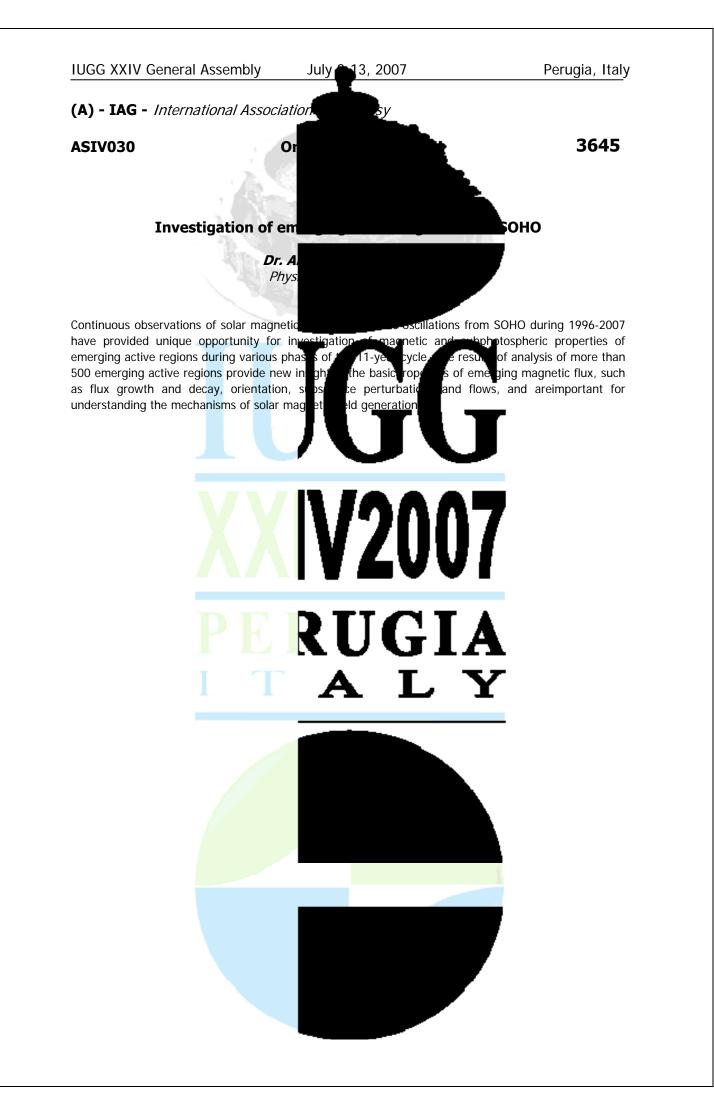
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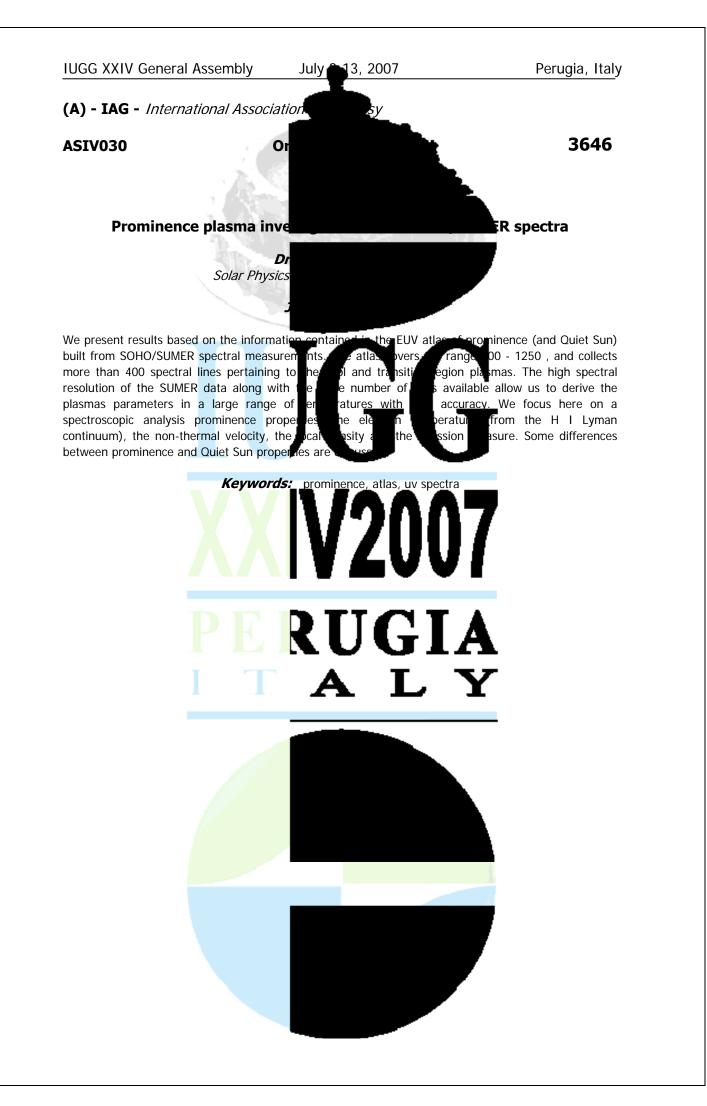
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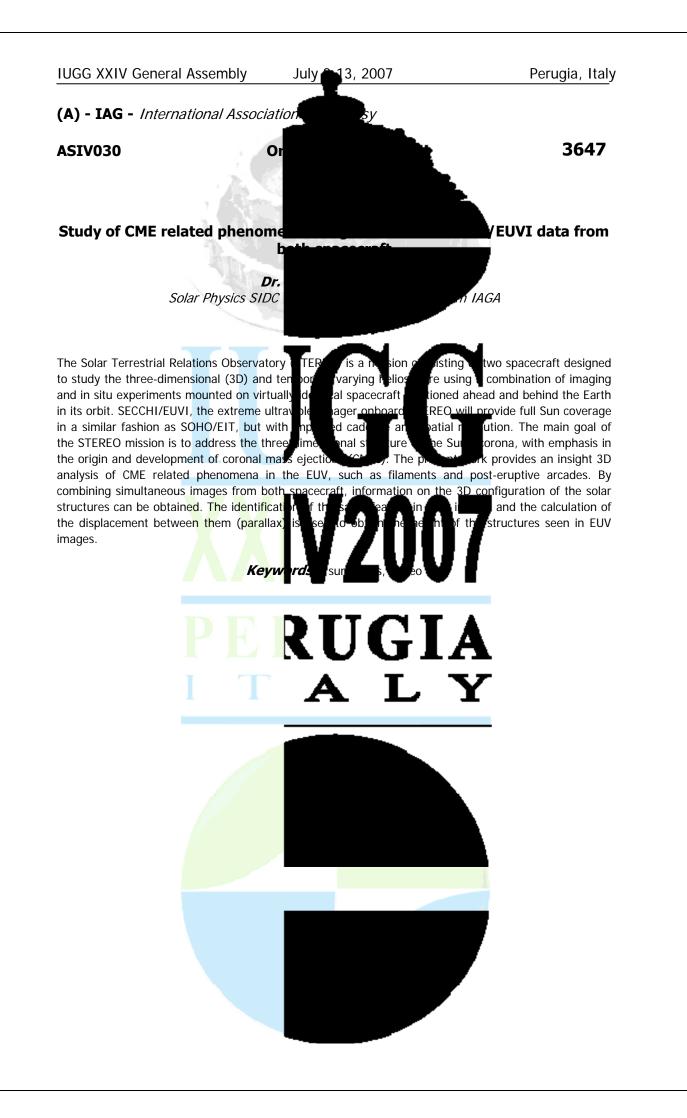
surements from existing me n wn that wast CMEs must generally the interplanetary propagation of radio sensing of the CME-driven from Wind observations, to enerated type II radio s tha o when, where and how

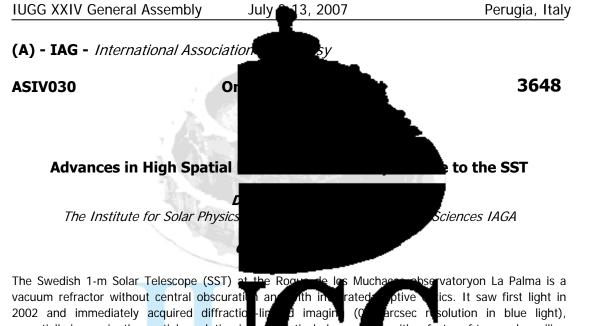
> power-law correlation initial CME deceleration derive improved space he how the remote radio

Keywords: coronal mass ejections, solar radio emissions









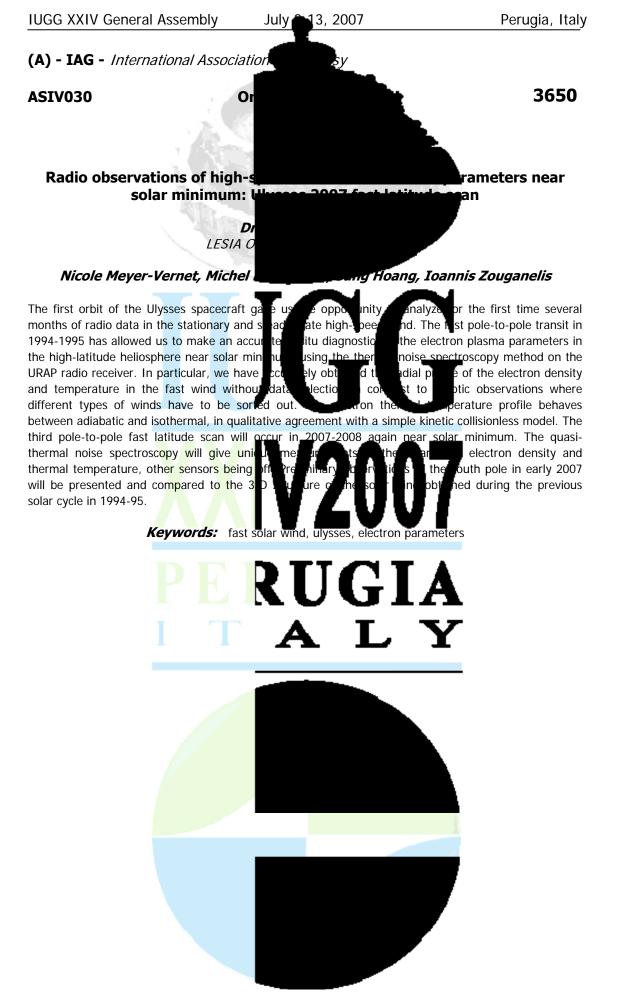
2002 and immediately acquired diffractio -lin essentially increasingthe spatial resolution in so hitherto unknown structures in the solar p bto image-restoration techniqueshave allowed in ag high-resolution polarimetry. We review rejent structure, small-scale magnetic structures outside s

Rocurs de los Muc de imagin (O ptical observa ere.Since the with here ten tults, at cult source are arong

accur observatoryon La Palma is a optive valics. It saw first light in arcsec r solution in blue light), s with a factor of two andunveiling ew instrumentation and improved al cad be (better than 1 s), and concurring sunspot penumbral unic mamics.





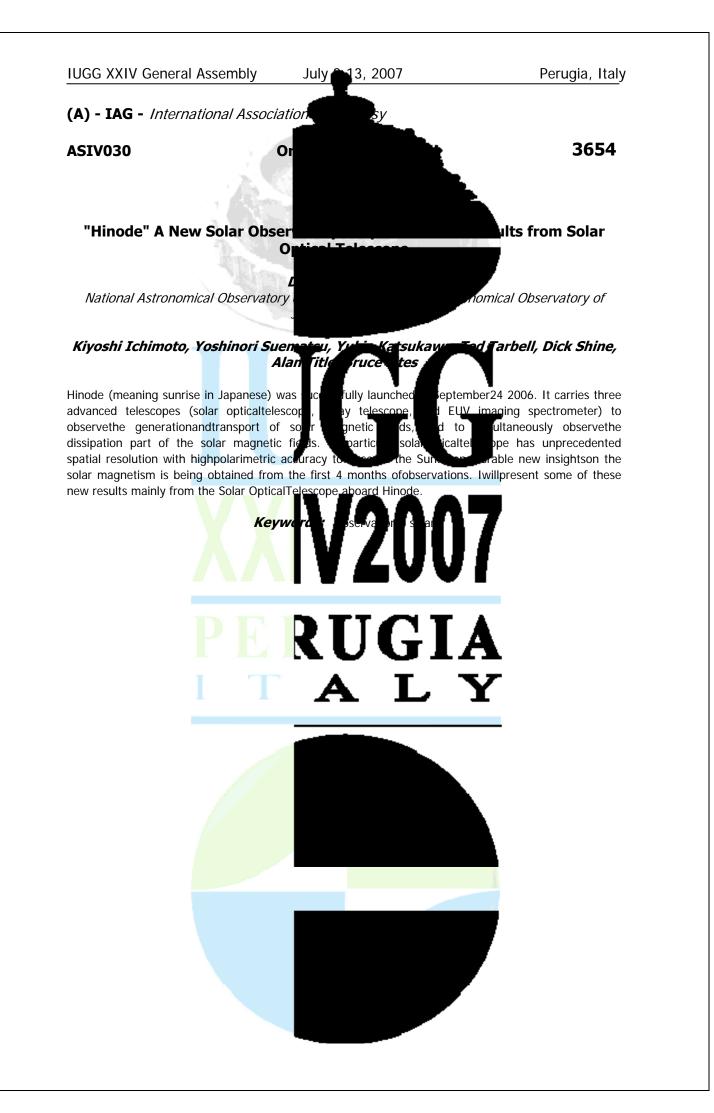


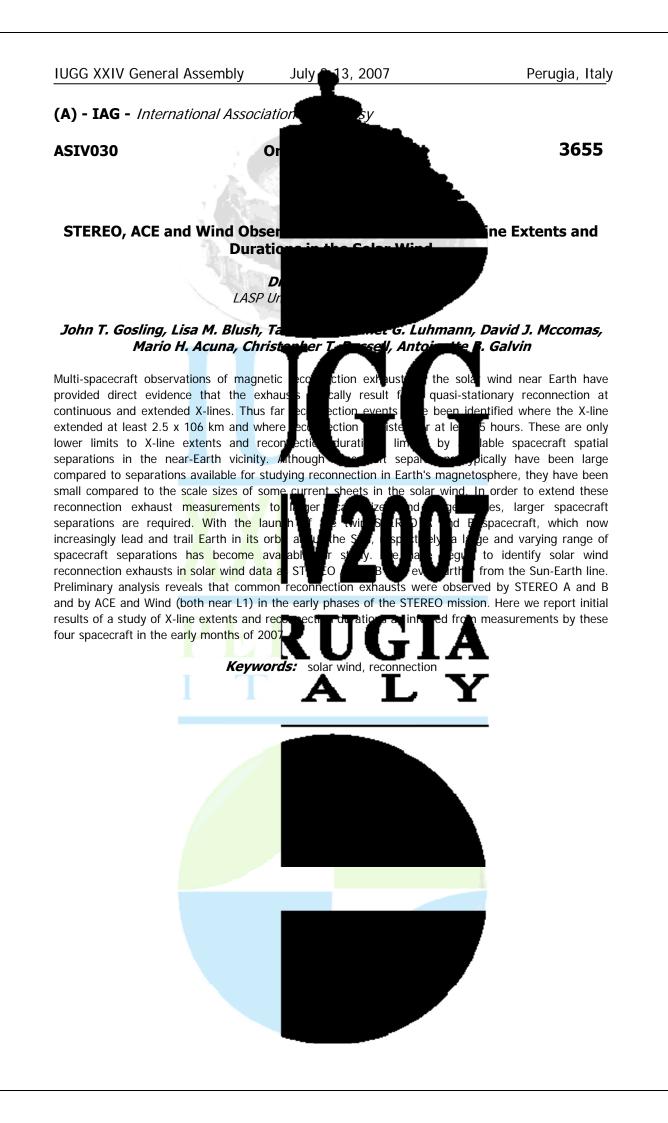
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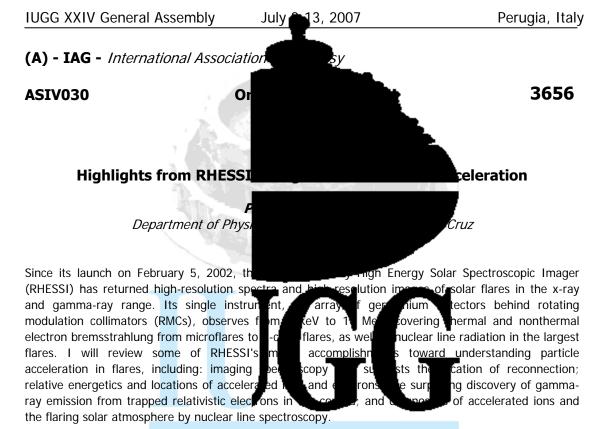




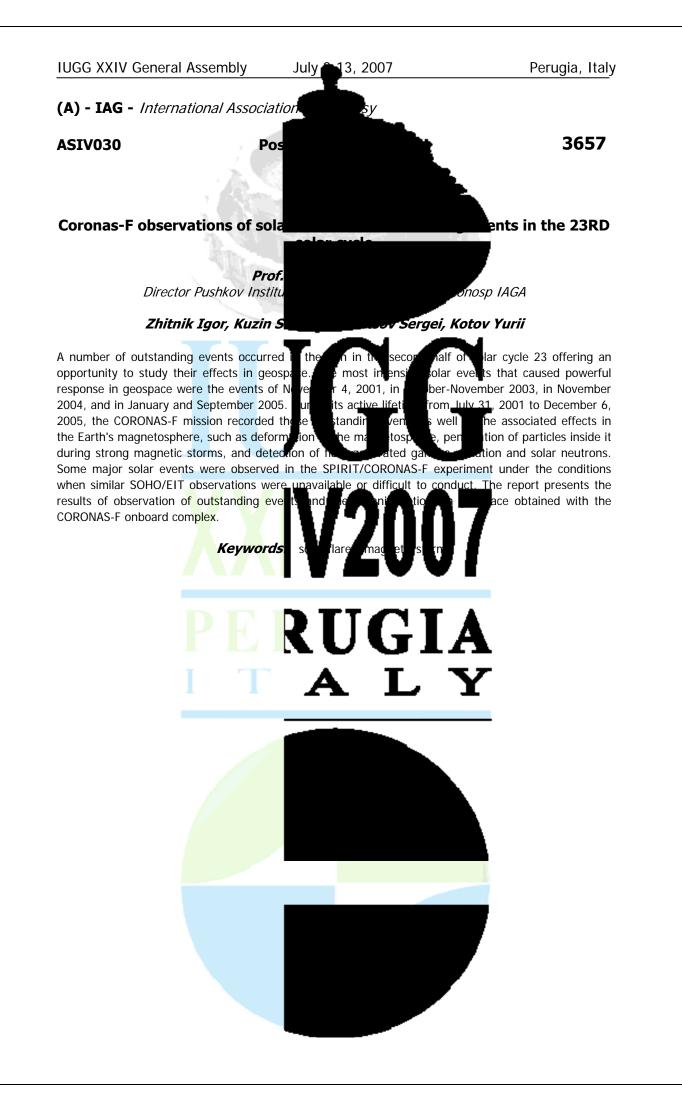




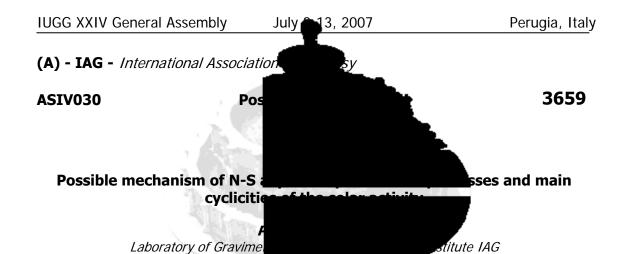












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The mechanism of cyclic inversion changes planets) have been discussed intensively in and forced relative translational displacement of all the core and the mantle - under gravi bodies (Barkin, 2002). We have been descrit and geophysics (Barkin, 2005; Barkin, Shu variations of gravity and geodetic hights; y Discovered phenomena have been obtained effect

observations (Shuanggen et al., 2002; Blewitt et al., 2003; Daillet, 2006 and oth.). In first inversion phenomena (contrast tendencies in variations of processes) are observed with respect to the northern and southern hemispheres. A set of ged dynamical interpretation and the explanat such complex phenomena, as the Mars b hemisphere; the dichotomy structures of phenomena (or asymmetries) are observed in and southern hemispheres; contrast variations in rotation regimes of the N/S hemispheres with the

certain cyclicities, variation of parameters of asymmetry in the time, others asymmetric phenomena (Li et al., 2001; Badalyan et al., 2001). We ben and interpreted from positions of develop nature and play important role in geophy. another's stars (Barkin, 2002). According to the developed model in all mentioned solar processes the gravitational influence of planets and, first of all the Jupiter and Saturn on por-spherical and eccentric shells of the Sun should play the important and convective zone) can play the role of the Earth's core and mantle in considered translational

Sun diameter (Sun shape) and its activity inversion of contraction and expansion of main period of the solar activity is predi mentioned variations also can be observe phenomena have been obtained on the b variations (Sveshnikov, 2003 and oth.). We with a latitude Q is varying on the low dL seconds (ars) and A=0.009 is given in ars

of the Earth (and others connected with the free anism spherical shells of the Earth - first Moon, the Sun and others celestial ersion phenomena in geodynamics annual and semiannual secu and mic activity and others. geodesy and gravimetric

> ha have obtained the al model. In particular hountains mainly in one many similar inversion activity between northern

t thi echanism has universal ies, including Sun and C stia du dun core ad its external shell (the displacements. This mechanism we suggest for explanation of the observed data about variations of orrelations. The phenomenon of cyclic hemispheres of the Sun with the (or long-periodic variation) of of parameters of discussed tudy of the Sun diameter un parallel to its equator B=0.150 is given in arc nt of the time. w is the

ed processes can be understood

frequency corresponding to period in 11.1 years. Other cyclicities of the solar activity also will be observed in variations of hemispheres shapes. Spectral studies of variations of solar activity for last 250 years have allowed to reveal interannual and decade cyclicities (Kaftan, 2004). We shall result here

values of the periods (with errors), the reve years): 51.8+/-0.5 (50.0); 40.9+/-0.3 (40 (22.2); 19.0+/-0.1 (18.2); 17.1+/-0.1 (16. 13.1+/-0.1 (12.5); 11.9+/-0.01 (11.8); 1 9.4+/-0.2 (9.51); 9.2+/-0.1 (9.08); 8.8+/-

ase (values are given in -0.2 (25.0); 21.3+/-0.1 4.3); 13.4+/-0.1 (13.3); 0.5); 10.0+/-0.03 (10.0); 8.1+/-0.1 (7.99); 7.9+/-0.02

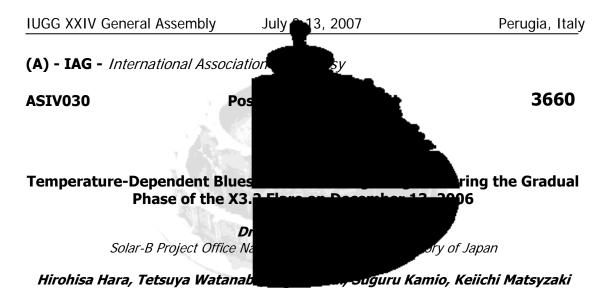
## **IUGG XXIV General Assembly** Perugia, Italy July 13, 2007 (7.69); 7.5+/-0.02 (7.40); 7.1+/-0.01 (7.14)

(5.75); 5.5+/-0.01 (5.55); (5.00); 4.8+/-0 values of the periods calculated on one (n=4,5,6, ...) are presented. According fundamental oscillation of the system "the orbital period of Jupiter Tj and period To 11.1978 yr. References Barkin Yu.V. (2002 and its cyclicity. Izvestia cekzii nauk o Zen M.L. (2002) Variations of the solar radius f V. 28, No 2, pp. 133-139. Li K.J., Yun H.S Astronomical Journal, V. 554, pp. 2115-217

(6.67); 6.4+/-0.02 (6.45); 6.2+/-0.2 (6.24); (4.54). In parentheses the appropriate 199.8 yr under formula Tn=To/n is period there can correspond rycenter of solar system. The variation of solar activity in of planets and satellites 9, M.: VINITI, pp. 45-97. In Russian. Badalyan O.G., Obridko V.N., Sykora J. (2001) Solar Physics, V. 199, p. 421. Sveshnikov isk. Astronomy Letters, on in solar activity. The

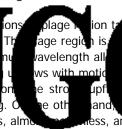
> Keywords: sun si etry, cyclicities /2007 JGI ΙA





We present HINODE/EIS raster scan observation X3.2 flare developed on December 13, 2006 flare arcade. The spectral observations with Doppler shifts in various temperatures. Stror line 284.2 A (logT = 6.3) in the plage reg bn calculated by two component Gaussian fitti (HeII, 256.3 A, logT=4.7), very weak upflows, almost

FeXV, FeXVI, FeXIII, FeXII, FeXI, FeX and FeVIIL velocity and the second-highest line, FeX The upflow velocities of other Fe lines also sound speed, but the dependence of velo speed on temperature. To complement of oł discuss the characteristics of the plasma shift, temperature and line width.



he gradual phase of the ted 200 prcsec eastward from the is to determine velocities from the s plasma are observed in the FeXV are a st 200 km/sec which is tion region temperature the tr Furthermore, we found

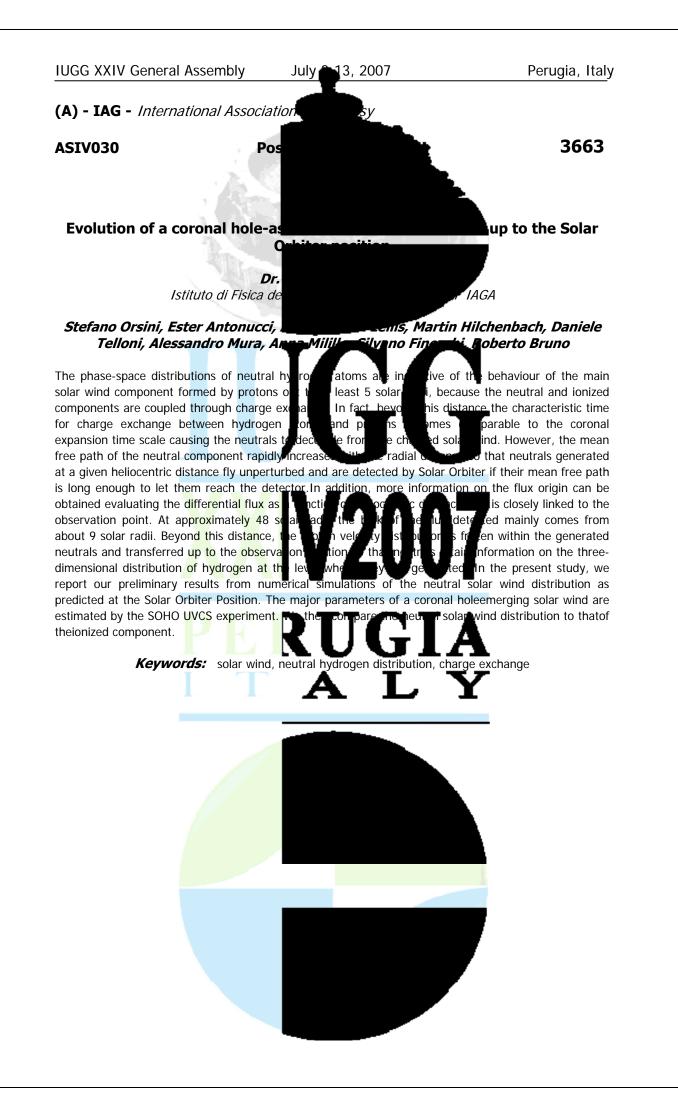
these upflow velocities clearly depend on the temperature, by comparing the upflow velocities among

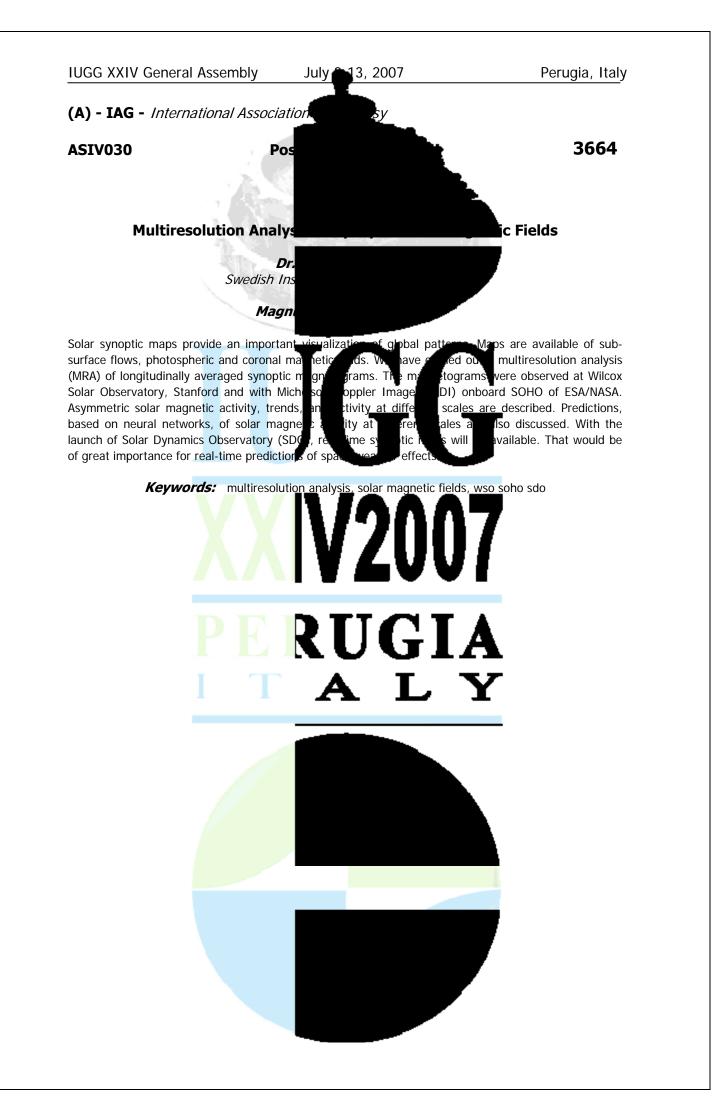
The\_hottest line, FeXV. shows the fastest upflow velocity (130 km/sec). velocities are below the e dependence of sound EIT data. In this talk, we ge region using Doppler



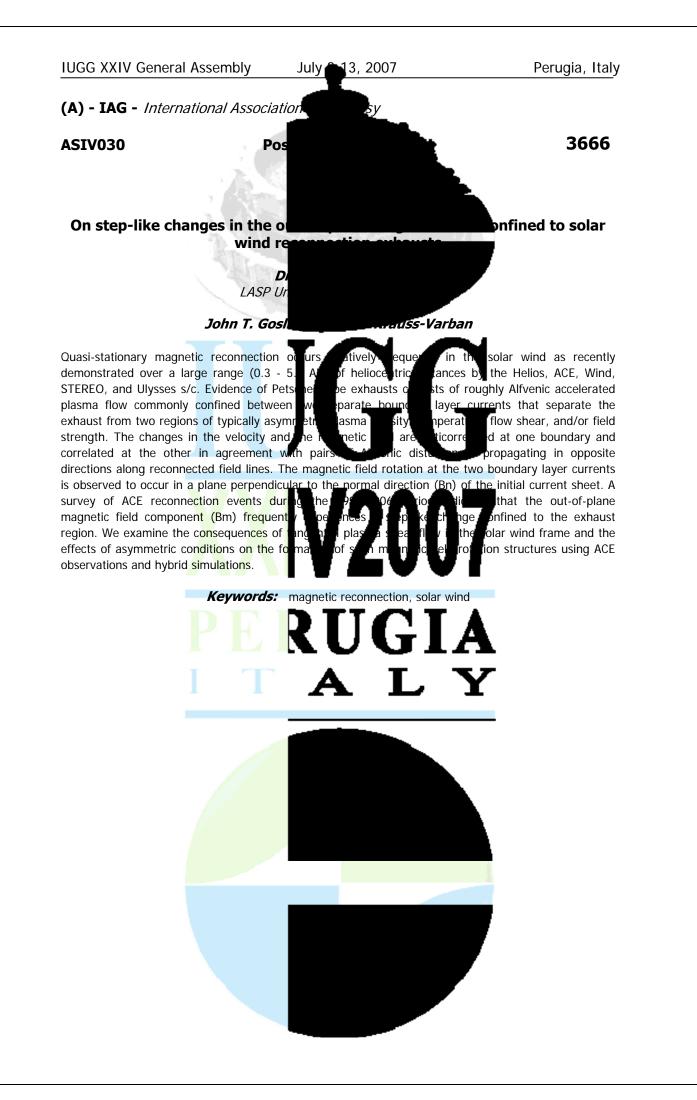


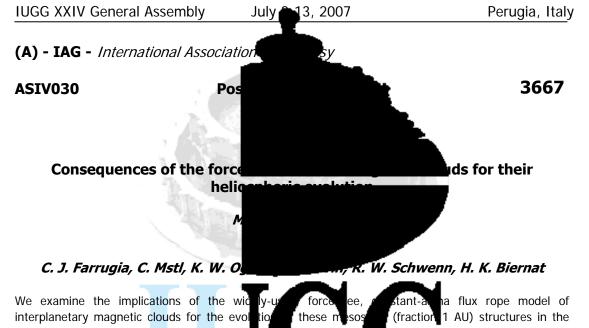












heliosphere, with special emphasis on the i observed by the Helios 1 and 2 probes betw solar cycle 21, and by WIND at 1 AU in a sin by observations from other spacecraft (e.g. consists of 130 events. We explore three differe

averages, binning the results into radial segments of width 0.1 AU in the range 0.3< rh< 1 AU. Doing this, we find that in the inner heliosphere\_the modeled\_average central axial field strength, B0, varies with heliospheric distance rh as B0 [nT] linearly as D [AU] = 0.23rh1.14. The orien data set is generally found to lie along the rh, but there is considerable scatter about evolution of magnetic clouds in snapshot f broad agreement with the statistics reported under step 1. In the final approach, we obtain the

< 1 AU) hq and 1 AU in se of a s 1, Vo ion hes.In here. We employ primarily events scending and maximum phases of cycle supplement these data 10, 1 nd others). Our dataset we work with ensemble

> neter increases quasiagnetic flux tube in our tic plane at all values of second, we monitor the ments. The results are in

ined from statistics. We

different methodology.

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functional dependence of B0 and D predicted by an analytic expression for a freely-expanding Lundquist flux tube. We find D to vary linearly with maximum field strength scales as rh-2 com br compare our findings with those of Bothme nd The results obtained form a good background to the forthcoming STEREO and SENTINELS missions and to multi-spacecraft studies of magnetic clouds.

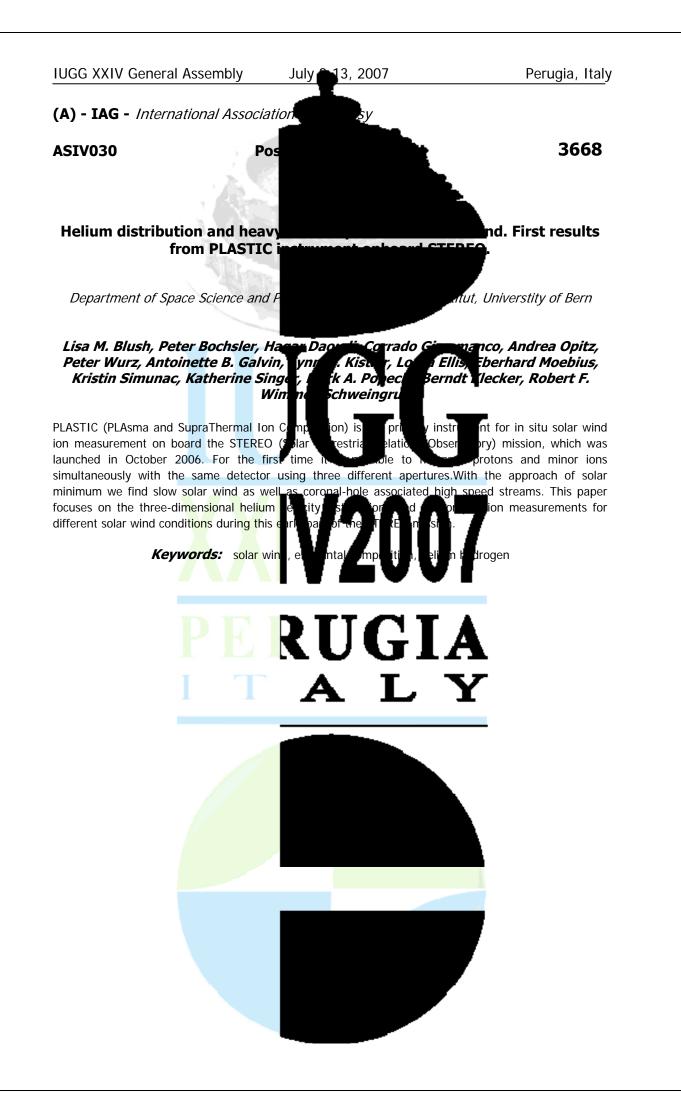
*Keywords:* magnetic, clouds, evolution

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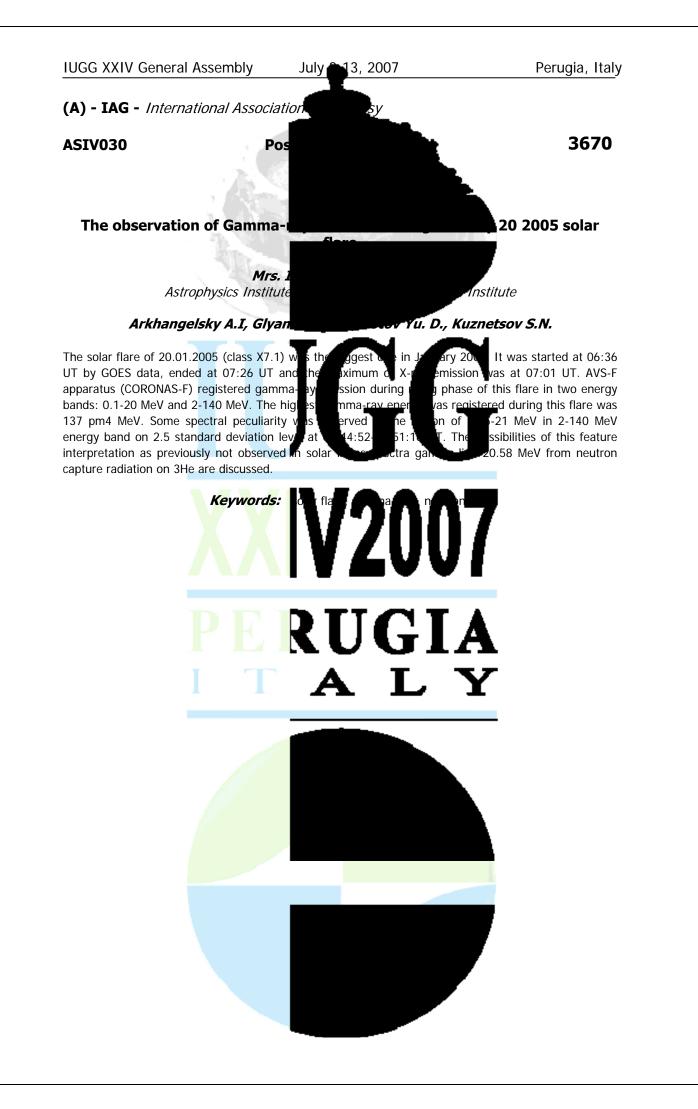
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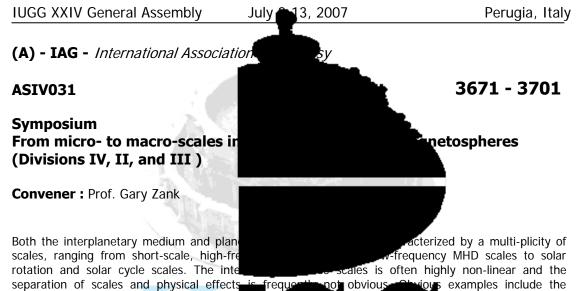
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separation of scales and physical effects scattering and transport of energetic particl wind with the local interstellar medium, the evolution and dynamics of turbulence in the response of shocks to turbulence, the ch turbulence in the magnetotail, etc. This multiple scales and physical processes in magnetospheres.

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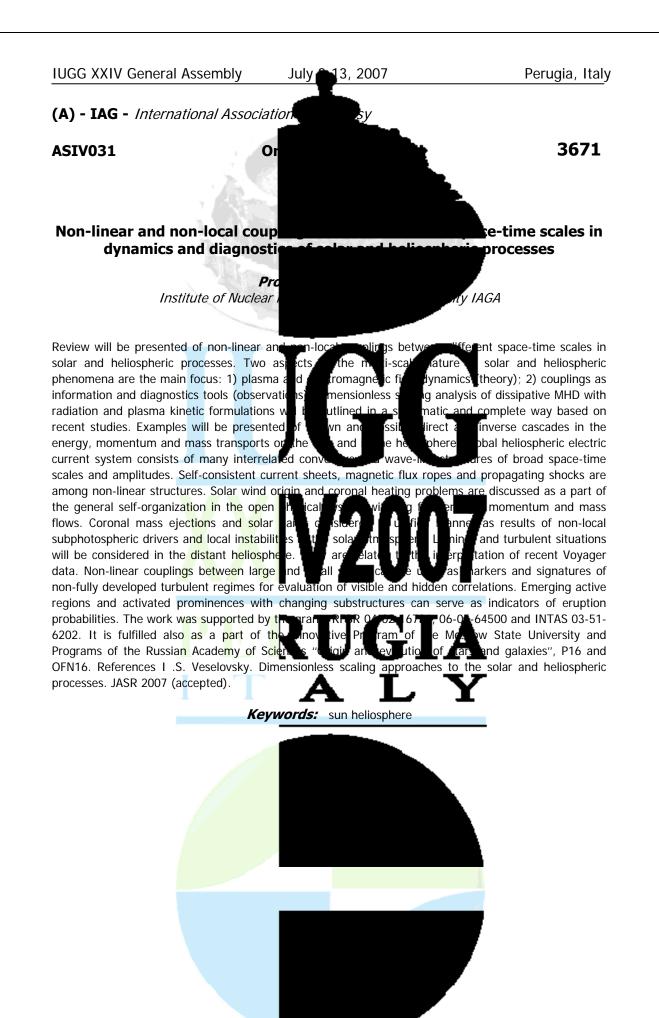
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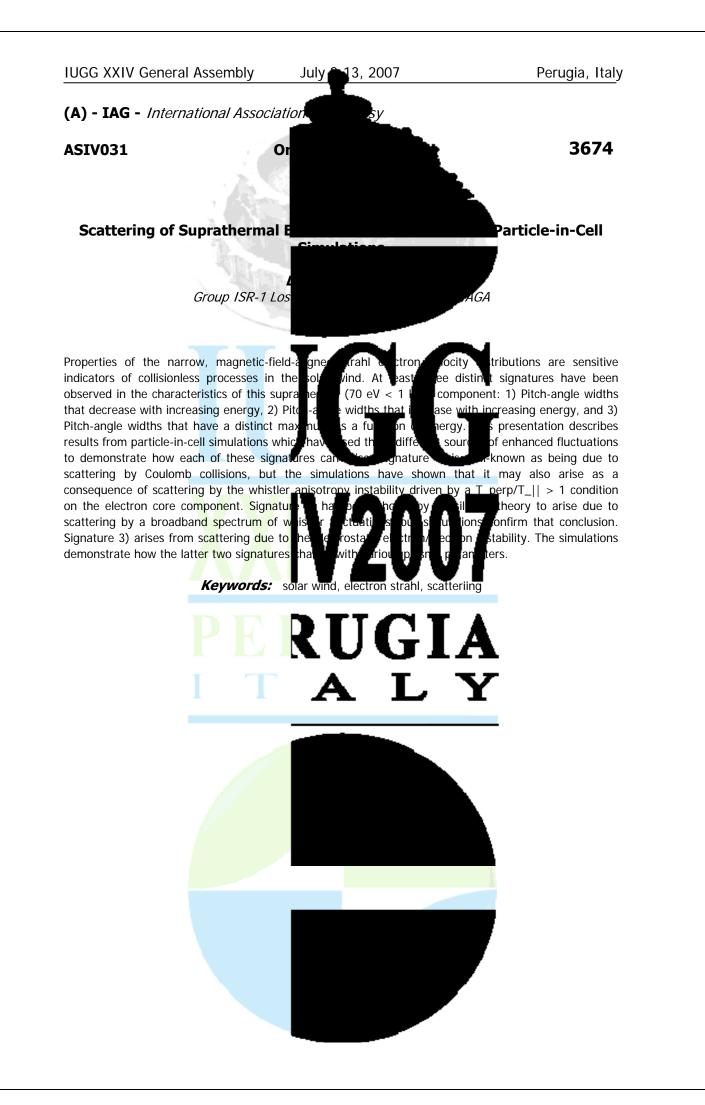
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ious examples include the interaction of the solar ince. rt of solution energetic particles, the emission processes at shocks, the ss shock waves and foreshocks, Replore the coupling of medium and planetary planet

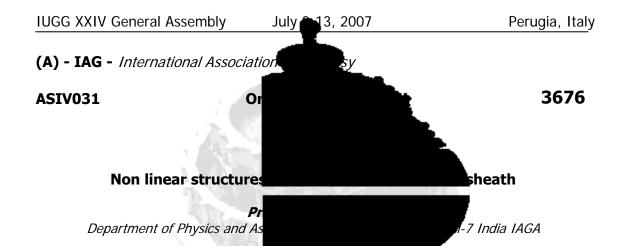












A Magnetic Hole is a stationary stable str the centre. Such structures were first observed in the [1977] and later from the magnetosheaths has revealed the presence of a rich clas sinusoids, magnetic humps with magnetic field and sequences of merged holes and hum strongly nonlinear have a width of few tens magnetic field. In the talk we will review regarding these structures. We will also give a br

existence of these structures. In particular we will discuss our recently proposed model based on the fully nonlinear theory of solitary wave solutions of McKenzie et al suitably modified for the conditions of solar wind and heliosheath. These solution strongly nonlinear, propagate at large approximated by Gaussians. The structu between the magnetic field and the plasm structure. These features are consistent wi solar wind. Results from 1D fluid simulation will

scale depression of the magnetic field in ter planetar oth anets ecent ationary 7 haqı ma in the cer [Burl<u>aga et a</u> pradii serva

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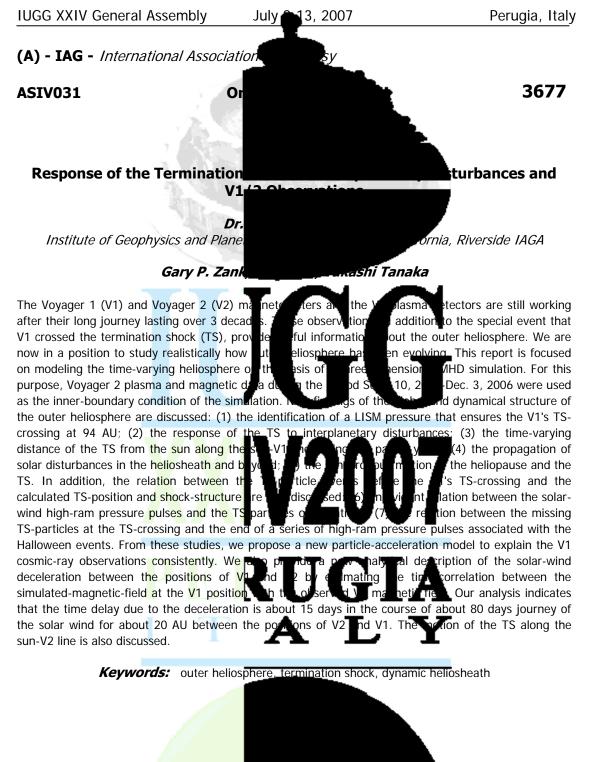
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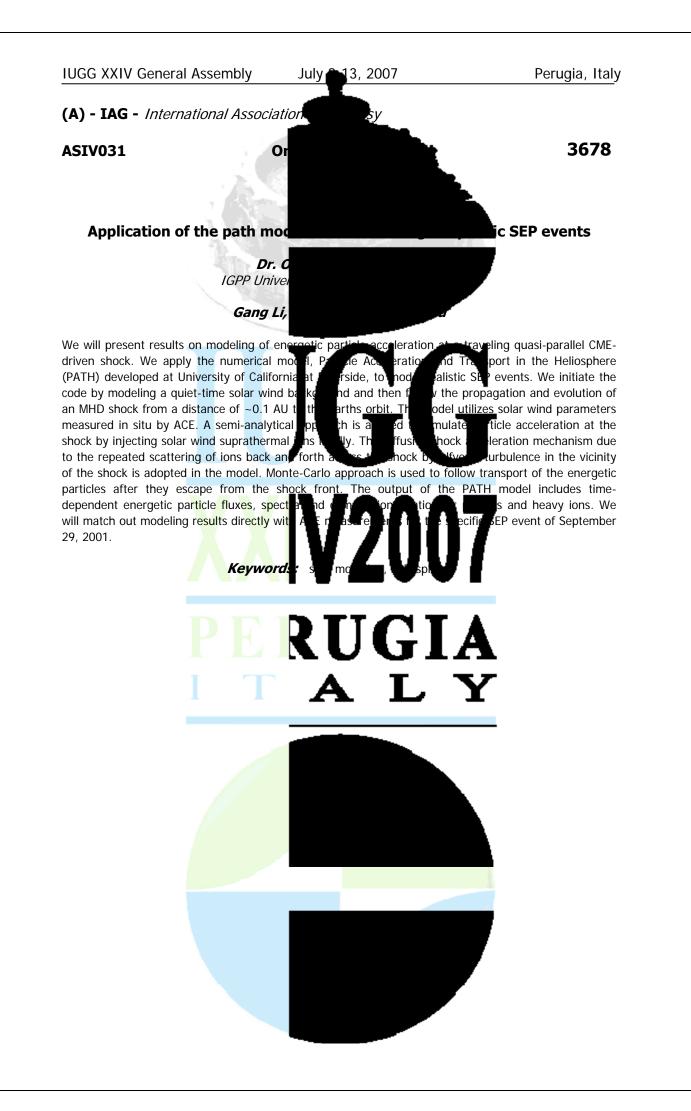
netic field by Turner et al. ter data from Voyager 1 structures e.g. magnetic holes, trains of several holes and humps, 006]. These structures which are que angles to the mean Voyager and solar wind theories to explain the

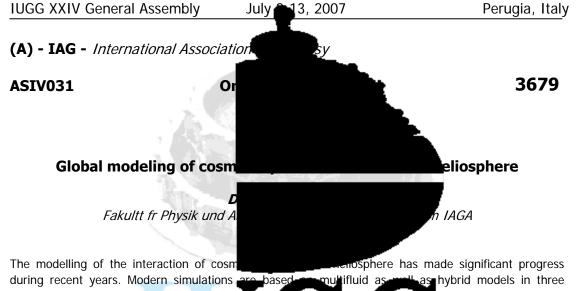
> holes and humps, are tic field and are well with an anti-correlation gnetic vector across the es in the heliosheath and











dimensions, self-consistently contain magnic fi variations as well as a changing interstella advances into the framework of interstellarexist such interstellar-terrestrial relations ar shield for the Earth, specifically against cos amongst other drivers, the Sun or the cosm ra periods of hundred years and shorter. It will be dis rays in the heliosphere can contribute constructively to this debate.

erget and article onment. The al relations. the h<u>eliosph</u>e ie. A d is va e inf terre cing the r

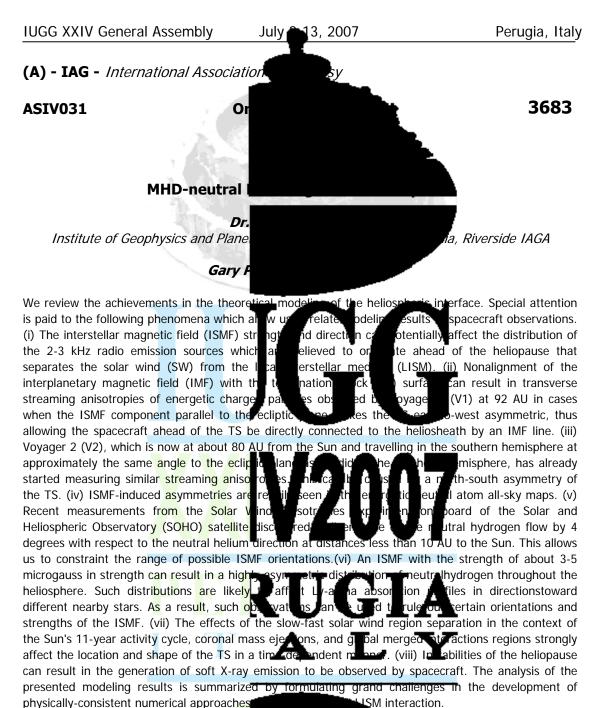
and include solar cycle ew will but the recent modelling e is increasing evidence that there effectivity to serve as a protecting te is going on whether, climate, particularly on the transport of cosmic

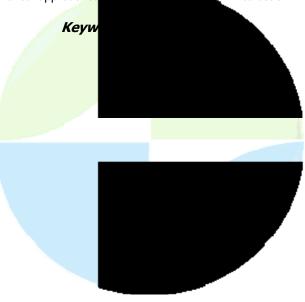


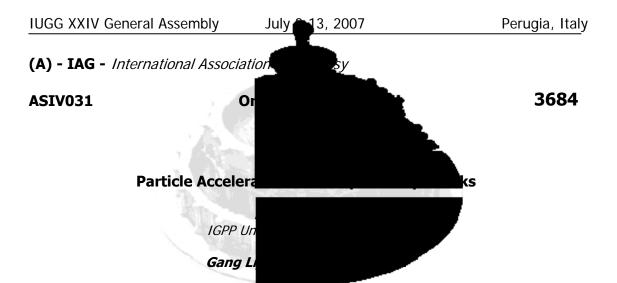












Understanding the problem of particle a importance, especially in the context of unersta thought to have been established in the late are not easily interpreted in terms of the sin Three fundamental aspects make the inter astrophysical problem: the time dependend geometry of the shock; and the long mean These aspects have been explored in the

aloration nterplanetar ig the ace 19 and 198 h ginal models ( ble y pro<u>blem m</u> acce the ĩoi h for sport cle conte n aco

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ks is assuming increasing The basic physics was etailed in erplanetary observations rticle acceleration at shock waves. more complicated than the typical wind background; the y from the shock wave. t interplanetary shocks.

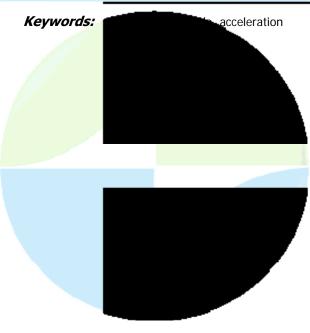
shocks since wave excitation, and hence\_particle\_scattering, at oblique shocks is controlled by the protons and not the heavy ions. The h characteristics are controlled by the prope condition for heavy ions introduces disting profiles, depending in ion mass and charge resulting fractionation are discussed. Thi acceleration characteristics of quasi-paraller and

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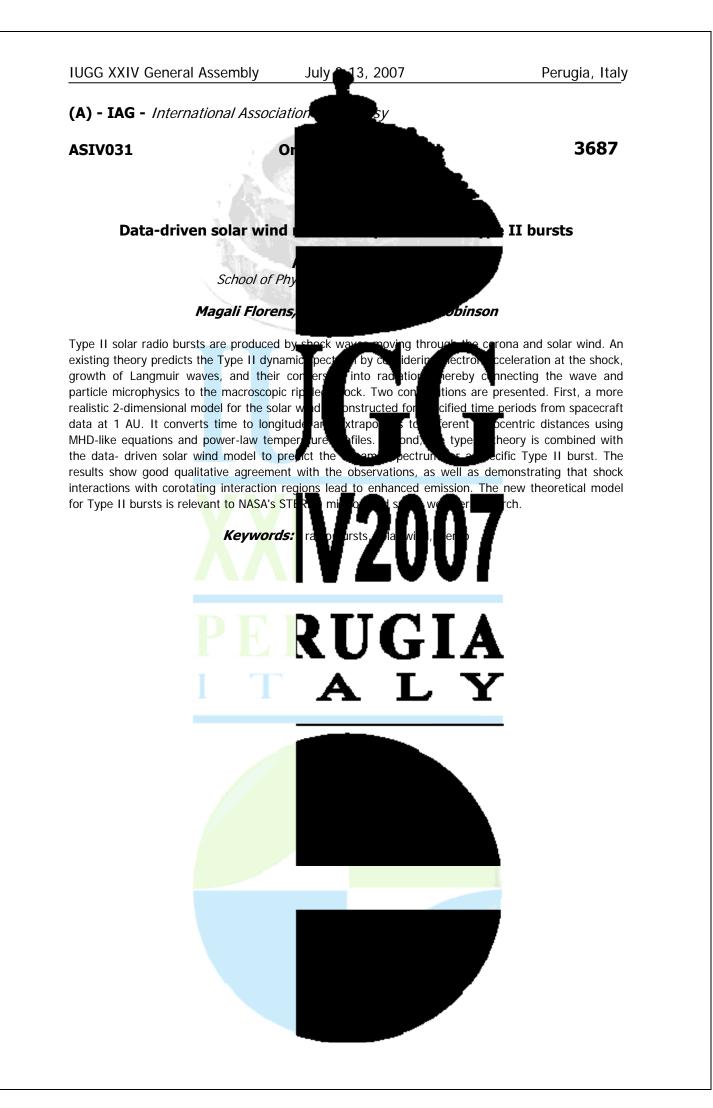
Understanding this is of importance to understanding the acceleration of heavy ions at interplanetary and their acceleration a result, the resonance e, spectra, and intensity ion acceleration and the ection problem and the

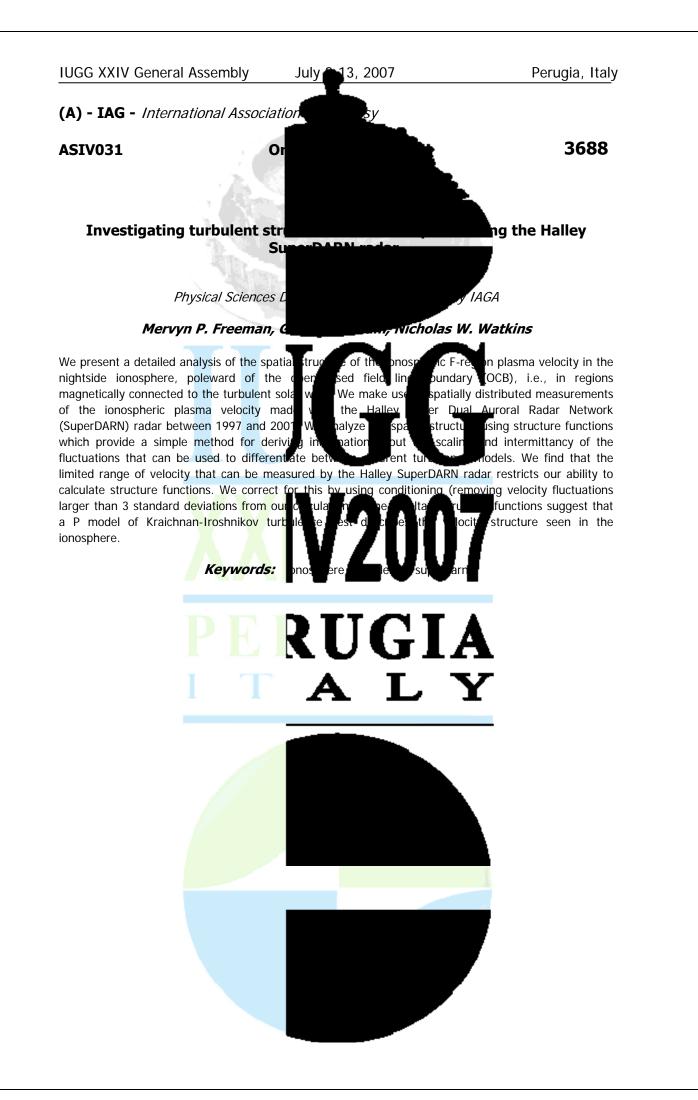








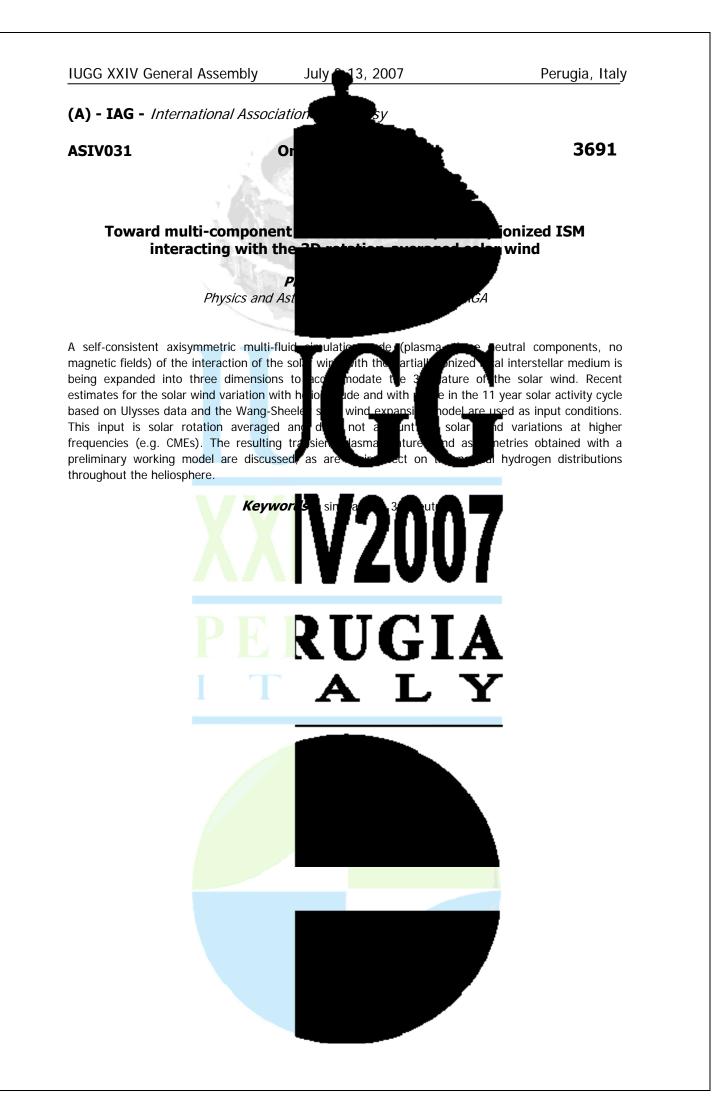


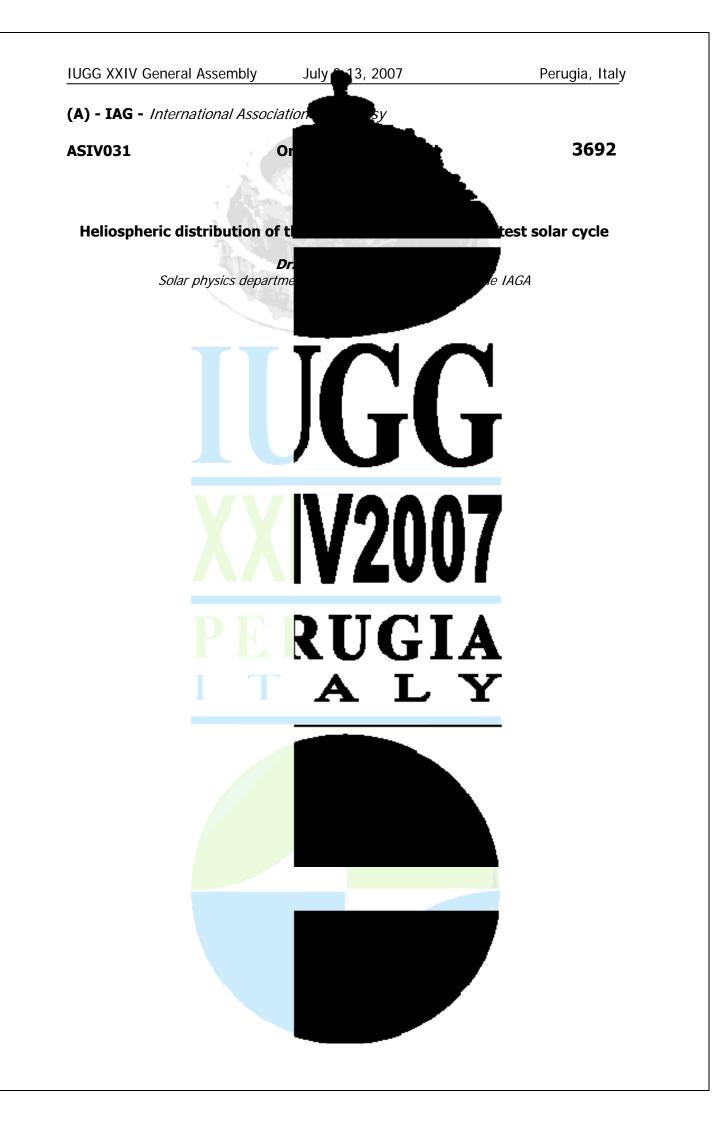


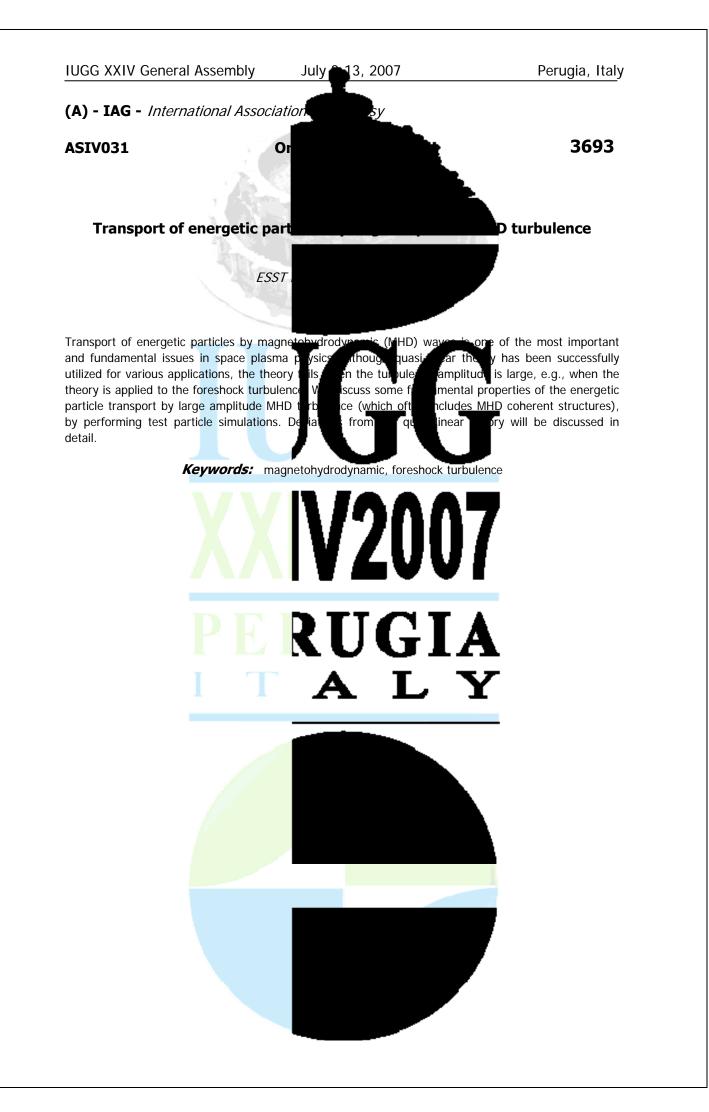


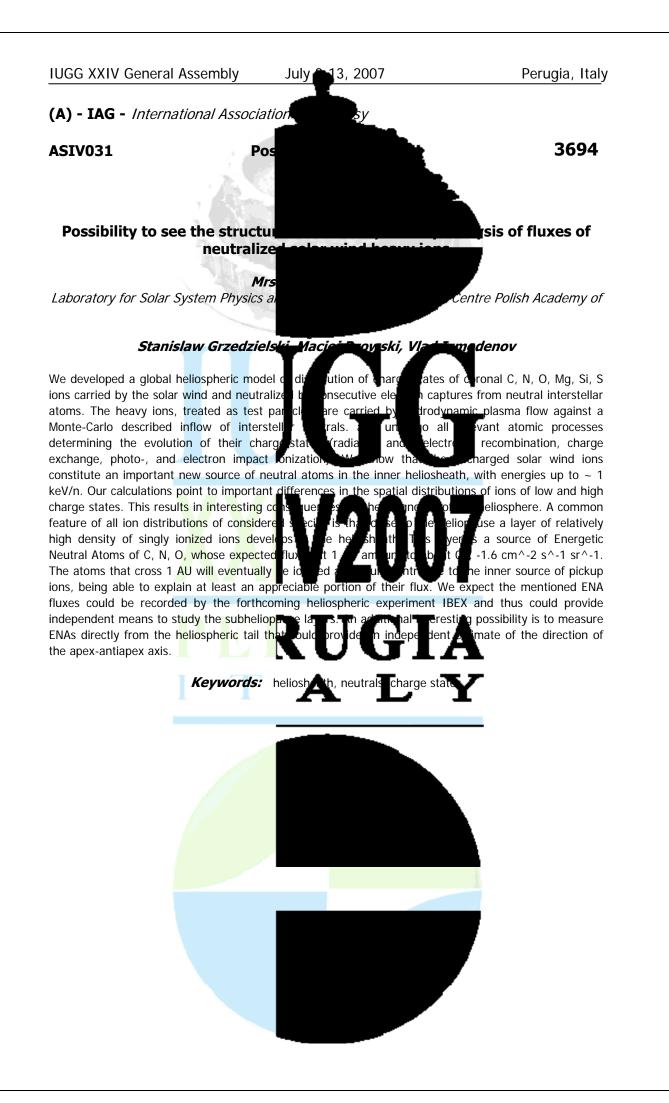








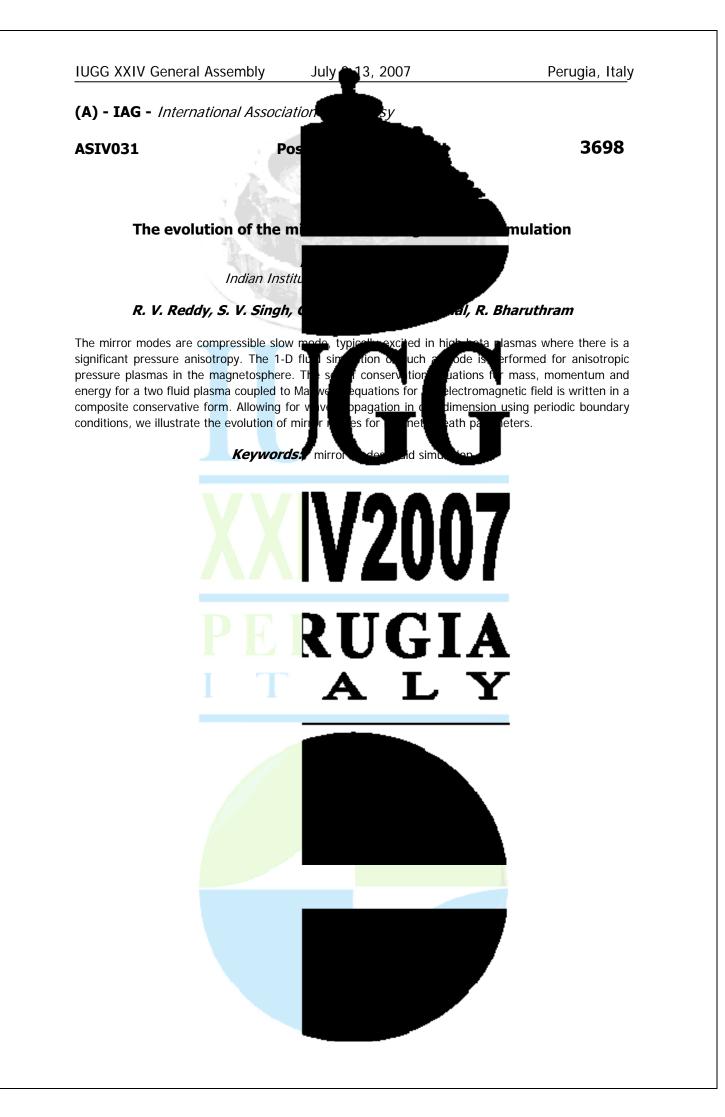




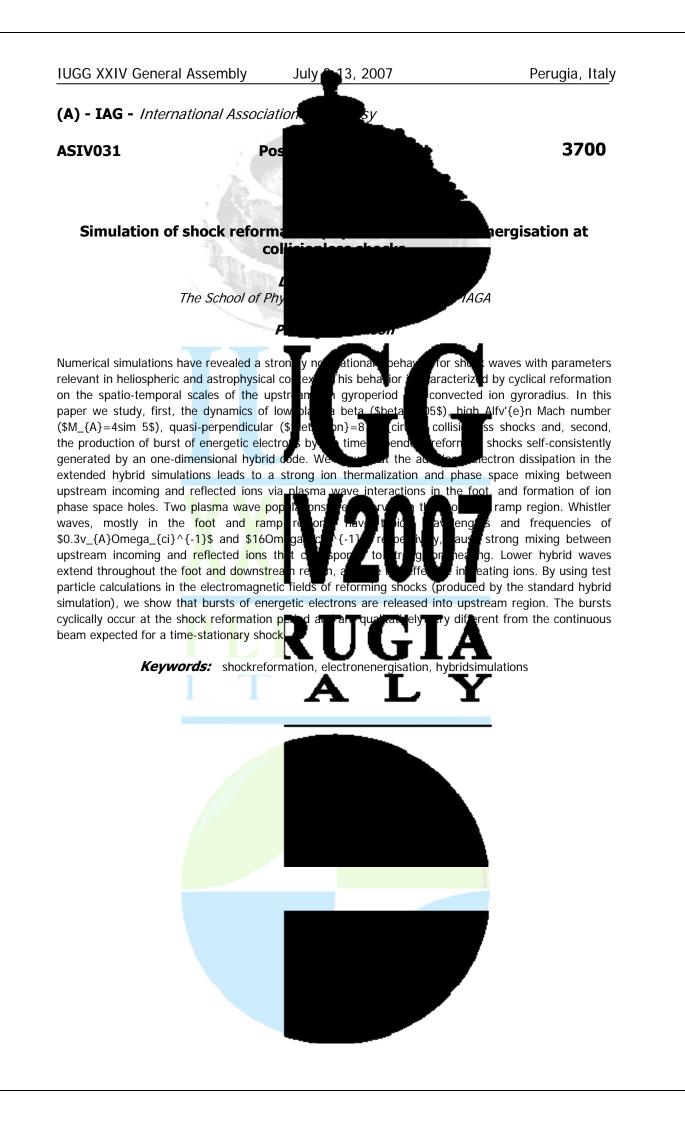














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## **ASIV032**

## Symposium IHY and universal processes (

Convener : Dr. Joseph Davila

On October 4, 1957, only 53 years after Ki space age. Discovery of the radiation belts prepared the way for human exploration t Voyager is leaving the heliosphere, and

interstellar medium. It is inevitable that, during the next 50 years, exploration of Mars and the Outer Planets will be the focus of the space program, a processes will be required. Like the IGY bef on the cross-disciplinary physics governing in the solar system. Basic science themes a Transients, (2) Energy Transfer and Couplin Interfaces: Sheaths, Shocks, and Layered L Contributions on plasma processes, magnetospheric/heliospheric processes, the environment, etc. are sought.

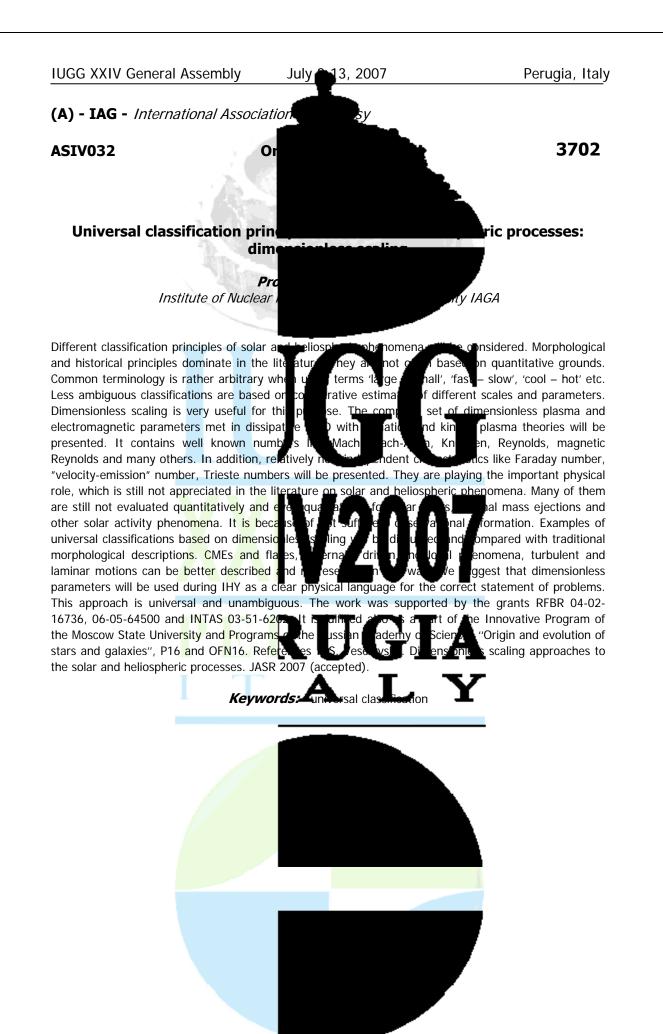
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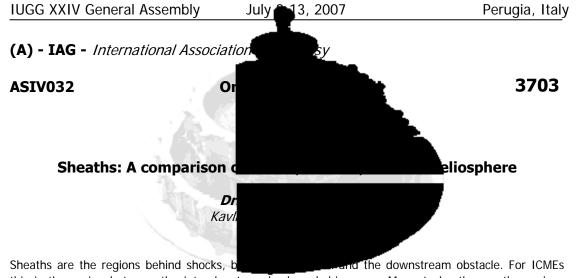
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ked the beginning of the re of Earths magnetosphere y is unfolding, as the spacecraft numans will begin to explore the local

> the global heliophysical iding leliophysical Year (IHY) will focus the study of Universal Processes eration of Magnetic Structures and d Ci ms, (4) Boundaries and ic Stu of the 3D Heliosphere. opaga solar phenomena, spheres to the space





this is the region between the interplanetant shock between planetary bow shocks and mag etop are termination shock and the heliopause curre tly ing plasma slowed, compressed, and heated by he bock Earth to hundred of AU for the heliosheath N with holes probably associated with mirror mode was a depletion layers form in planetary and ICMF sheat differences of these three types of sheaths observe

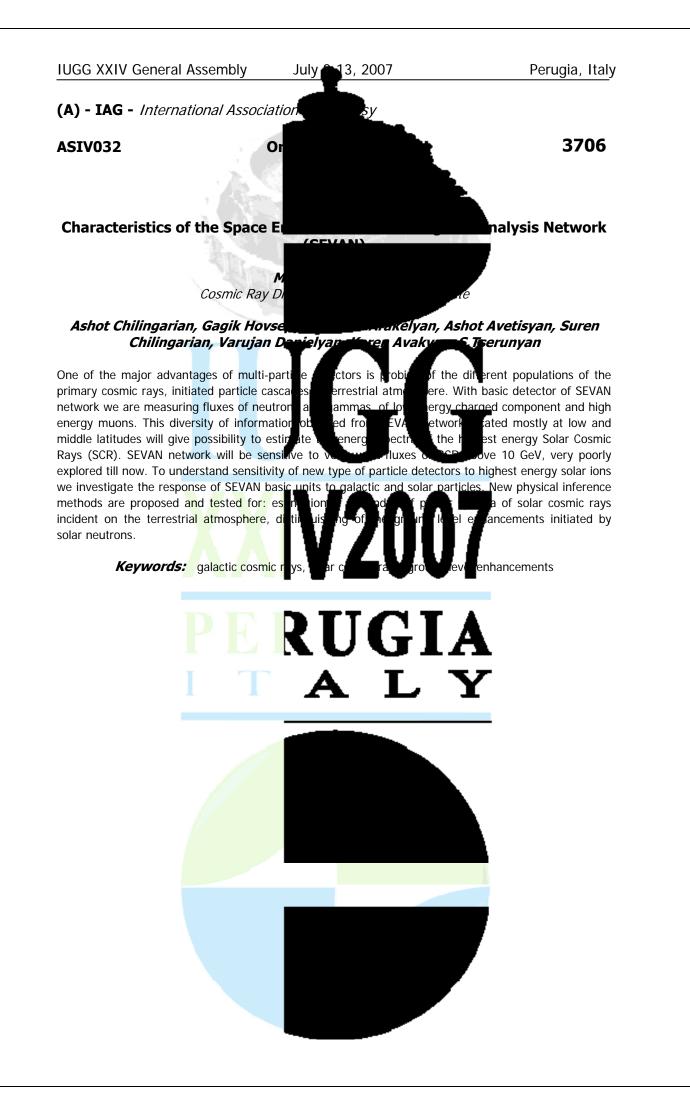
shock and driver gas openes. The helior ng explored by bck. But the le theless, simila are o ved exect We v exrve. the ariosphe.

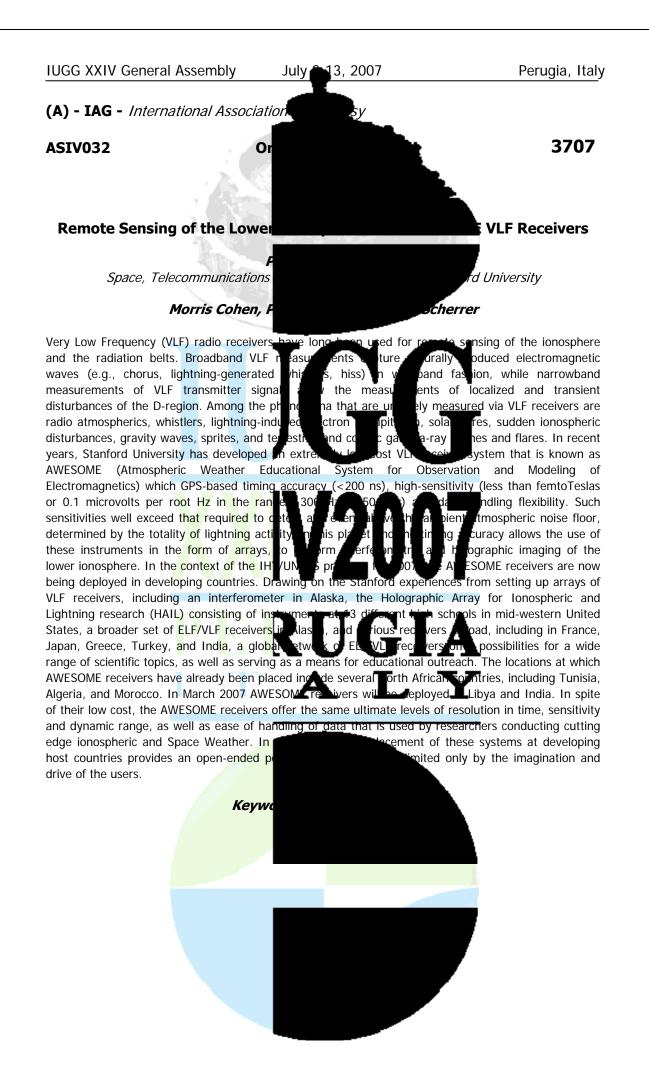
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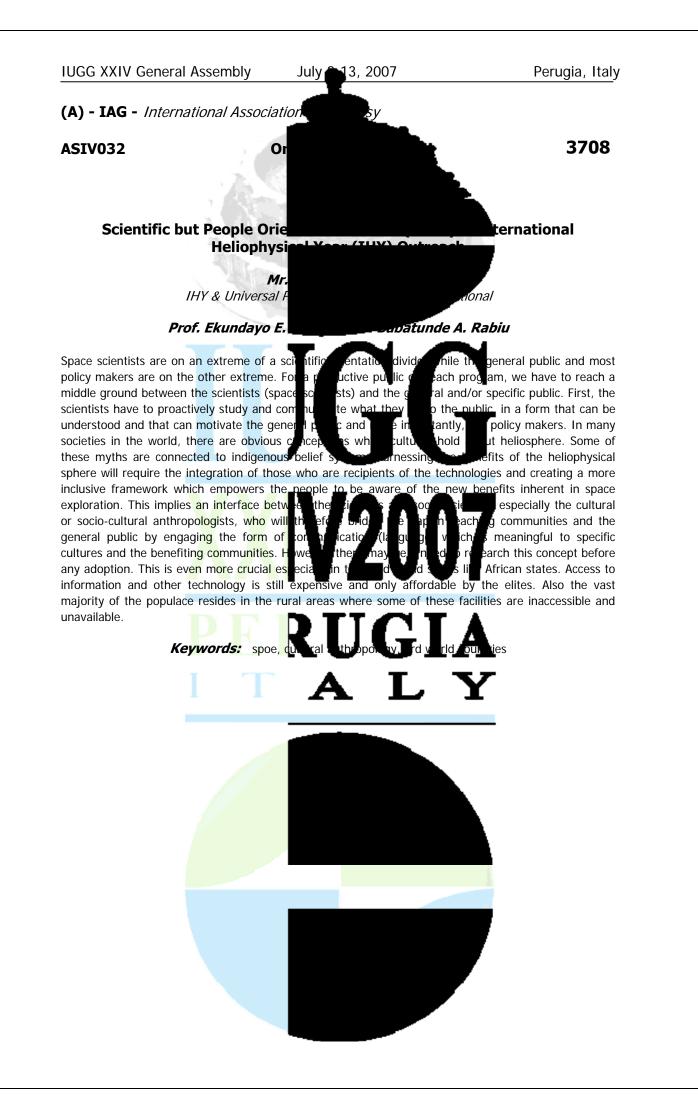










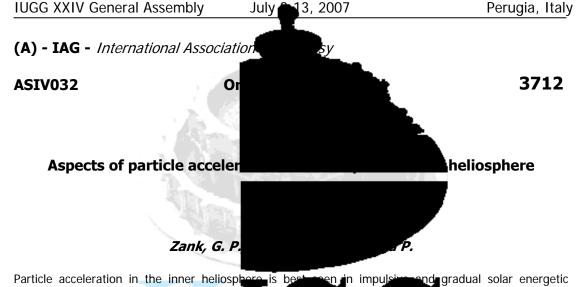












particle (SEP) events. In these events, en geti either in flares (presumably a reconnection s as high as ~1 GeV/nucleon. One active acceleration mechanism of these particles tremendous amount of data has been accur of remote sensing such as X-ray, gamma-r situ measurements where particle composition, tim intensity profile, time evolution of Fe/O ratio and particle anisotropy made by ACE spacecraft. We further discuss the implications of these aspects of shock acceleration, namely ho acceleration process and the particle energy observations of particle data obtained in sit

orotor irticle ind h propagating ch in space eir t<u>ranspor</u>t eral d over las light ar dio ol profile

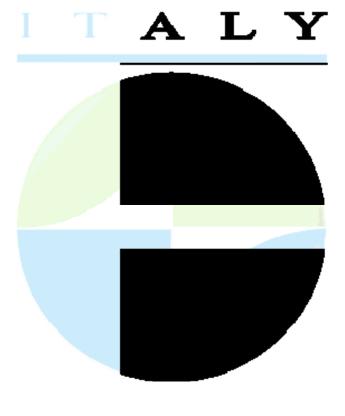
y ions) are accelerated -driven hocks, reaching energies sics today is to understand the he s<u>olar wi</u>nd. Observationally, a es. These include those vations and those of inle spectra are obtained.

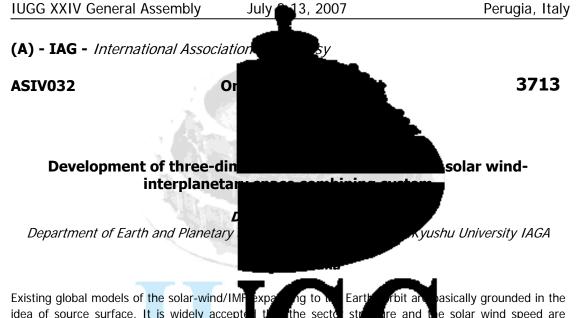
In this talk, we focus on gradual SEP events. We will review some recent observations such as time

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iscuss two theoretical bulence will affect the re helpful in interpreting

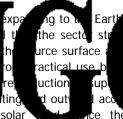
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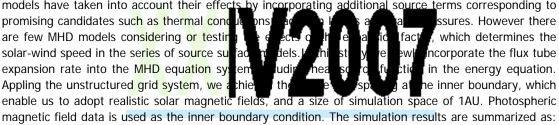
idea of source surface. It is widely accepted primarily controlled by the magnetic field at the other hand, 3-D MHD model is still off problems. One of the former problems is the of the physics of the solar wind, coronal high explain the supersonic evolution of the solar

models have taken into account their effects by incorporating additional source terms corresponding to promising candidates such as thermal cond are few MHD models considering or testing solar-wind speed in the series of source su expansion rate into the MHD equation sy Appling the unstructured grid system, we a enable us to adopt realistic solar magnetic fields, and a size of simulation space of 1AU. Photospheric



re and the solar wind speed are the so-called expansion factor. On se both of scientific and technical nic sol ind. From the viewpoint ation chanisms are invoked to m responsible for the

heating/acceleration is still one of the primary subjects of the physics of the solar wind, many MHD



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ssures. However there which determines the ncorporate the flux tube in the energy equation. he inner boundary, which

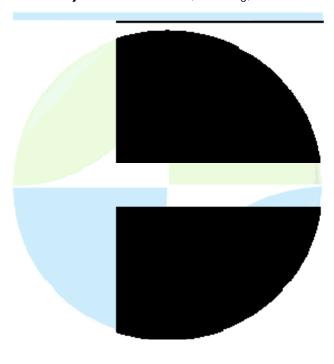
agnetic fields at and little

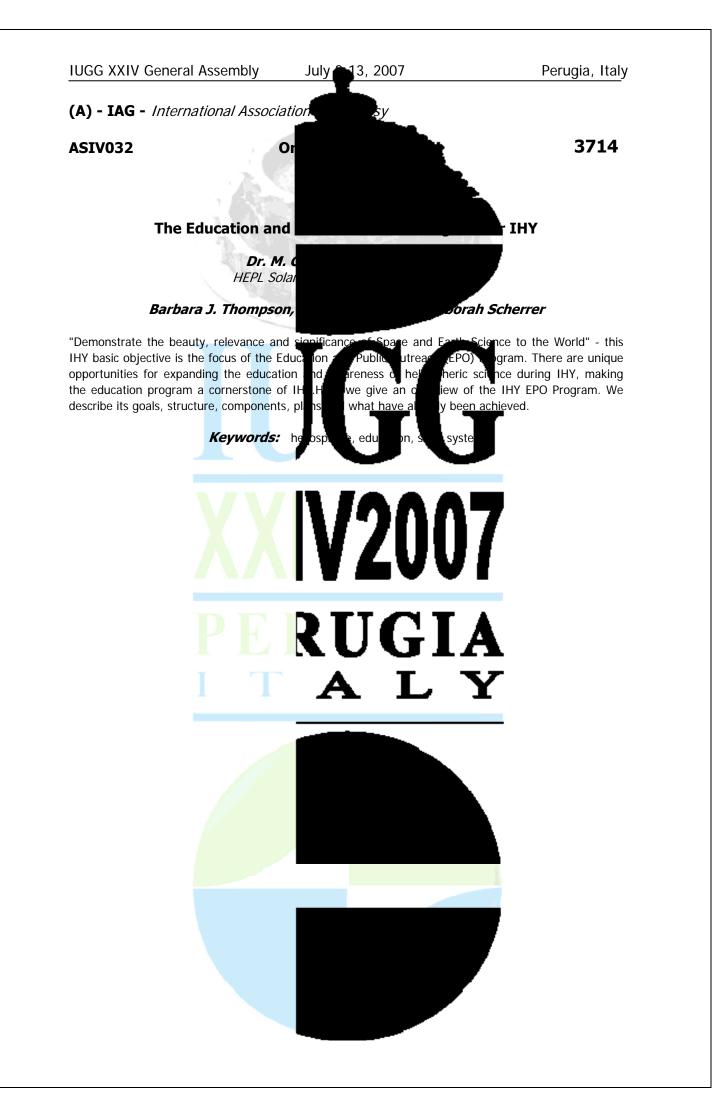
een high and low speed

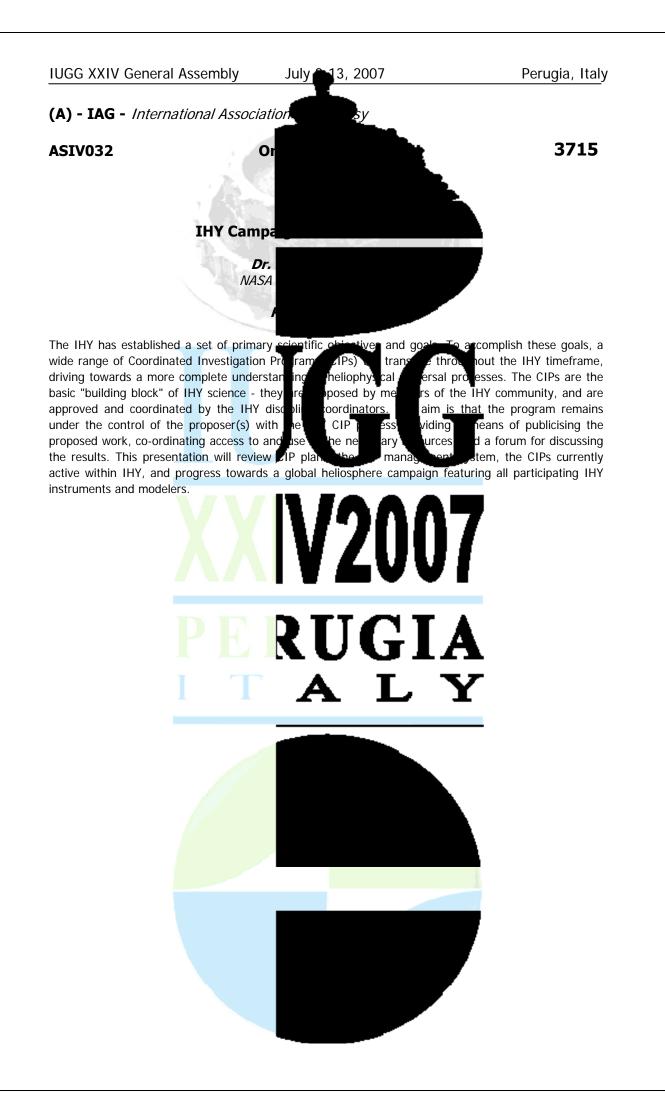
ulation with the actual

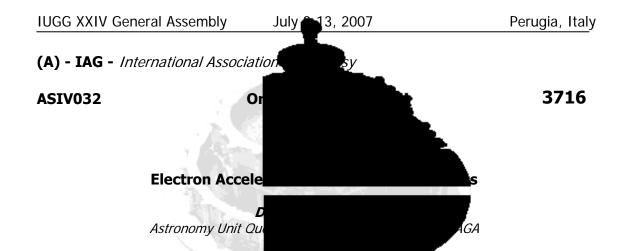
(1) The variation of solar wind speed is w above the solar surface and (2) Far above flows evolves to a structure suggestive of solar wind data obtained by spacecrafts, we discuss the future improvement of our model.

Kevwords:









Energetic electrons are a common feature are invoked as a key component of models of nonthe simulation study is carried out of electron acce shocks. Two dimensional self-consistent hy fields in which test particle electrons are

angles, and injection energies are studie configuration suppresses fluctuations along assuming magnetic moment conserving re-Mach number, with a realistic simulation configurate The corresponding electron energization is radically different: Energy spectra display: (1) considerably

higher maximum energies than Fast Fermi\_acceleration; (2) a plateau, or shallow sloped region, at intermediate energies 2 - 5 times the injec both upstream and downstream particle approaches perpendicular; (4) sustained f for adiabatic reflection. All these features scales produces effective scattering and effective sites for electron acceleration.

Keywords:

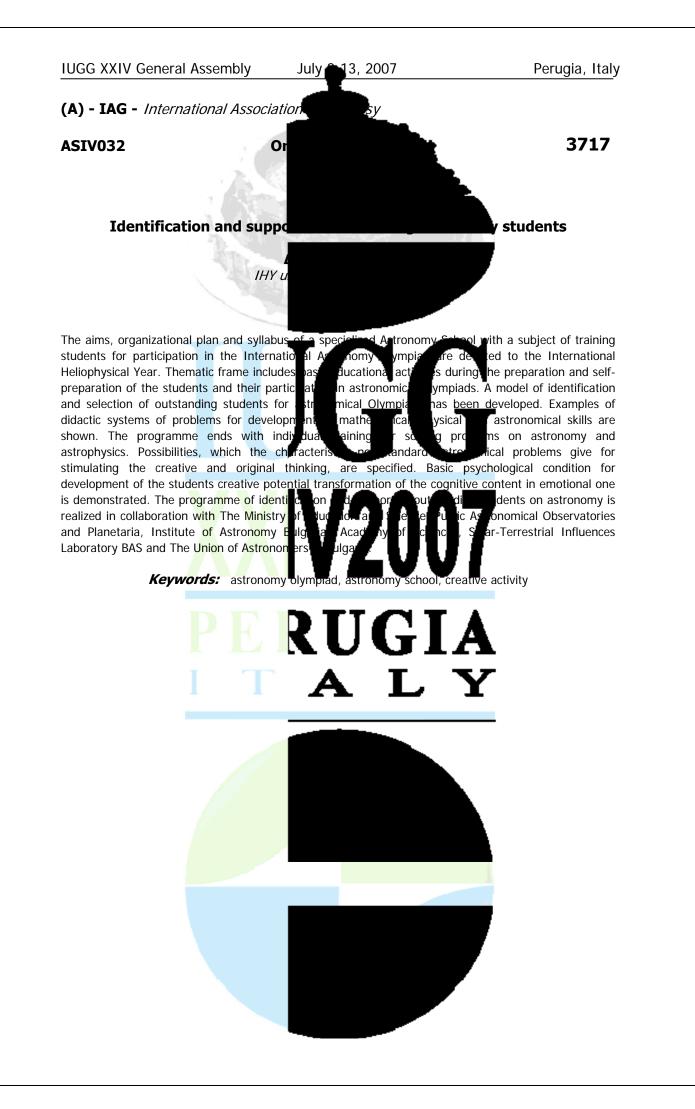
ocks and planetary bow shocks, and they l radio emiss high tion ock simulation brig I. A range o bild en t<u>he Mac</u>ł ignetiq Ы with mc

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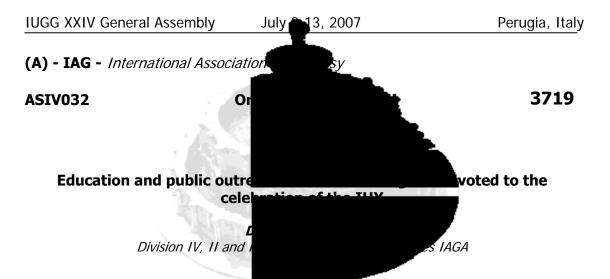
elect

cha as solar radio bursts. A per, quasi-perpendicular ch n rovide the electric and magnetic erent shock types, shock normal mbe<u>r is lo</u>w, or the simulation esults agree withtheory energy gains. For high namic rippled character.

> increasing energy, for shock normal angle hock normal angle than he shock surface at ion h Mach number shocks







Yuri Gagarin Public Astronomical Observation Laboratory of the Bulgarian Academy of S year: Lectures and Observations: Astronomy lectures at the Art Gallery, Stara Zagora) paintings and photographs, for students in Lectures Cosmos near and remote and as Astronautics, Yuris Night World Space Part May 4: Public presentation of the IHY Programme

at the Competition We and the Sun, press conference June: Open Doors Day on June 10, 2007, Summer Solstice festival municipal competition The Sun our nearest star July: Municipal Summer school of Astronomy for students, formulating Lectures devoted to pre-historic monumer the Antiquity October 4: Celebration of the the Earth in CosmosNovember: National c to the Day of the National Leaders 1st Nov

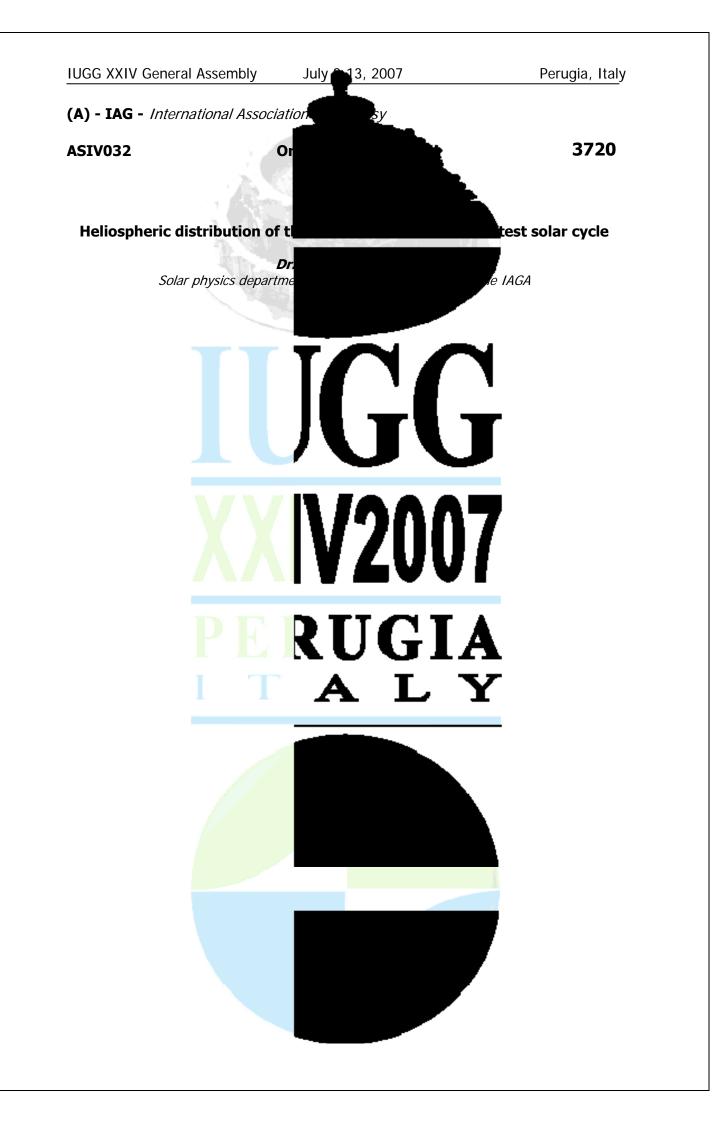
n (PAO and J ST III rybody F ncement of ge groups al ob hti on il 12, 7. hibition

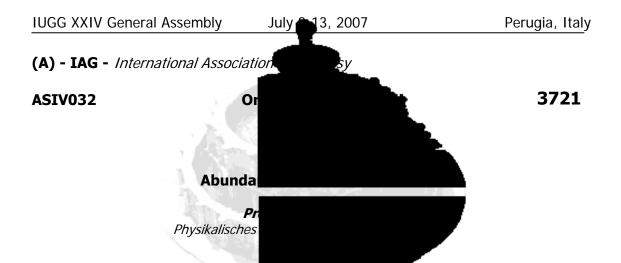
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larTerrestrial Influences he following: Whole the us or Narch: Lettures on Astrophysics (6 Competition We and the Sun for and 16- 20 years old. April: evote April 12 World Day of April Vorld day of Astronomy gs and photographs won

> OlympiadSeptember: considered as a God in of an artificial satellite of a Zagora 2007 devoted







Solar matter provides information on differentiation processes led to the formation of plane bodies of meteorites. The Sun is also the e the Big Bang, and processing by many gene of protosolar matter. The solar wind is the n of the Sun. However, the observed variabil 1:1 correlation between solar wind and sola wind composition to solar composition requ

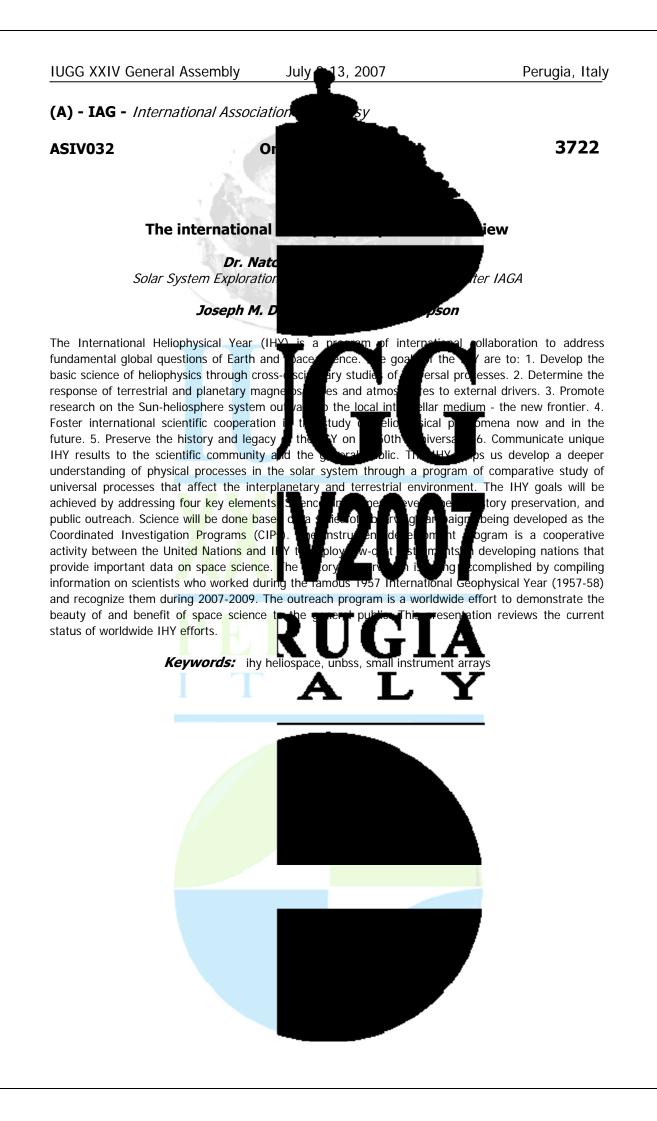
non of the solar nebula, from which objects, inclu lipoi nucle a lð of stars, I tic hvir ct source of otop<u>ic and e</u> sition espon stand preh /e lead to the variably fractionated solar wind abund nt mi

planets, comets and parent volution, beginning with itheti eir impring in the final composition mation on the isotopic composition ntal abundances indicates that no y, inferences from solar of the processes, which a somewhat ambiguous picture of this variability. A preliminary analysis of the Genesis samples, which were exposed to different

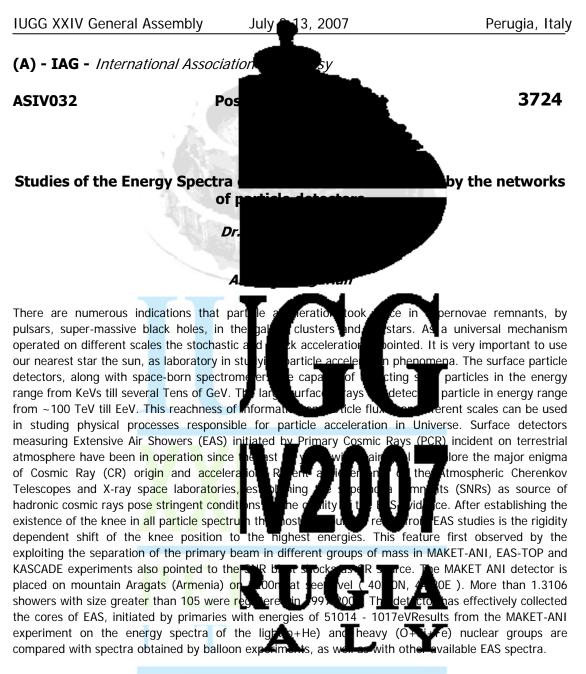
solar wind regimes, indicates that the solar wind is isotopically rather homogeneous, confirming the picture obtained from the Apollo Foil Expe in-ecliptic solar wind has yielded the pictur time scales and also varies substantially i from coronal holes or from the equatoria possible impacts of systematic and statisti some proposed models of fractionation proc

ss-spectrometry of the le on comparably short In solar wind emanating results, we will mention vations and comment on

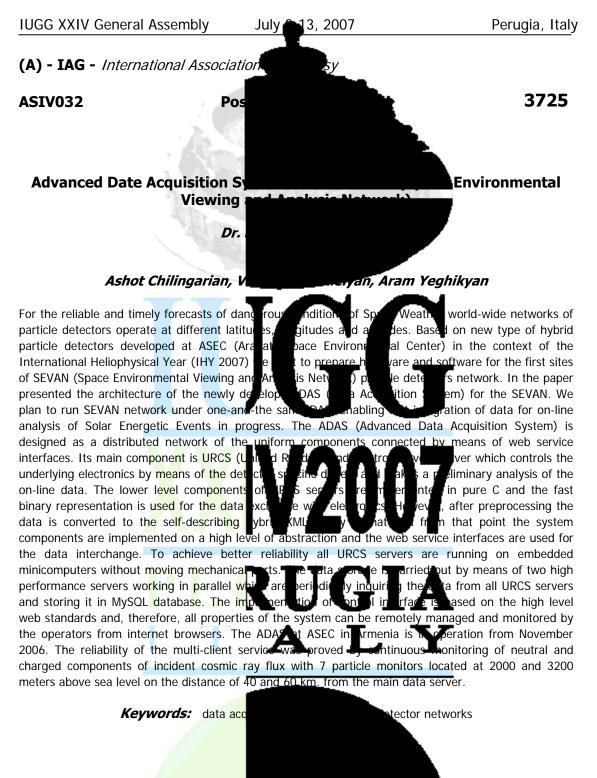




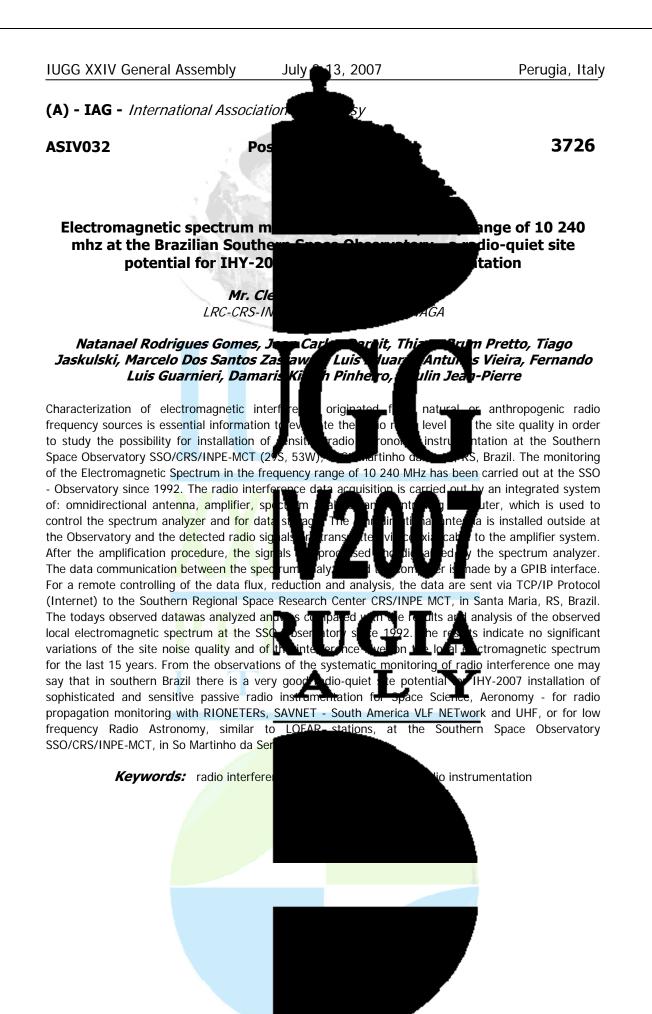








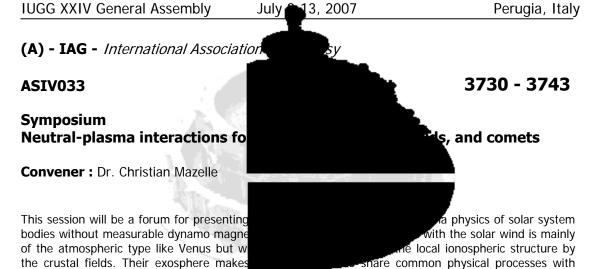












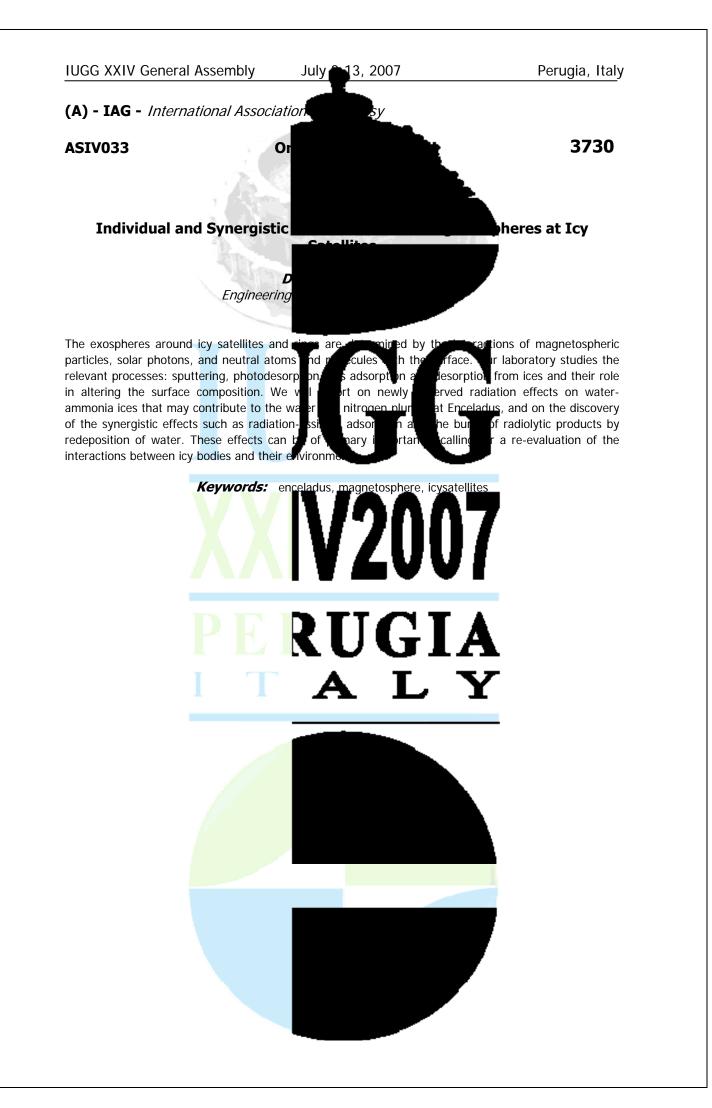
comets. The interaction of Titan with the fast co-rotating plasma inside the magnetosphere of Saturn is another example of such interaction in a d devoted to new results from Mars Global S from Cassini around Saturns moons includir from Venus Express. Paper relating to Rose include upstream waves, plasma boundarie influence of Martian crustal fields, etc. Rece numerical simulations are encouraged. Pap and New Horizons) or future projects are also weld

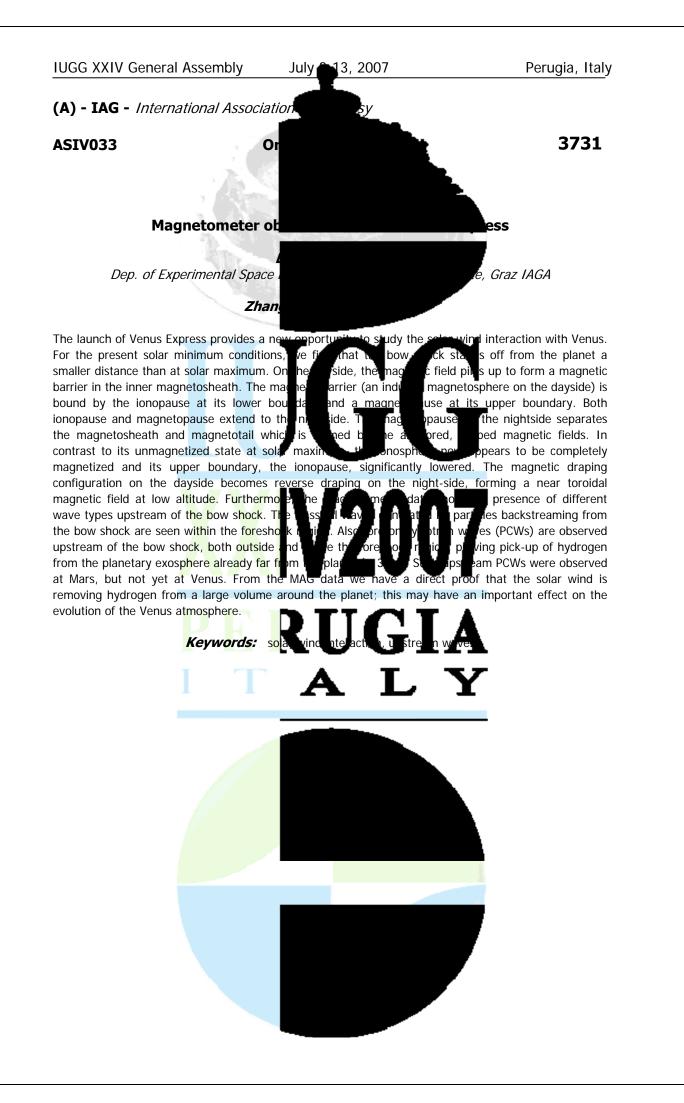
ferer rand iran and Ma Exp VE Enceladus, rs flyby are a neir da ts in c an d to t con

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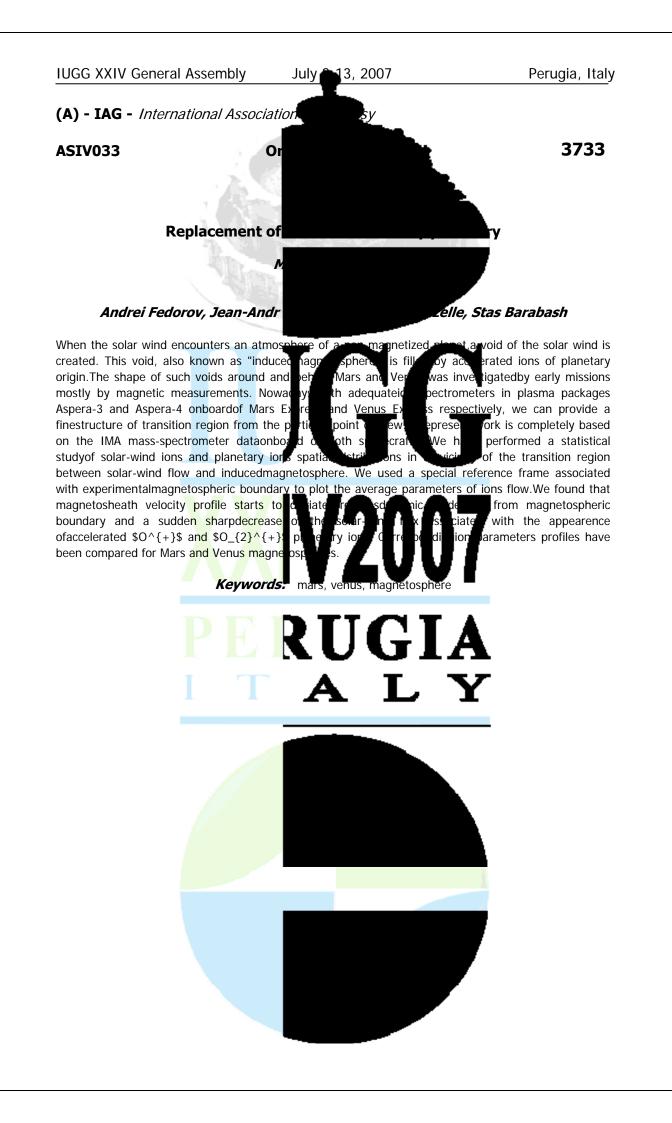
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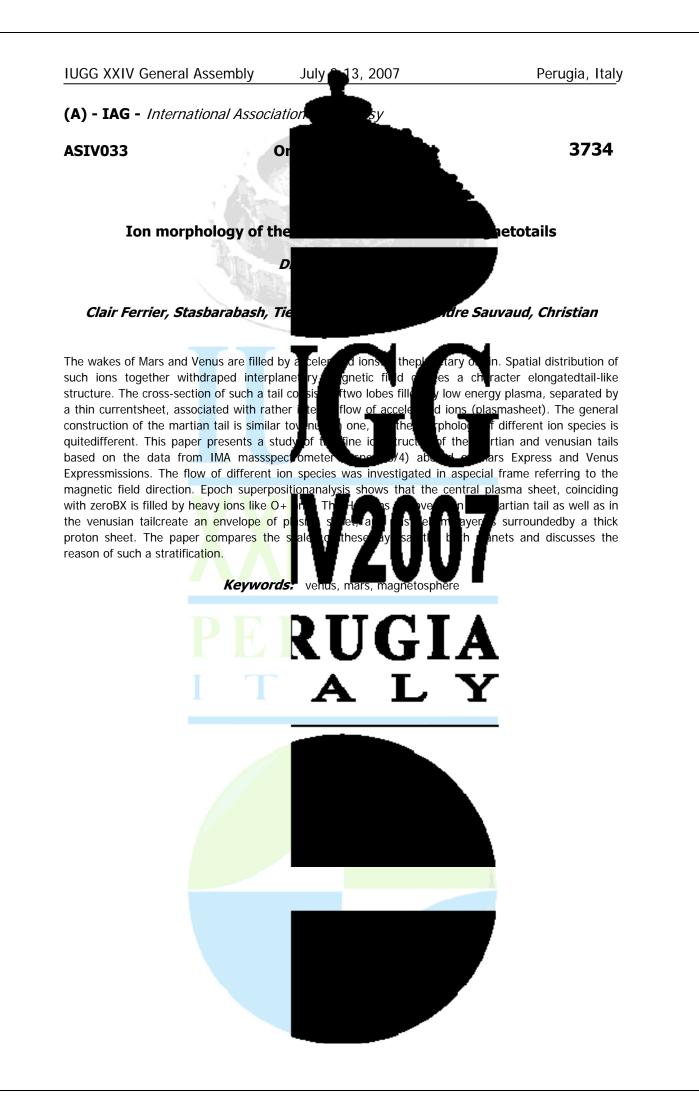
snare common physical processes with ion will be in particular 'he at Mare (e.g., Martian aurorae), and others, and expected results ncouraged. Numerous open issues nosp and ionospheric escape, and retical results, including sions (including Rosetta pace



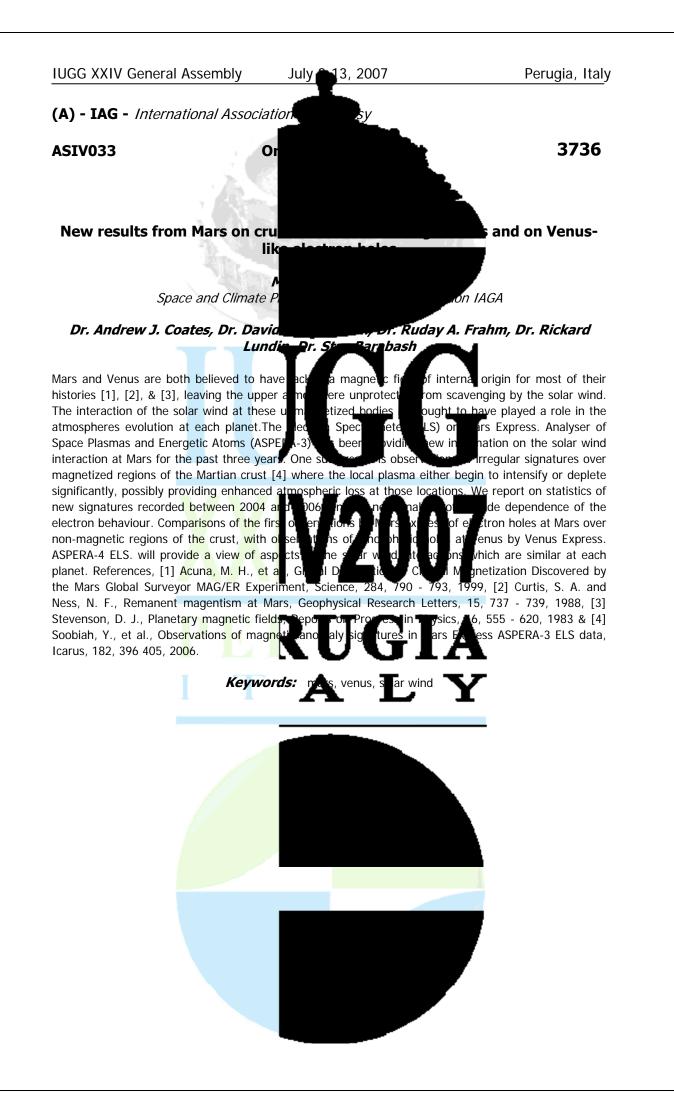


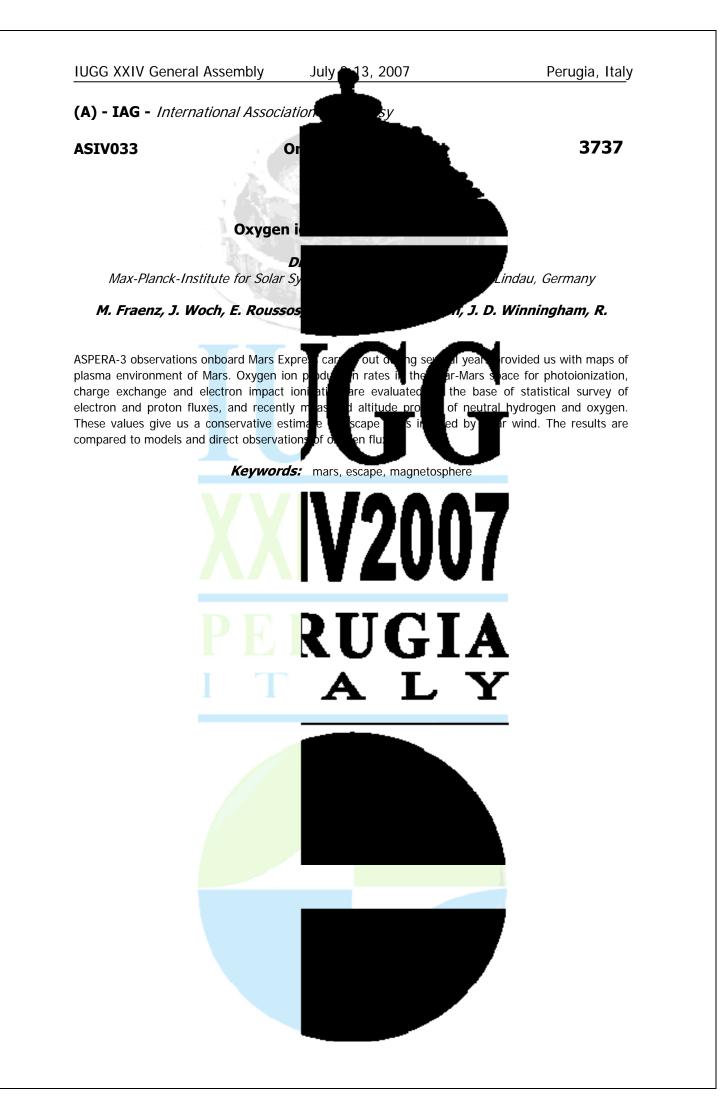


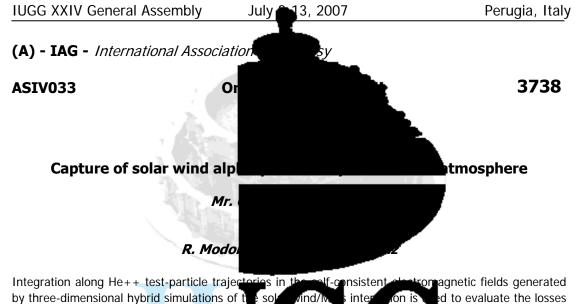






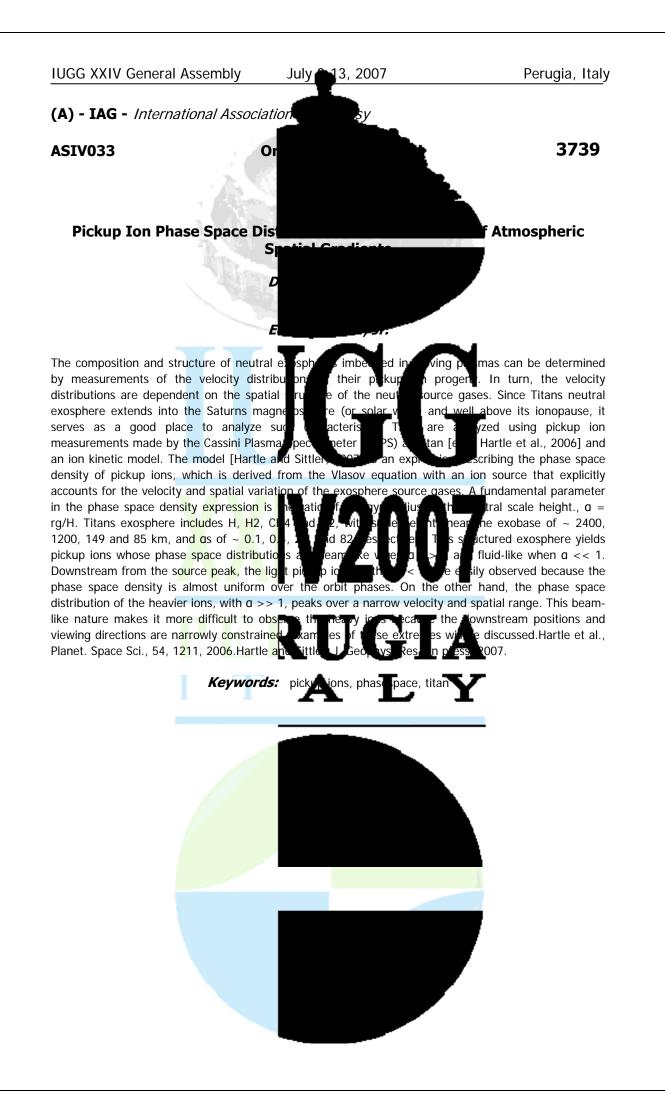


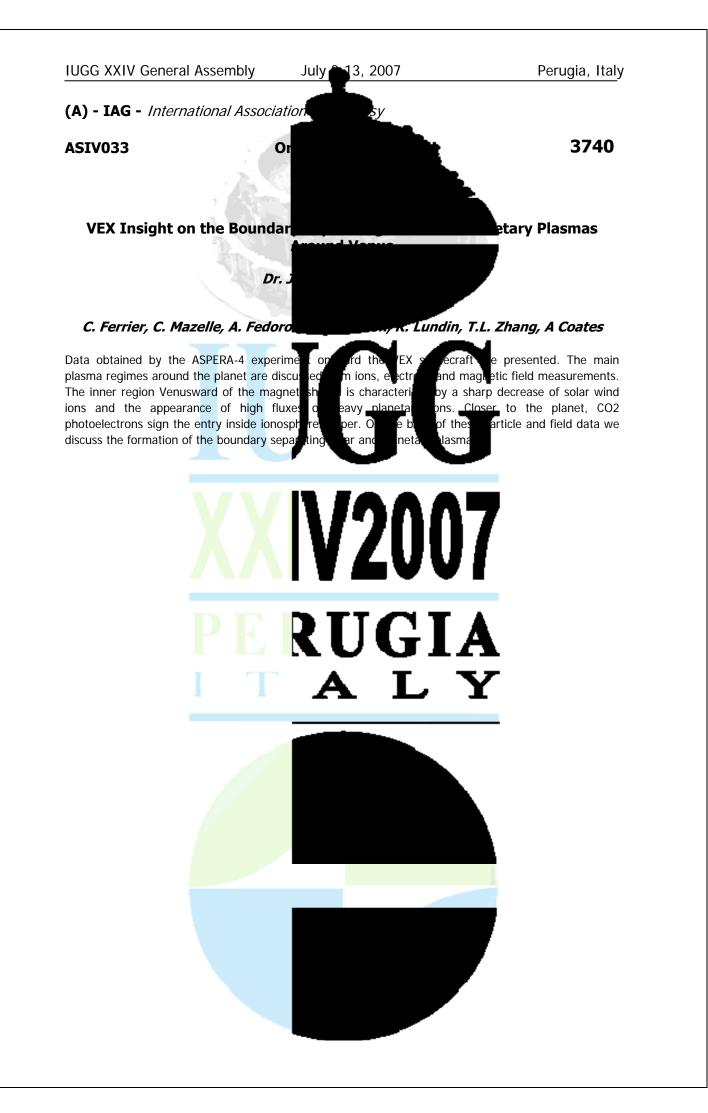


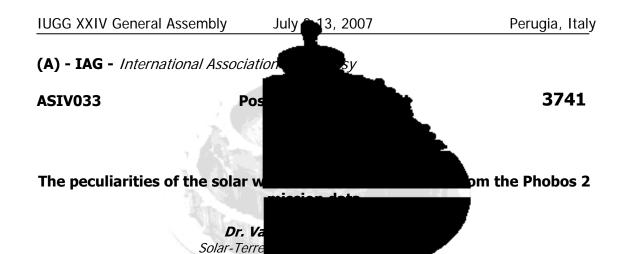


pproximately 30% of solar wind of solar wind alpha-particles due to charg nge prod -e alpha-particles impacting the planetary cro n are transf d into single-ionized and neutral helium, that corresponds to a total loss ra 6.71<u>023 s-</u>1. The flux of helium le++\_ions\_e neutral atoms, created by double electronic acting the exobase, and on e ygen, ies an important role of penetrating below where it can be trapped of 1 This 23 the solar wind source in the helium balance of the mplantation of the solar tmosp helium on Mars shows an asymmetry related to the orientation of the motional electric field of the solar wind. -VSWBIMF .









The experimental facts contradicting the st wind are examined with the use of the data of the Phobos 2 expedition is unique during which he the plasma parameters near to Mars were a longest uniform set of data obtained on circ established which specify that Mars itself re with processes of the dispersion. It is ascer field in the Mars wake is directly proportional to

necessary to point out the same dependence from the velocity is absent. There is the dependence of the occurrence and disappearance of the magnetic field depressions in the wake from the direction of the interplanetary field. The standard repr a comet-like or a magnetosphere-like are if the plasma density exceeds a critical va solar wind plasma ahead of the Martian points to the solar wind with the density directly.

on the rd po hobo sate ultaneou me Besides, the its at<u>2 radiu</u>s an ol ble t at rad of th

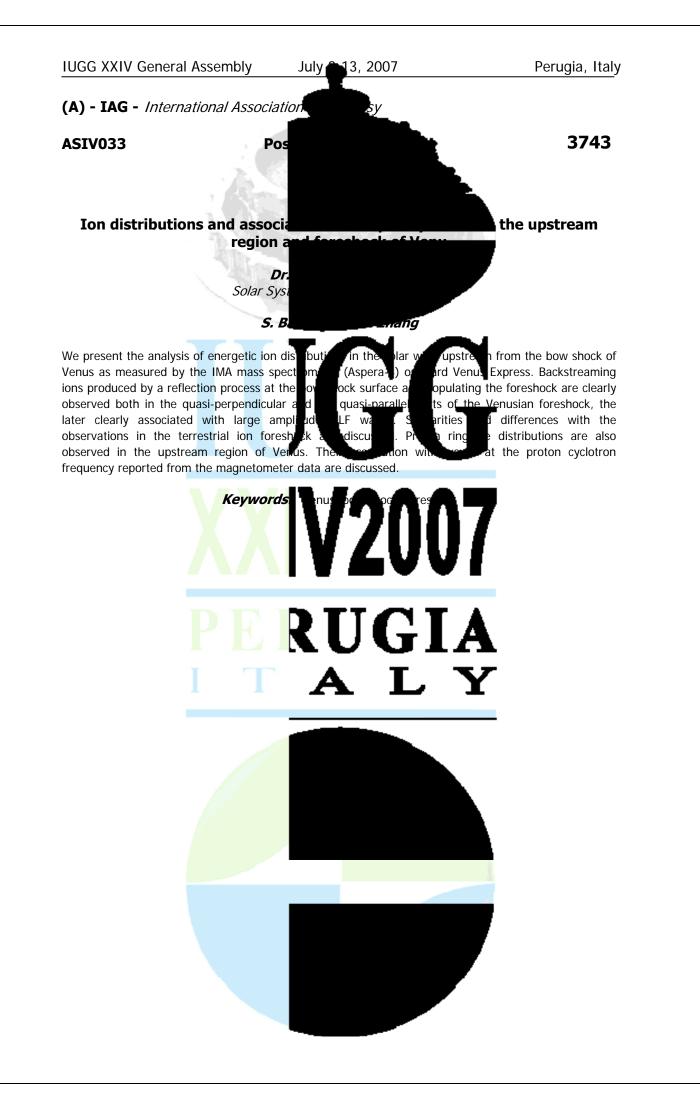
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on of Mars with the solar cessary to note that the It is ements of the magnetic field and ue of the data is that there is the Mars. The experimental facts are e sola nd as the physical body s of N the perturbed magnetic solar wind plasma. It is

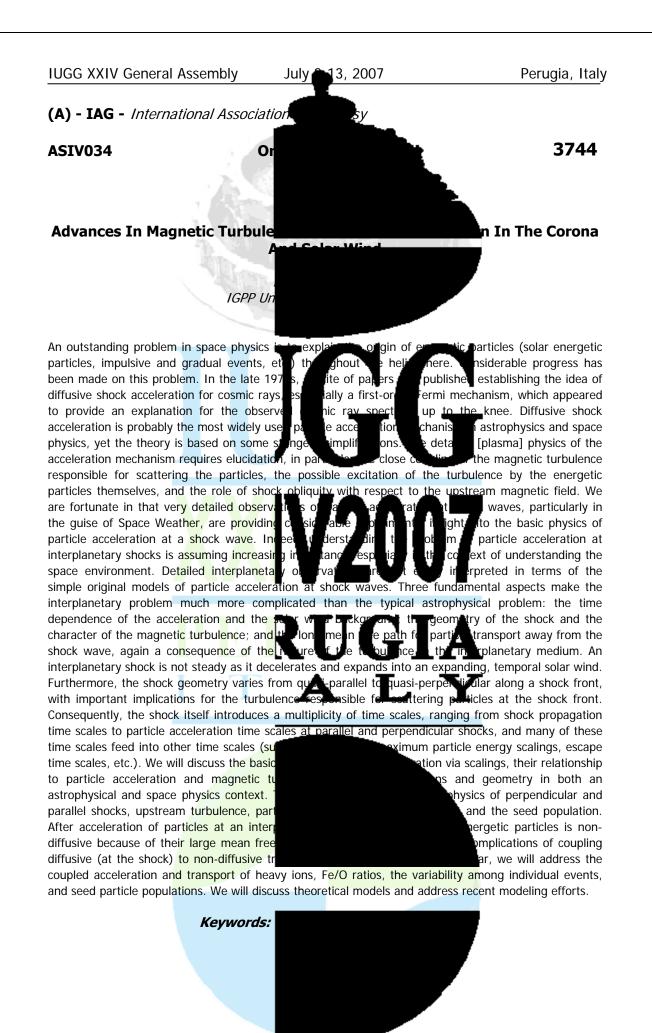
> with the solar wind as al facts. It is found that the accumulation of the of the magnetic pillow the Martian atmosphere





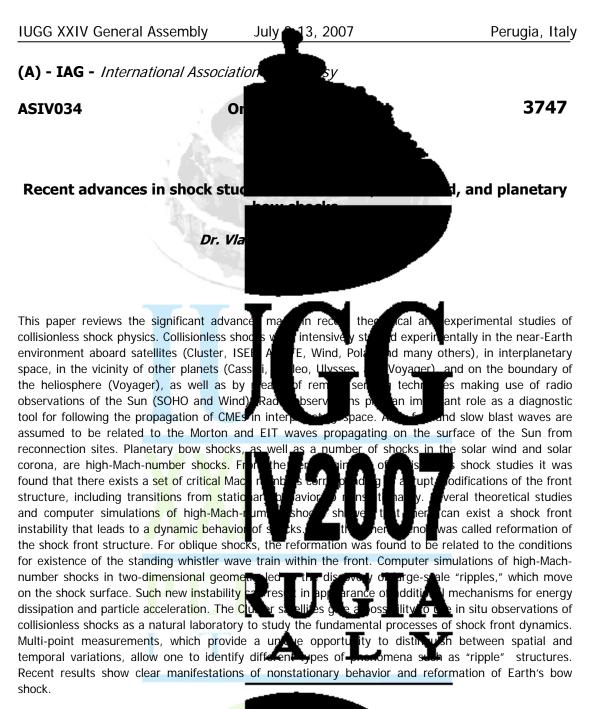


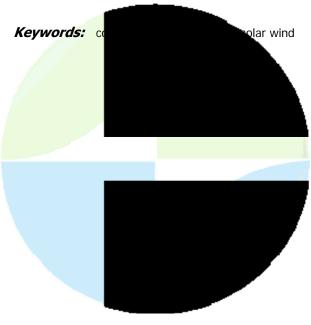












## IUGG XXIV General Assembly

Perugia, Italy

3748 - 3791

(A) - IAG - International Association

## **ASV035**

Symposium The role of magnetic observato magnetic field

**Convener :** Dr. Jean-Jacques Schott Co-Convener : Dr. Pieter Kotze

Magnetic observatories specialize in meas time providing one-minute or sub-minute s types of users of magnetic observatory da addition, a large amount of data now come the role of magnetic observatories? What in and the availability of data from satellites or welcome contributions that examine these required by the user, the coordination of ot

and other campaigns, and the types of instru

from s irveys. L act the c aina burces h ve ( is from all po ries and othe equi

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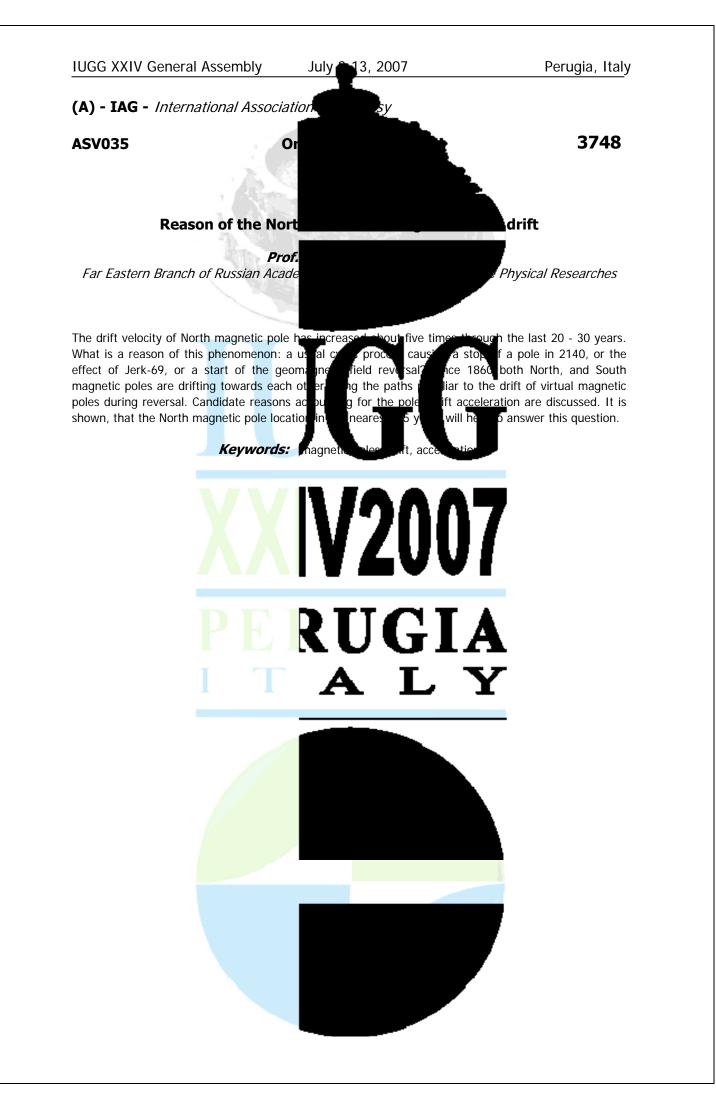
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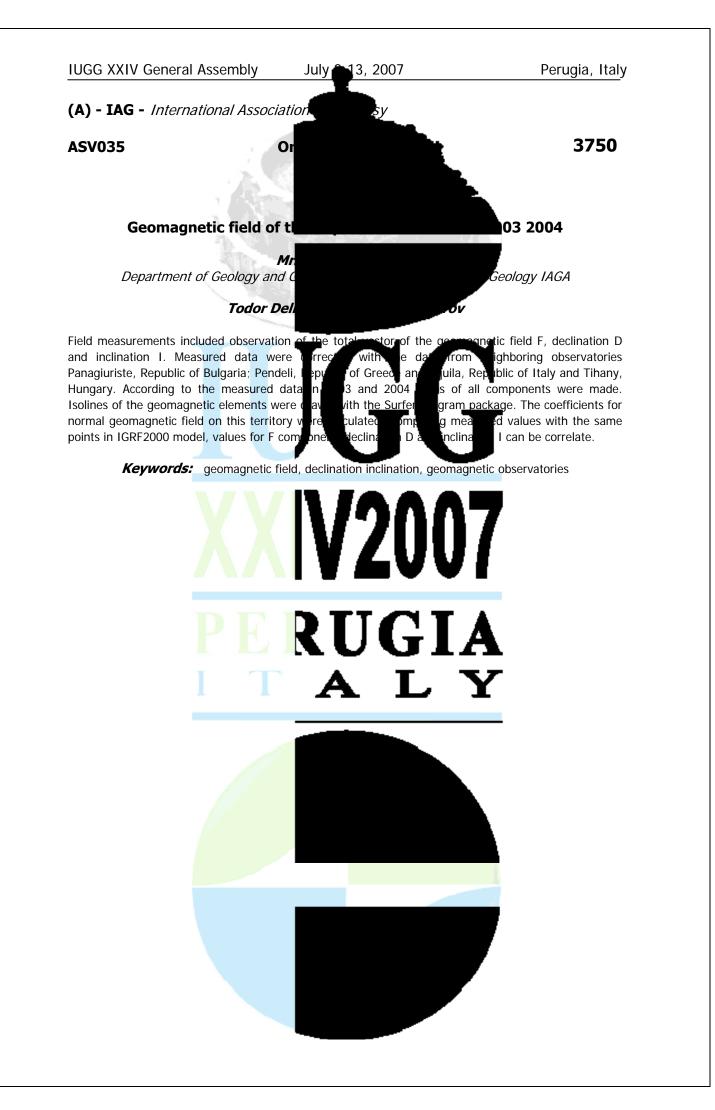
The field while at the same pid variations. Over the years, the which they put the data have changed. In these changes affected

deling Earths

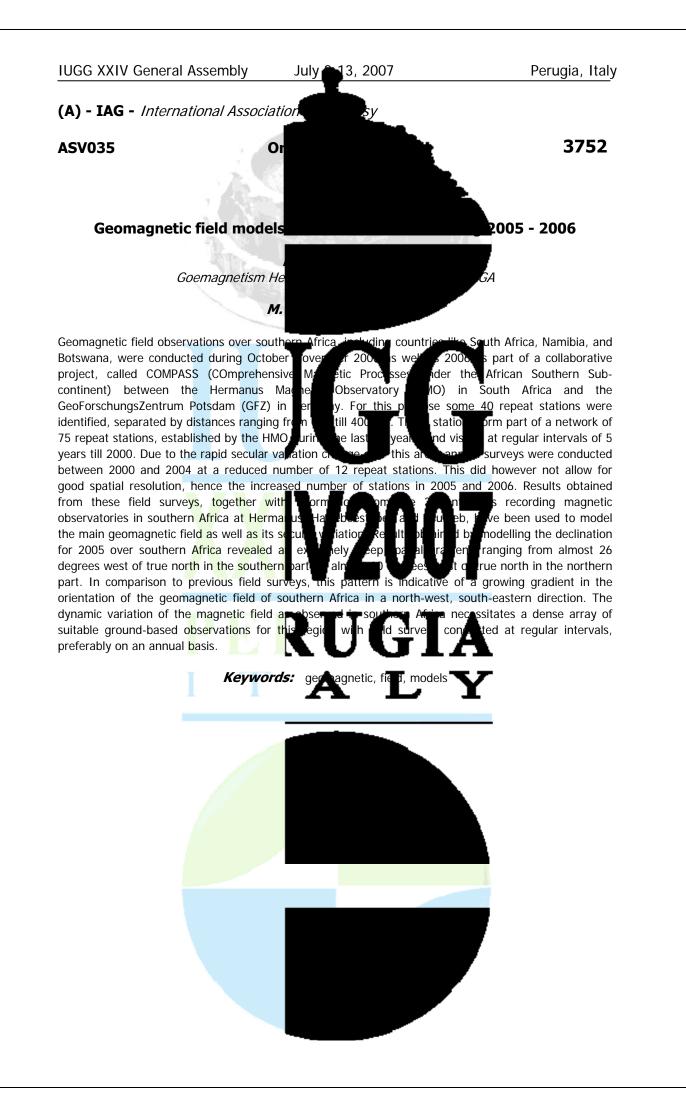
s of the user community lirem ound magnetic observatories? We of view, such as the type of data bund magnetometers with satellite e th

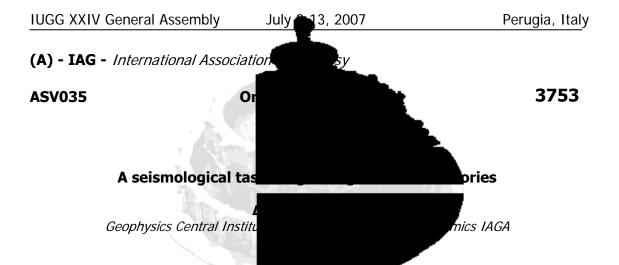












Continuous recording at geomagnetic obse the geomagnetic dynamo, with solar-terrestrial particular dynamo, with solar-terrestrial particular dynamics and solar observatory data are indispensable referen eventually provide essential data related to crust, too? The presentation is going to ind values at observatories for seismological pu which have been obtained in studies per

Meteorology and Geodynamics, Vienna, and Geomagnetic variations in three time ranges, daily the changes of seismic activity in almost every earthquake region, which has been studied so far. The data of observatories within a distance of 100s km and even more than 1000 km have been used for this analyses. The starting point for the inv a clear and systematic variation with time 1971; Duma, 1996). In the past, the few But any dependence on local time logical powerful influence on the dynamics of the Earths lithosphere, are of course the tides. considered a basic and general source that triggers earthquakes. So, what else does? It was the

astonishing observation of an obvious synd seismic activity (Duma 1996; Duma and Villado electromagnetic mechanism that links both energetic point of view. An answer to these confusing observations has then been given by a quantitative model of telluric currents in the accompany all the geomagnetic variations in all am model indicates the generation of mechanic forces (Lorentz forces) due to the telluric currents and a resulting mechanic moment, the amount of which is comparable to that one caused by tectonic deformation itself. Observational results a and N-America and they are compared w Seismic Effect for the geomagnetic diurnal

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gnetosphere. Additionally, But do observatories sur ynamic performance of the Earths utinely recorded geomagnetic field s novel considerations are results he Central Institute of cal institutes worldwide: m, are closely related to

mily to study phenomena associated with

eismic activity exhibits hrad, 1932; Shimshoni, h were without success. process which exerts a I origin, which act on the studies reveal that tides can not be

thesis of a magnetic or

nagnetic variations and regional

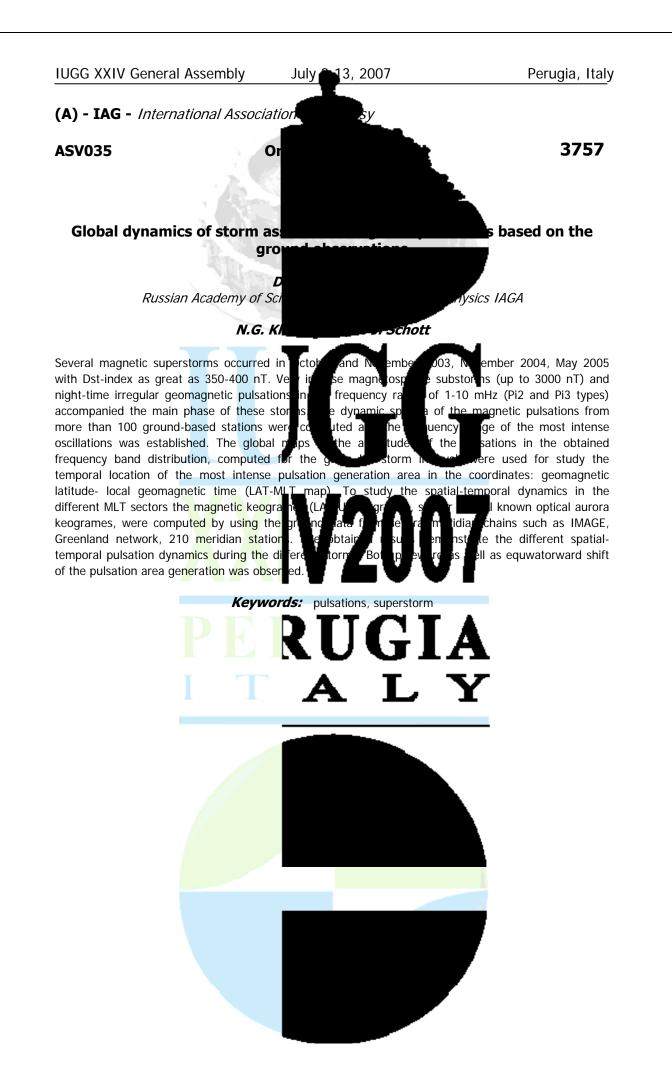
m reasonable from the d s ŋ Arths lithos here (Duma and Ruzhin, 2002) which Maxwell equations. The erding to main earthquake zones in Europe, Asia el, which simulates this Magnetovariation.

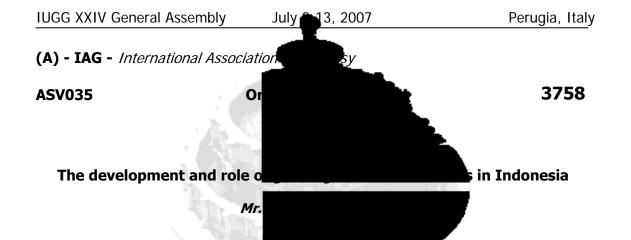
Keywords:











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Geomagnetic observations in Indonesia ha Geofisika (BMG), and started in 1866 during Dutch, The first observatory was conducted at Bat via (

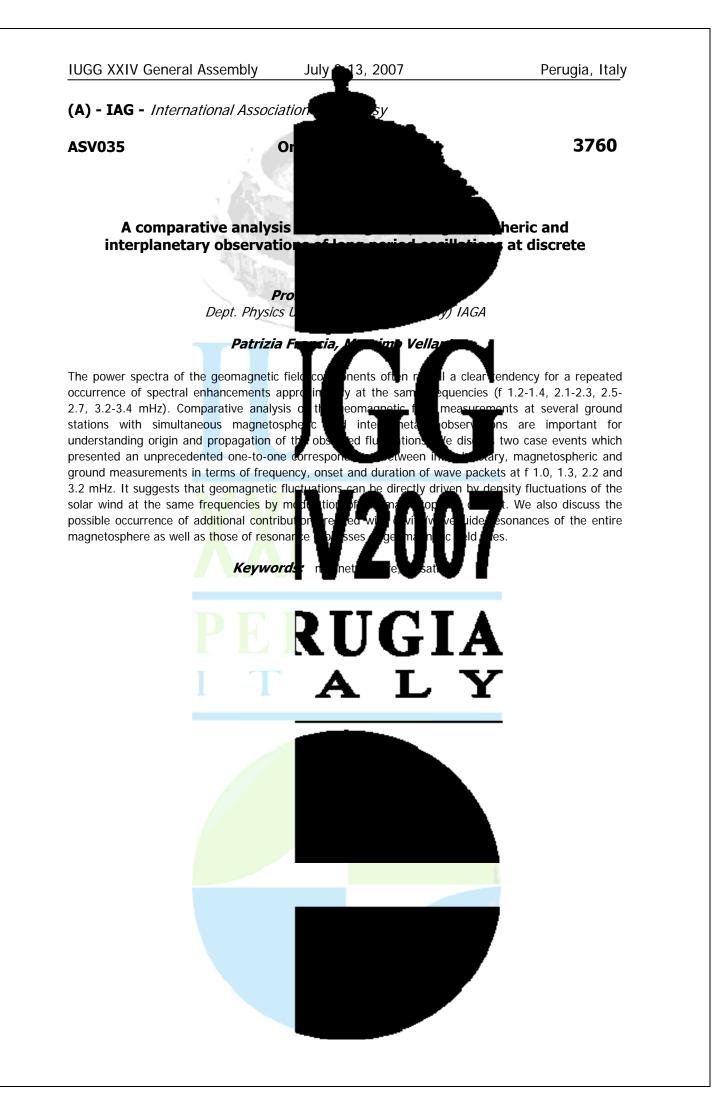
respectively. In the last ten years there observations conducted by BMG, especially system. BMG has developed two new geom Kupang observatory is located in the region observe the geomagnetic phenomena alo region. In the mean while, the Pelabinan Ra

observations at Tangerang Observatory which has been contaminated with the local disturbances such as electric railway and other developments of the Tangerang town. Pelabuhan Ratu is located in the West Java Province, about 150 km south geomagnetic observatories, Tangerang, operating two new observatories , i.e : Ku observatories in Indonesia is to provide da communication, mapping and geophysical ese be accepted amongst the best observatories in member of the global geomagnetic community.

and developed by Badan Meteorologi dan f terrestrial magnetism. Kuyper and Tangerang o Boo provement of the geomagnetic quipments from analog to digital Kupang and Pelabuhan Ratu. The Timur T) Province is aimed to of eastern Indonesian mispl ry will take over the

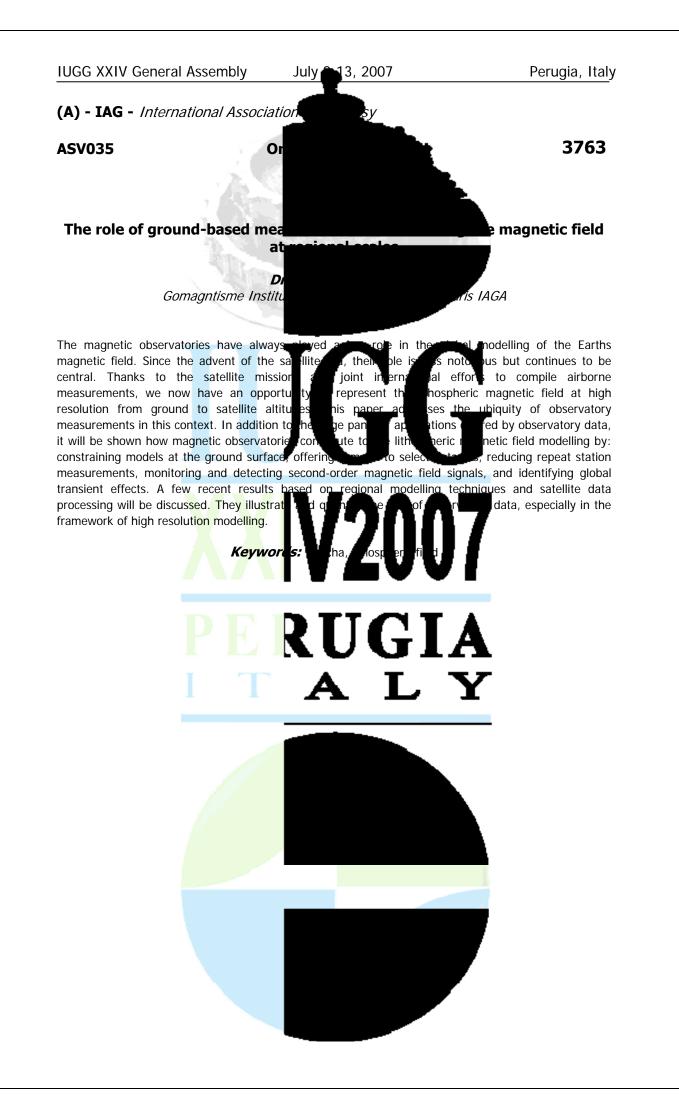
> eady operated (three) (Manado), and will be he role of geomagnetic dealing with navigation, acity BMG is planning to seen as an active and respected

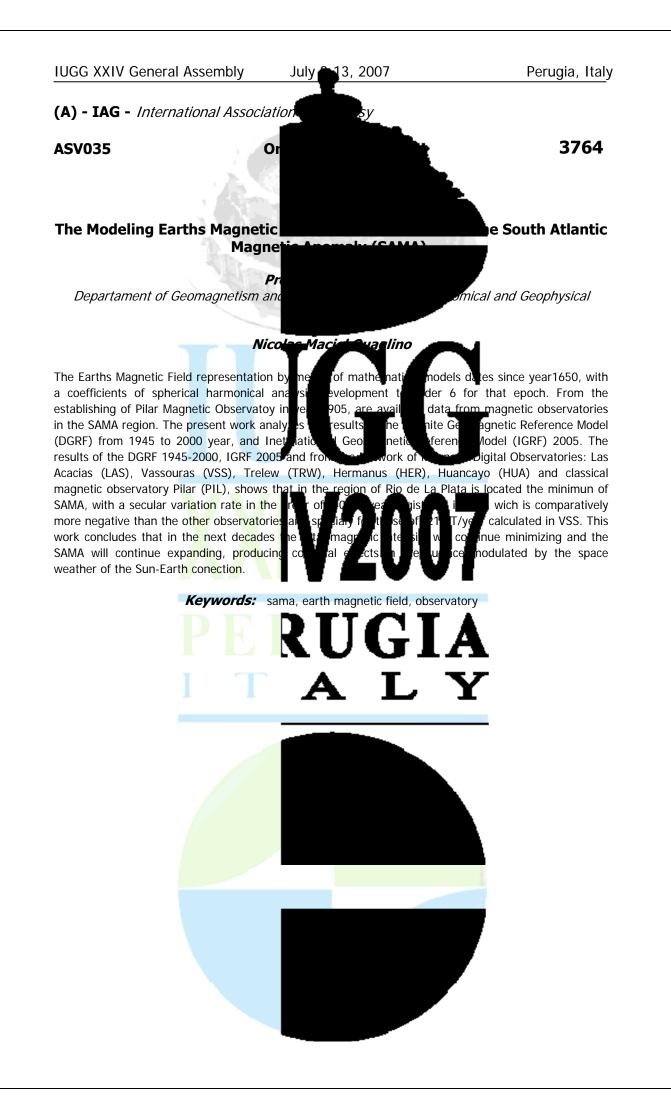


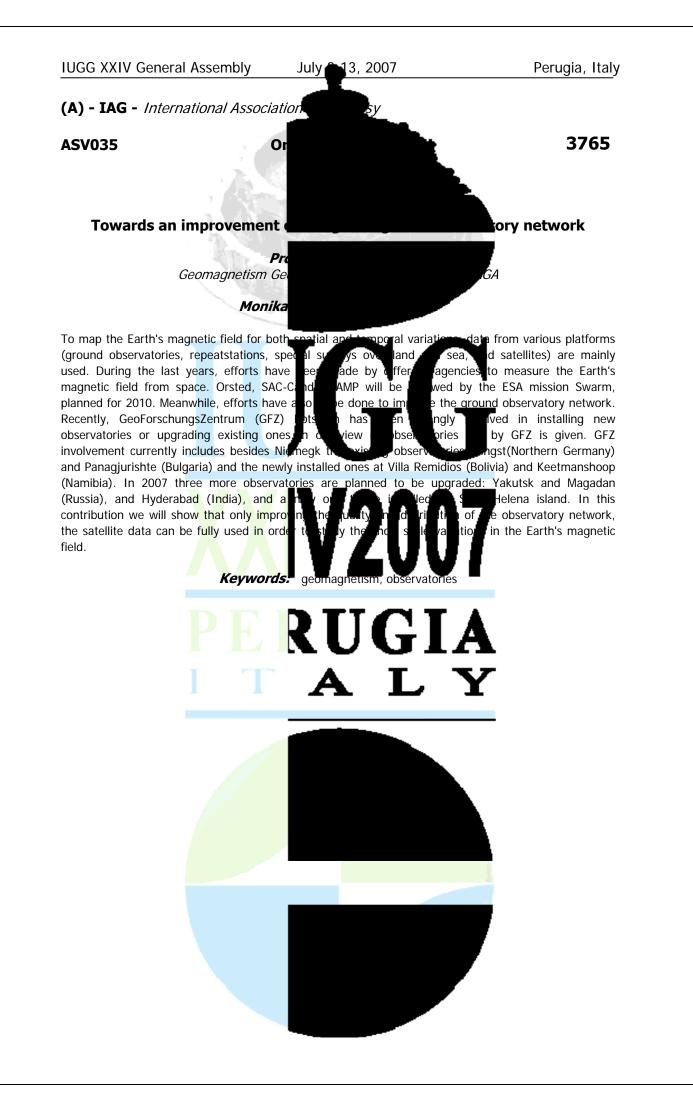




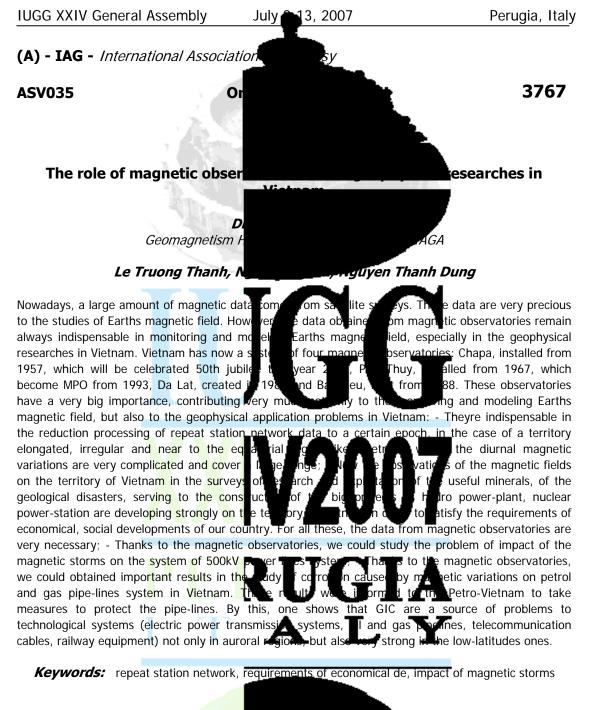












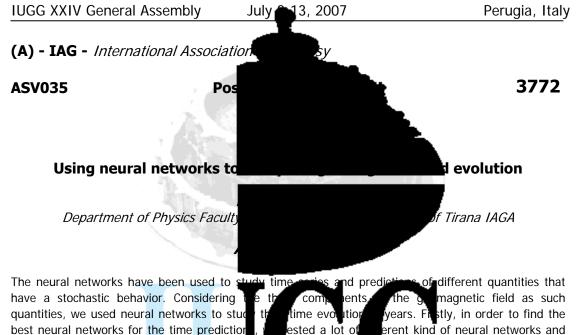












different ways of their training that are pa athLa<u>b softw</u>a As in<u>put and</u> target data we used those simulated by the Gufm1-model at dif blaces long Ear annual values of the geomagnetic field co Fc neural bbd forward back-propagation' and 'cascade-forwar pagati prediciton of more than 20 years with several nT accuracy was achieved, Then we used such networks to predict the values of the annual means of the geomagnetic field components beyond the time registration periods of those Geomagnetic order to predict a time evolution of the gld Geomagnetic Observatories, chosen to have over the Earth, filling out the missing value dù was chosen) by using the 'cascade-forwa geomagnetic observatories' in the places where eal Geomagnetic Observatories were missing by using the same kind of neural networks for the same time interval (1960-2005). Then, using neural networks, we have predicted the time evolution of the lobal geomagnetic field beyond 2005 with accuracy that depends on the time 10

prediction the accuracy goes from 10 nT to

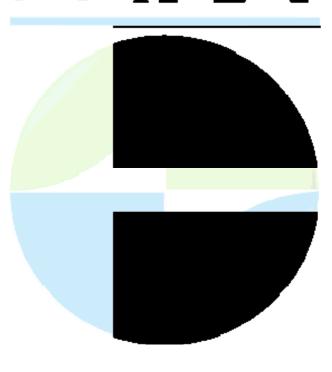
rks) a time evolution eries registrations. In d annual means of 105 hd been well distributed interval from 1960-2005 also added 139 'virtual

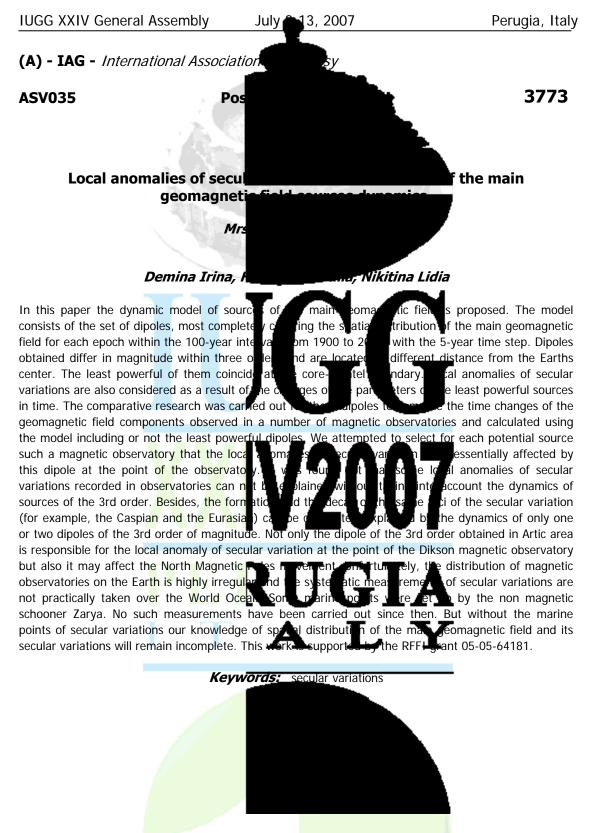
prediction to 20 years

e series (1600-1990) of

works (so called 'feed-

Keywords: geomagnetic field mode ield prediction ural netvi deomad

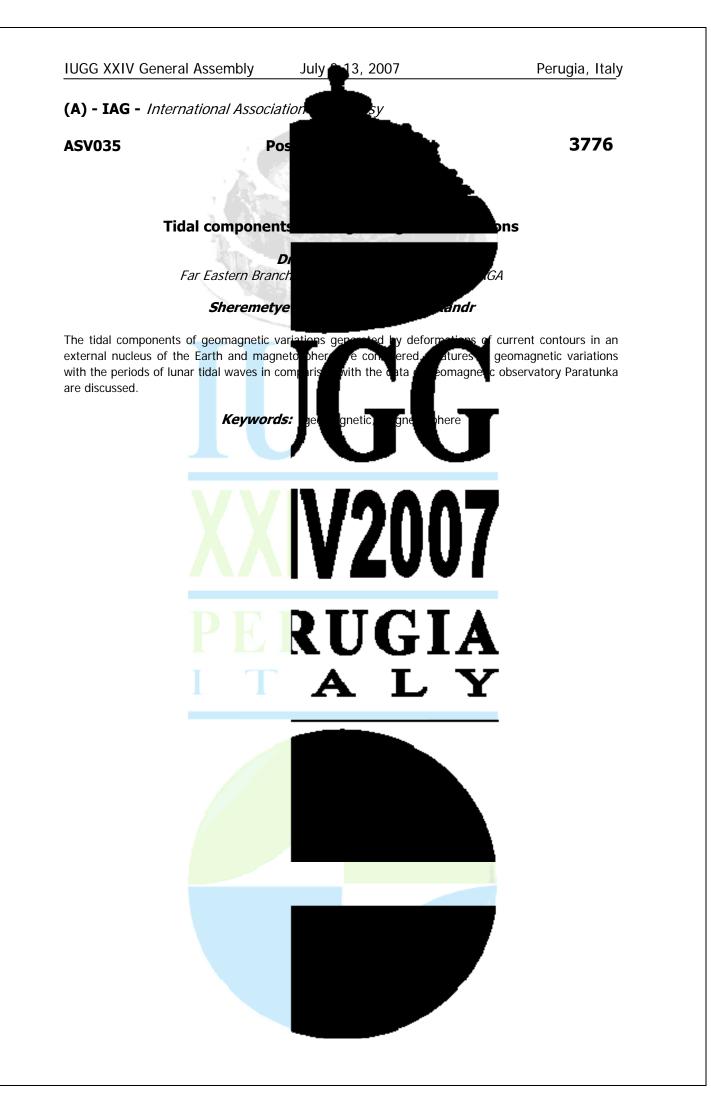




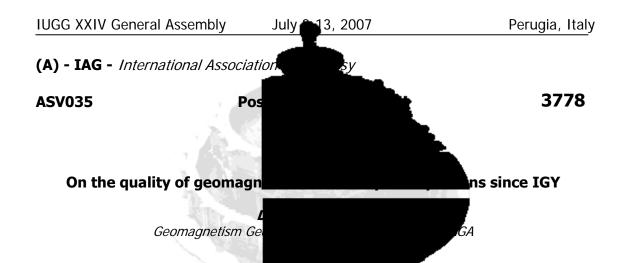












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Long time series of geomagnetic observatority hou purposes, e.g. inductions studies, investigations estimate the core field and secular variatio data. Hourly means are conveniently availab is mandatory to check their quality prior problems, technical or cultural disturbances common sources of errors in the data. Such series is analysed only. We are working or a proje

we had concentrated on the recent years, after 1995, and had mainly used a method of intercomparison of neighbouring observatory data to detect problems. Although many observatories had reached INTERMAGNET standard by that time, a nu World Data Center C1, Copenhagen. The d data users and with the request to the corrected. Currently, we are mostly applyin a global model and checking individual tim of this project and present information of rec data.

values ie tir than fro World Data G ng th<u>em. L</u>es so sim n data ften a erro ot all ava

nterest for a variety of ields, and as a basis to xtern ly or an ual means based on all rs, but particularly for older data it ecise older devices, instrumental insmission are the most when an individual time ly means. In a first step

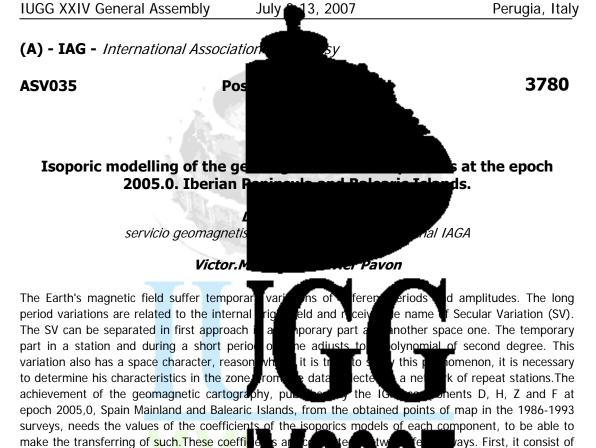
problems in

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in the files held at the a table as reference for hether the data can be to predictions given by e report on the progress the analyzed observatory



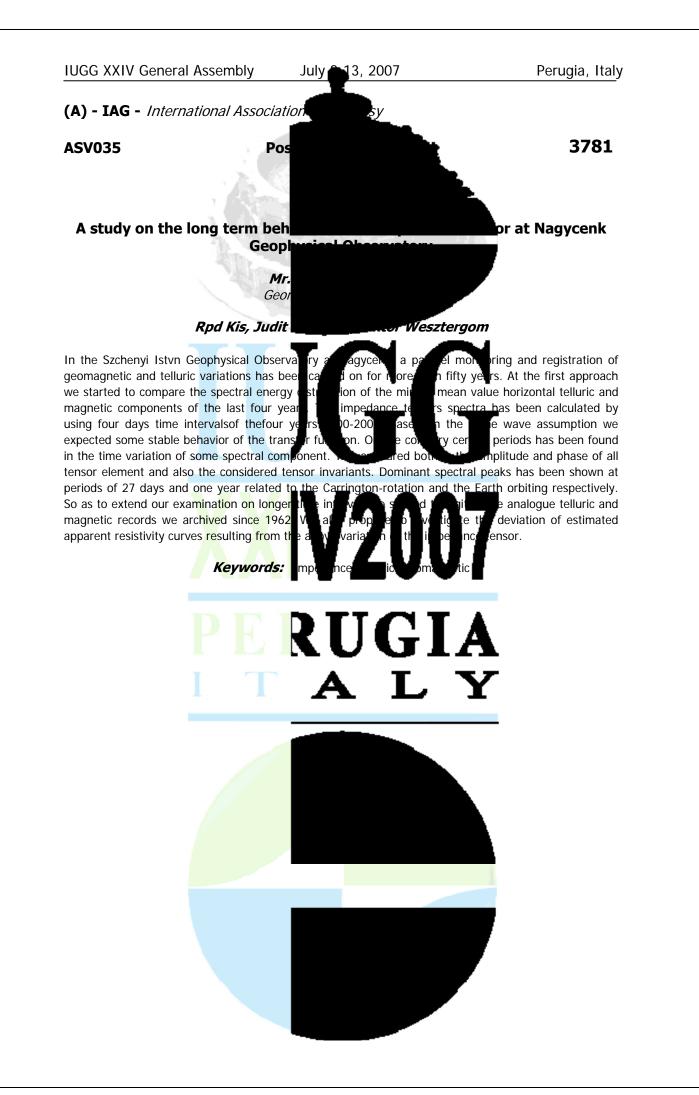




the resolution for each repeat station of the degree, surroundings to the reference state method that applies the spherical cap has zone in study. In this work, the results comparative study among them.

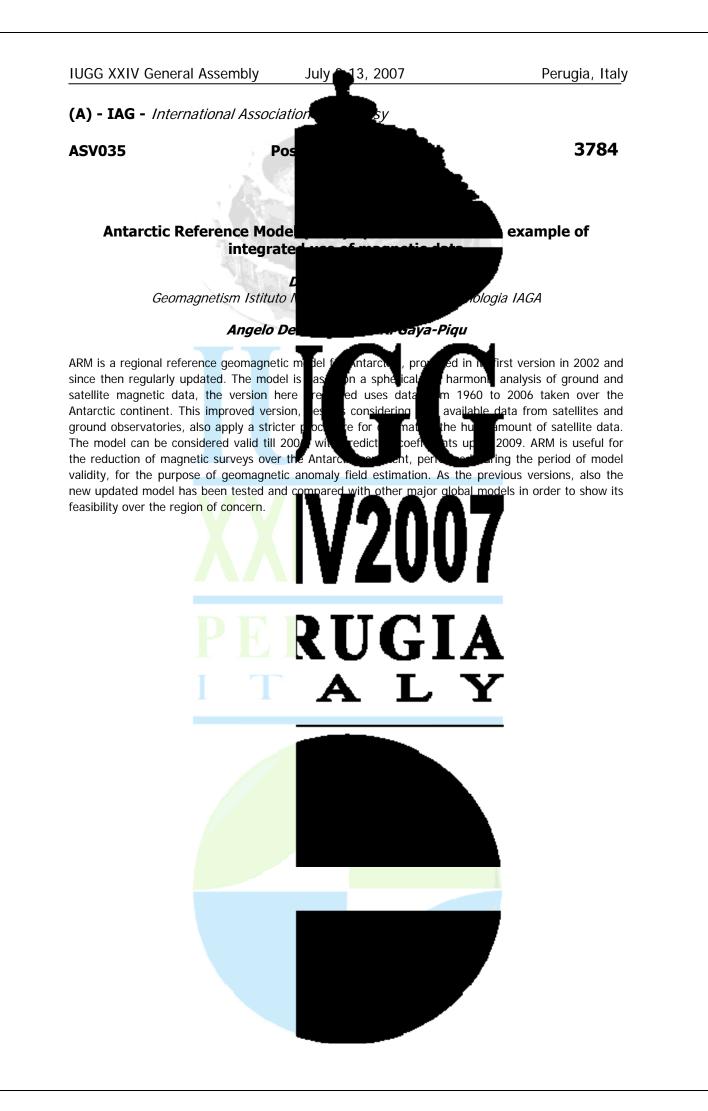
ens and constants of a structure fe envision of the structure of ion that we manime ensisted non-unnally (StellAntaan op obtailed antaba structure a component, to be able to vays. First, it consist of this series until second equation. And a second at sufficiently covers the exposed, as well as a

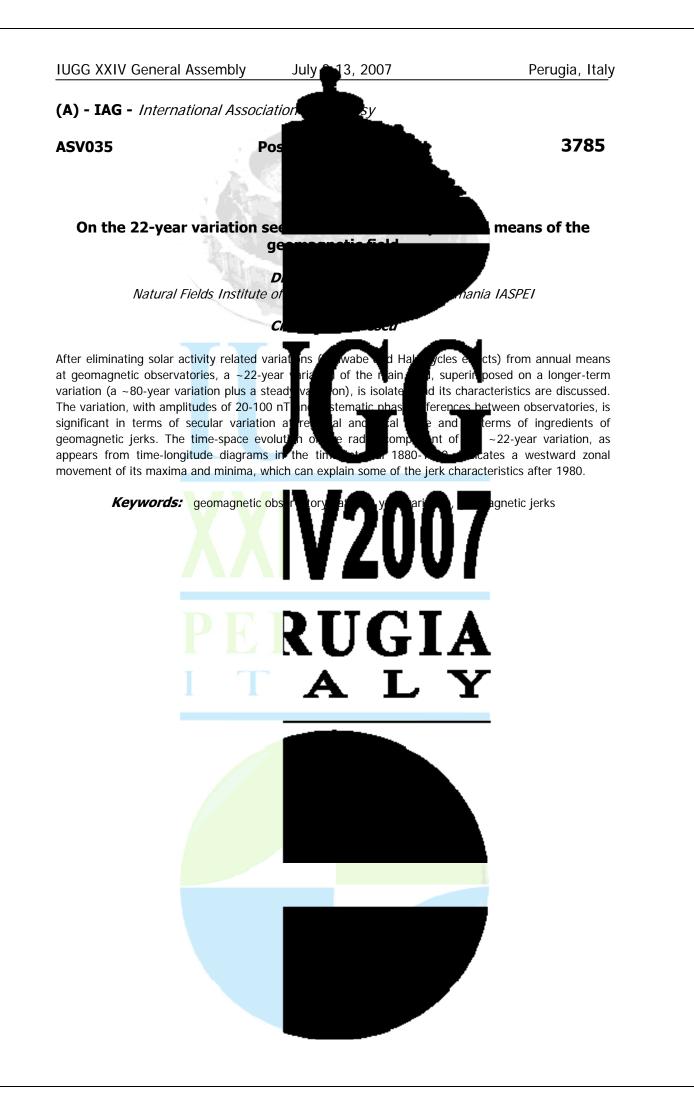




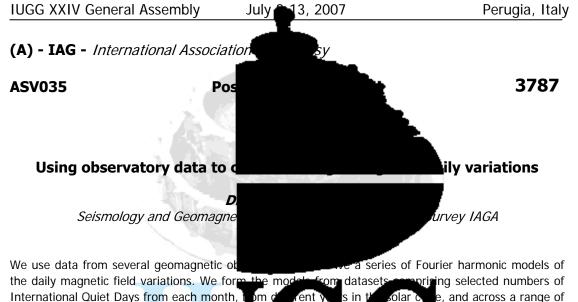










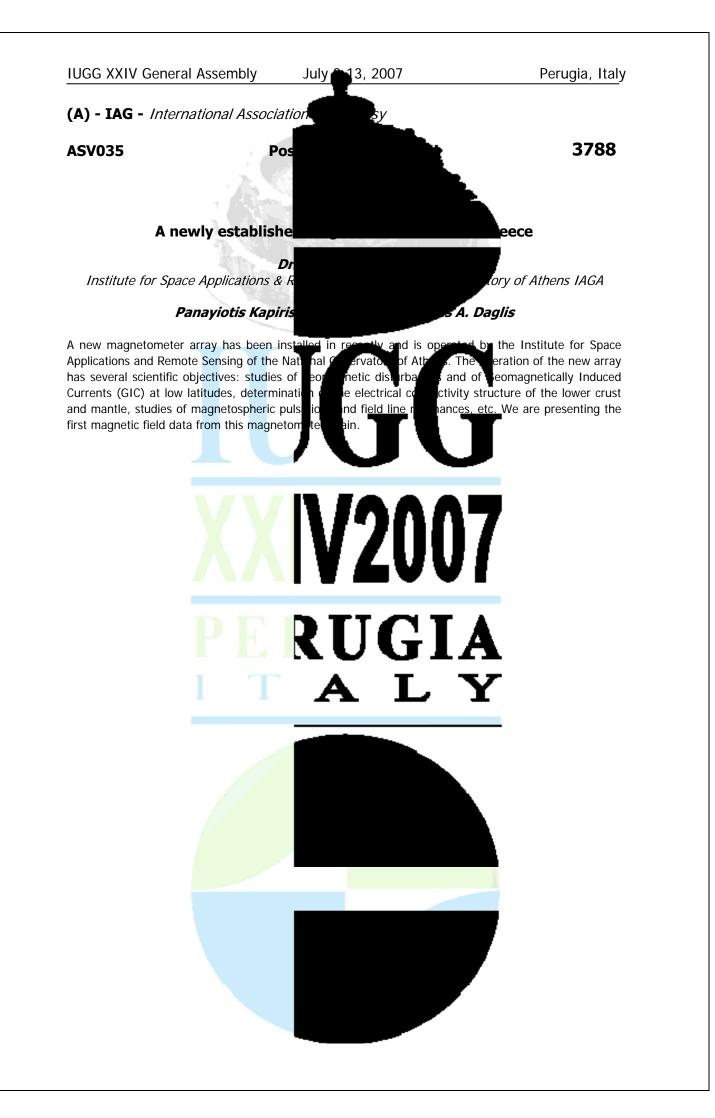


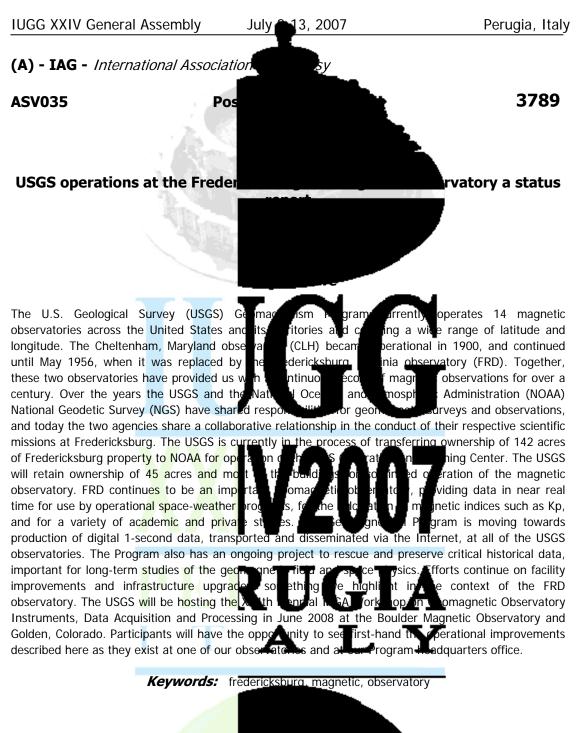
the daily magnetic field variations. We form the m International Quiet Days from each month, ibm d geomagnetic latitudes. The performances of th with the input data. We comment on the hp main field models for different seasons, solar cy investigate how these improvements depind Comparisons are made with the Compret insit approach, separates ionospheric sources using sation on the relative performance of each approach.

models from datase chartent y is in the nodels are ass ment in daily phases, and g the libe Model sion sature downs well

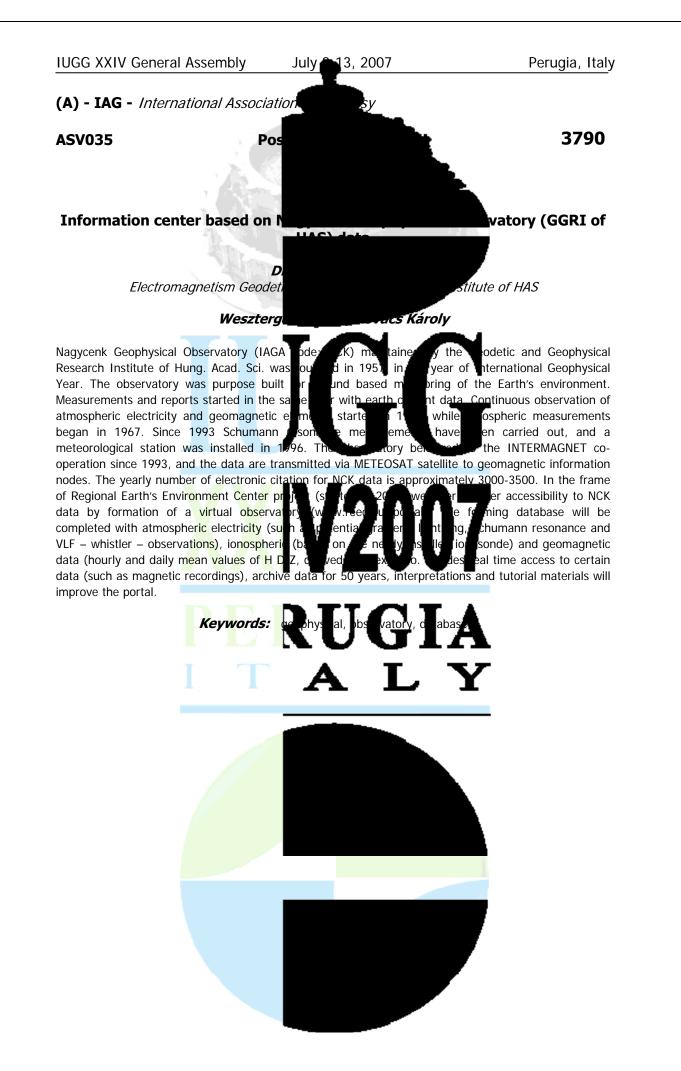
ts accepting selected numbers of solar cycle, and across a range of ed by comparing their predictions gnetic field estimates over purely agnetic latitudes. In each case, we International Quiet Days used. a global model that, unlike our cobservatory data. We comment

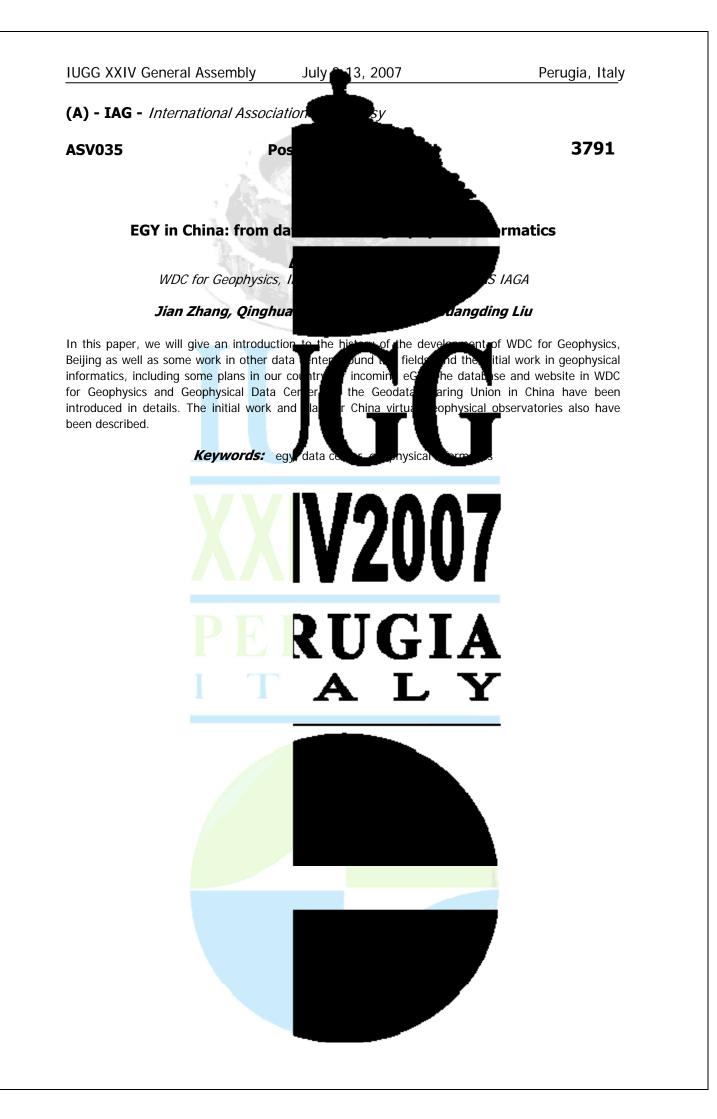












## **IUGG XXIV General Assembly**

Perugia, Italy

(A) - IAG - International Association

## **ASV036**

## Symposium Geomagnetic measurements in

Convener : Dr. Baldev Arora Co-Convener : Dr. Angelo De Santis,

Lack of measurement and collection of environmental, logistic and communicatio the search for the physical mechanisms variability of auroral and equatorial electro field and oceans on transient variations etc. This session focuses on data based and numerically based research suggesting essential configuration of geometric tations with schand and on ocean floor, to quantify such phenomena, particularly network; for example, Antarctica and the e measurements of geomagnetic field could i be of special interest, as well as discussions for the placement of the station. Papers des and decimation from the remote regio communication means are particularly welcome.

hg the trate al region.<sup>®</sup>Pap upon existing uniqu novel [n the lare

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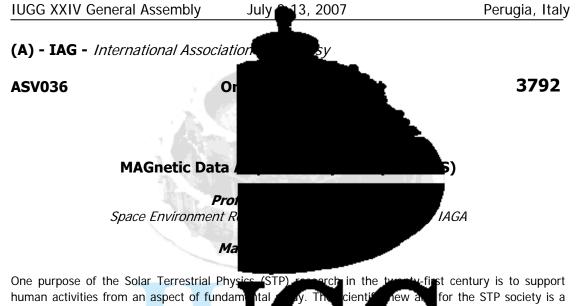
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ons of the earth due to escription and, thus, inhibit phenomena, e.g., space- time a low altitude coupling, influence main gaps in the existing observatory defining strategic locations where omagnetic indices and models will gion the scientific justification uipme modes of data collection ho power / electronic ted



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Keywords: ihy, magdas, magnetometer network

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cooperation with about 30 organizations in Year (IHY). The SERC will install the MAGDAS (MA the CPMN (Circum-pan Pacific Magnetometer Network) region, and the FM-CW radars along the 210magnetic meridian. Nearly 20 and 10 MAGDAS units were installed along the 210 magnetic meridian in 2005, and along the magnetic dip equ deployed in places such as South Africa. In MAGDAS is to become the most comp magnetic field. It does not compete with complements observation from space. To required. MAGDAS/CPMN are roughly aividea into logging/transferring system installed at the CPMN stations: MAGDAS-A system, (2) data acquisition and monitoring system installed in SERC: MAGE axial ring-core sensors, tiltmeters and them logging/transferring unit, and power unit. than 15 kg. The data transferring unit transfer the obtained data in real time from the overseas stations to the SERC, Japan, by using three possible way order to understand the complex Sun-Earth sur global dynamics of geospace plasma environment during magnetic storms and auroral substorms, the electromagnetic response of iono-magnetosphere to various solar wind changes, and the penetration and propagation mechanisms of DP2-UL equatorial ionosphere. The ordinary data long-term variations, e.g. magnetic storr bandpass-filtered data will be useful for st analyzing these new MAGDAS data, we c global 3-dimensional current system and electromagnetic and plasma environment d

creation of new physics, i.e., multi-scale cou

goals for the attainment of the purpose are

Modeling Stations for integrated simulatio

Center (SERC), Kyushu University started

composite Sun-Earth system. The ations for global observations and he <u>Space</u> Environment Research gnetometer network, in based ernational Heliophysical iod o h) units at 50 stations in

MAGDAS units will be Antarctica. The goal of system of the earth's s ground-based network nts, data from both are two portions: (1) magnetometer and data

> pe magnetometer, data etometer system is less

**Satellite** phone line. In

lives, we have to clarify

from the solar wind region into the tations can be used for studies of while the differential- and d impulsive phenomena. By and modeling of (1) the ty for understanding the nagnetospheric storms.

netometer system consists of 3-

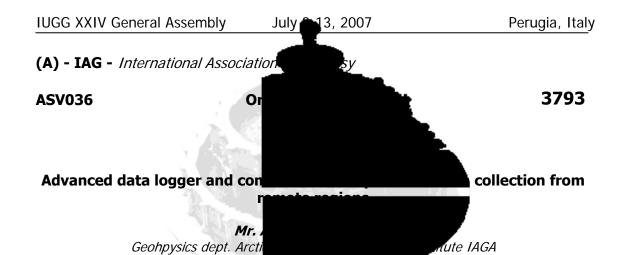
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The question on collection of reliable data The microcontroller data logger for geom problem. The logger is not sensitive to conversion characteristics, preset of sampli samples is one of the most important issue ensures the precise synchronization of th position on the earth. The logger can pr ensure the data surviving the flash memory card

limited power has been resolved by constant supplying the system from the recharging battery and small wind power generator (or solar panel) The on-line transmission of data was provided with proper communication system, which consists of the data by VHF radio. The system could well. The logger and communication syste one of the station providing data for AE-in Arctic and Antarctic stations and showed good This logger and communication equipment can be applied and field experiments.

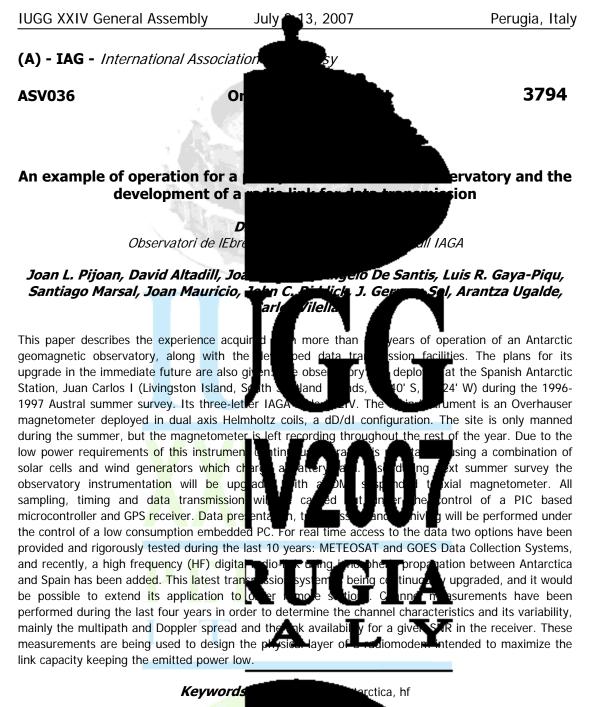
the\_ gions lik gne nent neasi tempera ure being up to logger. It in ing p S synd nou br relià

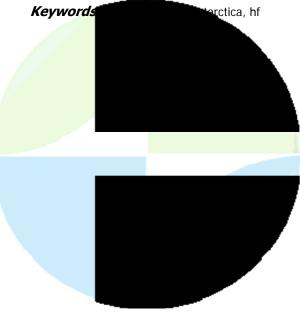
hd Antarctic is still open. developed to solve the bee has very stable analog-to-digital e tenth of Hz. The timing of data s the internal GPS receiver, which deter ation of the coordinate asure ht at distant points. To torage. The problem of

et modem transferring munication modem as tion Amderma, which is installed on some other course of year operation. many geophysical monitoring applications

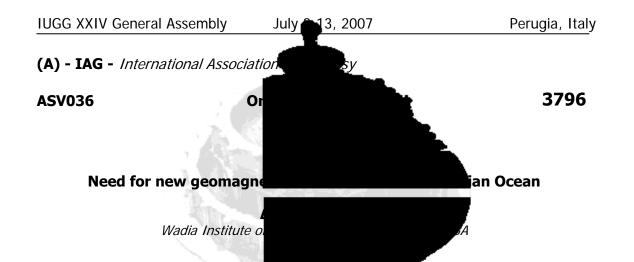


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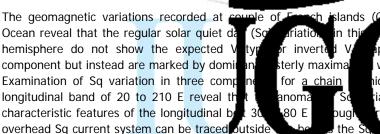






Ocean reveal that the regular solar quiet da hemisphere do not show the expected V component but instead are marked by domi Examination of Sq variation in three comp longitudinal band of 20 to 210 E reveal th characteristic features of the longitudinal by overhead Sq current system can be traced outside Australian to African sector. A detailed examination reveals that this anomalous deformation of Sq vortex, confined to narrow longitudinal sector, is also characterized by anomalous pattern of main vertical field component, a vital component mechanism. It is shown that the iso-magnetic circle of latitude tend to align in N-S dire anomalous behavior of Sq-Vortex to the n observatories at strategic islands or at Oc

current system.



erquelen) in the Indian igitua sector of the southern ped variations in the horizontal westerly minima in the afternoon. id-latitude\_stations\_encompassing iation escribed above, are the tain d acteristic deformation in ed with Sun moves from

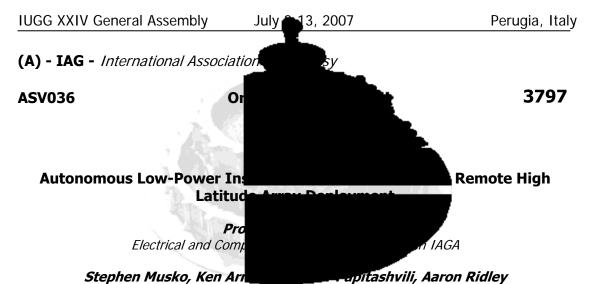
n through the dynamo at otherwise follow the kely mechanism for the establishing geomagnetic emphasized to quantify ynamo mechanism responsible for Sq



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A major driver in the advancement of geoph of data for use in scientific analysis, discov physical models. The need for more and be capabilities are driving the ambition to deplo remote regions. This is particularly true in t due to the remoteness, lack of infrastruct

mpr for assi ilat surements to of autonomo regio h harsh 0 acquisition of continuous long term data from remo ation

e quality and resolution ent i nto or validation of empirical and er with improvements in technical eophysical instrument platforms in easur hts are presently sparse envi nent. The need for the s geophysical disciplines

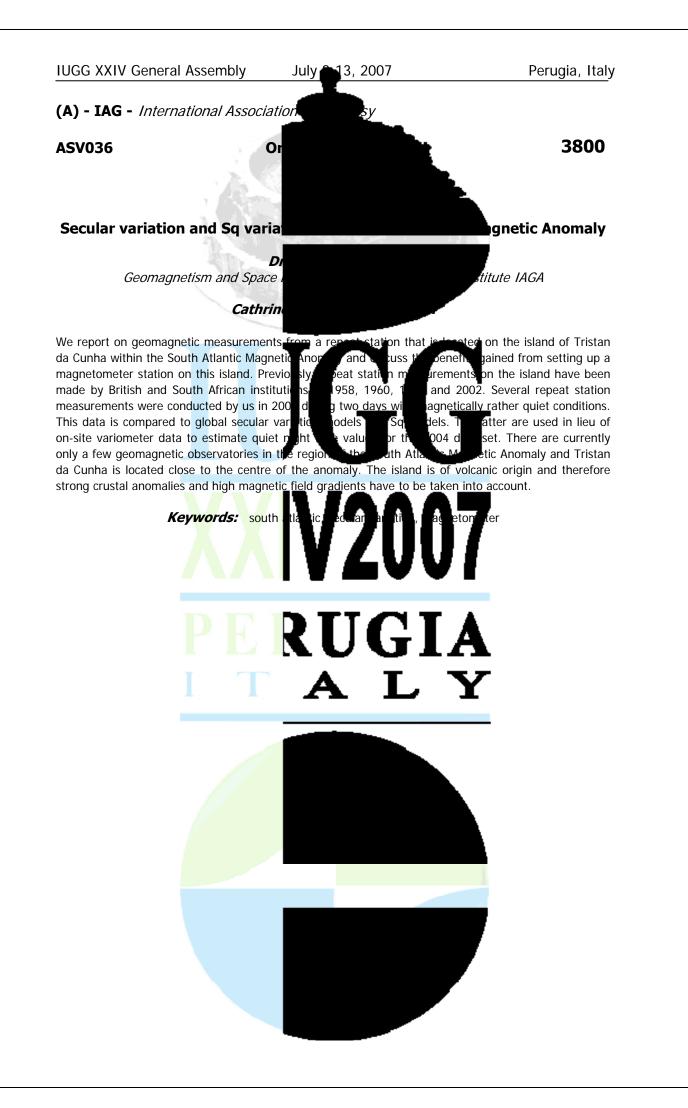
platforms in polar environments is still in the incipient stages of development. We report the development of an autonomous low-power being tested at South Pole with the goal o along the 400 magnetic meridian. The syst lm' provide data access via Iridium satellite co hm of the magnetic field variation (0.1nT reso utio status and environment parameters. The design and design research plans.

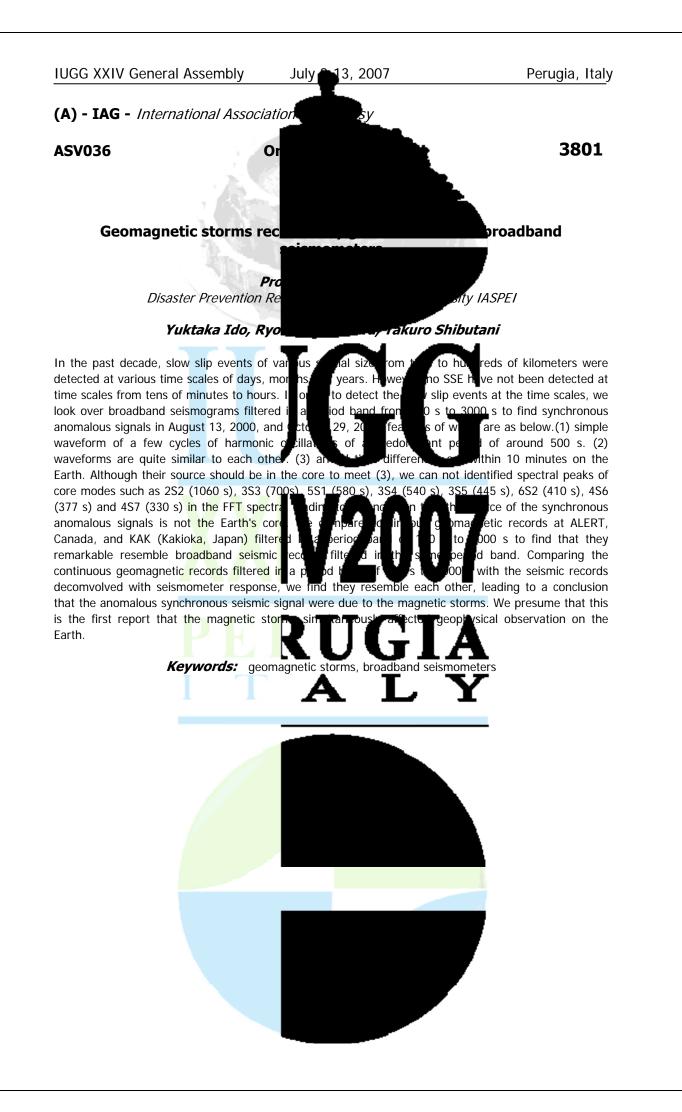
and is a generic infrastructure problem. The infrastructure, however, to support autonomous instrument prototype is presently In the Antarctic Plateau years unattended and to 1-second measurements a variety of engineering will be discussed along with future

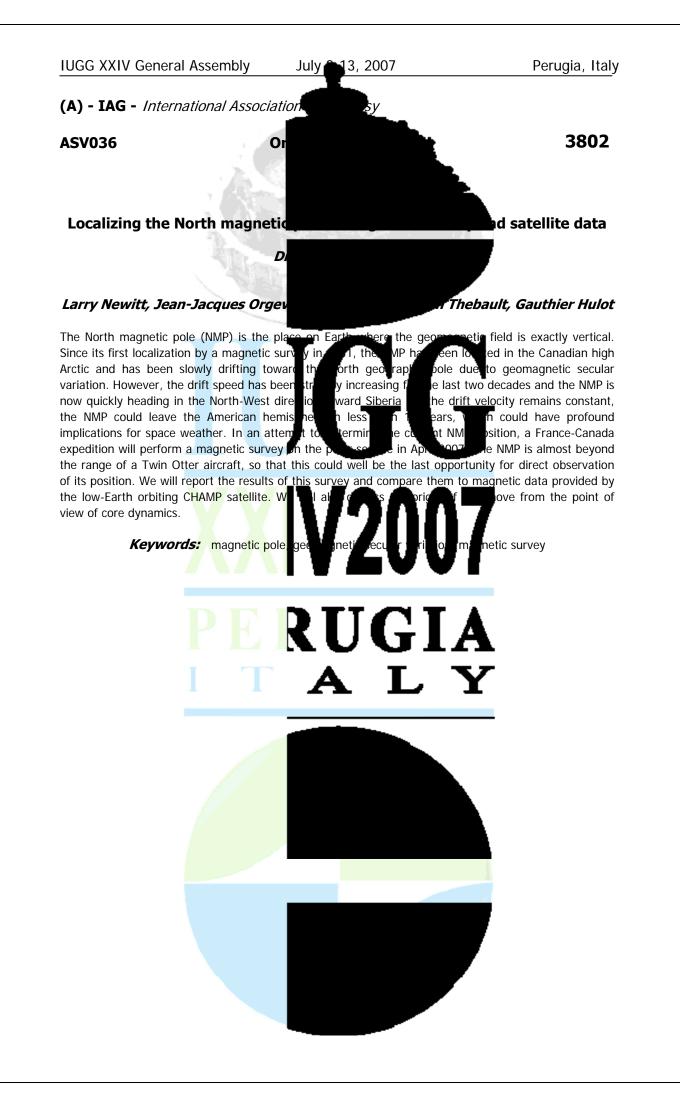


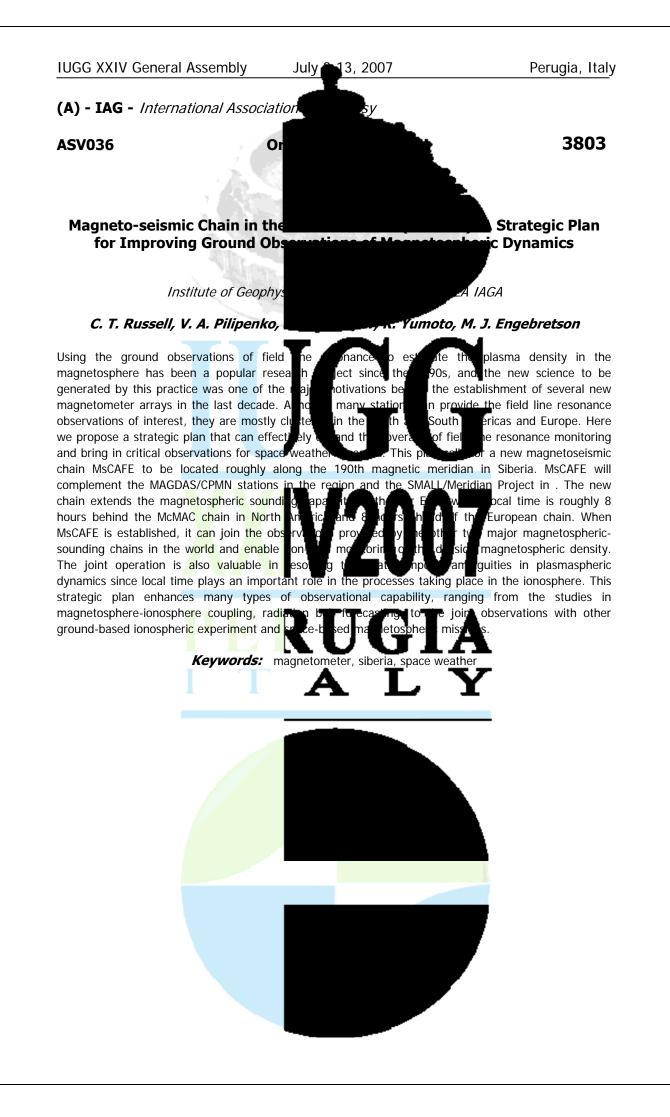


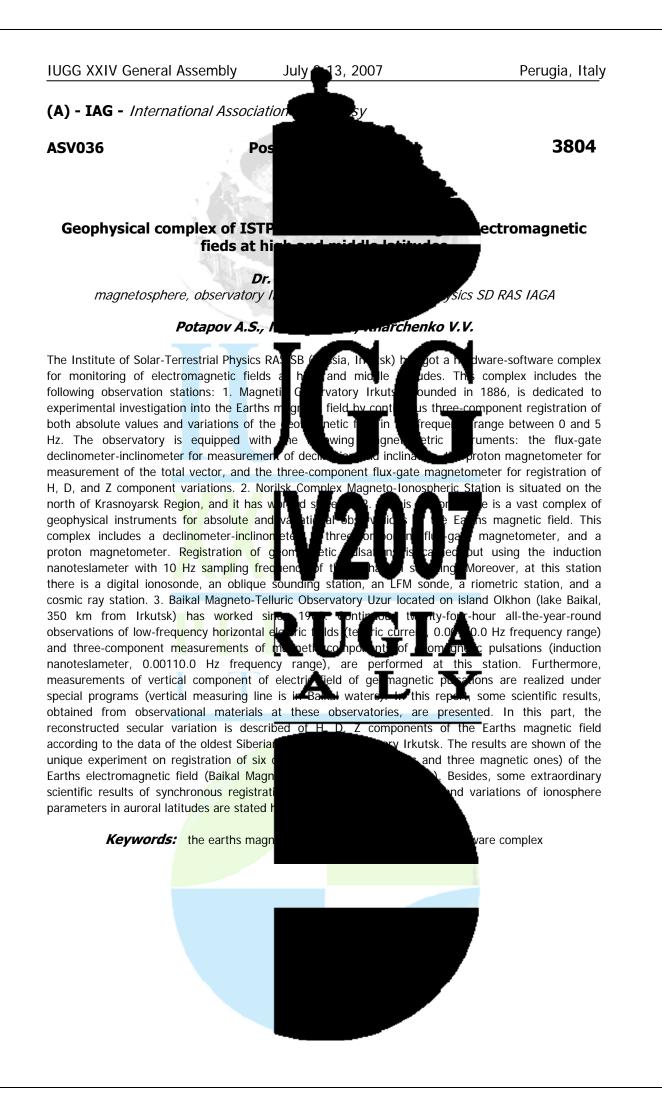


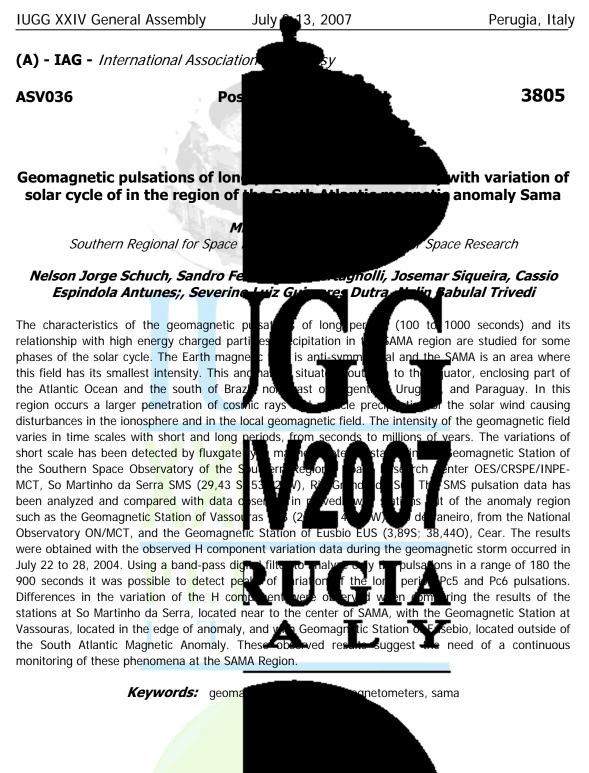




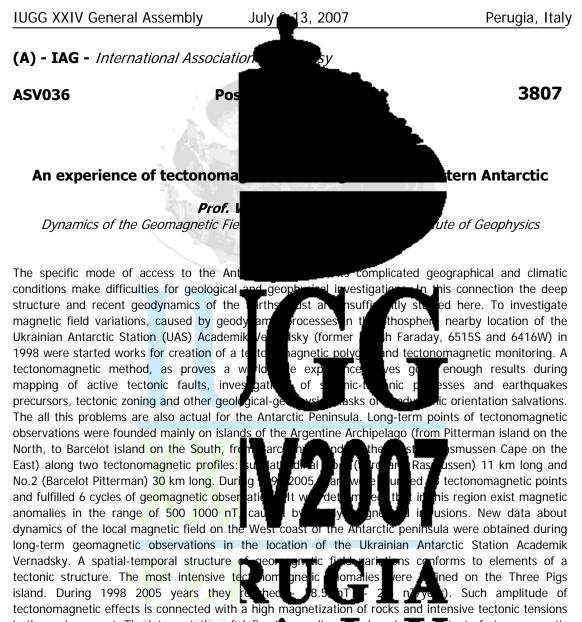




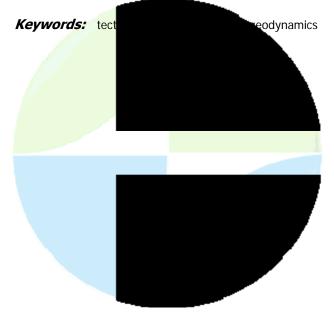


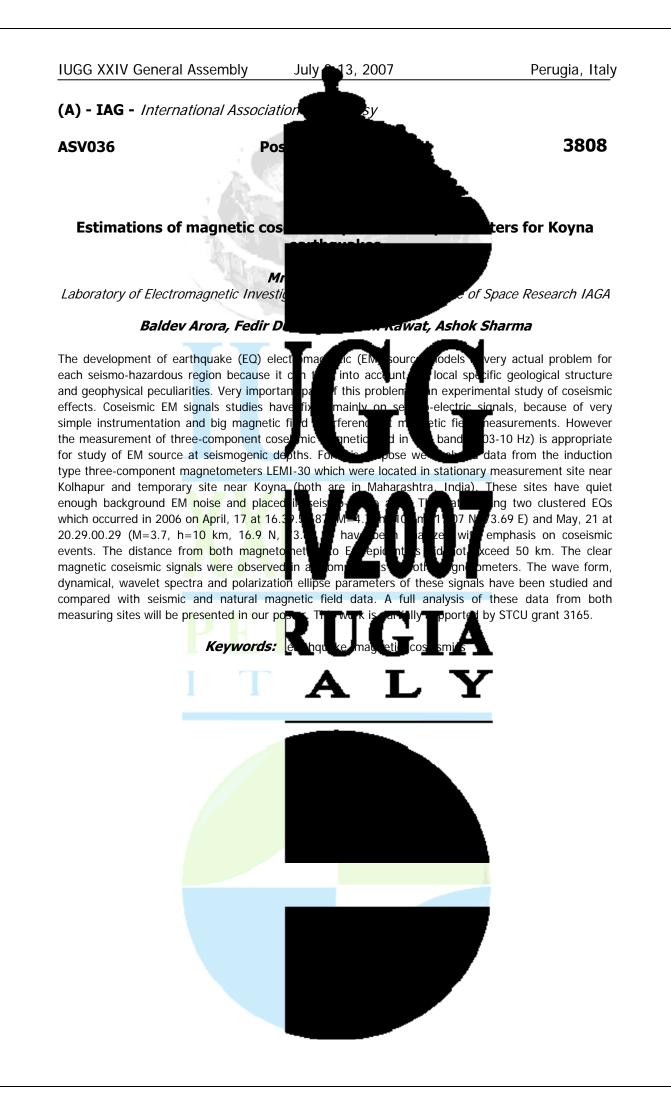


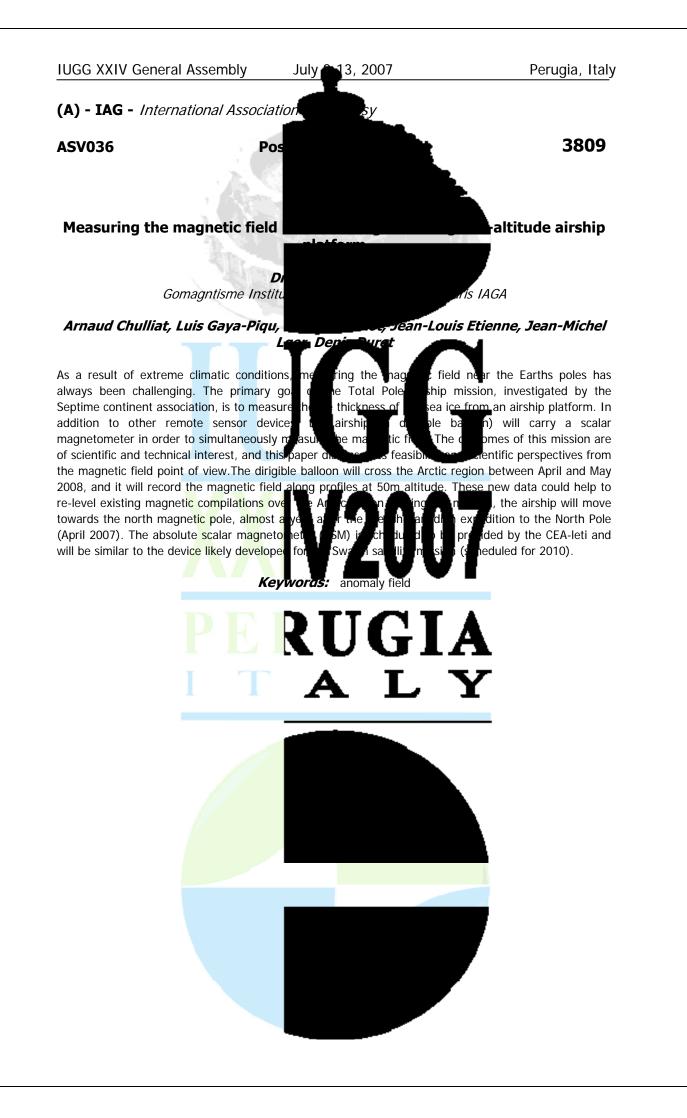


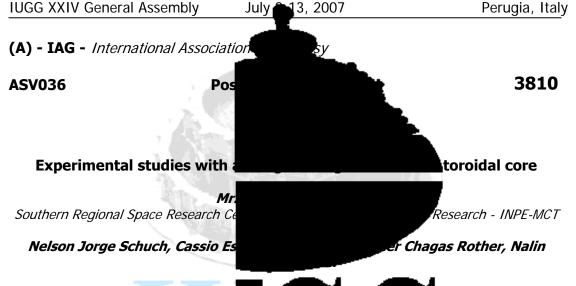


in the regions crust. The interpretation of defined nomalies was done in the context of piezo-magnetic mechanism. And on the base of mathematical modeling data was stated, that crust blocks in the Argentine Islands are being exposed by horizontal stretching forces in sub-latitudinal direction. Works were made under the support of the National Antarctic Scientific Centre of Ukraine.







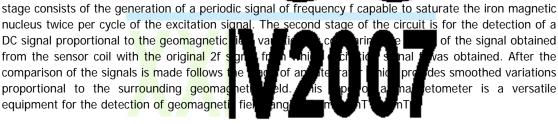


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The fluxgate magnetometers are instrumen The objective of this work is to construct a magnetometer described here is constituted a toroidal nucleus. Each sensor is compos another bobbin for the second harmonic magnetic field. The functioning of this sense ring core. The electronic circuit used in the constru

nucleus twice per cycle of the excitation signal. The second stage of the circuit is for the detection of a DC signal proportional to the geomagnetic from the sensor coil with the original 2f comparison of the signals is made follows proportional to the surrounding geomag equipment for the detection of geomagnet



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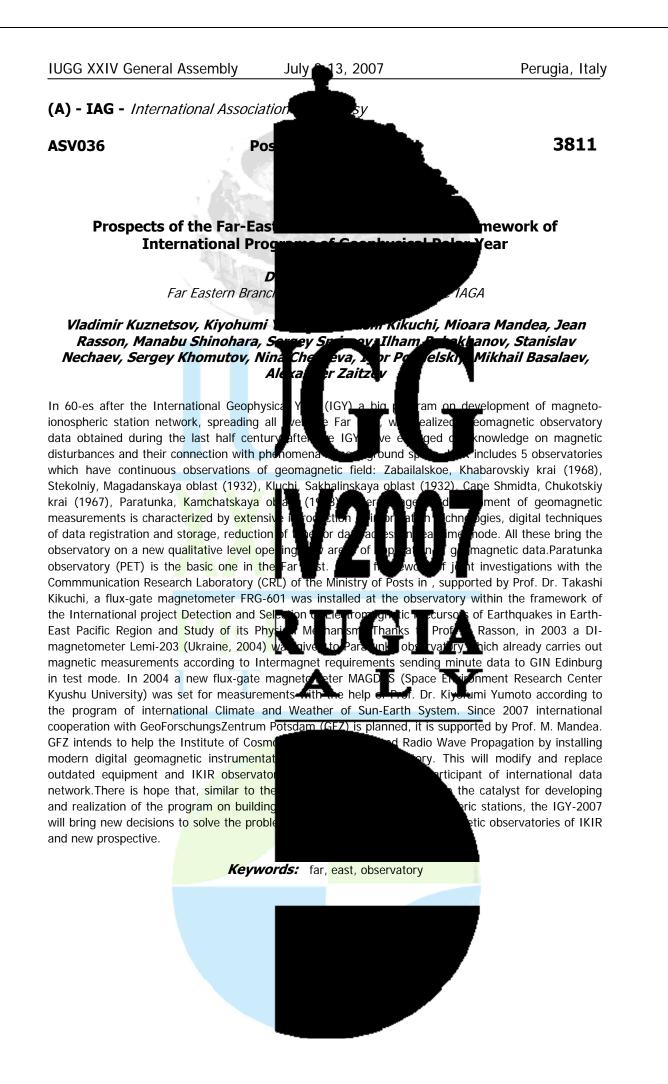
Keywords: toroidal, fluxgate, geomagnetism

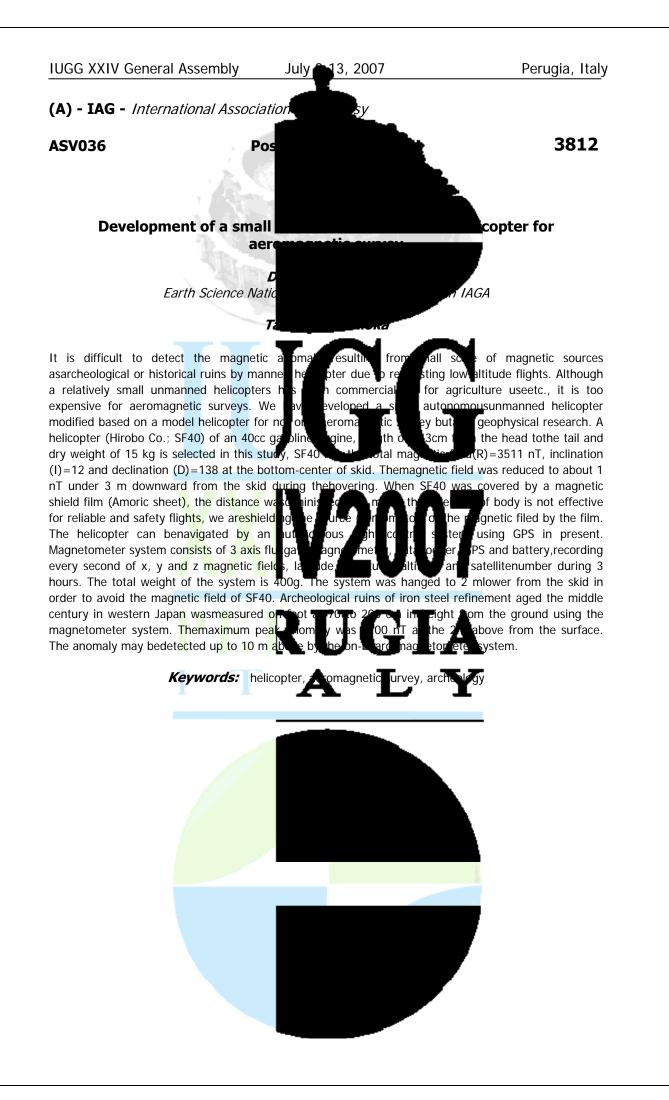
e orthogonal

two <u>bobbins</u>

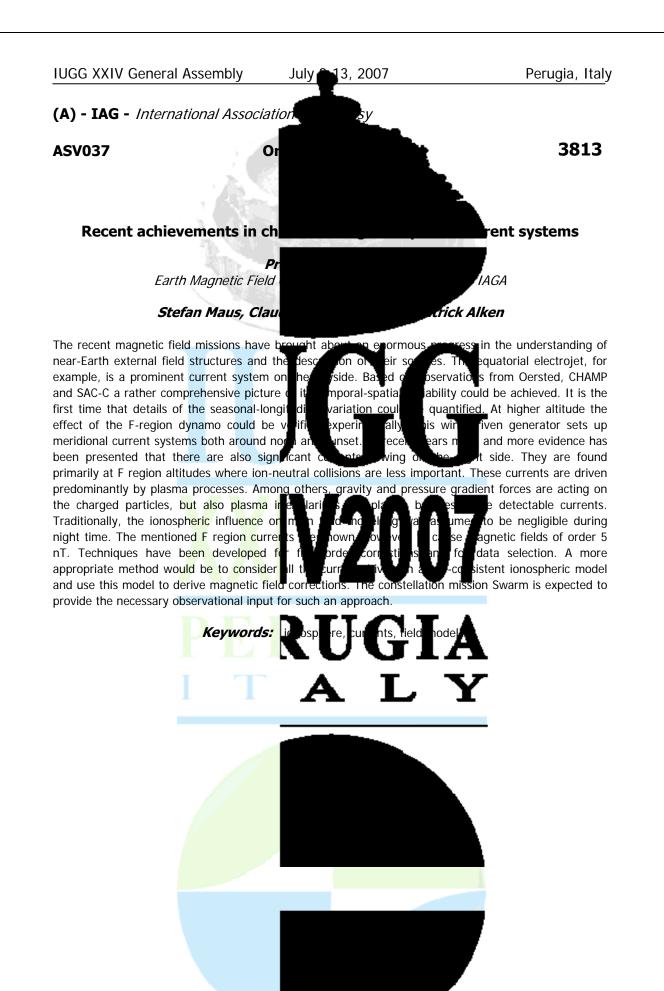
field and its variations. hagn based on fluxgate principle. The ors (H, D, and Z components) with ach axis, one for excitement and nal to the surrounding prop high meability material of the as three stages. The first

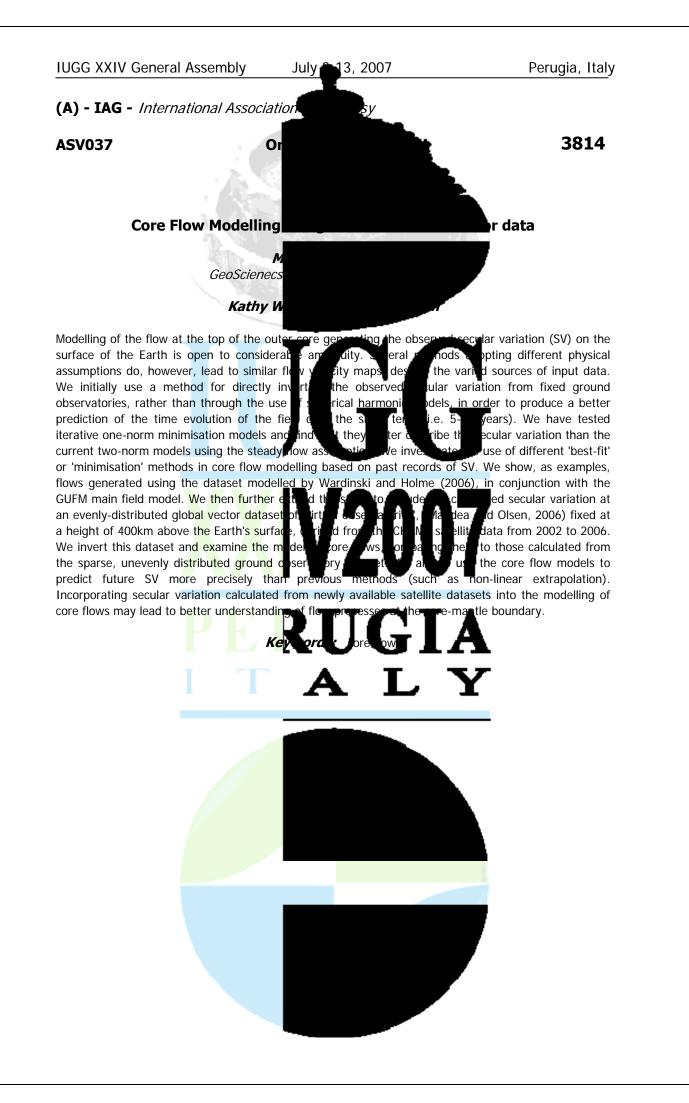
> of the signal obtained vas obtained. After the des smoothed variations etometer is a versatile

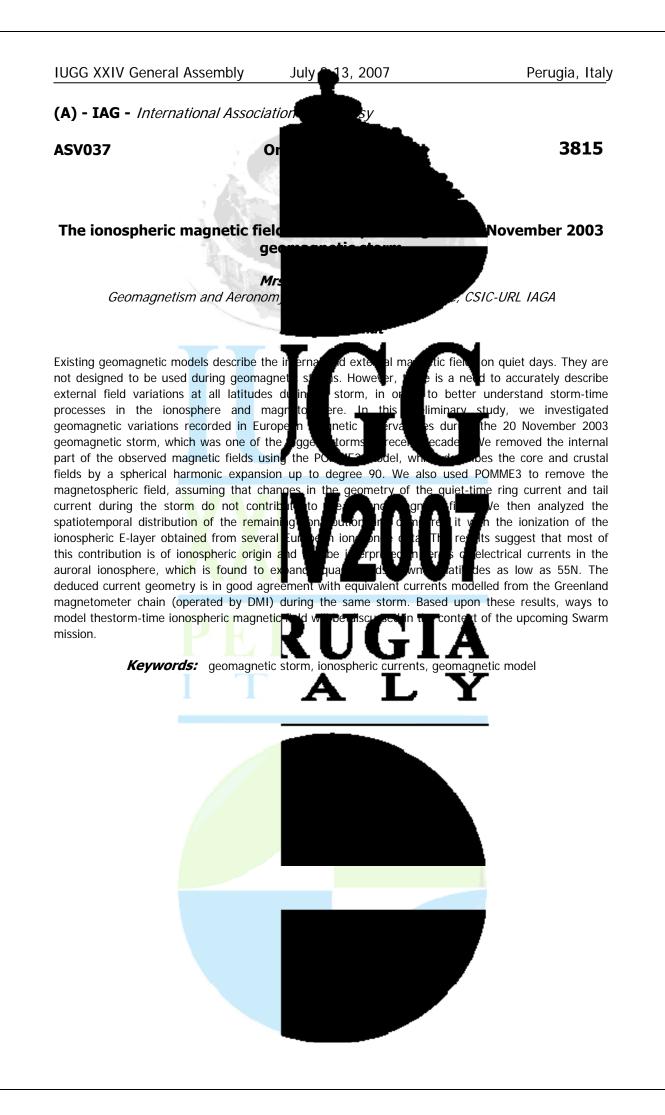




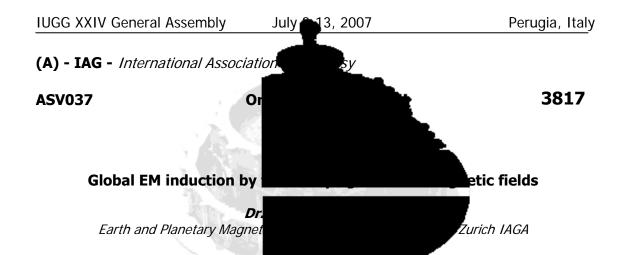












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There has been an increasing interest in global elect years, mainly because of two reasons. Firs dı the satellite measurements that have become a Indeed, 0 y the satellites Oersted, CHAMP, and SAC-0 ire the mage cy. <u>Moreove</u>r altitudes (400-800 km) with unprecedented constellation mission Swarm is scheduled nch in geomagnetic observatories, which are spar regula provide an excellent spatio-temporal coveringe with intriguing chance to tackle the most challenging problem of deep EM studies: detection of threedimensional (3-D) variations of electrical conductivity in the Earth's mantle. The second reason for the renewed interest in global EM induction s data. A main objective of geomagnetic s processes, core-mantle interaction, as well interpretation. For these studies it is esser ial the as little as possible by fields originating ron induced counterparts. Until now the conducting

symmetric (1-D) when deriving model of the core and crustal field. As a consequence, the EM effects due to induction in the oceans have been model studies that aim at predicting magn round a variety of realistic sources in a 3-D conduct ty l of variable conductance and a 1-D conductor underneath. In particular, we consider 3-D induction due to geomagnetic storms, Sq, and equatorial and contributes significantly to the near-Earth magnetic olar electr d, and of the magnetic field variations at many sites around the globe is caused by 3-D induction in the oceans. Finally, we present a global 1-D conductivity model obtained by analysis of five years (2001-2005) of simultaneous magnetic data from the three correcting the data for the ocean effect derived from ground-based data.

after the Magsat satellite mission, field and its variation from low ESAs three-satellite geomagnetic land-based data from te-borne measurements m quality. This gives an

tion studies during the last

of global geomagnetic

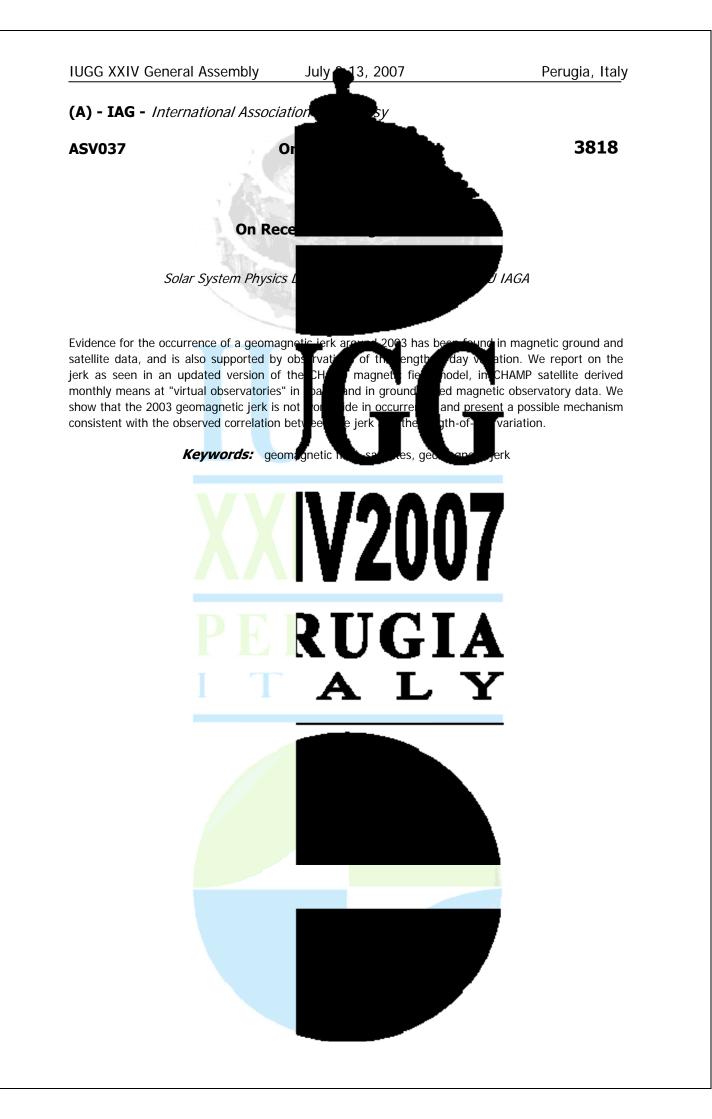
satellite geomagnetic dynamics, geodynamo etization and its geologic nodels are contaminated sphere and their Earth-Earth is either neglected or assumed to be spherically e will present recent results of e altitude) induced by a

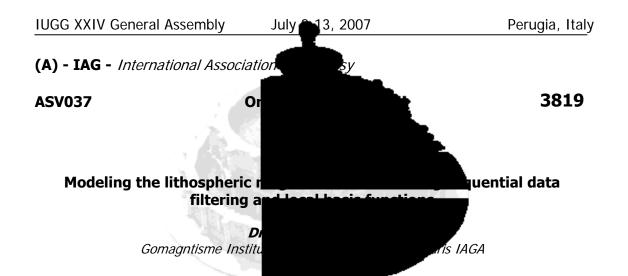
> ides oceans of laterally irth. hic worthat the ocean effect ets. We s an anomalous behaviour penstrate th HAMP and SAC-C. We demonstrate that

el which is rather similar to those

Keywords







The forthcoming Swarm mission will provi resolution and new modeling techniques, as necessary. The near-Earth magnetic field is sources with overlapping time and space sc sequential filtering based on a satellite t suspected to introduce spurious features method is proposed to highlight small-sca harmonics. Using four years of sequentially filte

lithospheric model is estimated at 400km altitude over the entire sphere by stitching independent regional models. The model shows new sharp signatures of possible lithospheric origin but the residual analysis suggests a possible contamination on high-resolution modeling of a sequentia and quantify the possible artifacts. Using the artificial signal are estimated and the simple but effective precaution is introd ceo filtering. It is finally showed that the modeling and considering the Swarm mission.

dented view an y well data accura blex supe pos a possible w track analys pheric άn ls us sm sate

be magnetic crust at high will become increasingly cessin of magnetic fields from different disentangle the signal is to use a his along track filtering is often nodels this paper, a regional iltered out by spherical ed a along satellite tracks, a

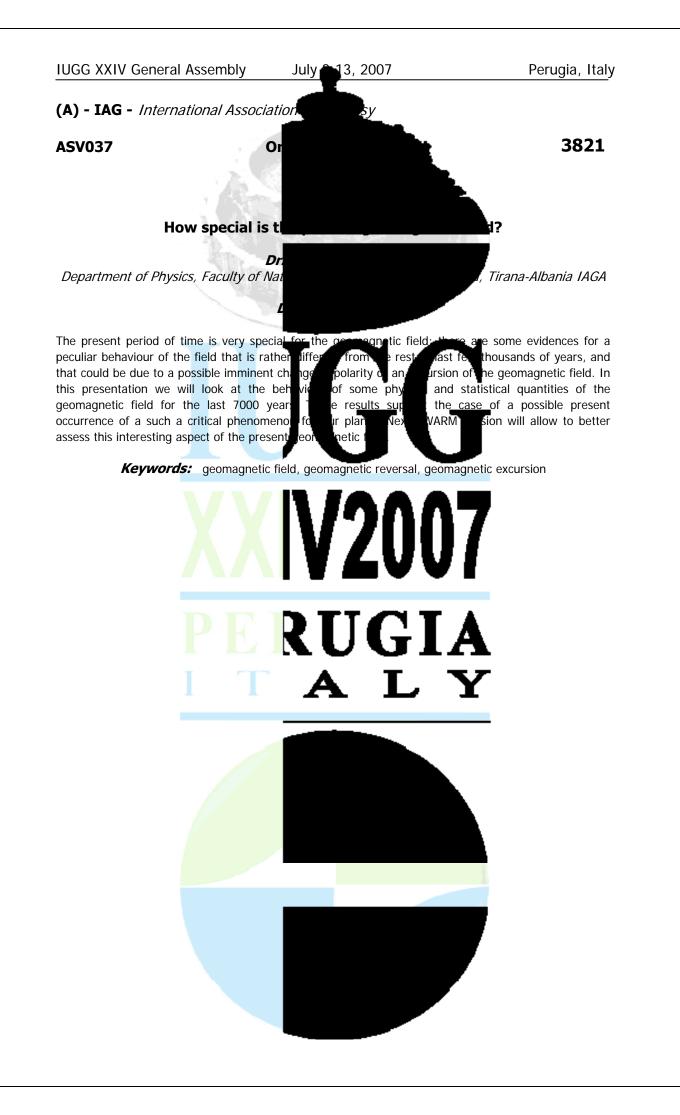
di processing

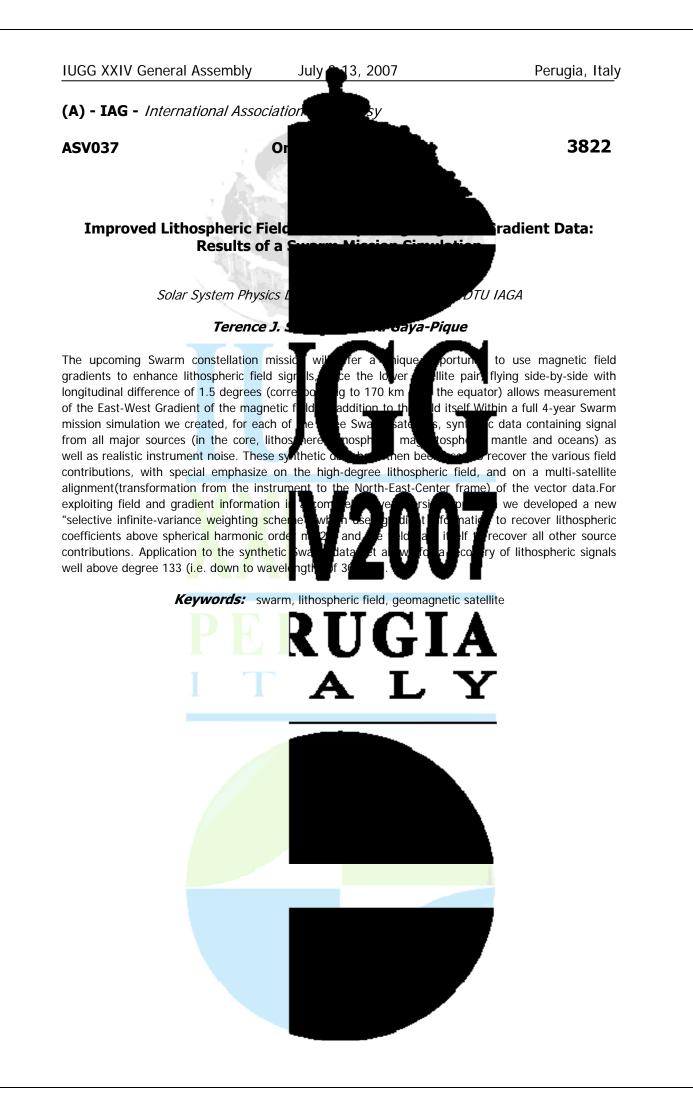
the theoretical effects ed in order to highlight ength and the shape of odels illustrated. A very ed by the track-by-track improvements are fruitful when

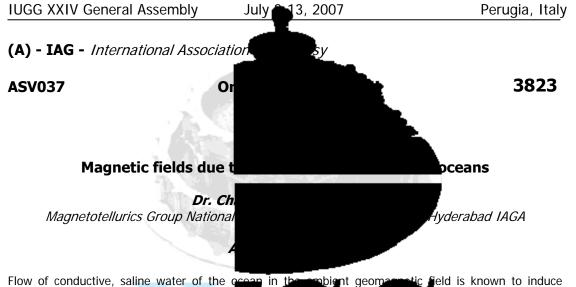


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Flow of conductive, saline water of the or aan in th magnetic fields which can reach distant and amplitudes. The depth integrated flow directly associated with water movement. The impli magnetic fields, and these need to be co measured geomagnetic data contain signati infer the flow strength and variability. This lap the motional induction due to ocean circulation, approach to calculate motionally-induced magnetic fields. We assume 3-D conductivity model of the Earth which contains a surface thin shell of variable conductance and realistic 1-D mantle underneath. Different ocean models are used to deriv due to ocean flows show diverse character

magnetic signal due to motional induction Earth orbit satellite (400 km or so), the eff detection of tidal magnetic fields is no measurements, the extraction of magnetic field magnetic data is a challenging task. This is primarily due to the fact that the mean (steady) signal is

ield is known to induce with detectable signal vator tic and electric field generation cean flow generates non-trivial (?) g g<u>eomagn</u>etic data and (2) the iese d can possibly be used to recent efforts to study ew of ly an integral equation

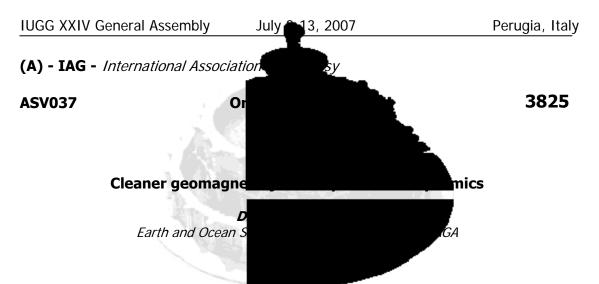
The magnetic signals d frequency scales. The vpical altitudes of a lows are within 2 nT. While and satellite magnetic related to ocean circulation from the satellite derived

hardly distinguishable from the time-invaria weverthe variability of magnetic signals induced by the ocean circulation The . easing sophistication in geomagnetic field models allow for the scale signals from the nova δlitu e/sr aua measured data and the upcoming three-satellite mission Swarm is expected to yield highly accurate potional induction in the magnetic data. Both these factors will encoura the futur research oceans.









Geomagnetic jerks are a well-known, often explained variation. A particularly promising suggestio the core (Bloxham et al, 2002), in part su (Holme and de Viron, 2005). However, whil the 1969 jerk in seen in the Y componen southern hemisphere) are less clearly fit. treatment. We seek better estimates of inj signal using the comprehensive model; 2) Jusing

calculation of monthly means; 3) examining the three components of the field in a coordinate system defined by the remaining noise on the data, seeking two (rather than the usual one) directions in which the jerk may beclearly seen; 4) particula coverage is sparse. These estimates are th to seek a model that better represents the dynamics leading to the secular variati Dumberry, M., 2002. Nature, 420, 65-68; H

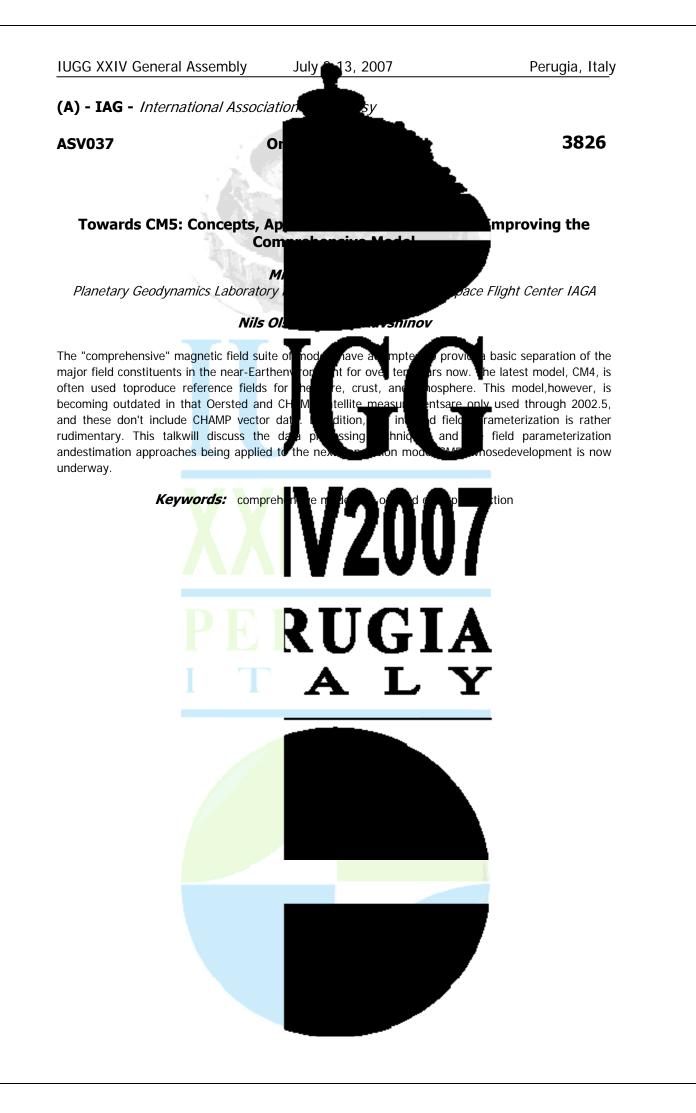
still rather is t are ihe je by analysis ypothesis exp rope<u>an obse</u> nine w proble iei ular be a i

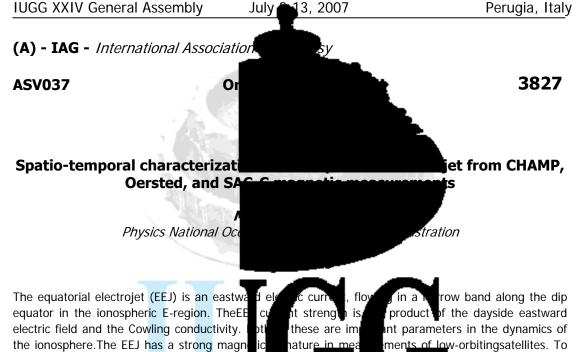
1) su

matic feature of the secular sult o rsional processes within ecadal variations in length-of-day some features well (in particular ries), other locations (particularly s due to issues of data cting modelled external quiet-time limit for the

> ns where observatory model of the main field The implications for the xham, J., Zatman, S., ys. J. Int., 160, 435-439.

Keywords: geomagnetic jerk, length of day, torsiontal oscillations





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across the magnetic equator are inverted individual describe these peak currents by a statistical model. This empirical model describes the mean and variance of the peak current as a function of longitude, local time, dayof the year, and F10.7. Our climatalogical model has been verifieda madeavailable online. The EEJ being an ex its auto-correlation in longitude and time. spatial from the temporal variability. Howe auto-correlation of theEEJ as a function of

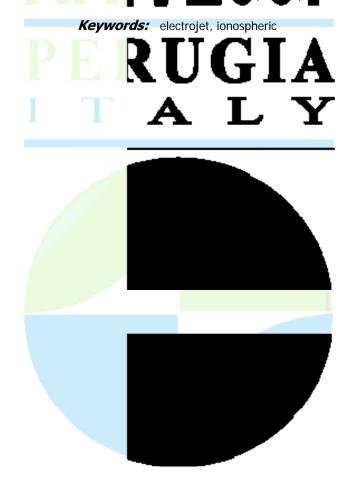
characterize the EEJ, we use a combined da

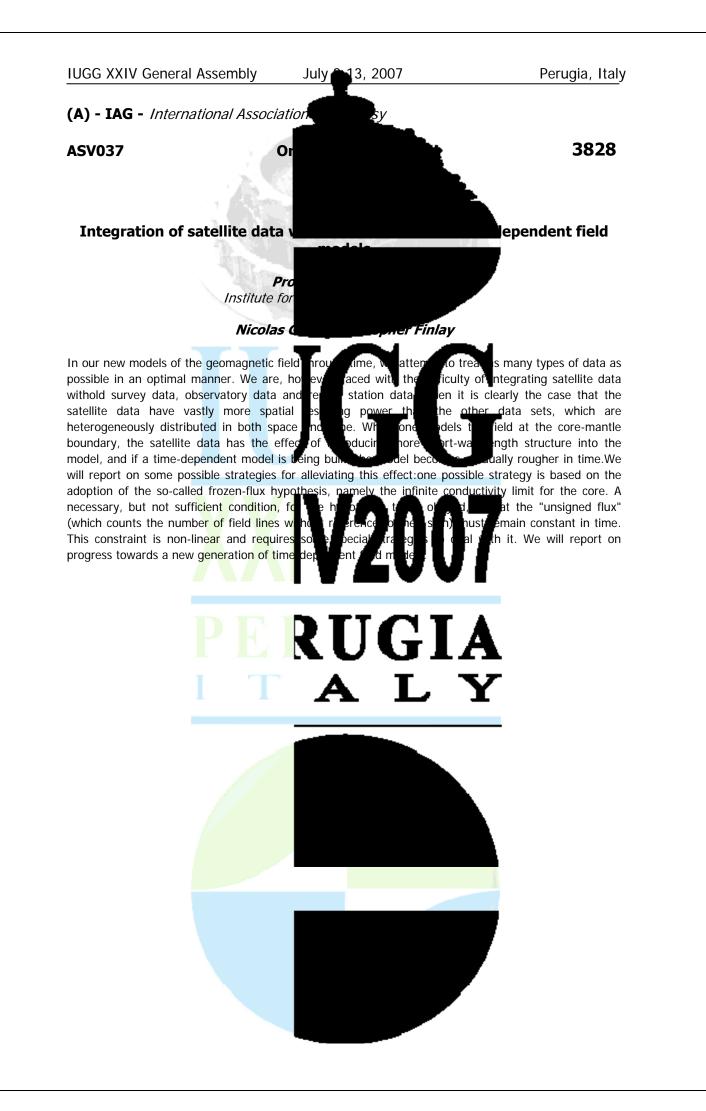
C, comprising more than 75,000 equator,

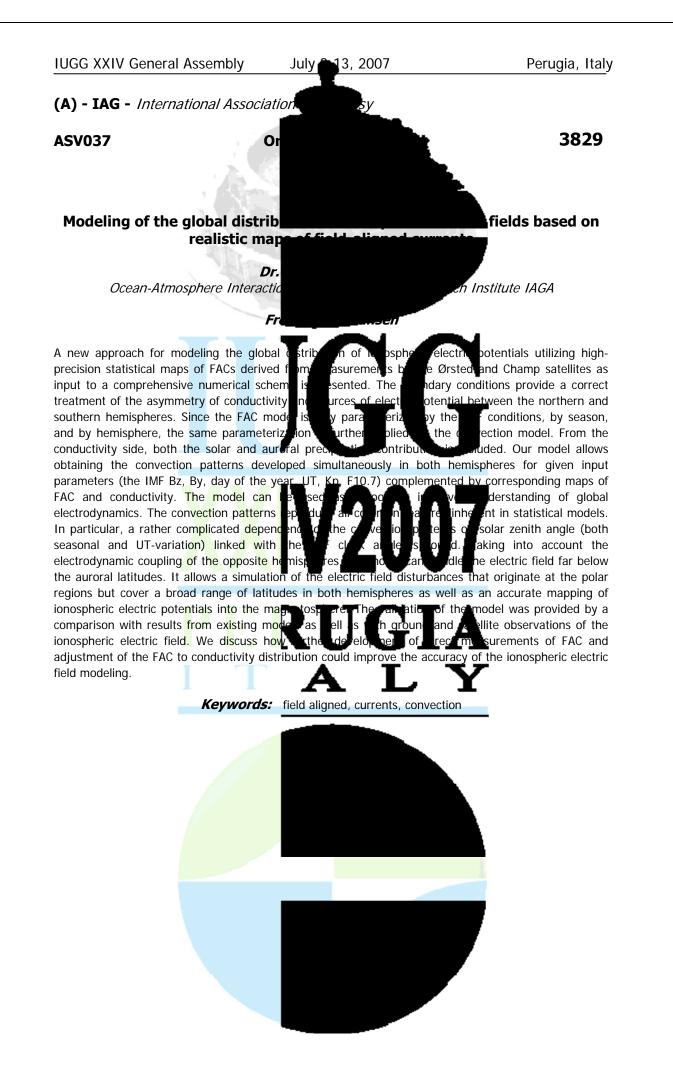
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AMP, Oersted and SAC-, these satellite passes arrent strength. We then

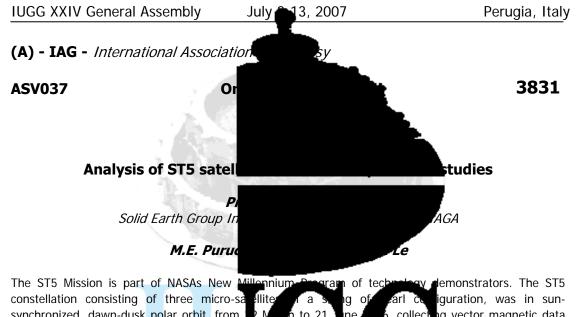
harca, and has been ere further interested in te could not separatethe ellation, we can infer the tion of twoobservers.











synchronized, dawn-dusk polar orbit, from from a spin stabilized platform. The orbit pe of the three spacecrafts, the leading spa spacecraft (SC-094) and the separation betw was 397 km, at the start of the Mission. opportunity for separating the spatial an

and low latitude regions. In this study, we concentrate on low latitude (geomagnetic latitude from 200N to 200S) magnetic pulsations in the longi which the CHAMP satellite data are also av second interval form Kanoya / Kakioka Ol from all three ST5 satellites, CHAMP and K no hrs 42 32 UT in the dusk sector. For the S IGRF field and CM4 lithospheric field for this time period. ground data and CHAMP data. The data are band passed filtered; the power spectral density consistently shows a very significant peak frequency between the different datasets is spacecrafts clearly show the PC3 micro puls

h to 21 J ine nd apogee is SC-155 was midd Ы g spað figura tiple of ' temp ns of much debate on the generation and propagation of Pc3-Pc4 (7 to 100 mHz) pulsations in the equatorial

, collecting vector magnetic data km and 4500 km respectively. Out and 2910 km ahead of the next aft (SC-094 and SC-224) llites provides a unique ic oscillations. There is

or. We select days for the data sampled at 1 ata for 29 March, 2006 from 8 hours 29 39 to 8 field and correct for the The TGRF values are also removed from the

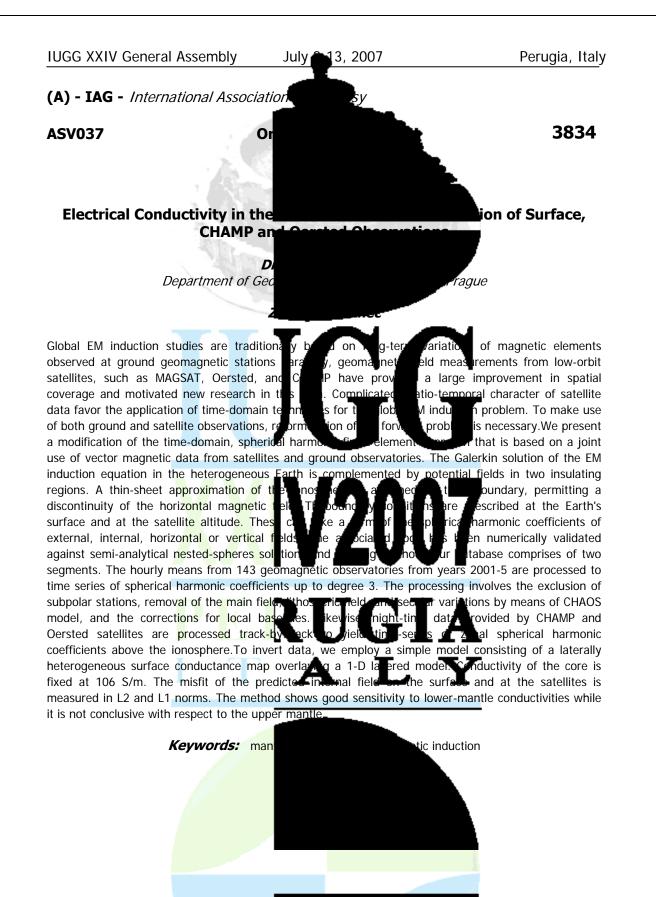
datagets. The coherence at this band, ssed data for all the ST5 vector components was sing ons run, also undertaken. Results of the analysis of vector and scalar data of ST5 satellites together with CHAMP and ground data will be presented to isolate the Tongitudina sallations and identify the nsverse an spatial and temporal variations of the pulsations

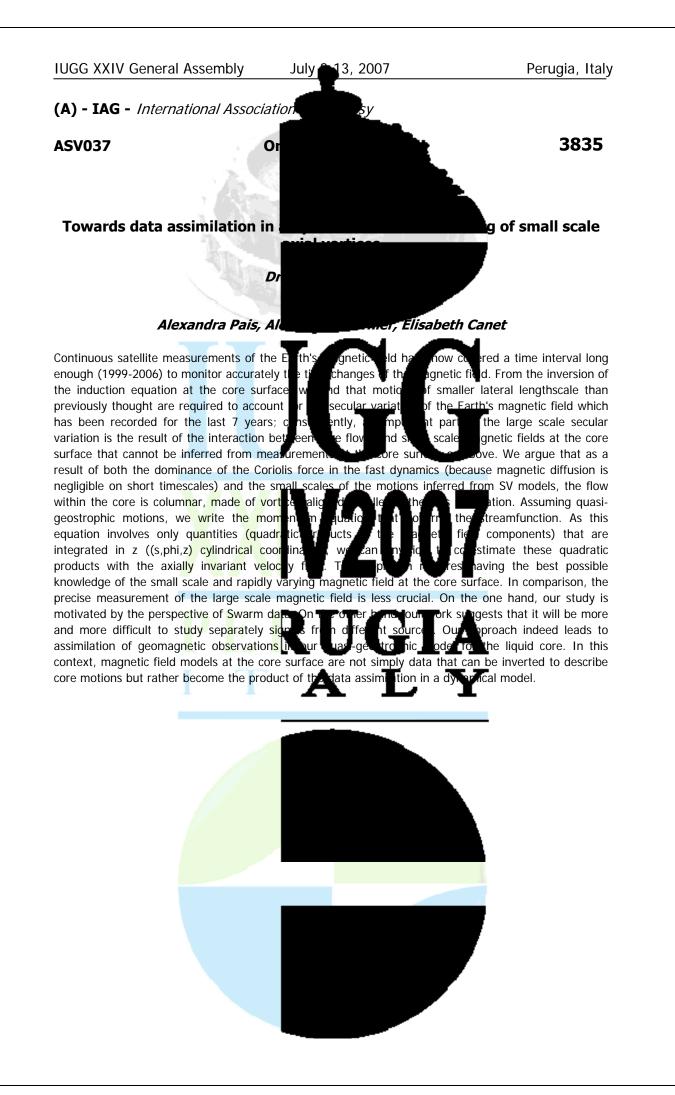
Keywords: micro satellites, pc3 pc4 puisations, low latitude

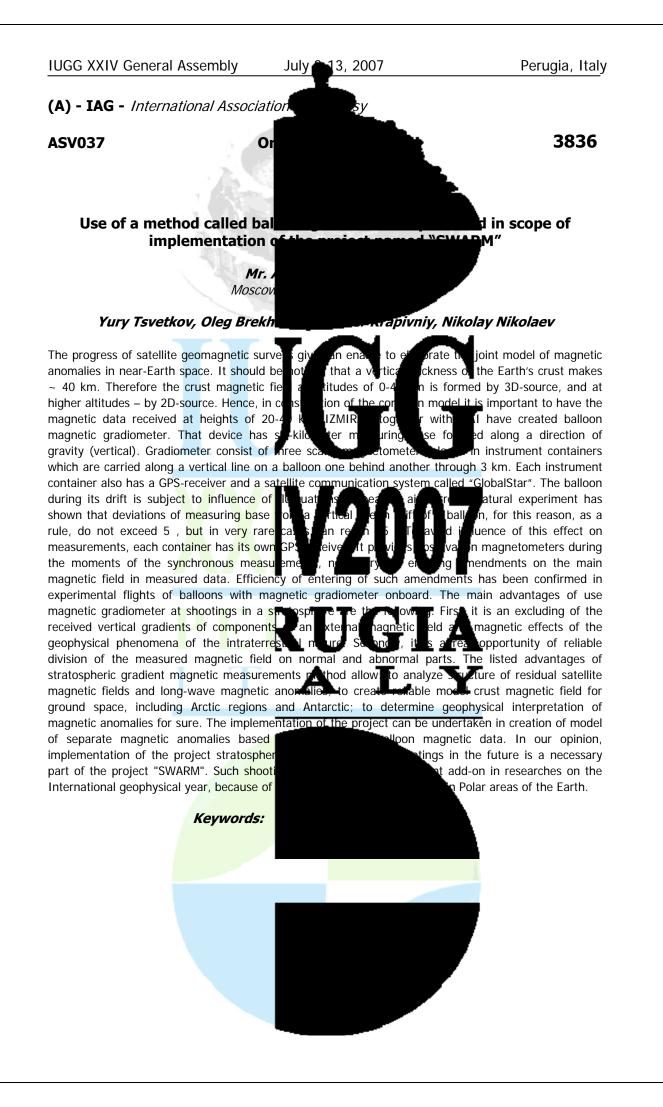




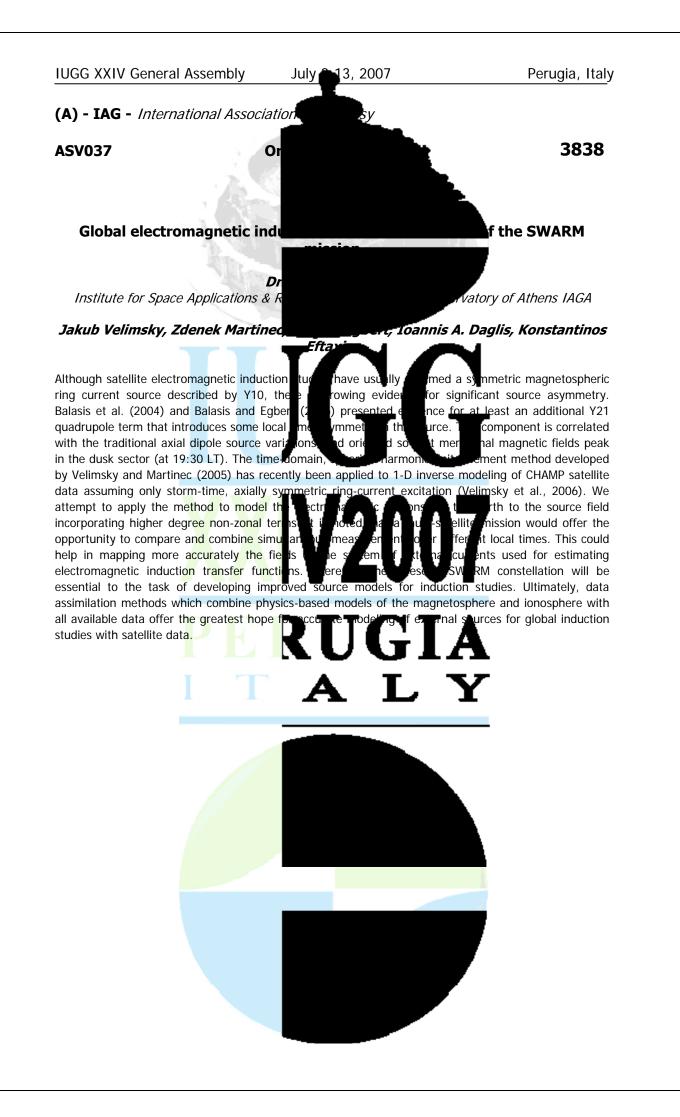


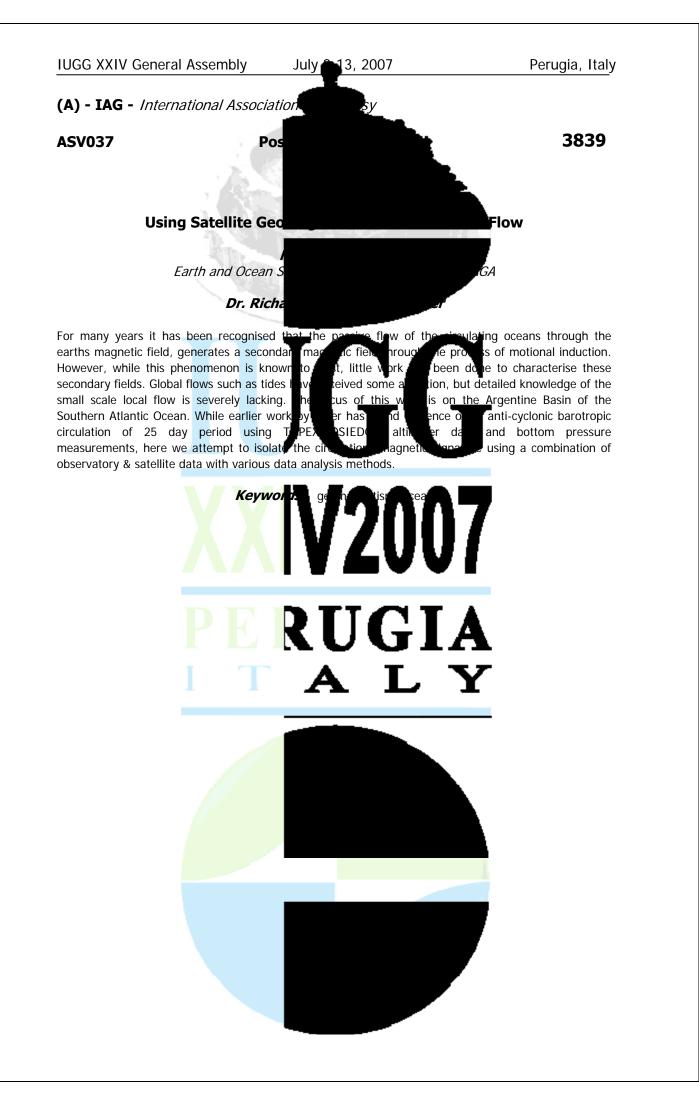


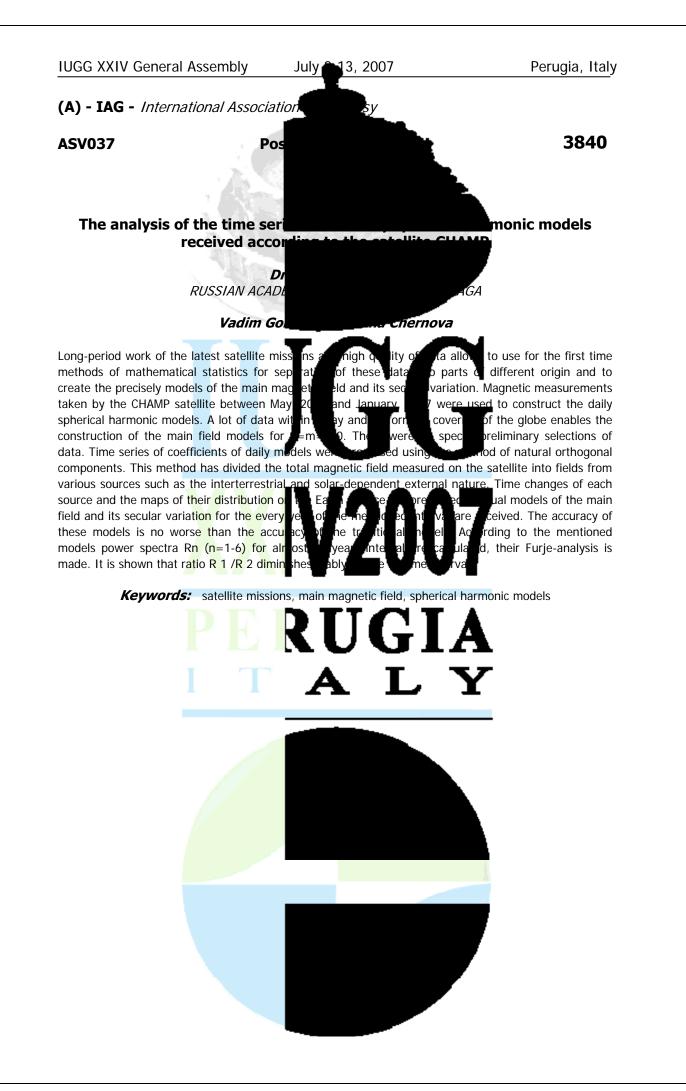


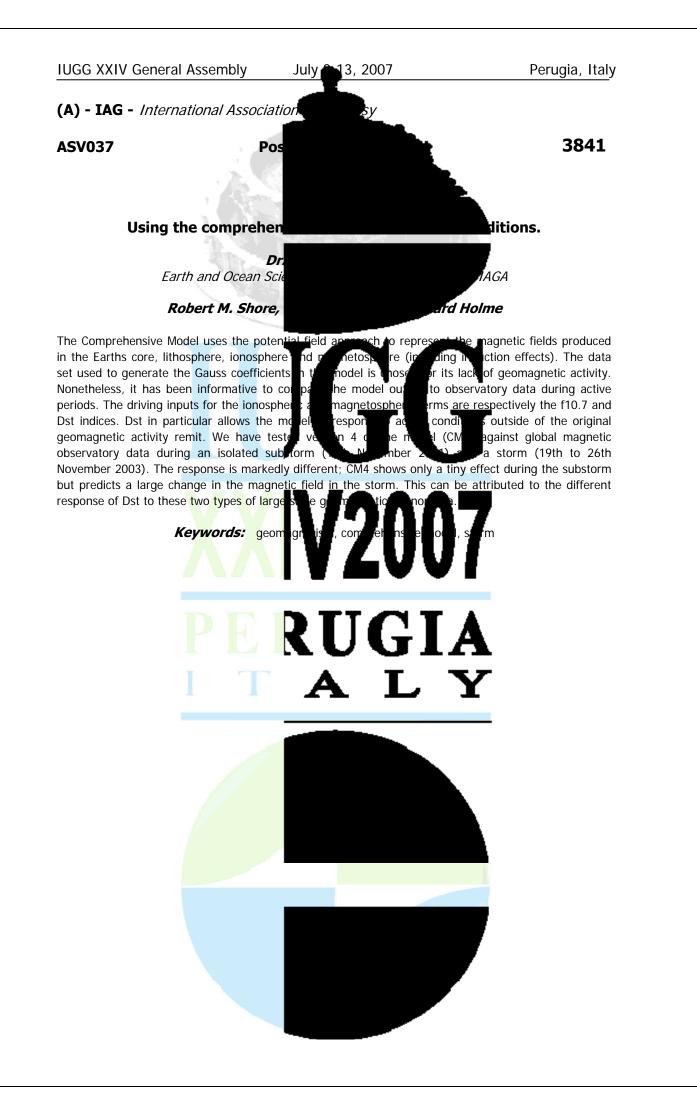




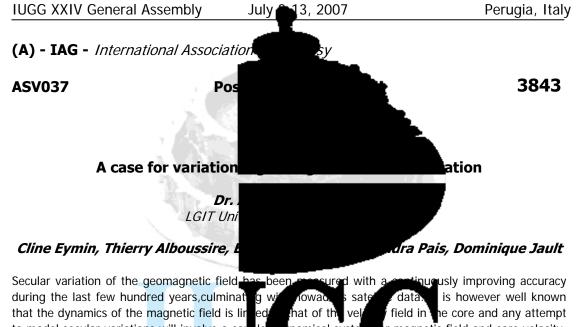












to model secular variations will involve a cou Unfortunately, there is no direct observatio above-mentioned coupled system, and the here whether good knowledge of the mag dynamics. Furthermore, what will be the mpact of

our knowledge of the geomagnetic field of the past and future? These questions are cast into the language of variational data assimilation, while the dynamical system considered for illustrative purposes consists in a set of two simplified This toy model retains, nevertheless, impo equations: non-linear magnetic and mom disturbances contains Alfvn waves. It appropriate in principle, even though the recover the entire evolution of both fields from

geomagnetic data and geomagnetic foreca first application of variational data assimilat the observed geomagnetic secular variation.

namical syste velocity. Inc nitatior obse ed in d car tra recen

а partial and irregularly distributed information on the

r magnetic field and core velocity. nden<u>tly of the exact nature of the</u> he question is debated ood knowledge of core se geomagnetic data on

> etic and velocity fields. tion and Navier-Stokes

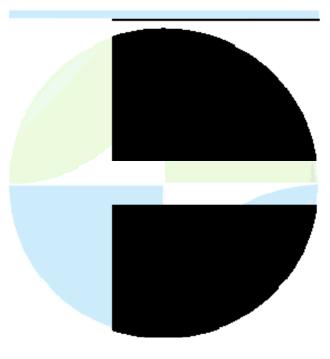
near response to small assimilation is indeed Il times; it allows us to magnetic field. This work constitutes a first step on the way toward the reassimilation of historical g, we should also report on the

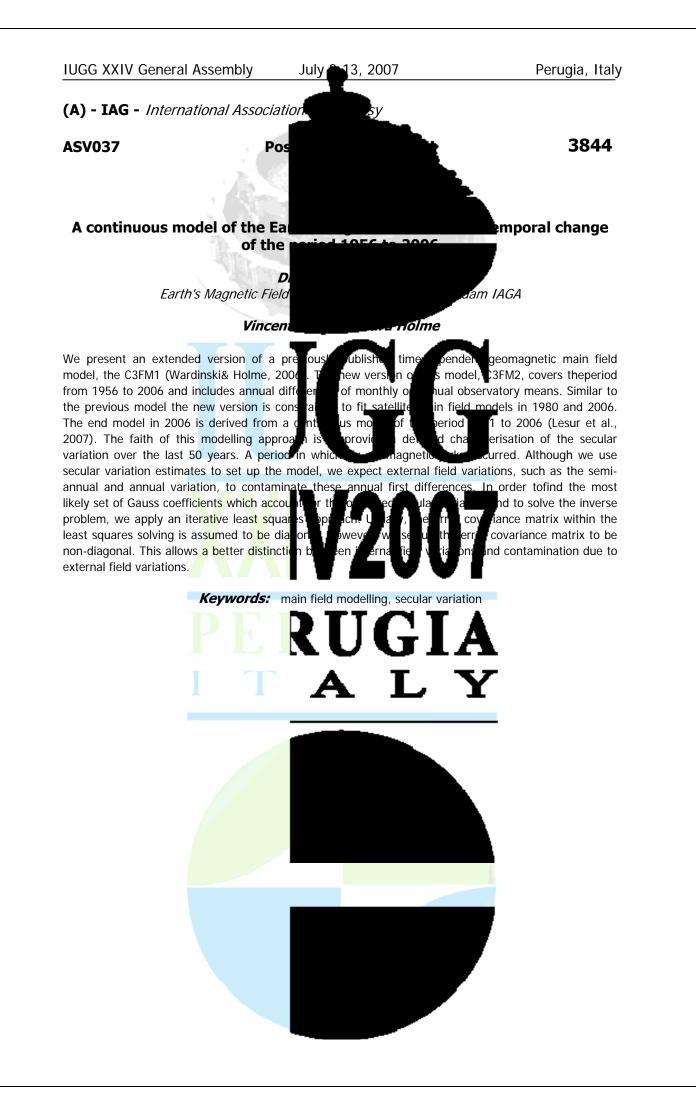
phic dynamical model of

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Keywords: geomagnetic secula ellite data riation, d assimilat





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## **ASV038**

## Symposium World Digital Magnetic Anoma

Convener : Prof. Dhananjay Ravat Co-Convener: Mr. Juha Korhonen, D

This session will focus on magnetic data, r Anomaly Map (WDMAM) being prepared a field magnetic anomalies of the Earth's li minutes of latitude/longitude) and altitud degree 15 (about 2600 km wavelength). This session methods, merging procedures, and process. (taken o a of the WDMAM. Deadline for receiving the r

is end of June 2006 and the submission of place before the end of September 2006. T short as well as long wavelength parts of t reproducible and are proven robust during t and merging procedures of specific large models.

at car r ar sets by ne e maps/rlod ributors may pro w pro of

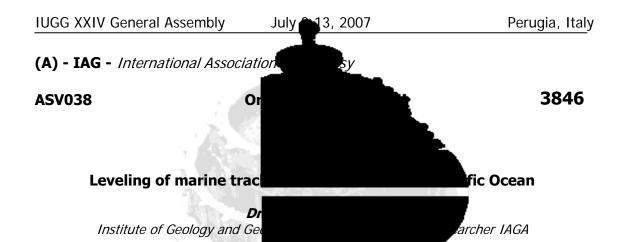
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MAM will represent the total al of about 5 km (specifically, 3 e geoid and up to spherical harmonic solicits contributions that describe the data, nents for future editions ate orce for the first edition AM task the WDMAM committee will take y choose the methods of merging sparent, scientific, and ey a equate cription of the methods be ir ded with the candidate





One of the important problems in produc track-line data in oceanic areas, which cover 70% of offsets mainly due to main field secular varia on external field variations. A comprehensive m reduce most of these offsets. However, th model and errors in the measurements. An r CM4-reduced anomaly values of more than are available from the U.S. National Geoph these errors by leveling longer wavelength compor

in general. In my method, for each data point, a weighted average of differences of neighboring anomaly data from that anomaly value is o distances from the point. Low pass spatial averages with a summed weight for each filtered values x 0.5 to the original anot halı obtained for the case of Gaussian low-pass

ic anomaly map is processing of marine earth. Origin a tim oan d external lin remain erro bout <u>50 nT w</u> n trad ta Ce difficul

Keywords: leveling, marine, track line

omaly data have very high years and shorter period host del CM4 Sabaka et al., 2004) can robably due to inaccuracy of the otained for the cross-over errors of in the th Pacific Ocean, which loped ethod to further reduce tie-line leveling method

by dividing the track-lines into survey lines and tie lines, because the track-lines are randomly oriented

the -4th power of the applied to the obtained obtained by adding the an rms of 33 nT was

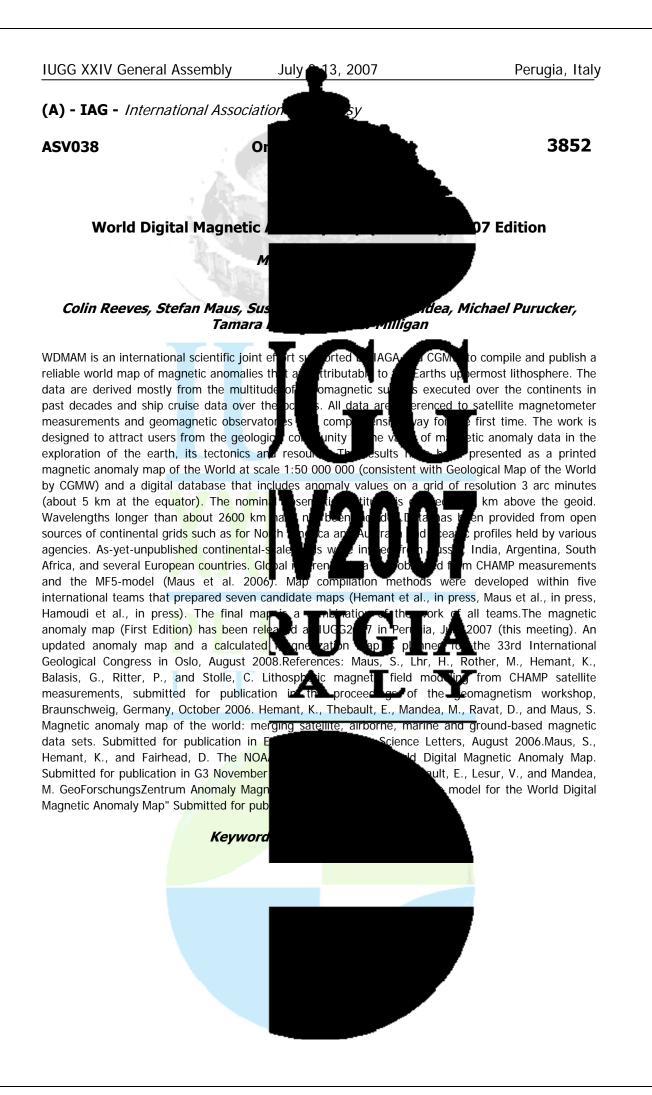


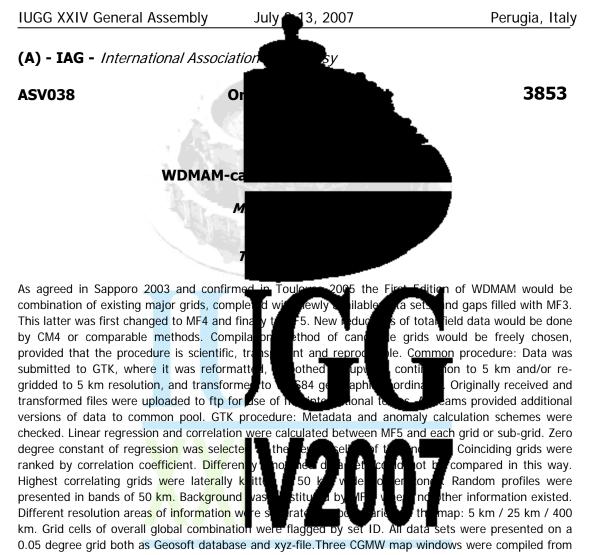




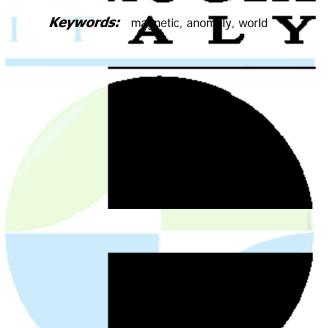


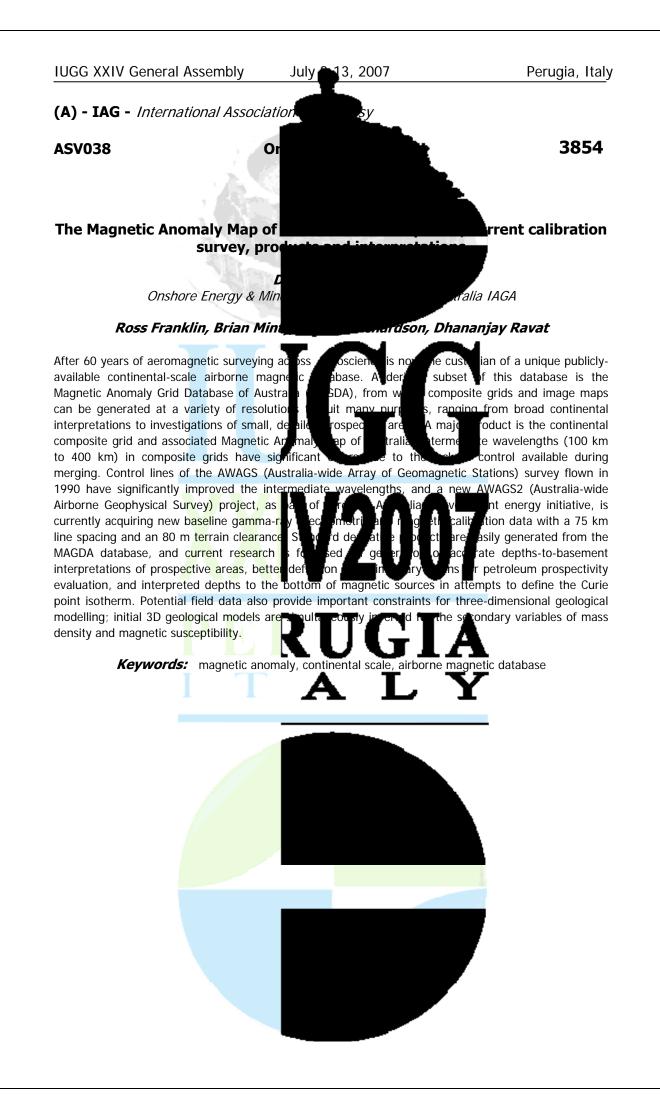


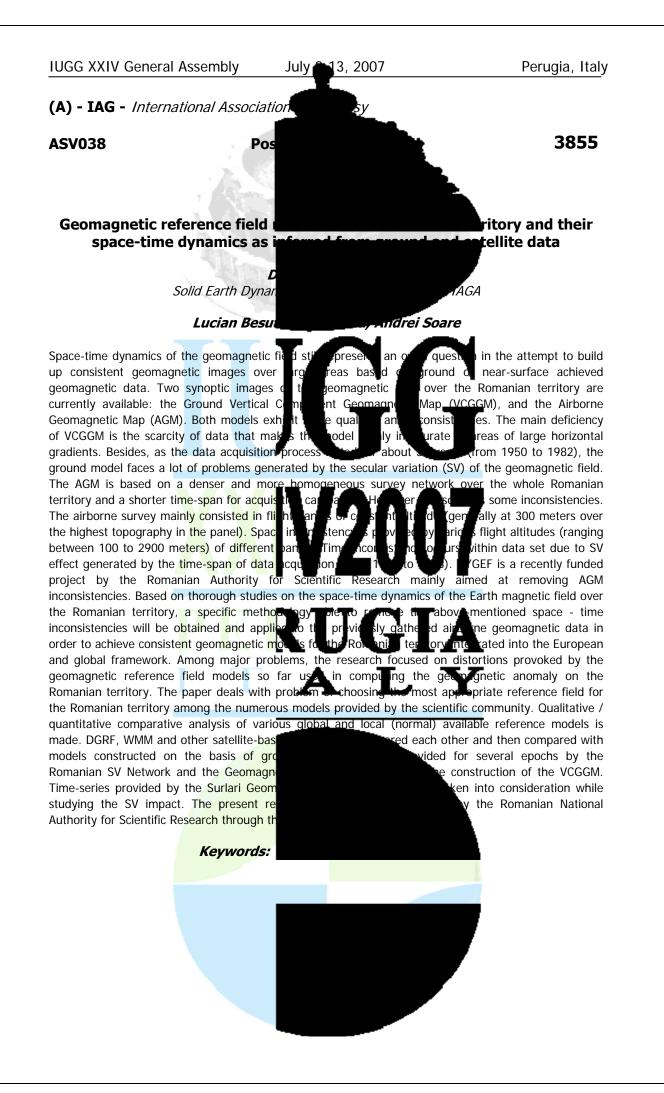




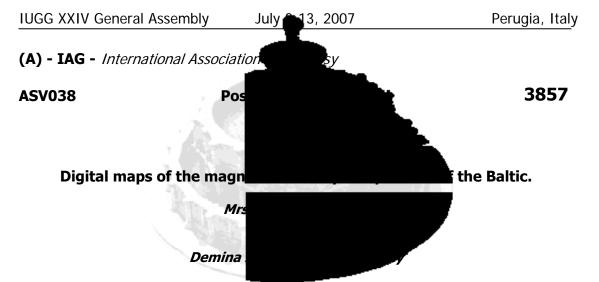
data and presented on 1:50 000 000 layon km resolution data grids interpolated to 5k band /400 km altitude satellite grid (MF5) bottene: 5 km resolution data grids/25 domptrofile: 5 km resolution, 50 km 7DN M grid











A systematic magnetic component survey on the B during 9 expeditions on the non-magnetic vertical (Z), declination (D) and total (T) expeditions was about 56643 km. The dista instrumental, deviation and variation corre variation corrections were determined on th around Baltic. Original technique was sugge interpolation of the data into the knots of a regular

components were used to separate the anomalous magnetic field. The problem of constructing approximating surfaces on the data of digital maps by least-square procedure falls into the category of incorrect one. It is due to the geometric sl involved to reduce an edge effect. Surface maps. Anomaly maps of T and H were ca directly and on the anomaly maps of pote tia field is close to the Z component in high la

ea\_was car hoo Geon Zary asured. he ere ween profiles vere <u>include</u>c ds of dat educe da 1 km

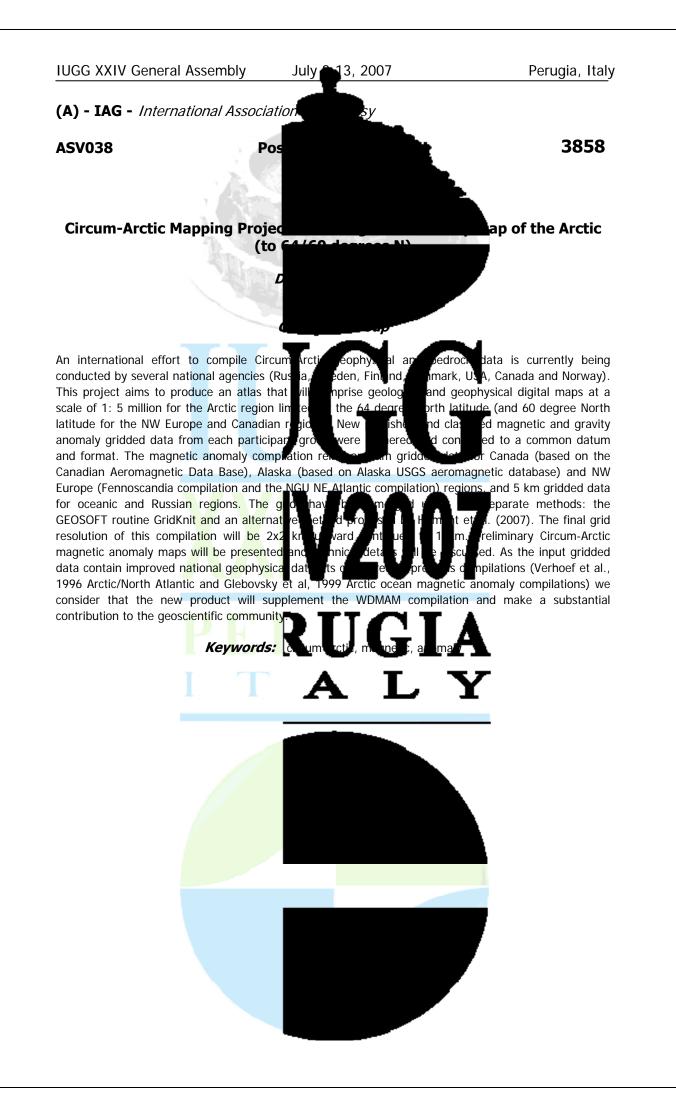
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n the years 1970-1990, ponents horizontal (H), ietic length of the profiles during all ages 1-2 NM (nautical miles). The all results of measurements. The tic observatories located h 1990. As a result, the hed. The digital maps of

> tic observatories were on the data of digital onding component map as it is known the total ethods differ essentially.

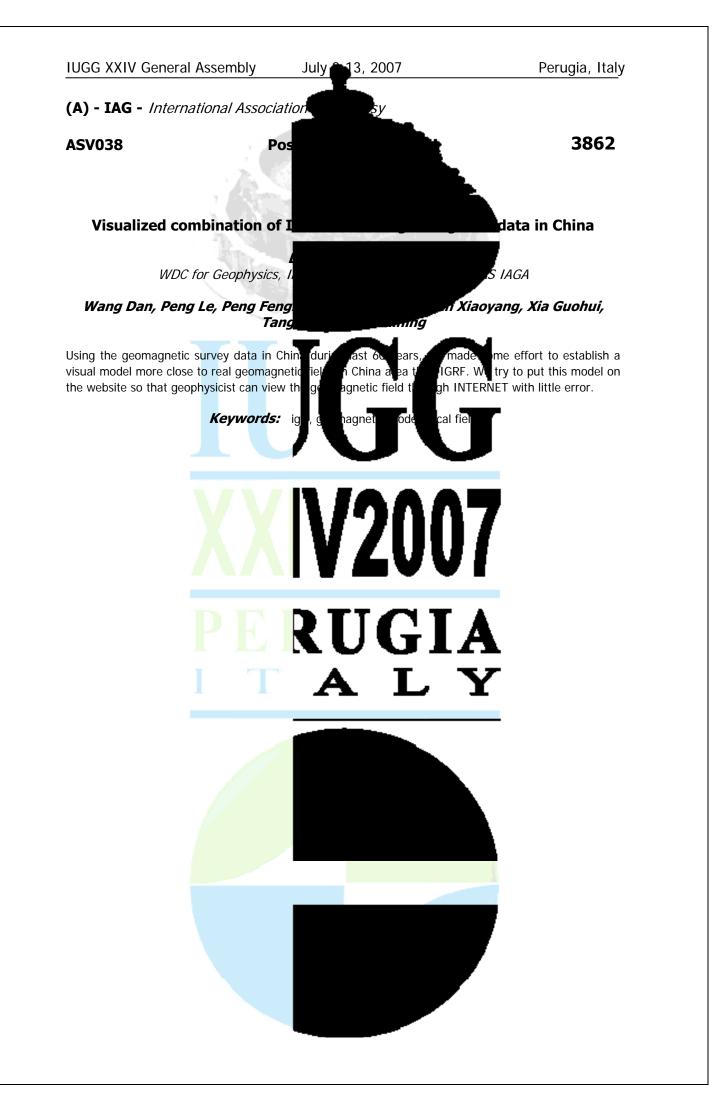
Keywords: anomaly maps of baltic











## **IUGG XXIV General Assembly**

(A) - IAG - International Association

## **ASV039**

Symposium Use of geomagnetic data and in climatology

Convener : Dr. Juan Jos Curto Co-Convener : Dr. Renata Lukianova

Magnetometers are routinely used on the to gather information on rapidly changing observatories also provide an important lo solar cycles. Such a global database and time span all and long term space climatology. In this se data and index analysis such as: space we activity (e.g. storm severity); derivation of g of data and indices for academic and c assimilation and visualisation; the short and weather; and climatological models of magn

to explor sion apers solic ent dete tior netic indices ial purposes m va ric and

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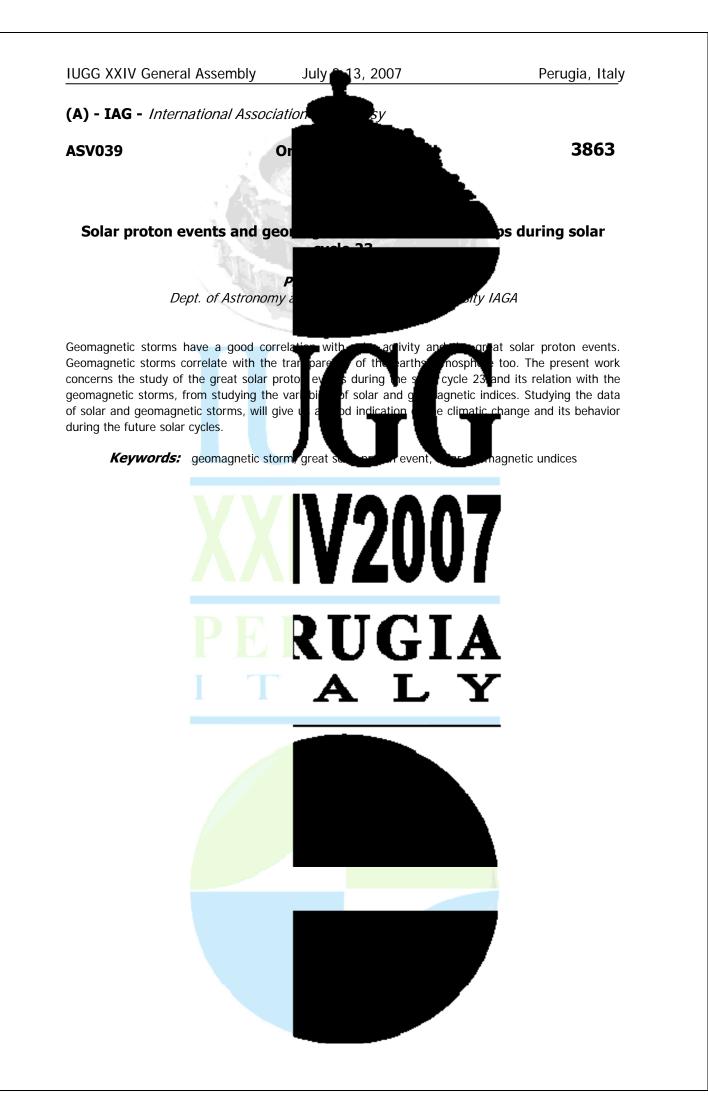
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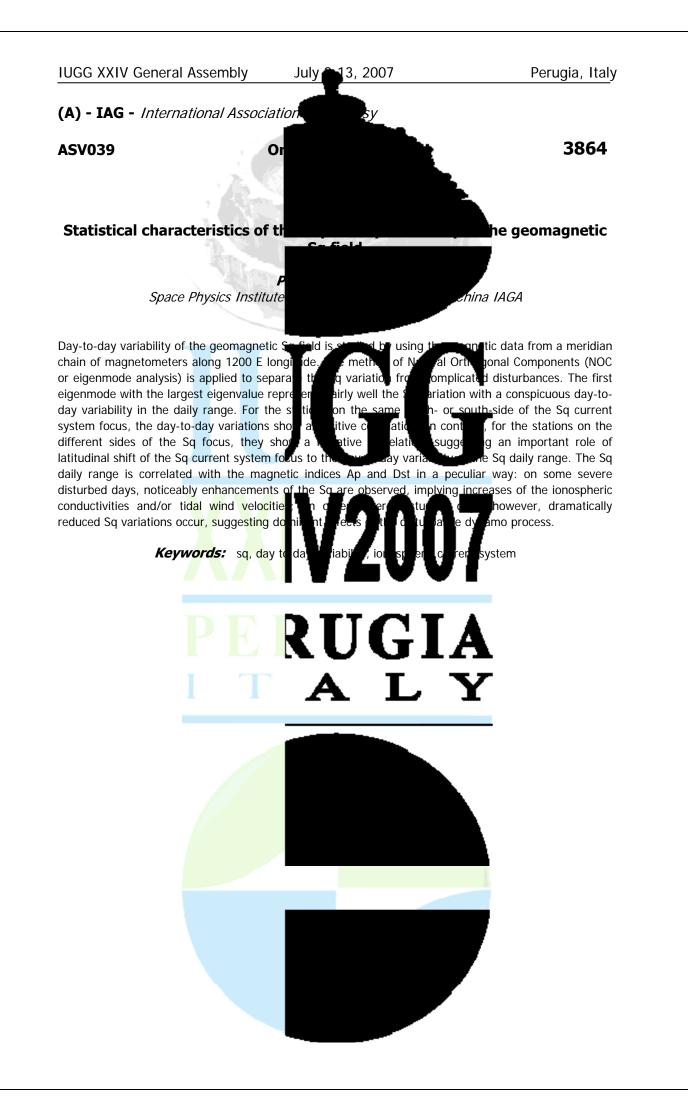
sphere and in the solar wind ditions. Ground based magnetic uata for monitoring conditions over many h short term space weather s issues in geomagnetic ado ethods of classifying geomagnetic traditional and new); applications magnetic data mining, analysis, Fironment and of space e spa ystems and fields. curre

nd space

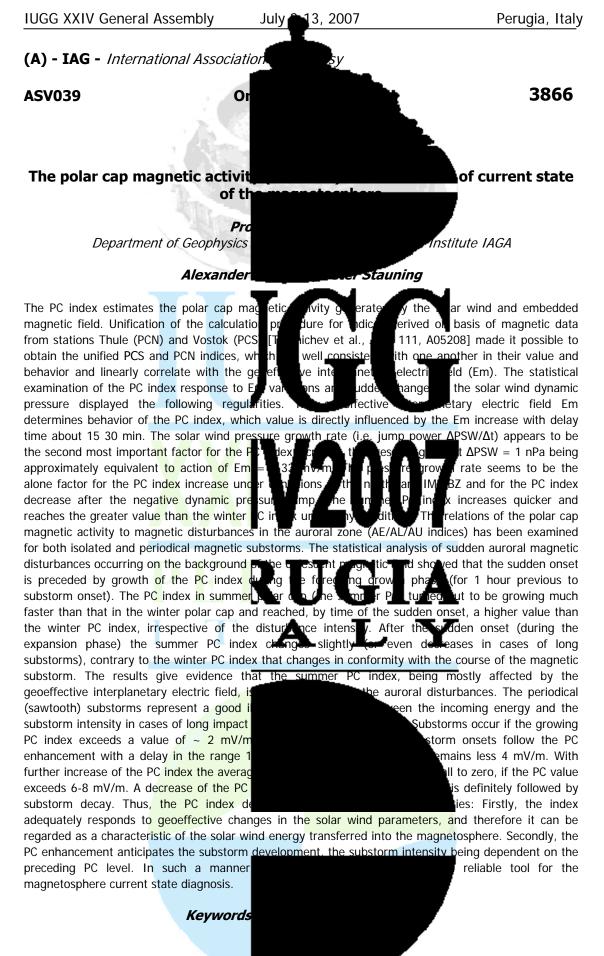


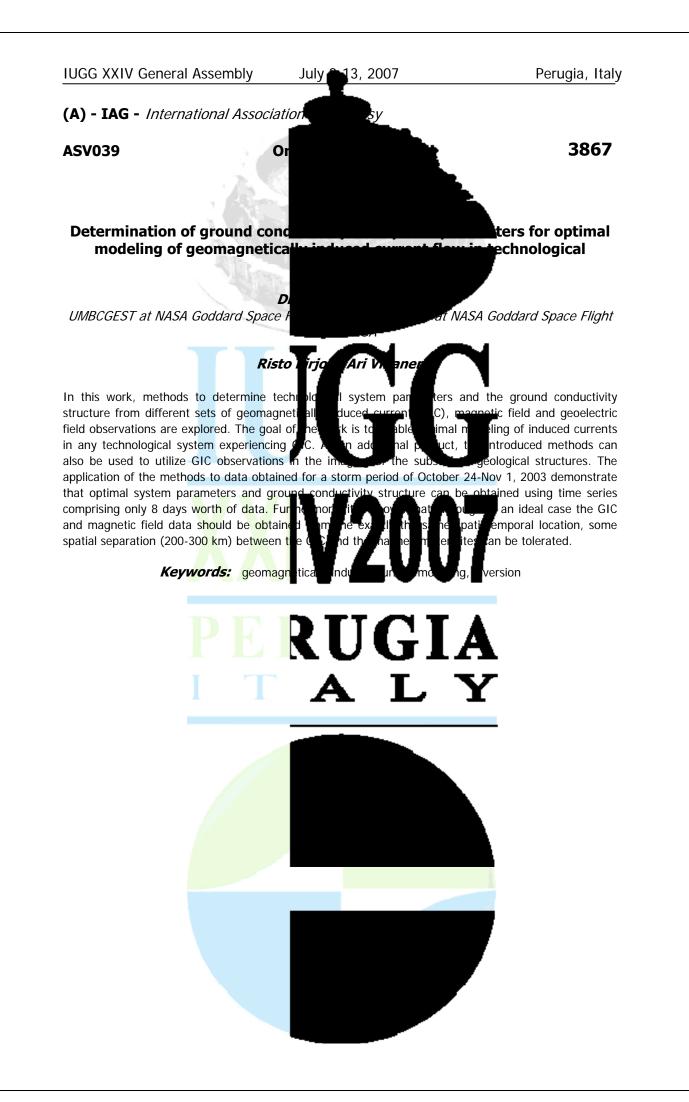








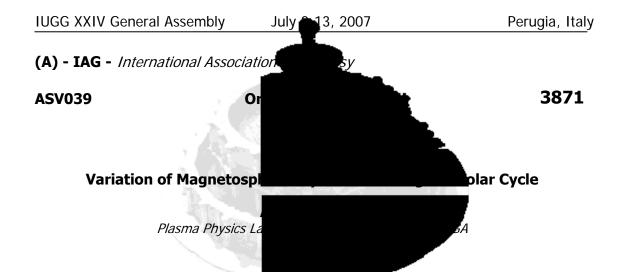












Geomagnetic indices have been constructed to Signatures of the solar cycle and the underling these indices. In order to study the lon te considered the nonlinear dependencies inhe the dynamics of the magnetosphere tend to The strong nonlinear dependencies tend to significant up to one week. Because the sol a much shorter decorrelation time for non-nearitie

related to internal magnetospheric dynamics. Moreover, the timescales for the nonlinearity seem to be on the same order as that for storm/ring current transport. In the descending phase of the solar cycle just prior to solar minimum, when magnet nonlinear internal magnetospheric respons To investigate this effect further, we analy of high speed stream interfaces were dete the nonlinear response.

terize/desc wind agne variability of the Kp data s re li<u>near at</u> a time d 40river able seer

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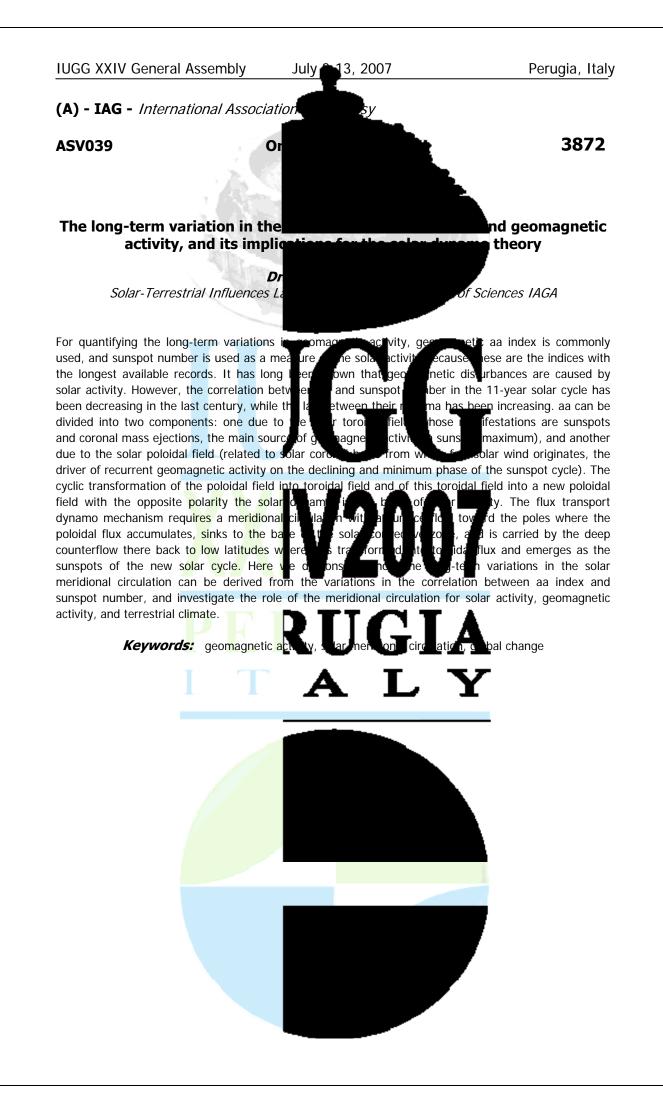
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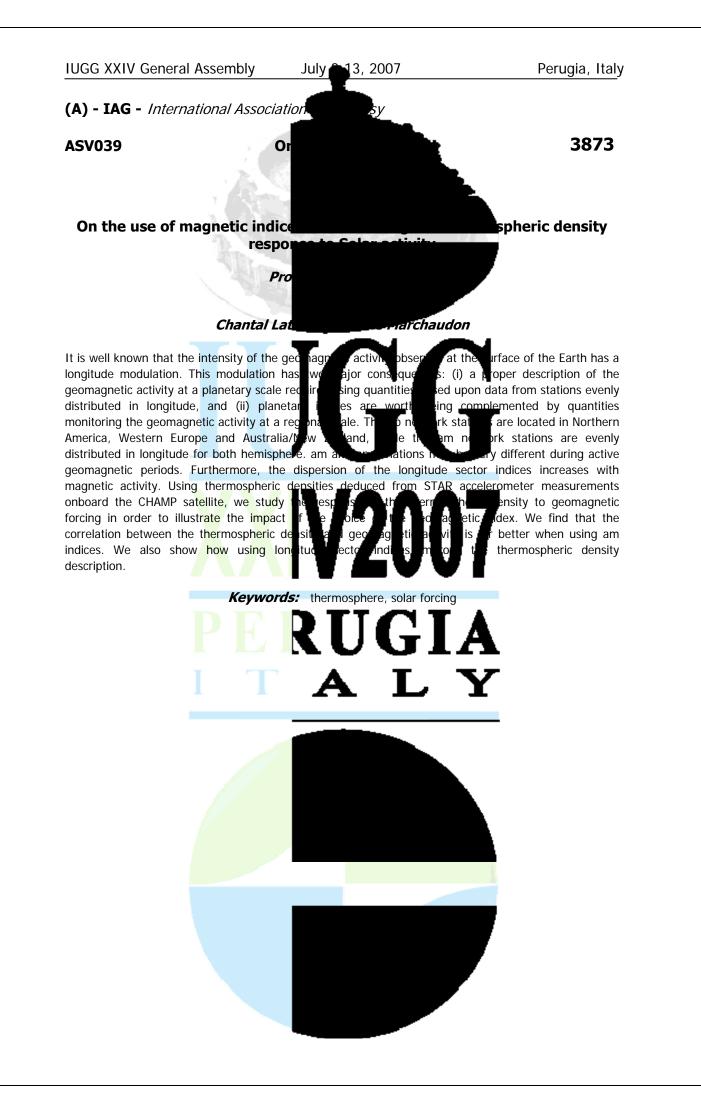
he magnetospheric state. eraction are reflected in netospheric dynamics, we have n from 1932-present. We find that max<u>imum th</u>an at solar minimum. ours and are statistically namical pressure exhibit that the nonlinearity is

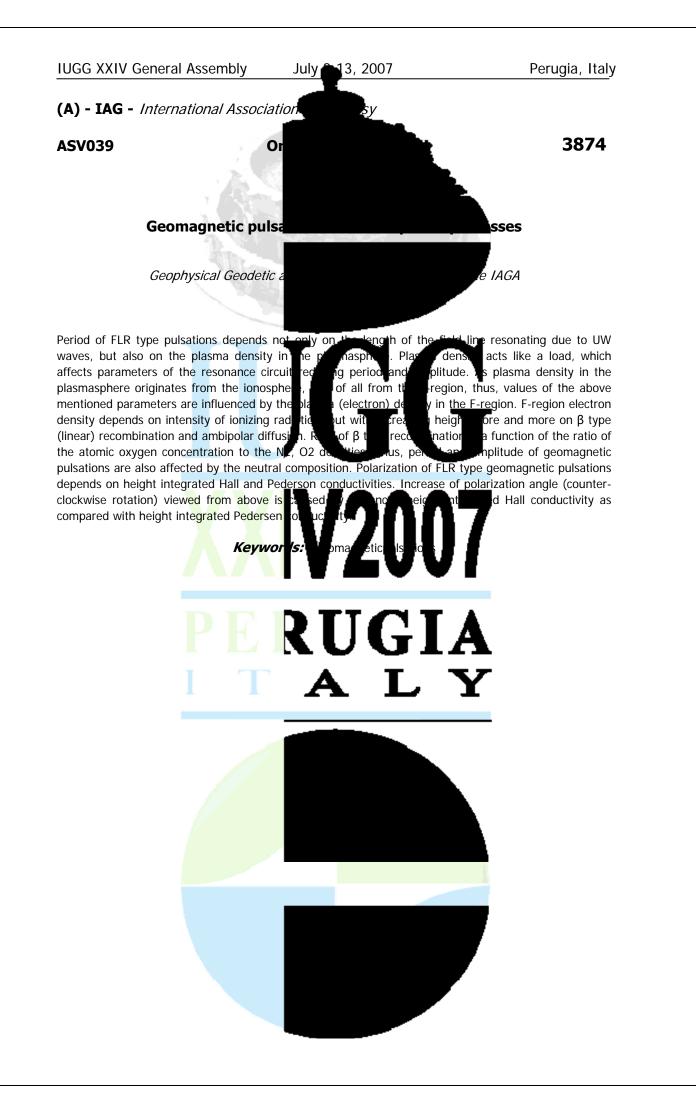
> cs exhibit a significant ased solar wind speed. 995-1996 when a series uss the physical origin of

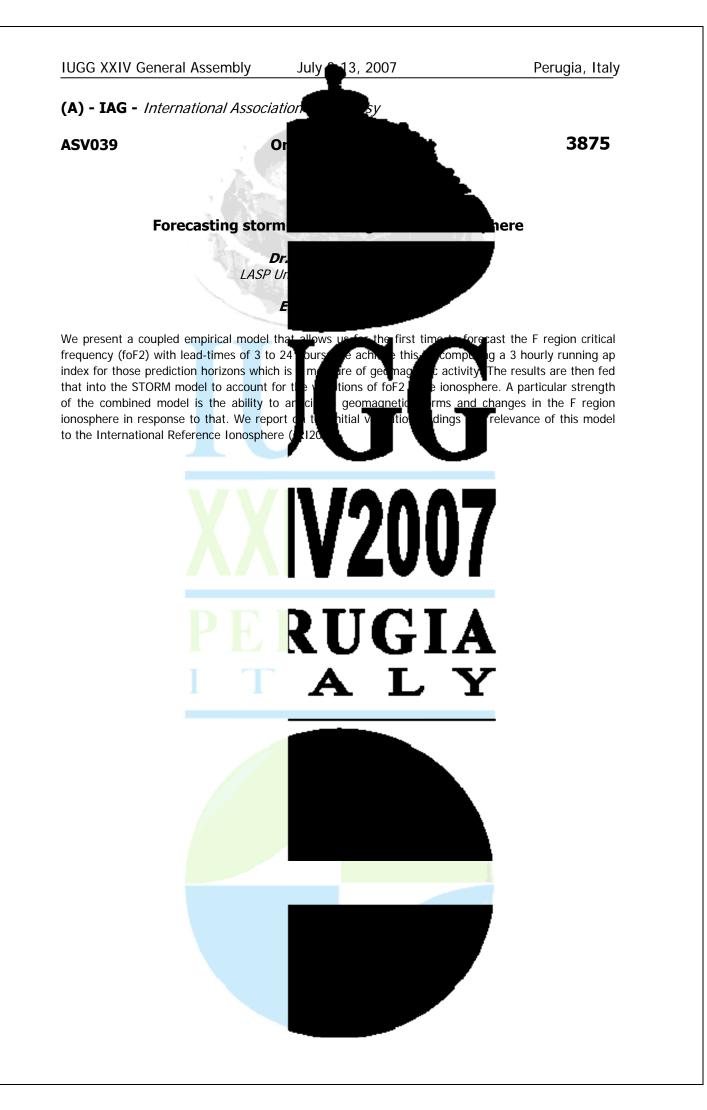


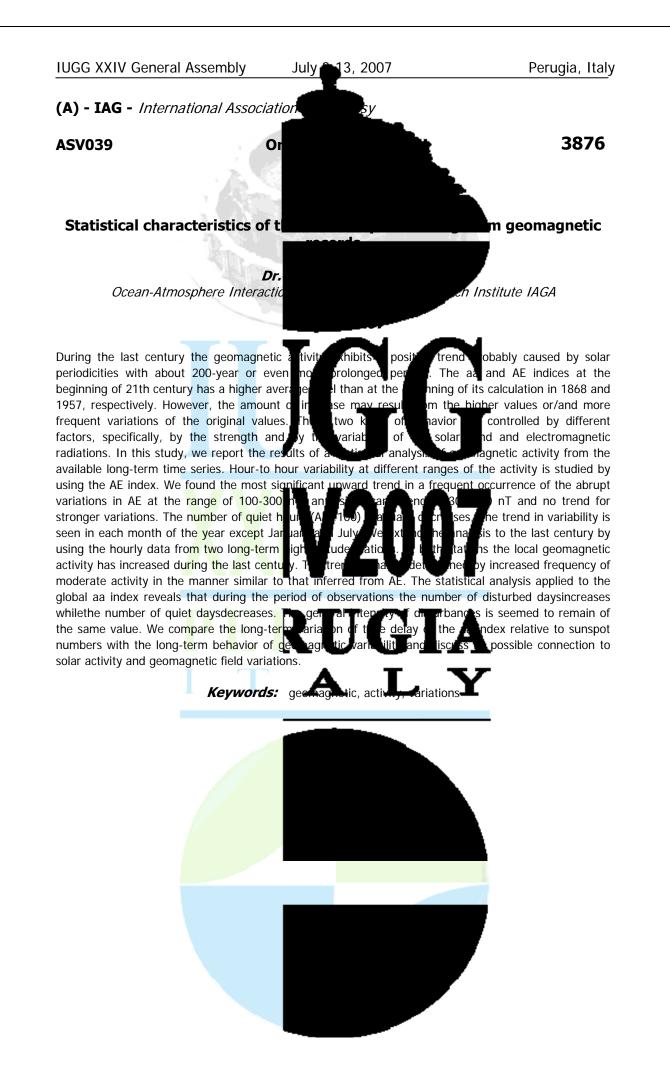


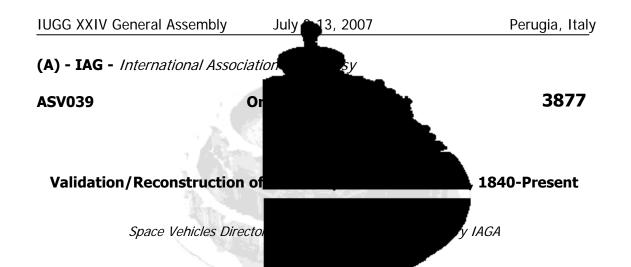






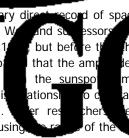






The 400-year long sunspot series is our primary dir Zurich (now: International) series compiled y W Schatten. The two series agree well back to lower than the Wolf SSN. Wolf (and others) Declination of the geomagnetic field variation relationship: rD = a + bR. In fact, he used before his own observations started (18 procedure. We re-examine Wolf's relations up using

directly related to the intensity of the ionospheric SR currents, which in turn depends on the conductivity of the ionosphere. Solar FUV radiation creates and maintains the ionosphere, therefore the rY range (corrected for the secular decrea that this proxy reproduces the F10.7 radio of determination of  $r^2 = 0.97$ , and reca exists that may allow such recalibration recalibrated peak numbers that are up Zurichnumbers.



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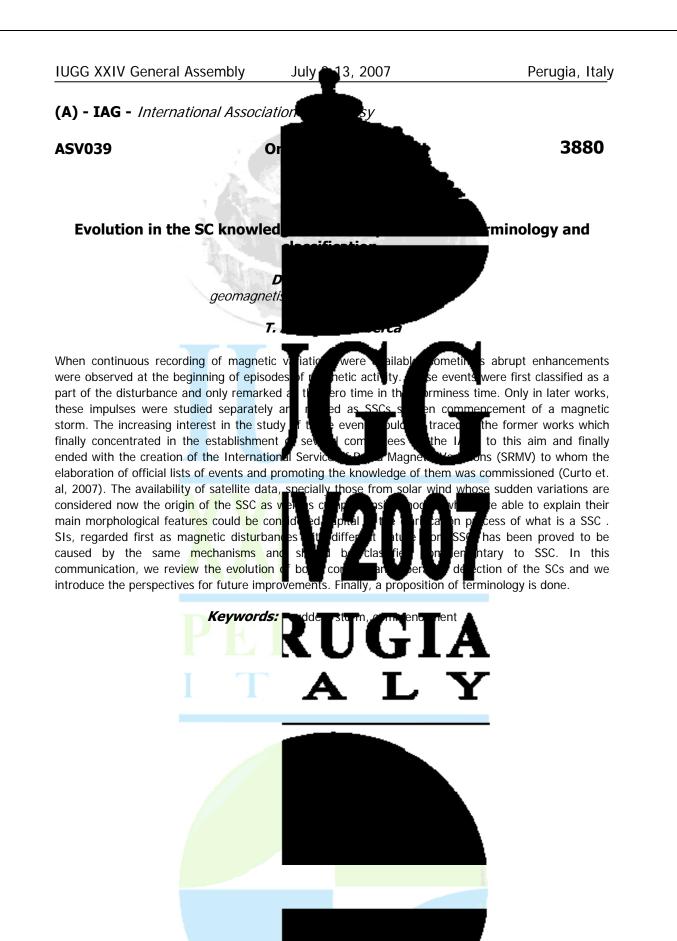
nate. Two series exist: the roup series by Hoyt and nd the he Group SSNs are systematically le, rD, of the daily variation of the mbe<u>r, R, a</u>nd proposed a linear nspot number for times enthusiastic about this bnent (rY). This range is

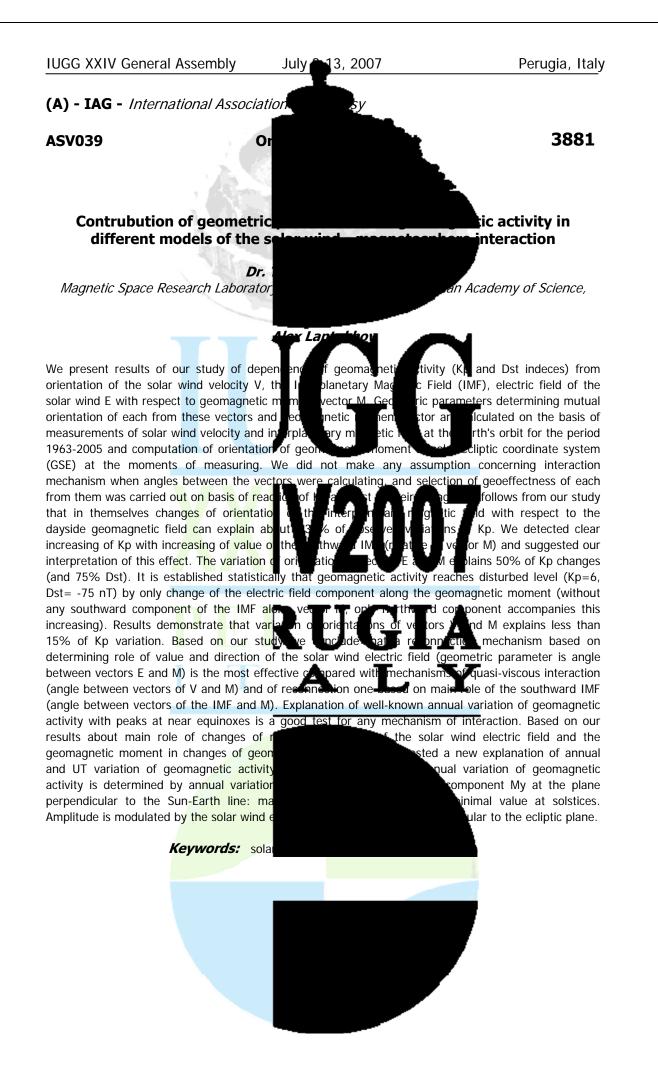
> of the FUV. We show mber with a coefficient 841 [geomagnetic data ~1840 to 1900 have ntly used Group and/or



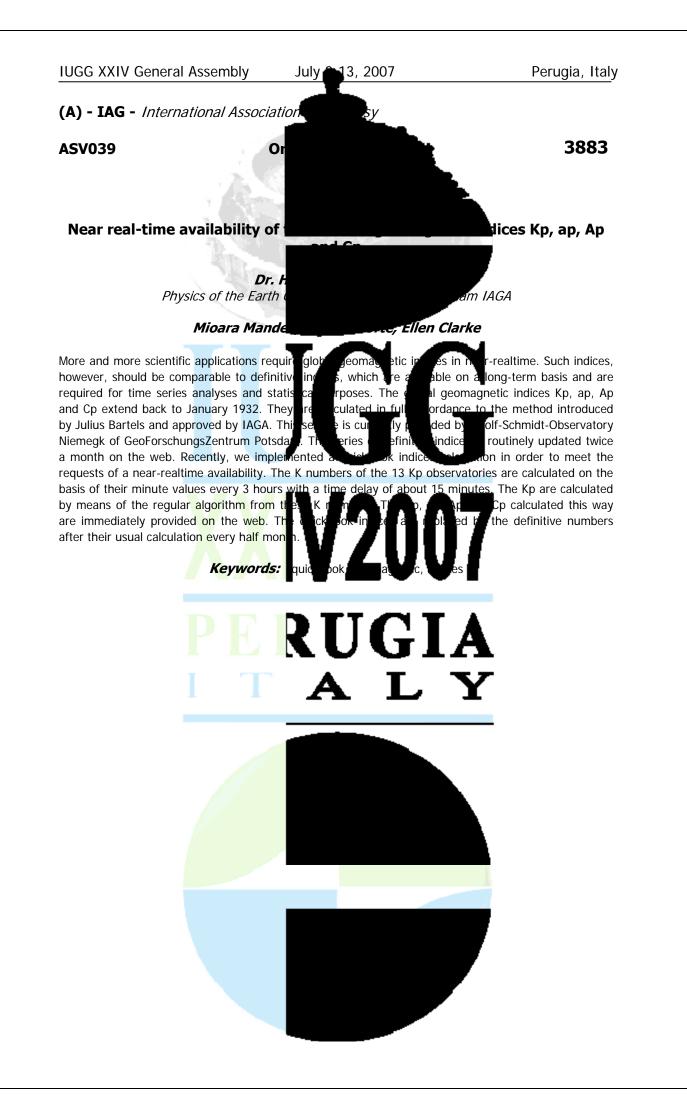


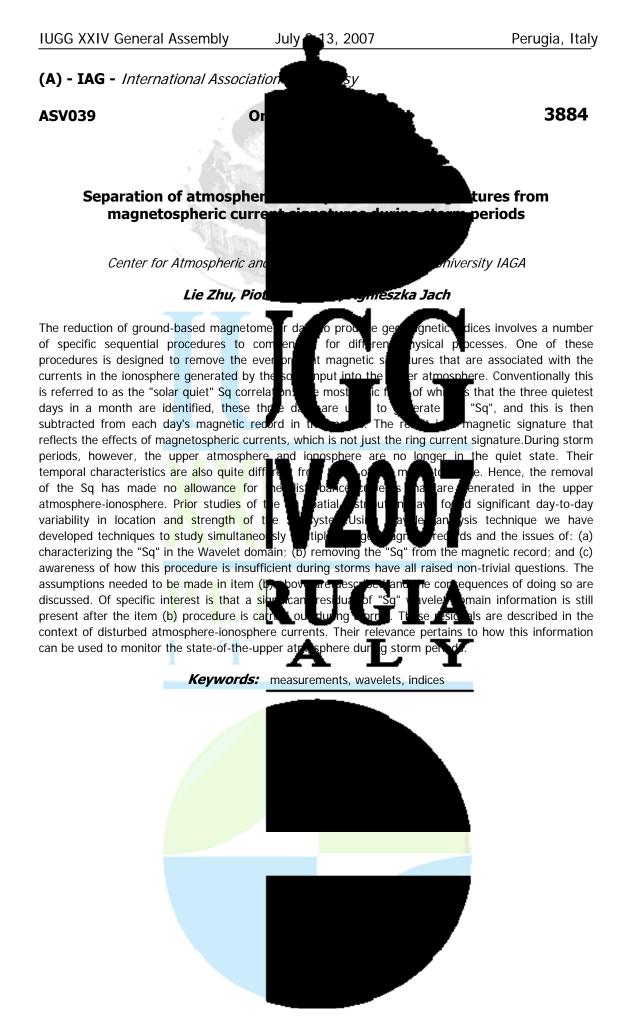






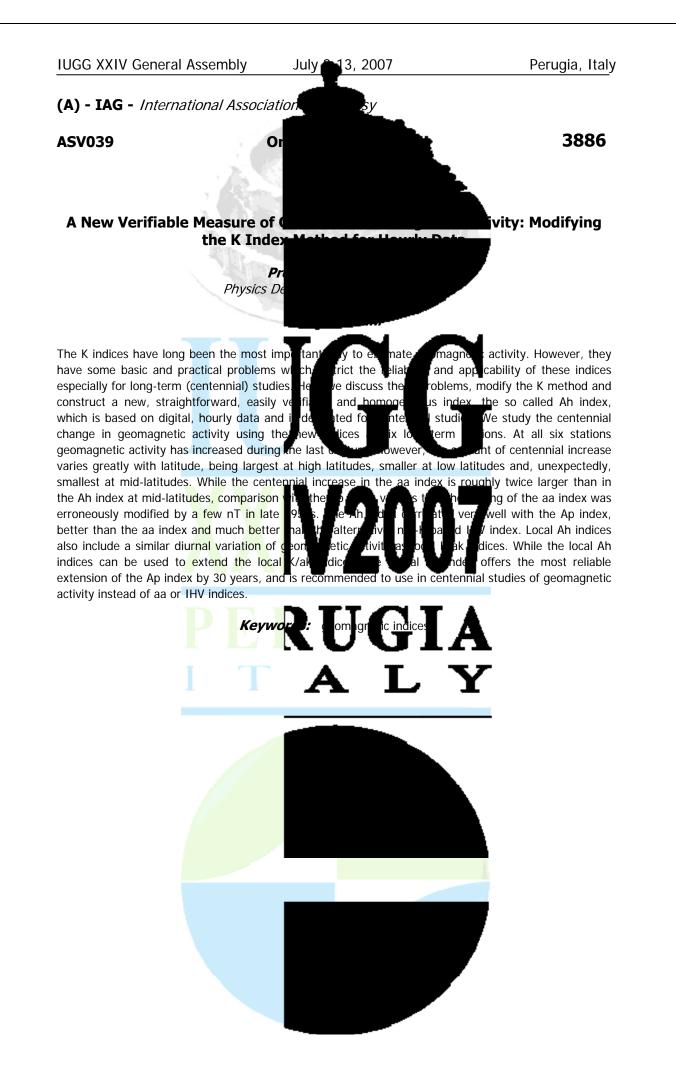


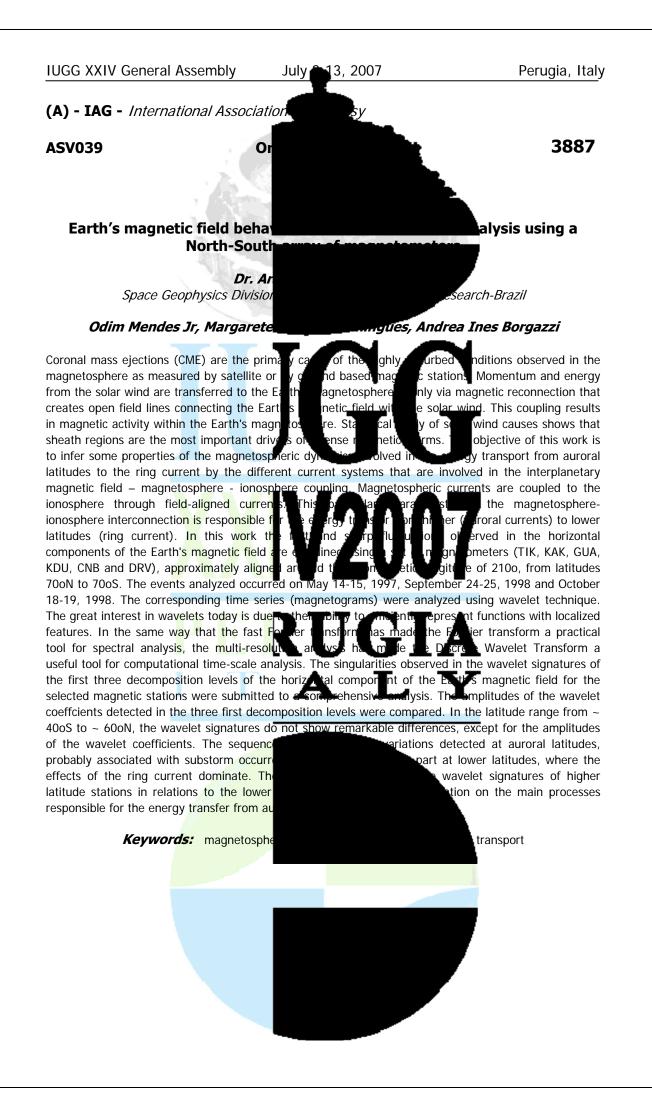






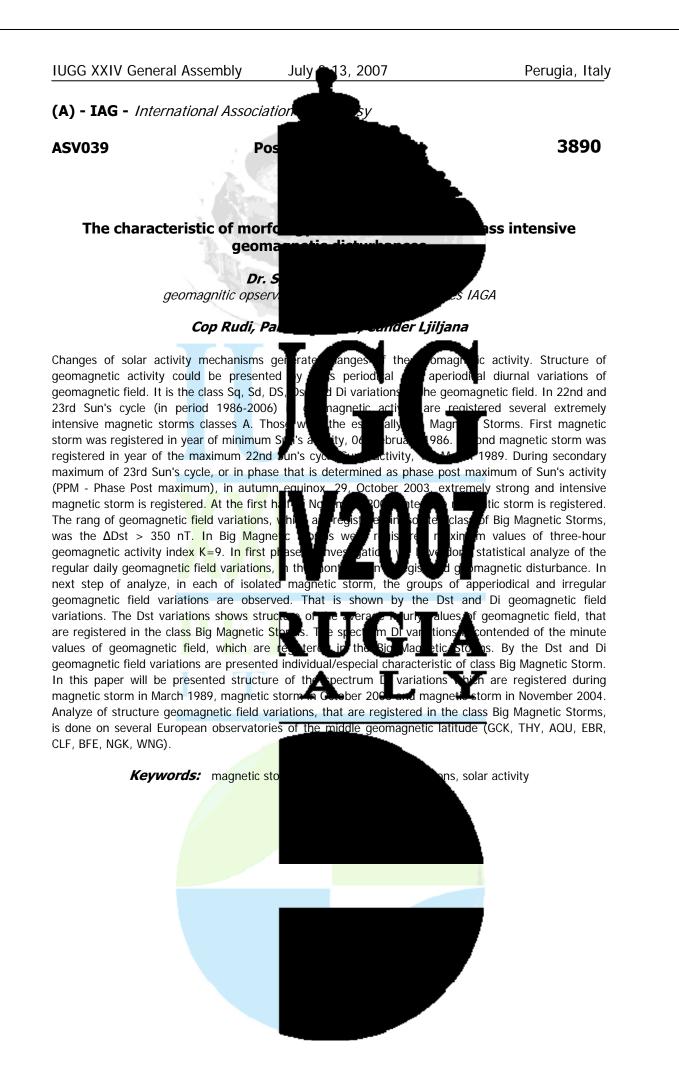


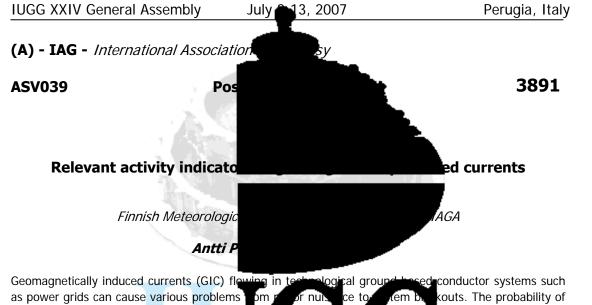












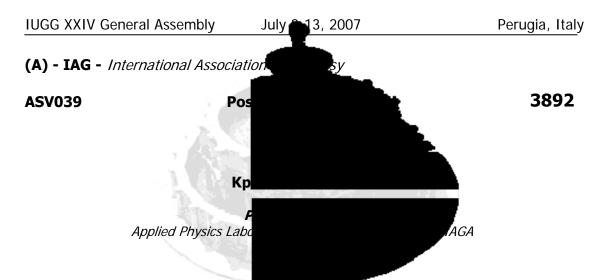
as power grids can cause various problems for r GIC is largest during high geomagnetic actively, ...). However, standard indices are based on t some hours or longer, and they may suffer fro GIC is primarily related to the time derivative of timescales of a couple of minutes. Based on pipeline, we demonstrate the strengths and weakn of alternative activity indicators.

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the mosed conductor systems such them by kouts. The probability of tional magnetic indices (K, Ak, aa, f the magnetic field in periods of he most extreme events. In turn, dB/dt) which varies rapidly within nents withe Finnish natural gas which well as discuss a couple



m

Magnetically active times, e.g., Kp > 5, are notorious are crucial to the space weather users. measurements at Langrangian point (L1) networks were developed with the focus on different needs and operational constraint nowcast Kp, solar wind parameters, and pr and predict Kp 4 hr ahead; and (3) model, ahead (the exact prediction lead time depends of

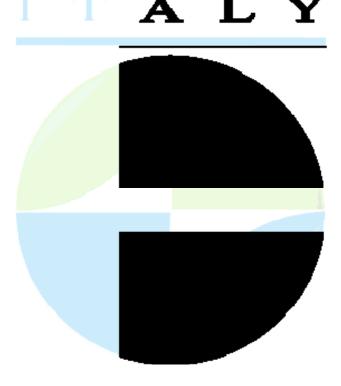
wind monitor). Extensive evaluations of these models and other major operational Kp forecast models show that while the new models can predict. Kps more accurately for all activities, the most dramatic improvements occur for moderate and act 1975-2001, show that solar wind driven m solar minimum. This result, as well as info more dominated by internal dynamics du directly driven by external inputs, namely

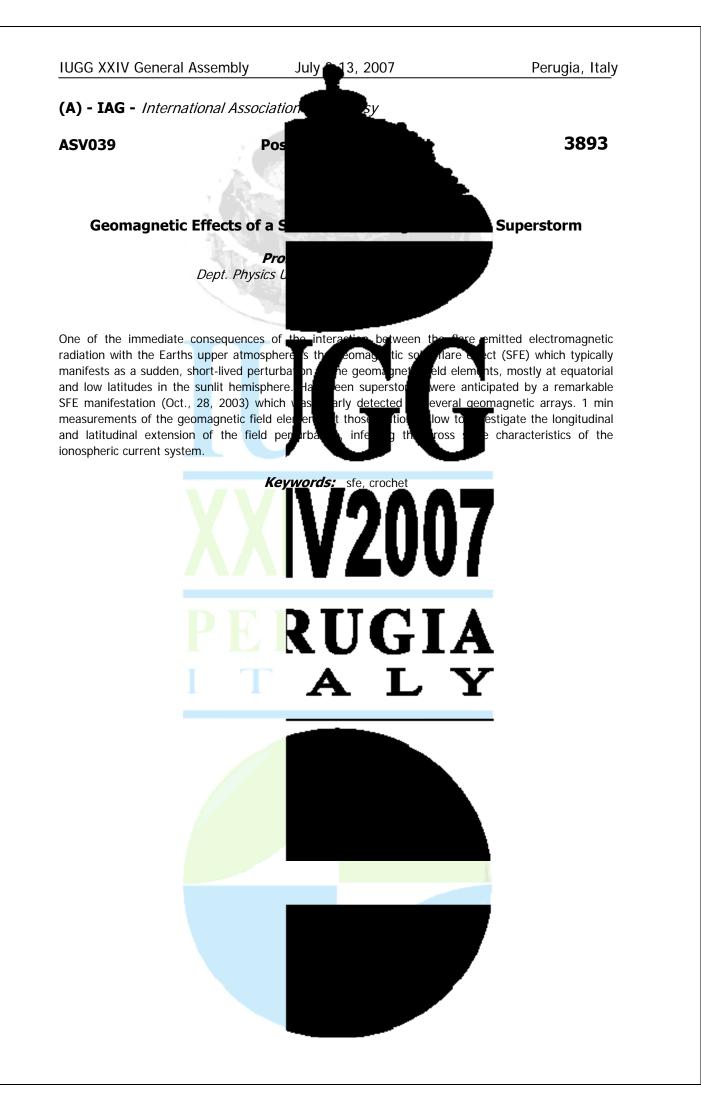
ficult to predic akir of idvan rout wcast K Ing ing the forec e m<u>odels w</u>e model 1 hr ۶d its on olar l para hat wind

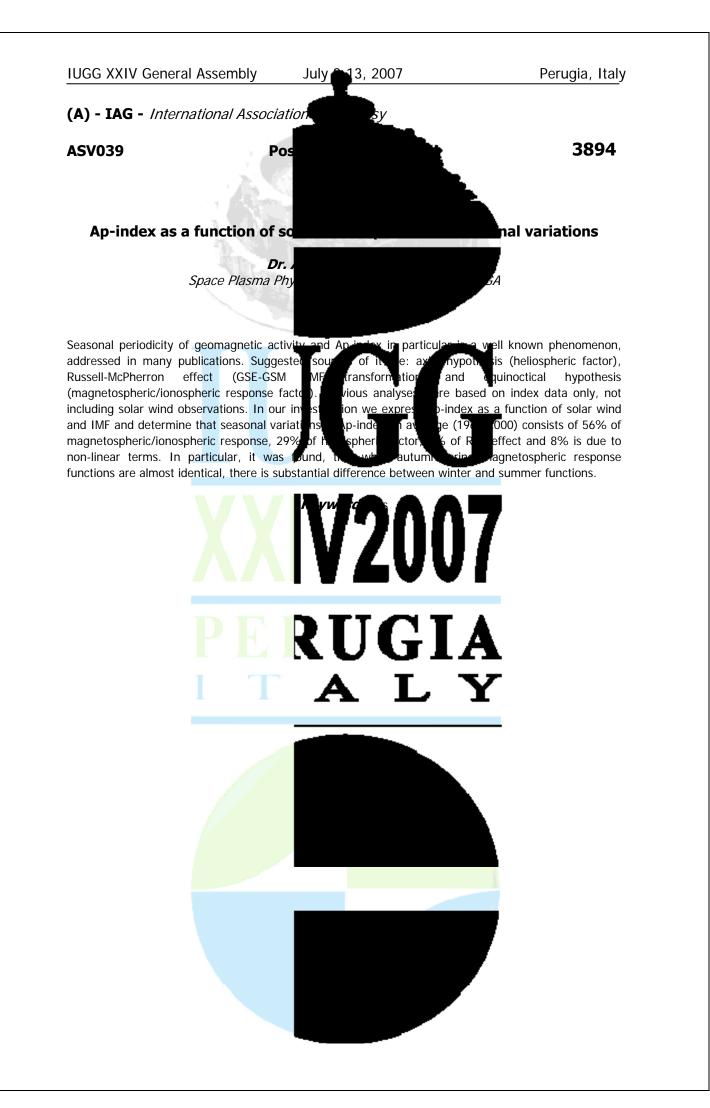
circly when the predictions y available solar wind brecast hodels based on neural br active times. In order to satisfy leveloped: (1) model that inputs The same input as (1) ers and predict Kp 1 hr he location of the solar

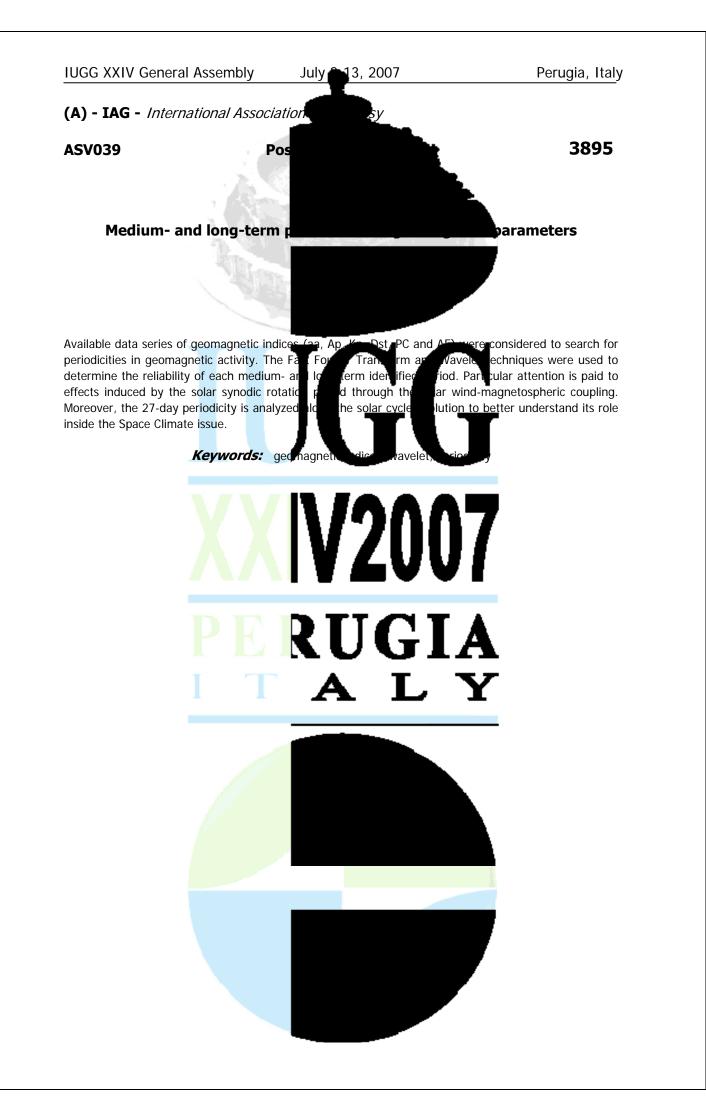
> els over 2 solar cycles, ng solar maximum than ggests that geospace is kimum, when it is more

Keywords: kp, forecast, models

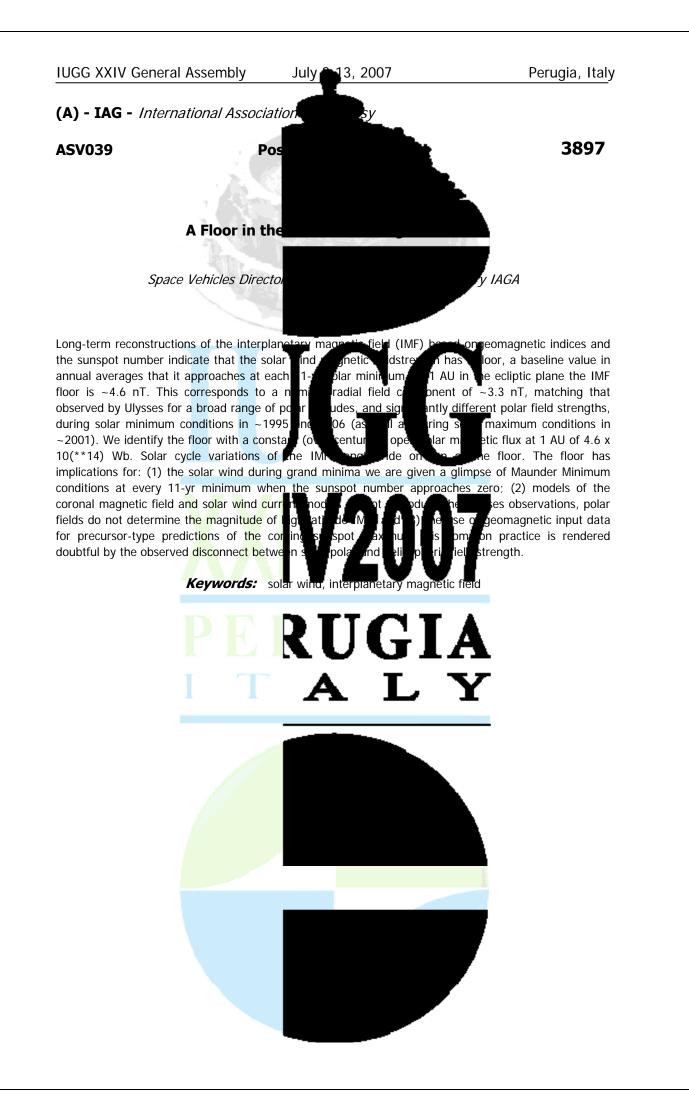






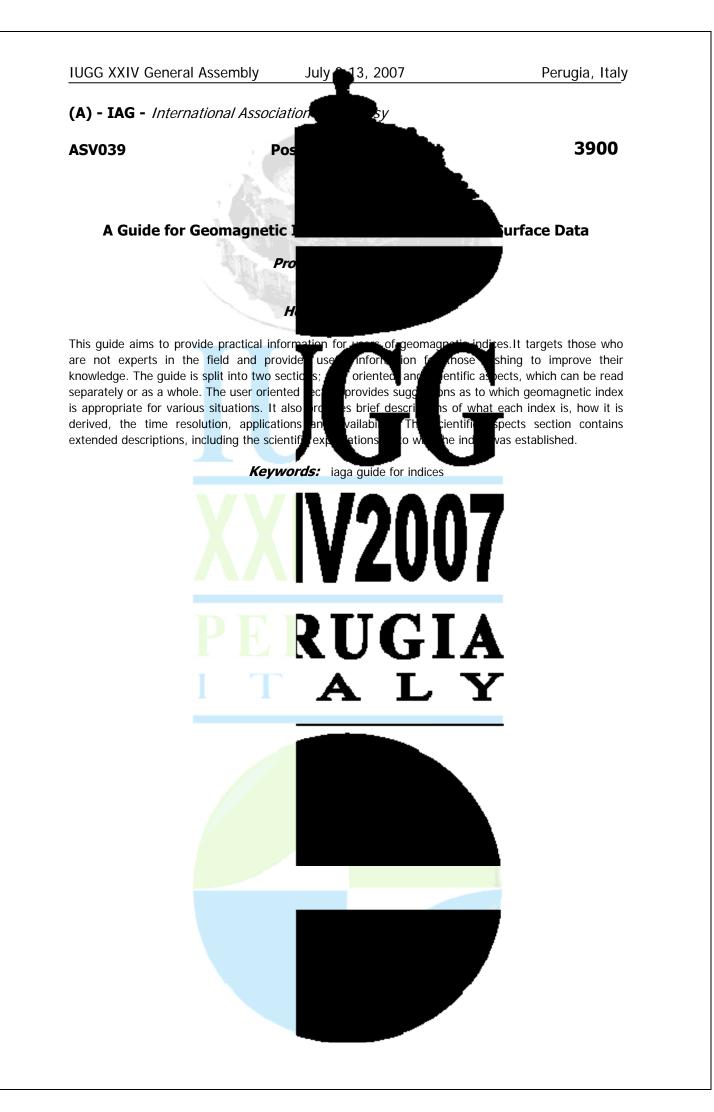






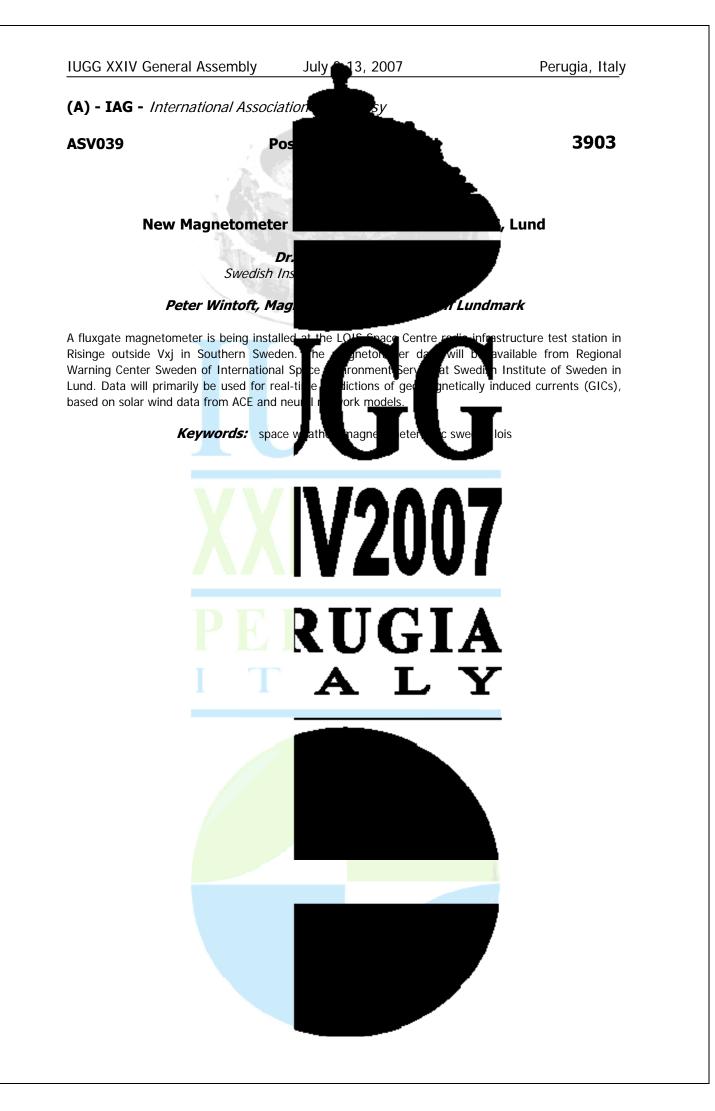


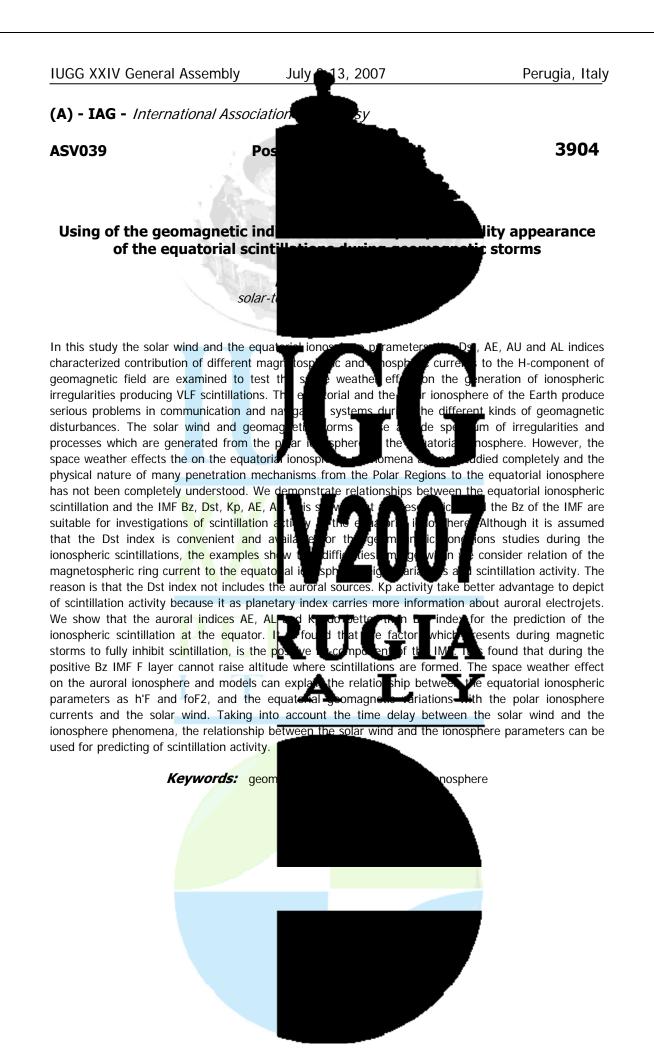


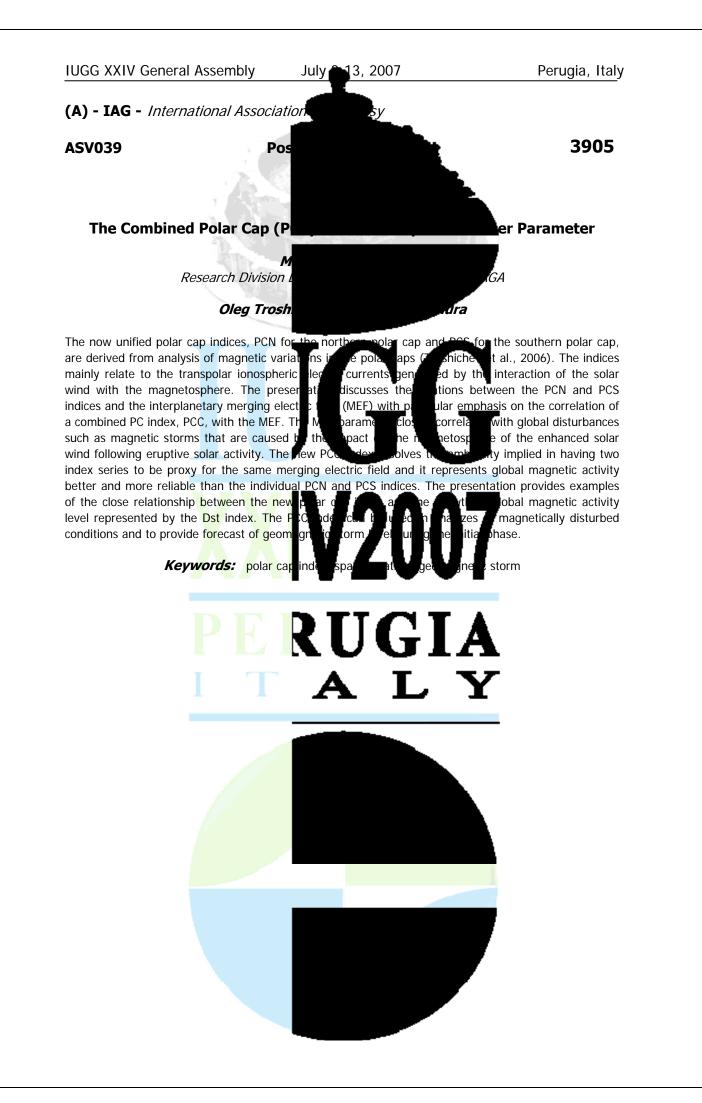


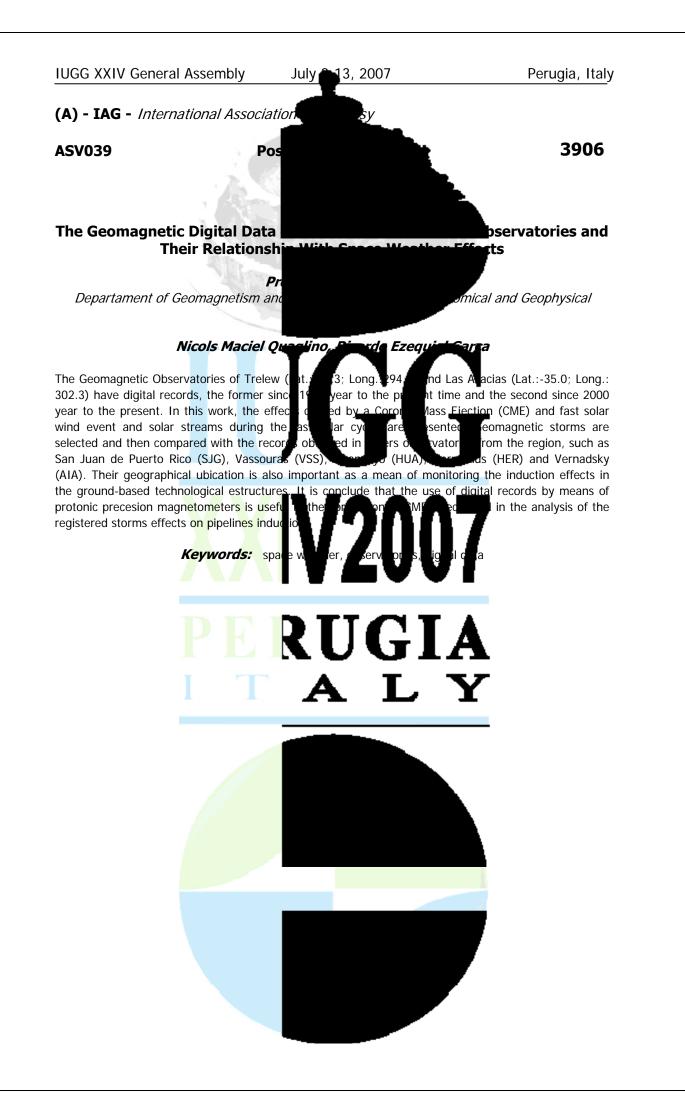


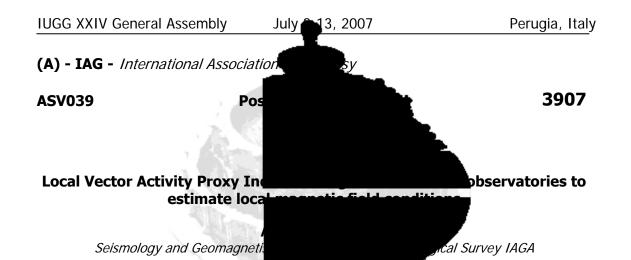












The INTERMAGNET network of geomagnet over 100 observatories around the globe. The resource to determine new activity proxy example we describe how, for a given positi any geomagnetic field component, using sample point, and giving a local measure of is merit in using this local estimate of the e indices. We consider if further refinements of the

observatory data, can enhance the results obtained. Currently standard global indices are used in data selection procedures (to reject geomagnetically active satellite data) when modelling the internal magnetic field. Active periods are regarded signal from the internal field. The techniqu have other applications, for example to covered by geomagnetic observatories or does not give enough time resolution.

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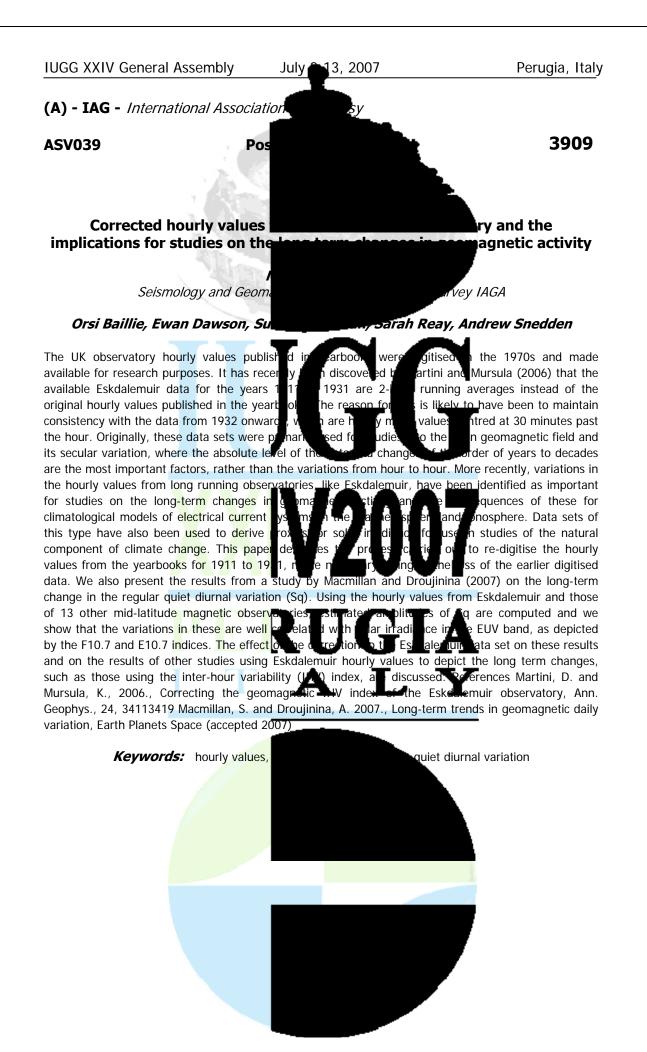
y one-minute data from es is potentially a useful serva htific and other purposes. As an index value can be determined for est available observatories to the level examine whether there posec the standard large-scale by interpolation of local

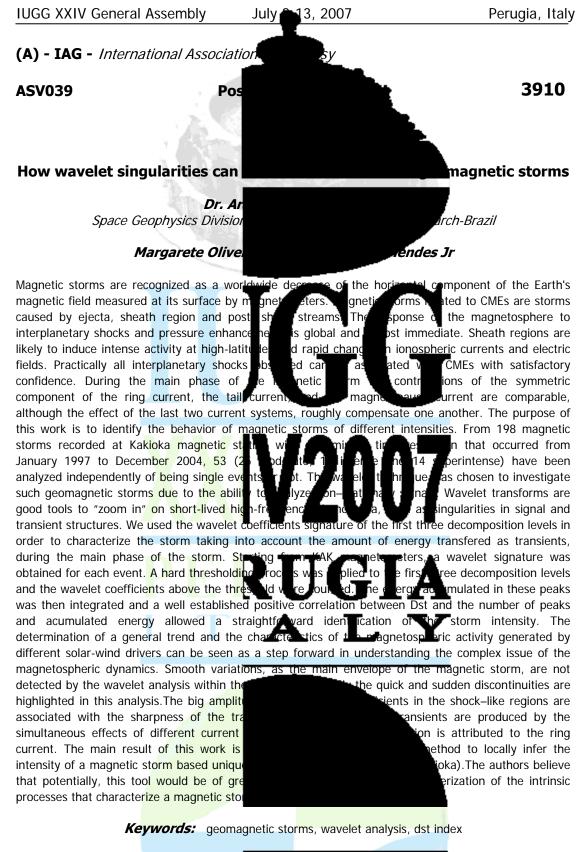
> nal field can mask the a selection. It may also ariation in areas poorly asure of local variations

Keywords: geomagnetic activity, geomagnetic indices, geomagnetic observatories

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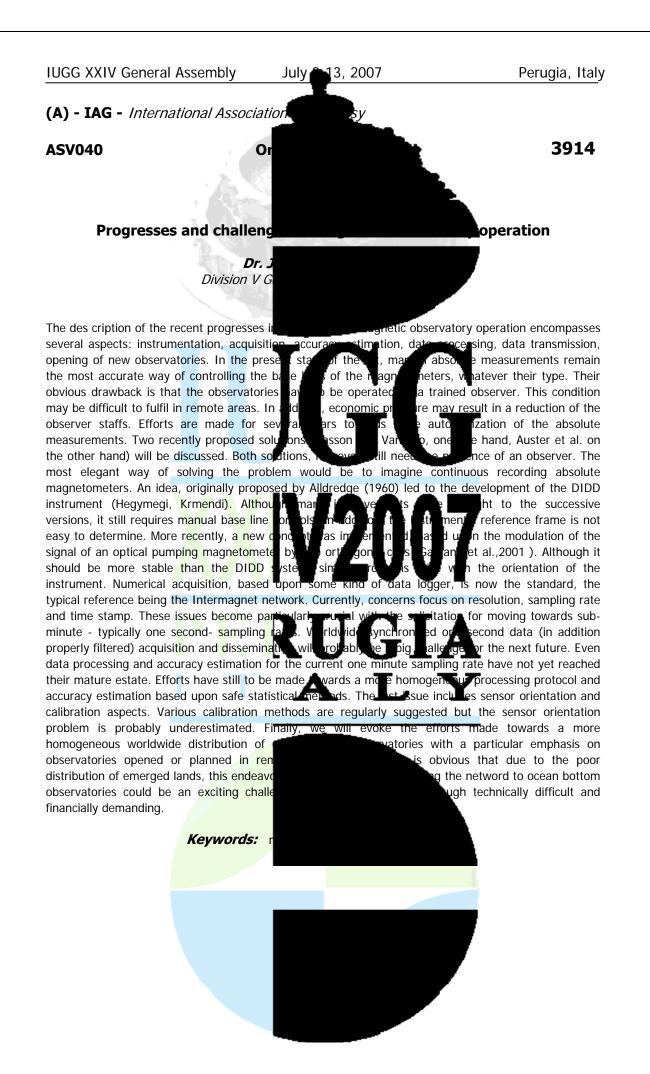


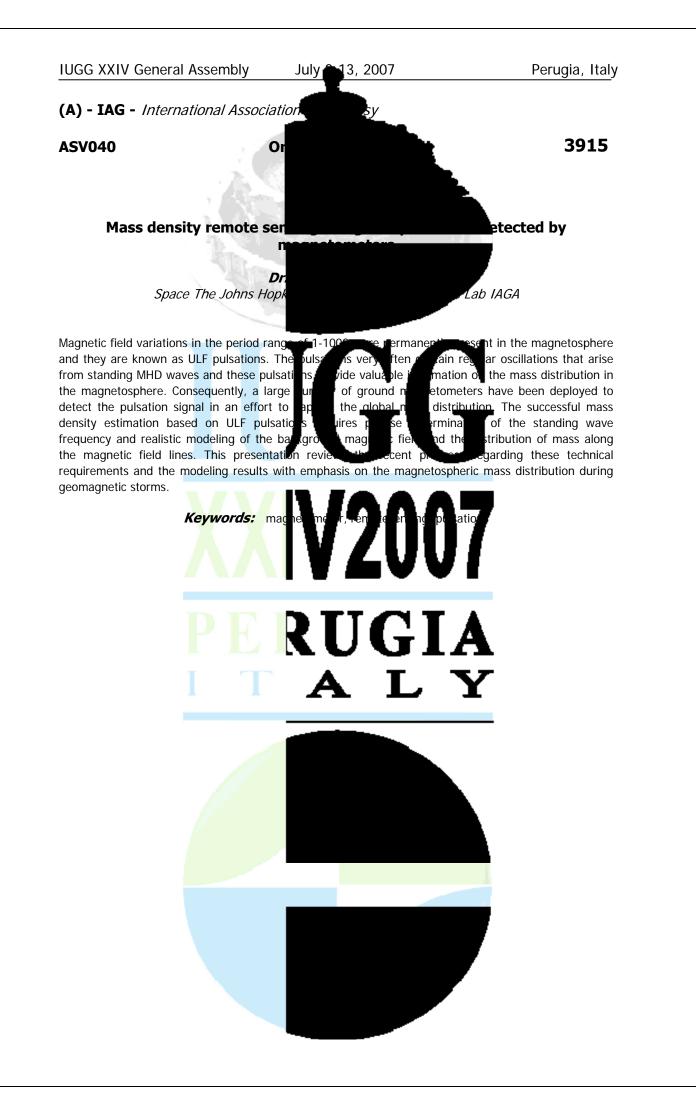


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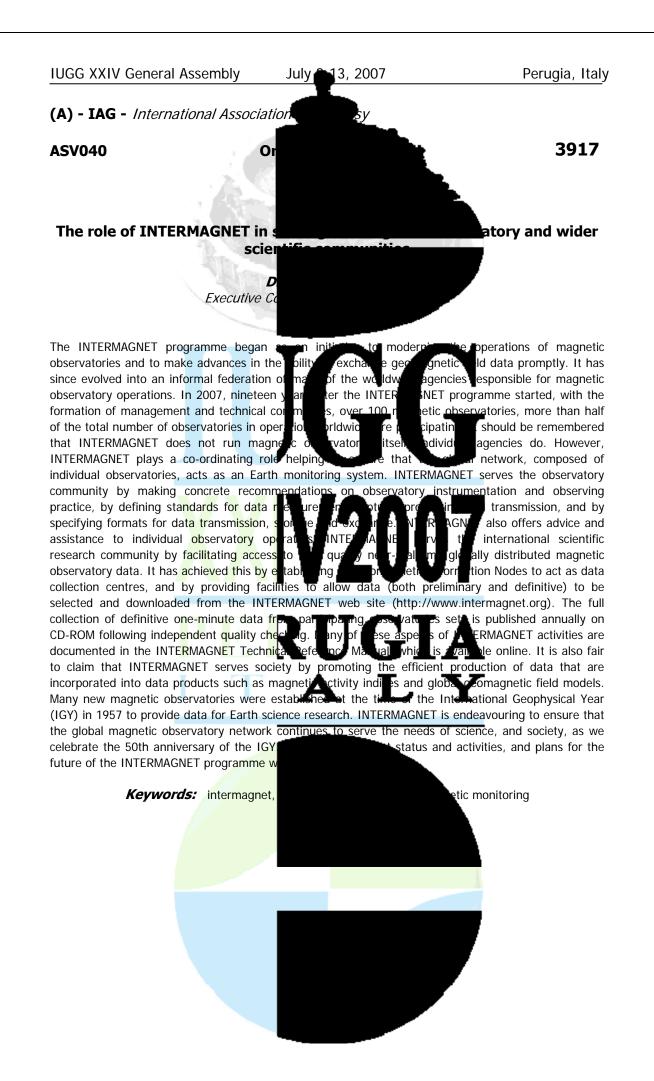


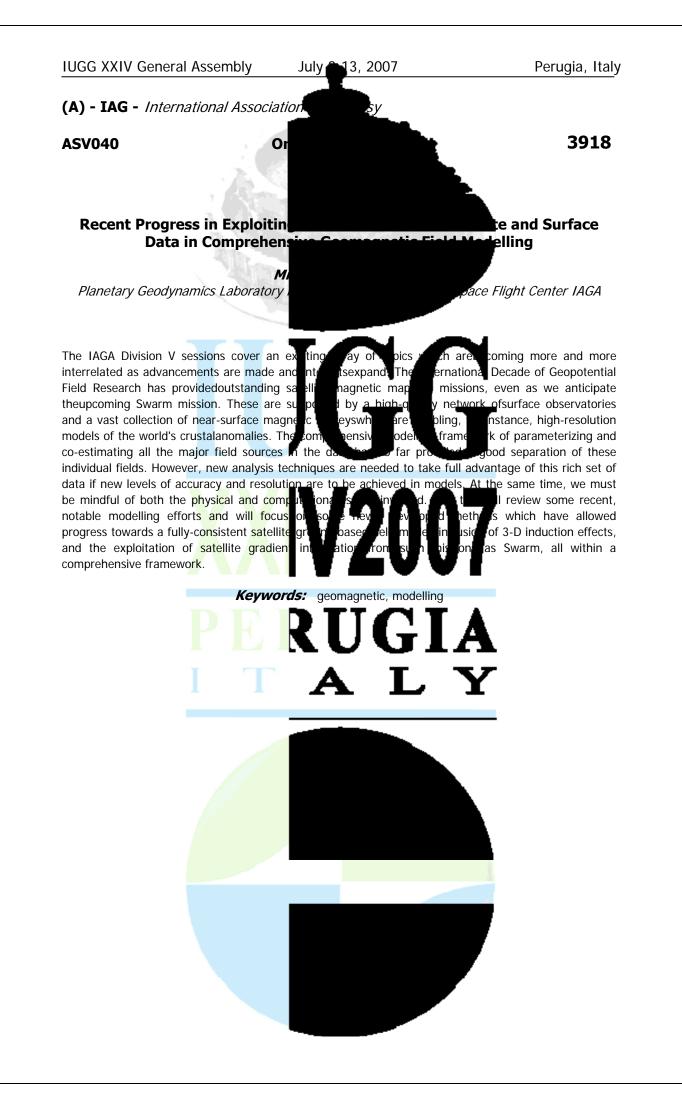


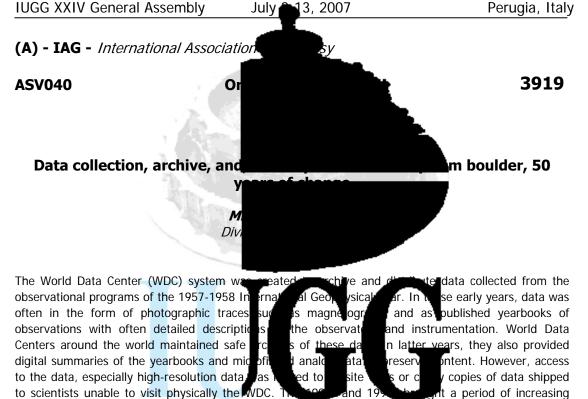




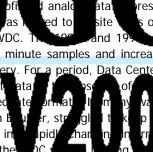








digitization. Data began to flow digitally at minute samples and increasing numbers of observatories converted to an all-digital form of data delivery. For a period, Data Centers were challenged to keep up with the flow of data, to properly docume exchange data without established or inac expectations. Many WDCs, including those of format, archive, description, and deliver The last five years have seen a maturing ir the stable capability based on a flexible information technology base. Data are flowing at ever-higher



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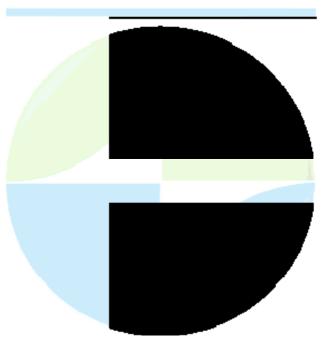
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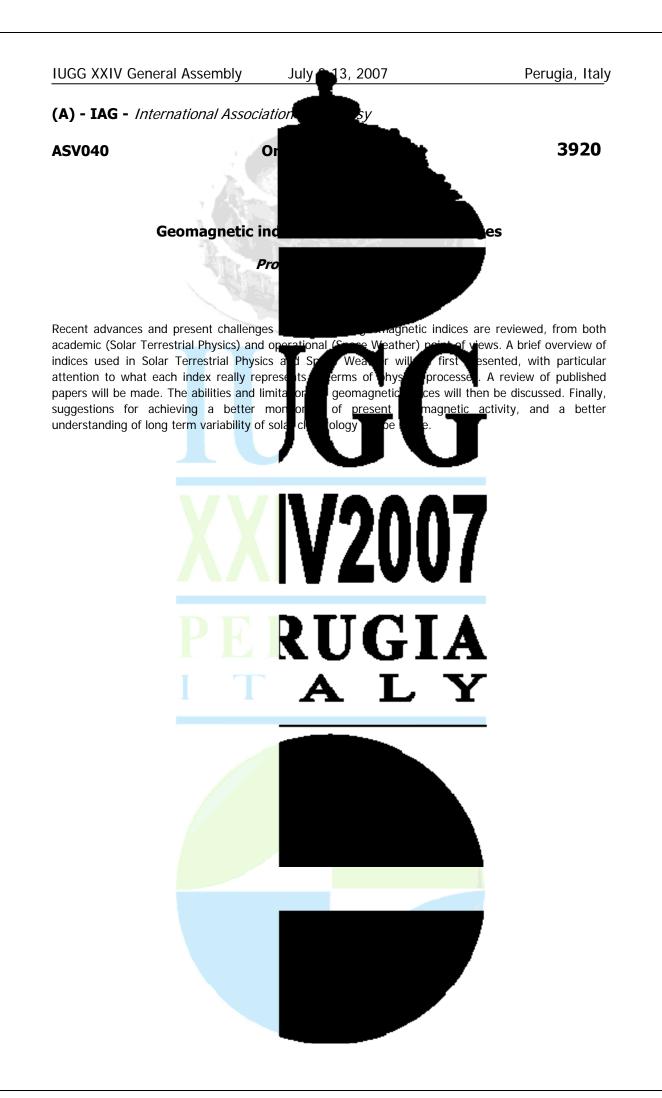
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spatially-enabled databases, web services improvement in data collection, archive, review the changes over the years since in that seem hopeful for sustained archive and access of geophysical data for the next 50 years.

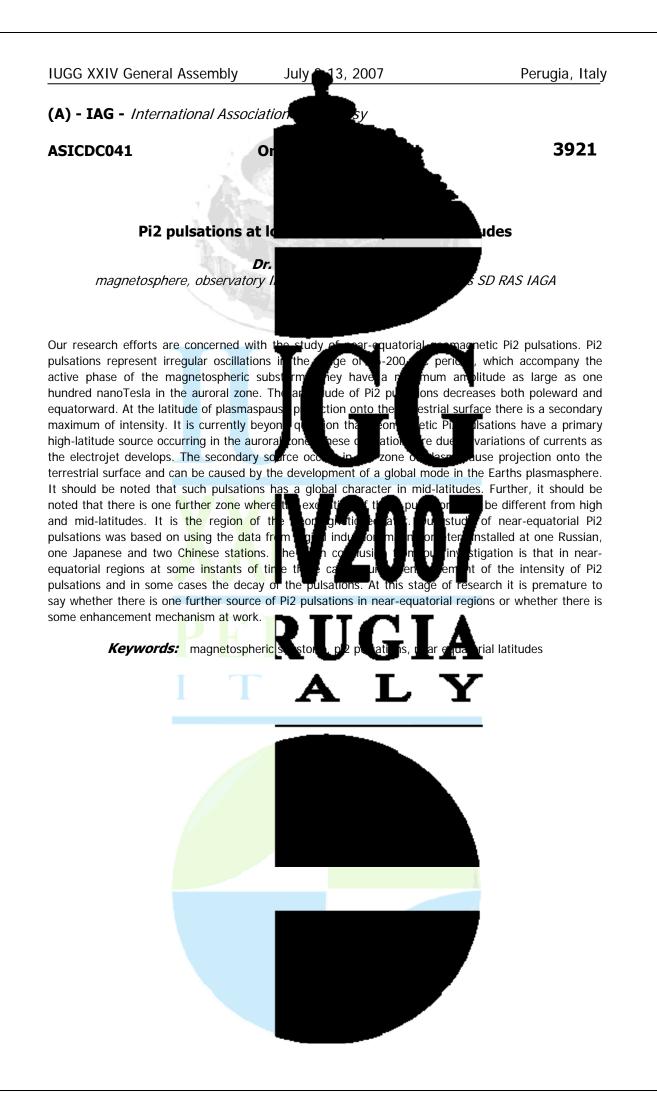
> Keywords: world data con access

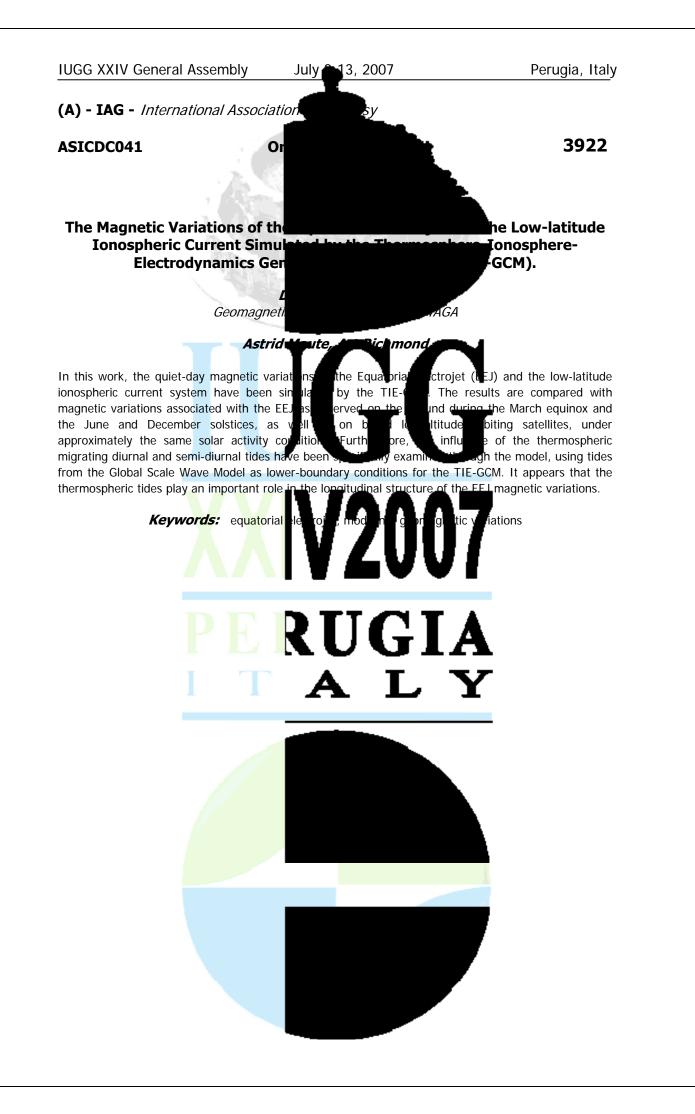
resolutions in closer to real-time. Metadata and data standards designed to grow with time coupled with

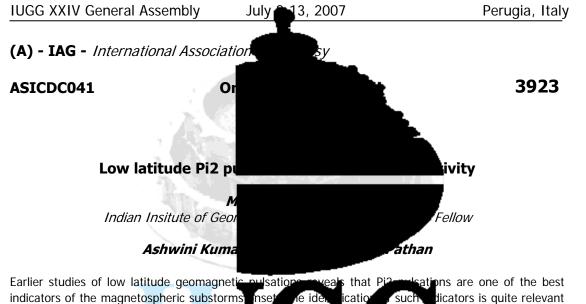












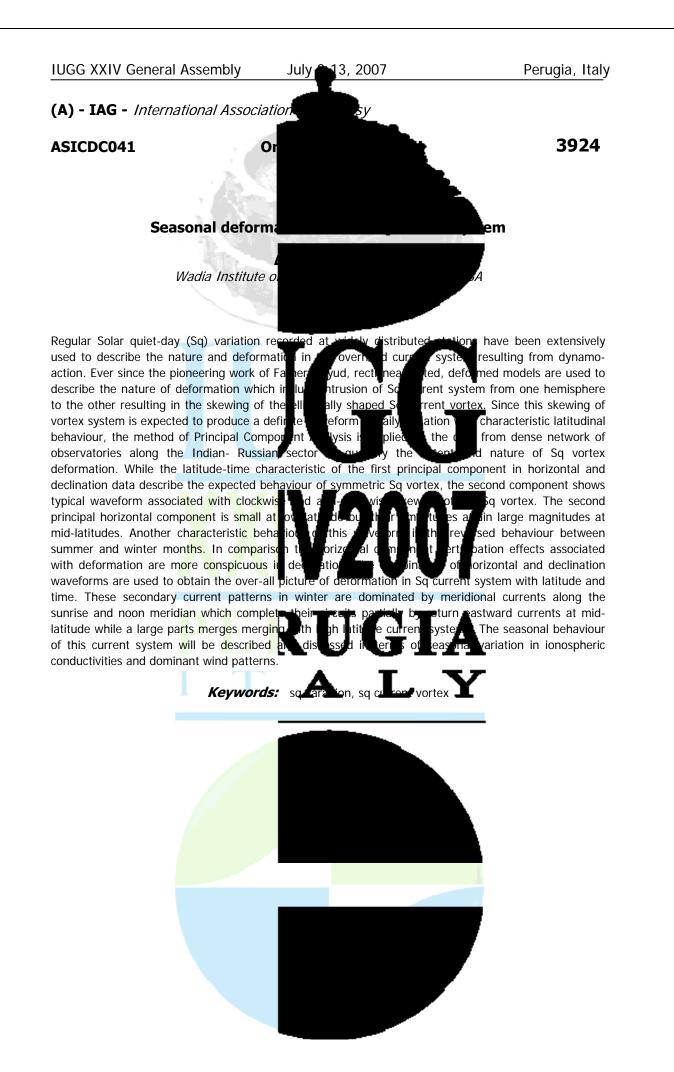
indicators of the magnetospheric substorms for space weather prediction. In the present from a chain of stations covering a longitudi al low latitude region. Data of 6 hours (17-23 Pi2 events having dominant frequencies at that the burst of the observed Pi2 events Also, the sharp rise in the solar wind dynamic prein the terms of dynamic equilibrium at the magnetopause boundary.

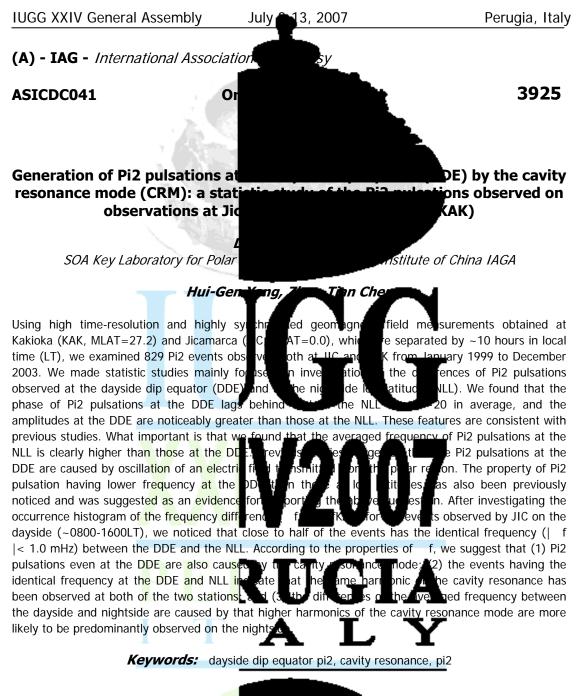
ie ide icatio ve have loke latitudinal ex 31st\_August nHz ar ssoci wit a lig

dicators is quite relevant such o the singultaneous magnetic data of 650 and 270 respectively in the from the chain reveals a burst of Ald nto AE indices suggests substorms on the day. mul eneration of such pulses

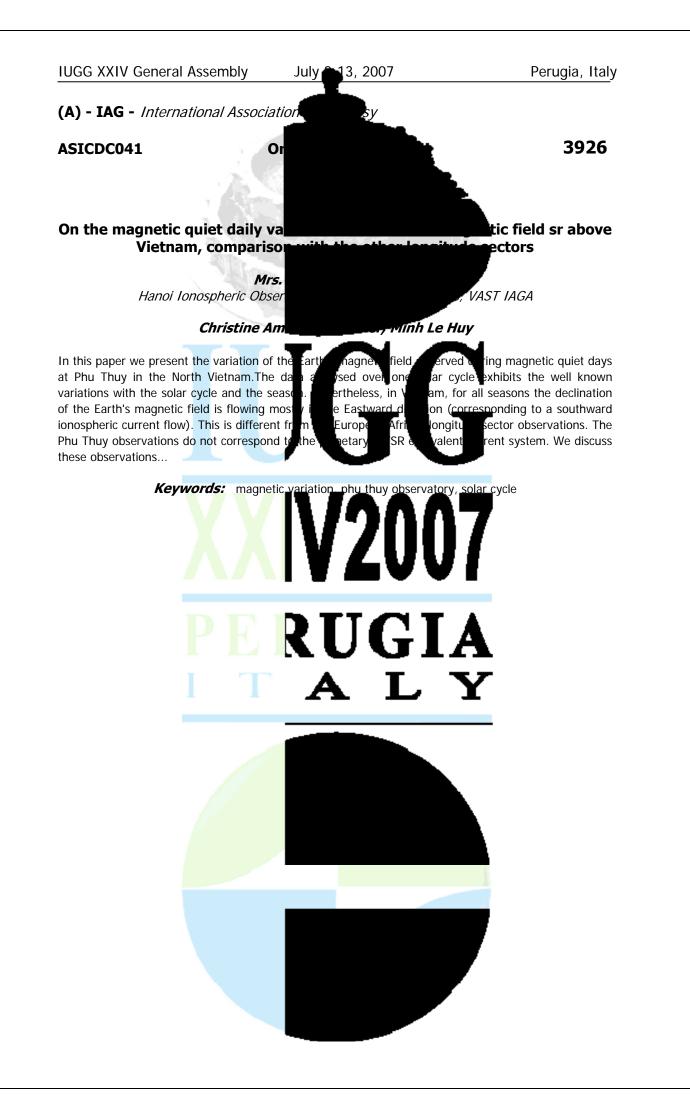


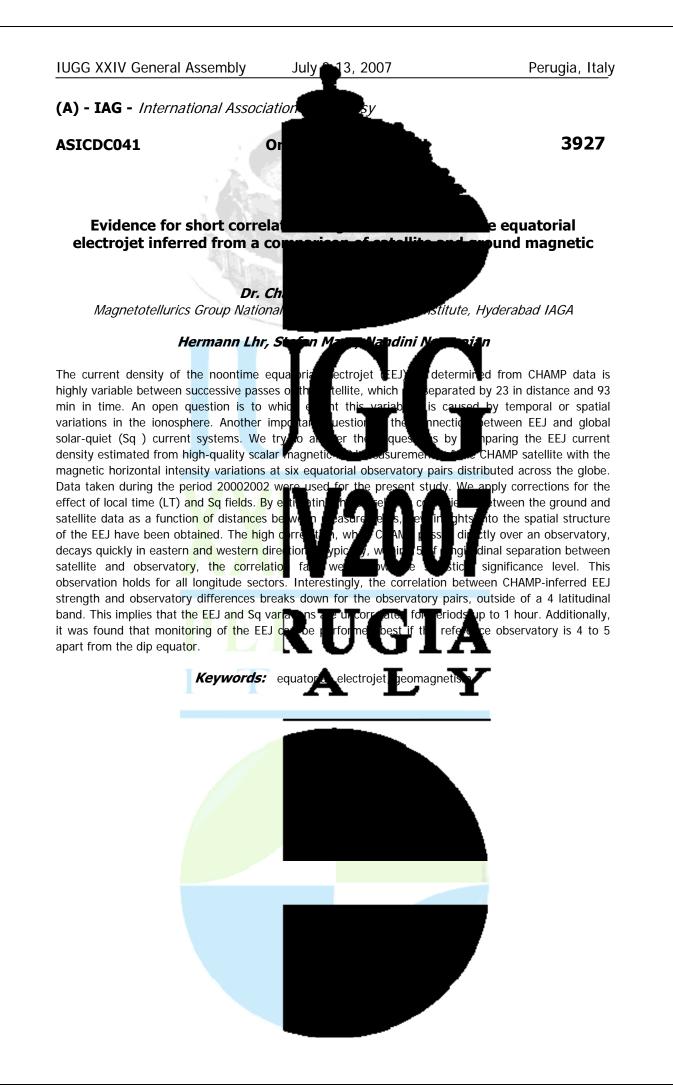
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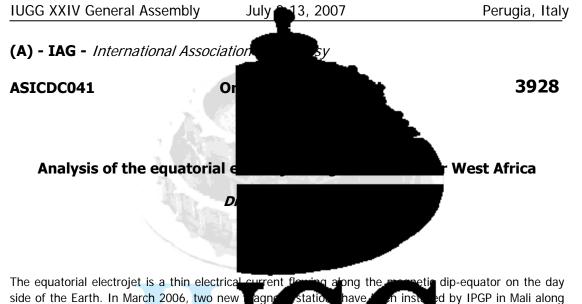












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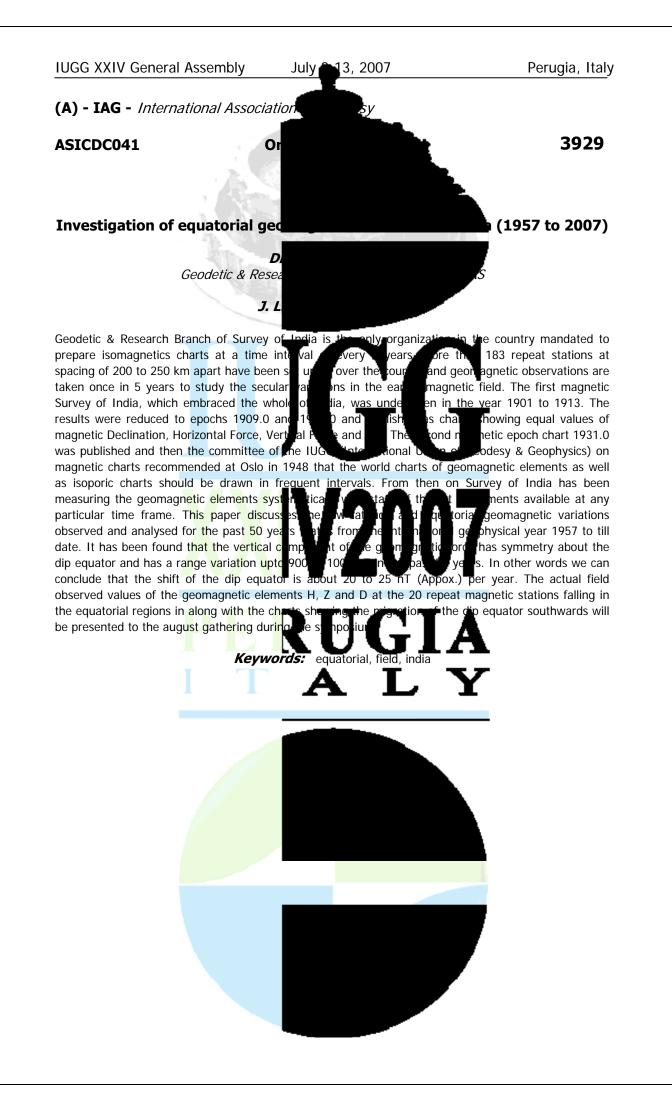
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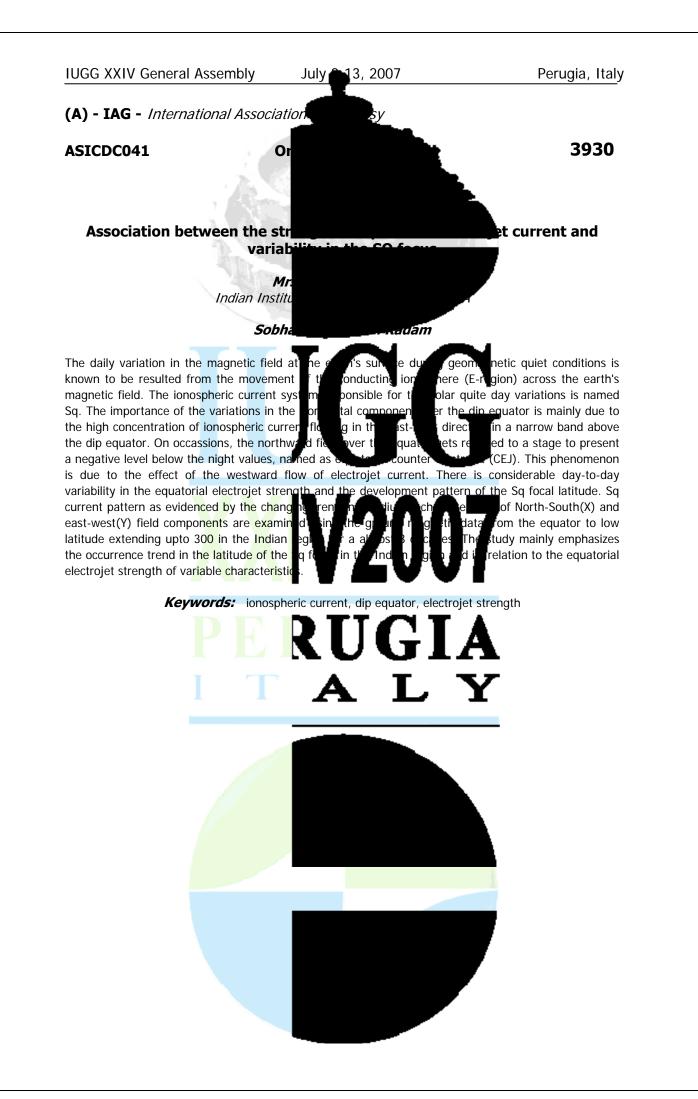
urrent system. We also

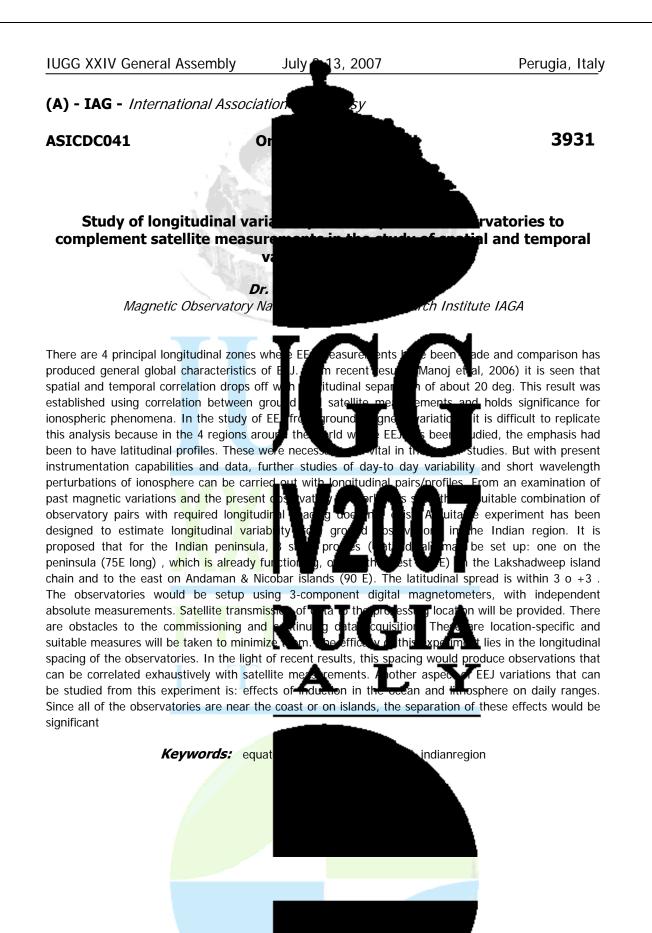
h data from the CHAMP

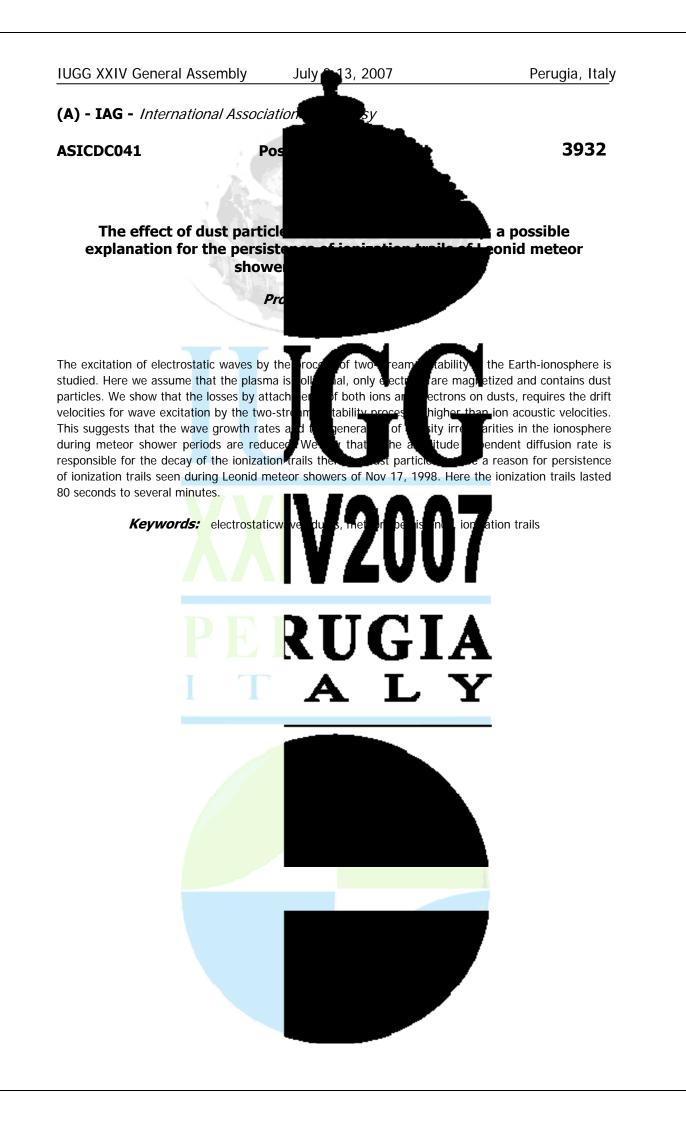
side of the Earth. In March 2006, two new agn the same meridian, under the Northern fla These stations are temperature controlle components every minute. Using data from Tamanrasset and Addis Ababa, we analyze electrojet in this area, as well as his rela bns compare ground-based measurements of the elec satellite, from which the internal and magnetospheric fields are subtracted using a global geomagnetic field model.

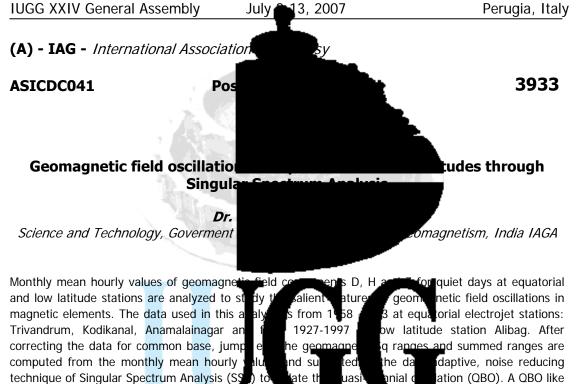












signal with a quasi-periodicity of ~ 24-month is vectors analyzed through SSA up to order 18 represent different oscillations of the field such as; 11year, annual, semi-annual, 4-month, 14-month (Pole-tide) and a quasi-biennial oscillation etc. The Sq ranges and summed ranges of H-element s 132-months running average, range and s cycle variation. The Sq ranges, summed ra for the same period are also analyzed by months in order to identify whether QBO si QBO like signature in the Suns atmosphere. It is found that a QBO signal with varying amplitude (period

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ation (QBO). A QBO like rum. The pair of eigen

hs and after taking the press the 11-year solar mean sunspot numbers h unit response for 24 4 <sup>t</sup> dynamo winds or due to 24 to 26-months) occurs in all the three ranges and summed ranges of D, H and Z and also in the

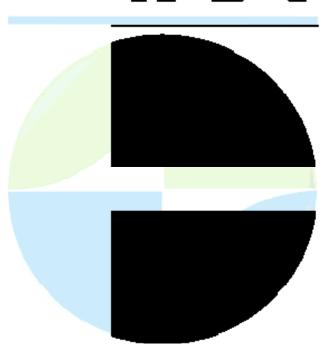
monthly mean sunspot numbers. The amp uatorial electrojet stations in comparison with low latitude station Alik

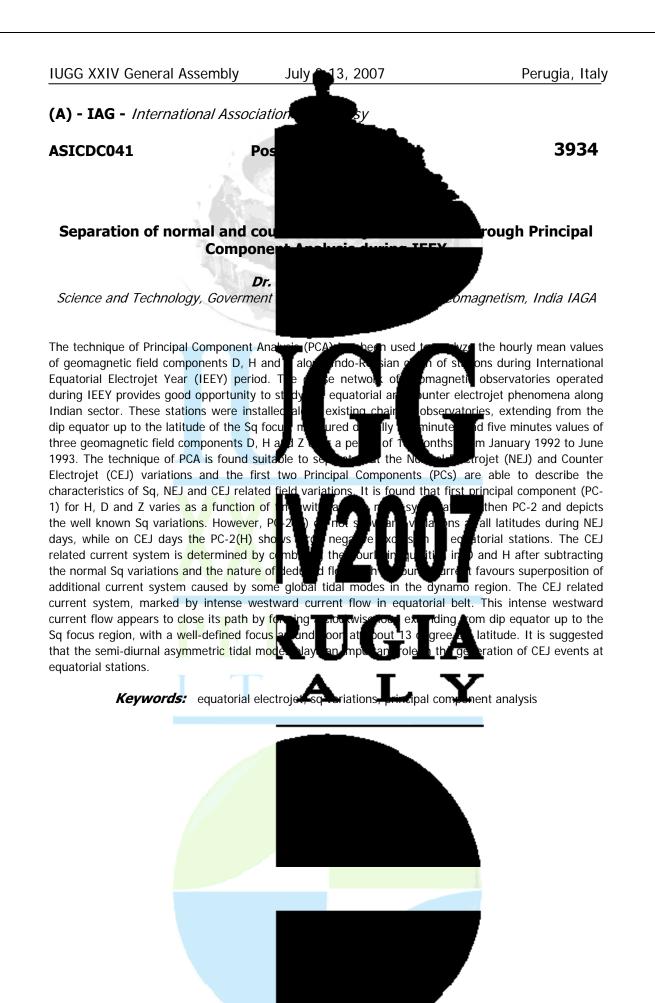
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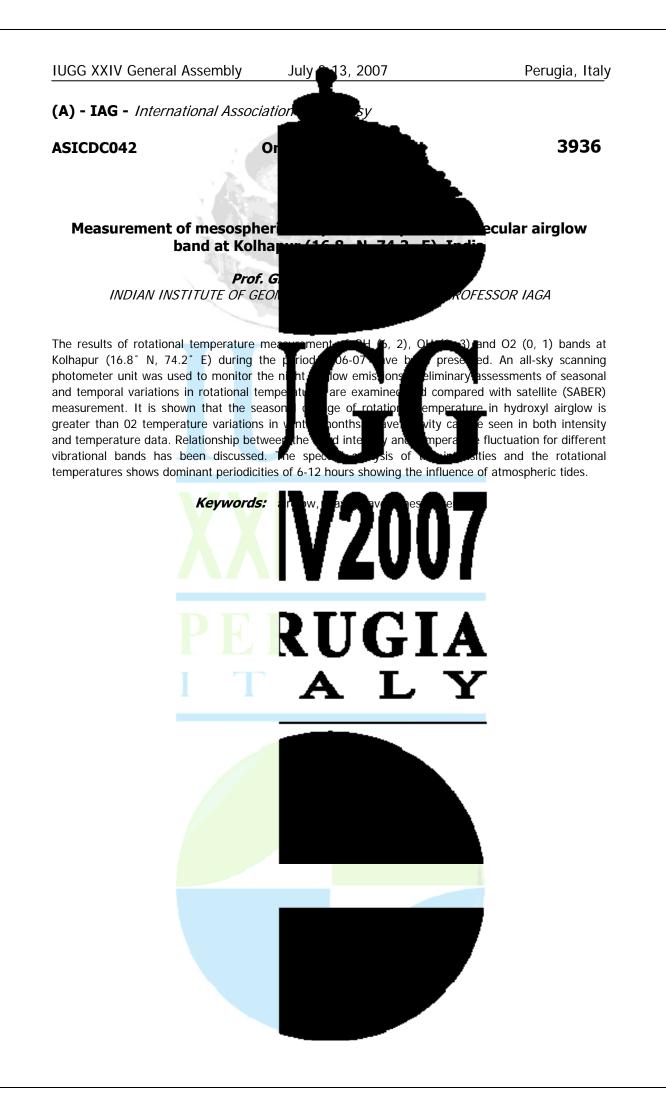
Keywords: quasi biennial oscillation, singular spectrum analysis, band pass digital filter

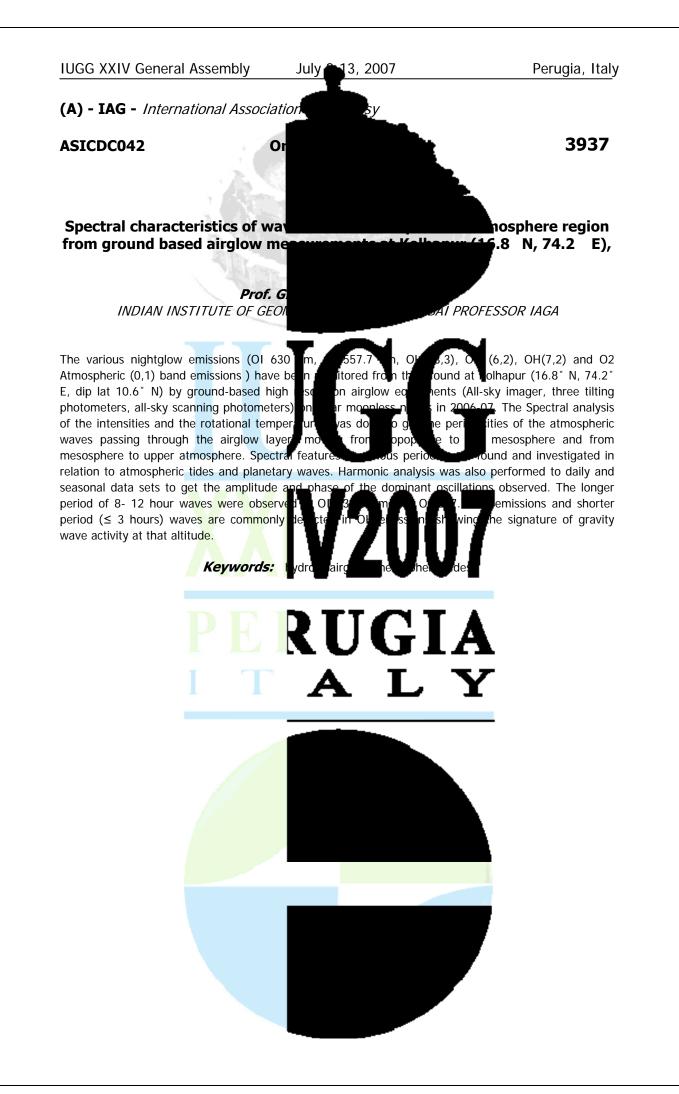


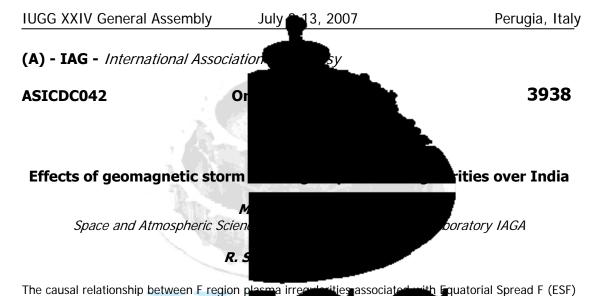












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The causal relationship between F region pla and geomagnetic storm is being debated for effectiveness of geomagnetic storm events on the F region ionosphere over low-equat (ESF) events is investigated. These case irregularities by the Indian MST Radar at G measurements from Thumba (8.68oN, 77 6.0oN), a station 100 km east of Gadanki Based plasma drifts corresponding to the zonal electric field have been derived for all the three cases. In one

different over Thumba and SHAR, meri observations at those stations. Simultaned radar site are available for the first two ca (17.70N, 83.30E, dip lat 10.090N), a statio interplanetary electric field (IEFy), whereve

bspher particular case (March 21, 1998), as the temporal variations of F region layer height was considerably

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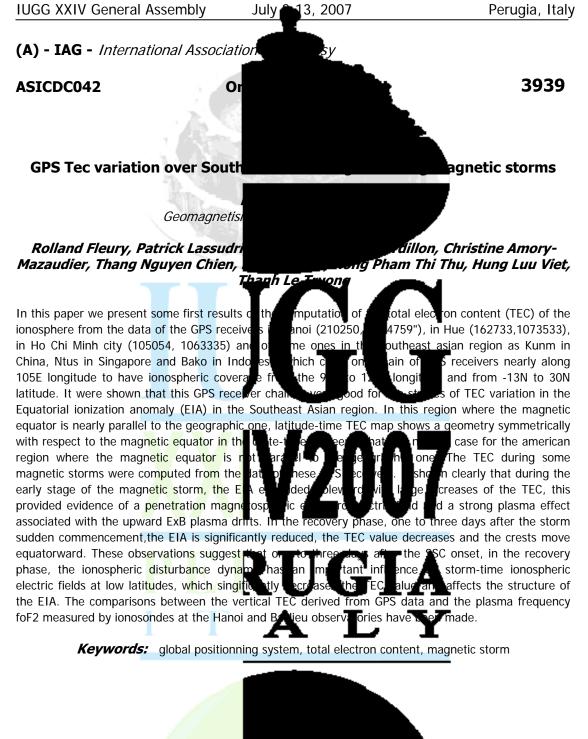
lat 0

th Equatorial Spread F (ESF) address this issue, the orde uary 7, 2005 and March 21, 1998 velopment of Equatorial Spread F Iltan<u>eous m</u>easurements of ESF dip la ON), along with F layer SHAF 3.70N, 80.20E, dip lat. ons at Thumba, vertical

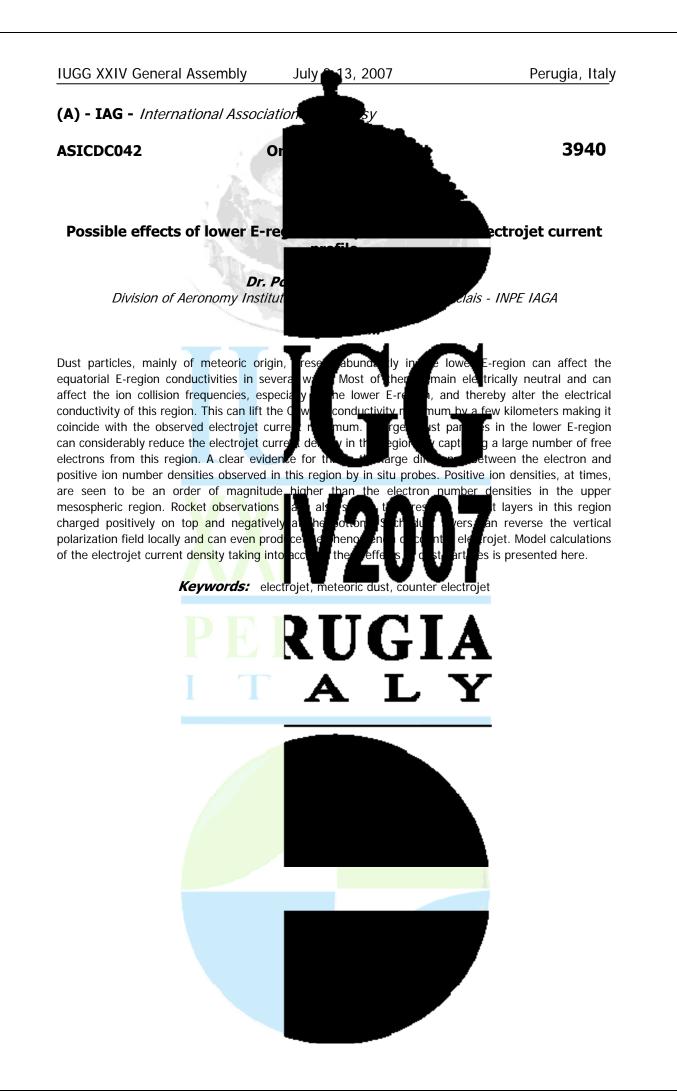
d on the ionospheric 0 nm airglow from the third case from Waltair vn-to-dusk component of e interplanetary magnetic field and solar wind velocity measurements by Advanced Composition Explorer (ACE) satellite located at the first Libration point of the sun-earth system. The IEFy datum points, in each case, are time shifted

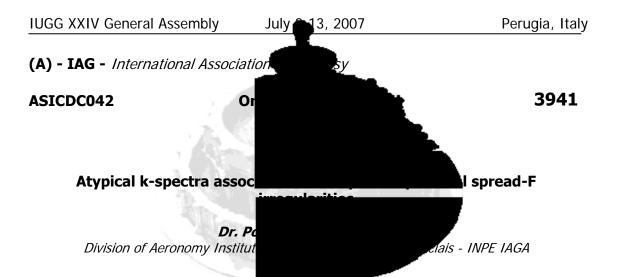
using an appropriate methodology to calqui en the satellite and ionospheric rom observations. Investigations using these day hat<sup>1</sup>the benetration of IEFy into equatorial and low latitude ionosphere did larity was westward on trid le. FS as j ie i February 12, 2004. However, on January 7, 2005, IEFy triggers ESF in the post-sunset hours and causes a plasma plume event during pre-midnight hours the third 1998), zonal electric field ase (March 🛛 addition to that, plume reversal is delayed upto 2100 hr IST under the storm. 🛛 influence developments in the pre-midnight hours are observed irrespective of the polarity of the zonal electric field when the bottomside structure of ESF, extrapolated over dip equator, is found to lie well above 450 km. The details of these three cases will presentation. Further, the present day view on the correlation between ESF and ontrast to the earlier view will be discussed.

Keywords: geomagnetic penetration









Height variation of the k-spectra of interm irregularities obtained with rocket-borne L theories of the generation mechanisms of atypical k-spectra, with characteristics diffe observed. While theory and laboratory meas for gradient drift waves with spectral index observations reported here varied from 3.Q 3.0 in the topside. This puts in check the grad

irregularities produced by the Rayleigh-Taylor instability mechanism is expected to be in the range of 2.0 to 2.5. The height profiles of k-spectr different equatorial spread-F conditions are k-spectra of electron density irregularities In the topside F-region, at transitional an much steeper than the electric field spectr Atypical behavior was noted in the electric field spectra

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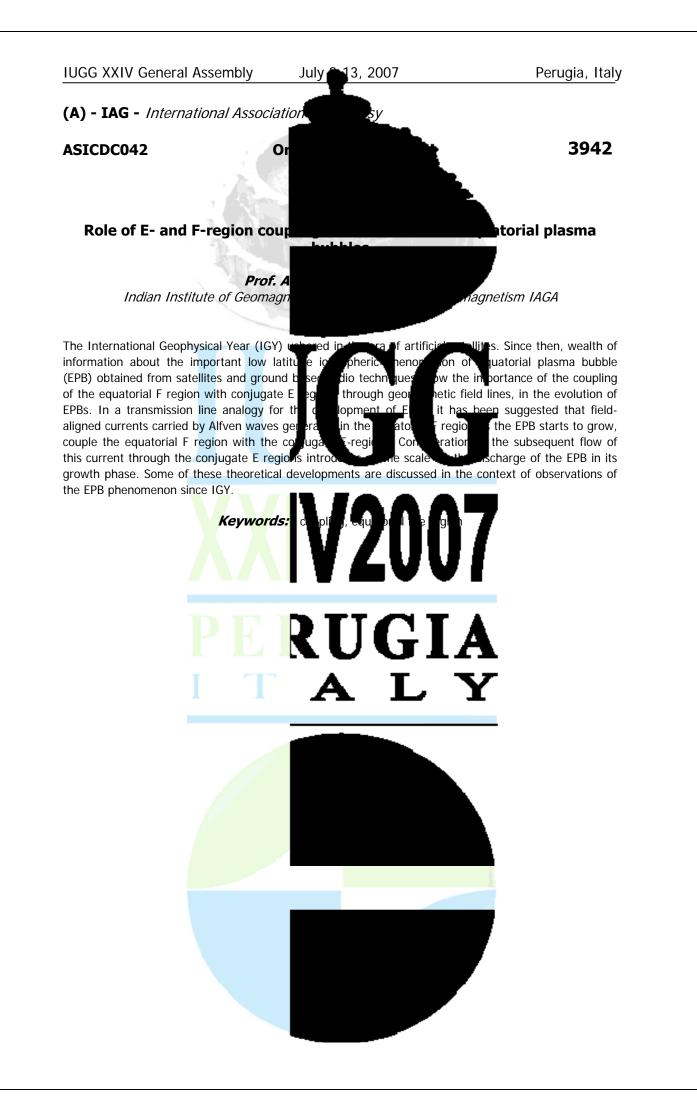
of th hstabili irregularities especially in the topside F-region. The spectral index expected for the large scale

0, spe

elength electron density ned i he light of the existing larities. In certain height regions, d from the existing theories, are er law density fluctuation spectrum indices estimated from region, and from 2.5 to nerative mechanism of

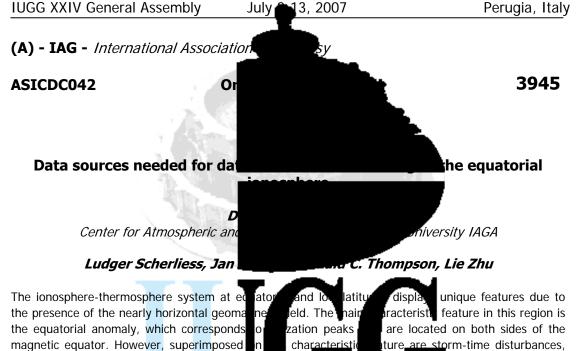
> ents conducted under ches reported here, the lectric field fluctuations. ctra are expected to be in agreement with this.











enhanced ionization (storm enhanced densities) and thermosphere, the disturbances include upward propagating tides and gravity waves, O/N2 depletions,

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bubbles. A powerful way of modeling this only useful if a sufficient amount of dat dominated by developing countries and oc available for assimilation into ionosphere-t from an ionosphere data assimilation mod also be presented.

mesoscale (100-1000 km) structures, and

traveling ionospheric disturbances (TIDs),

and neutral gas perturbations in the regions containing both the equatorial anomaly and plasma

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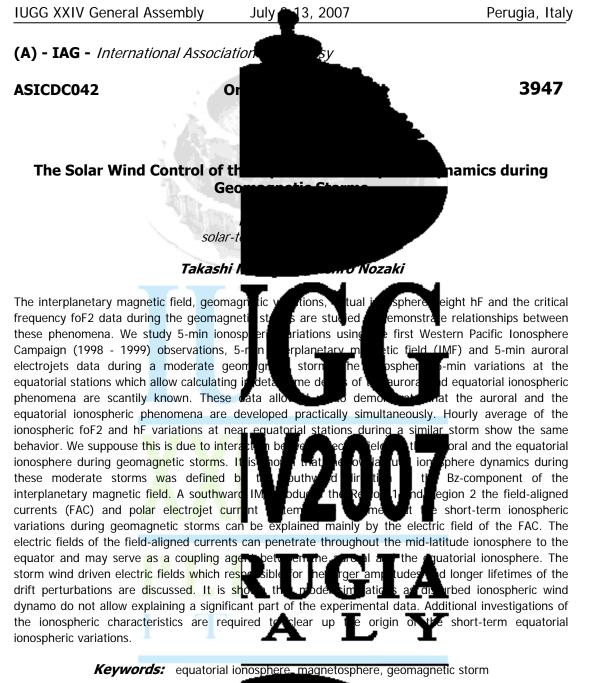
des

osphere, these include or the ng in nediate layers, ridges of lasma bubbles. For the

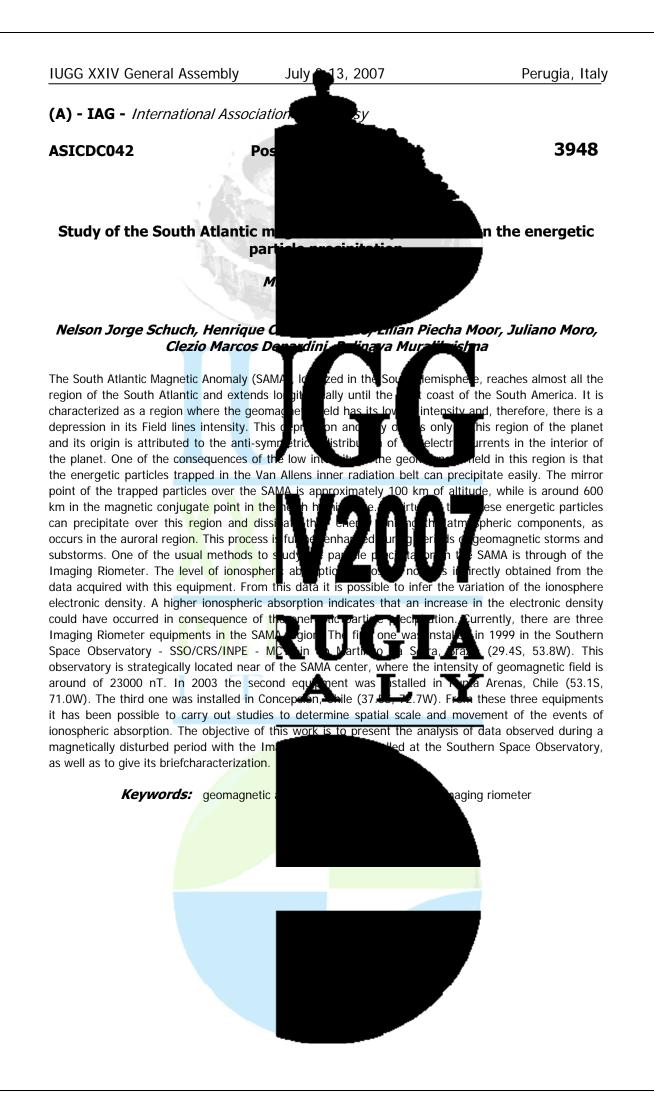
> h models, but they are of the low latitudes is e data that are currently ed, as will typical results d for the near future will

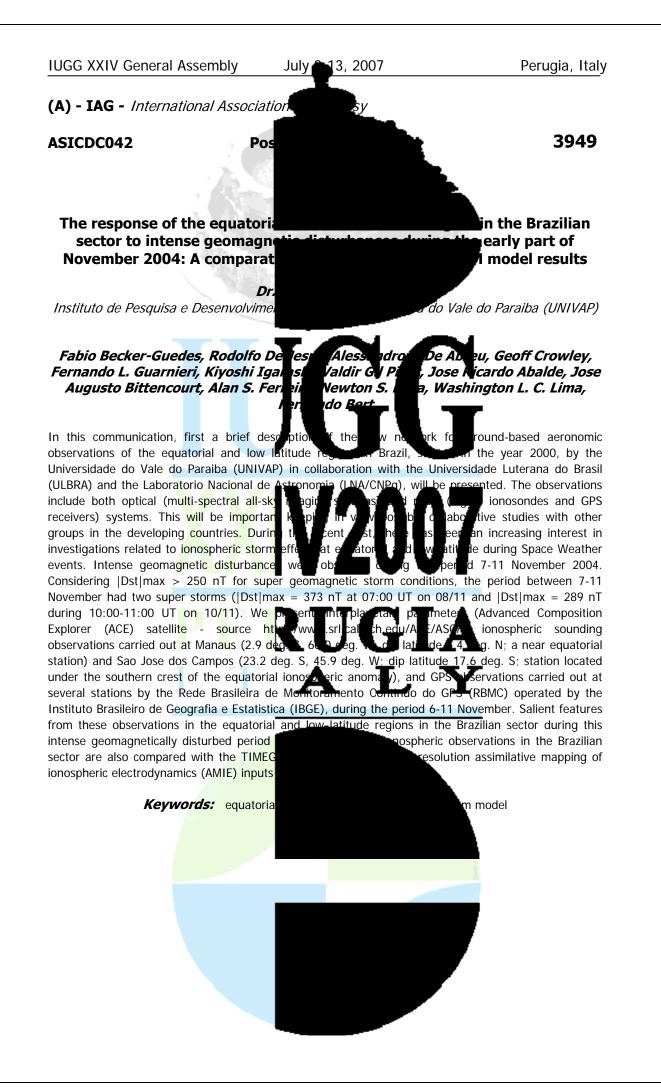


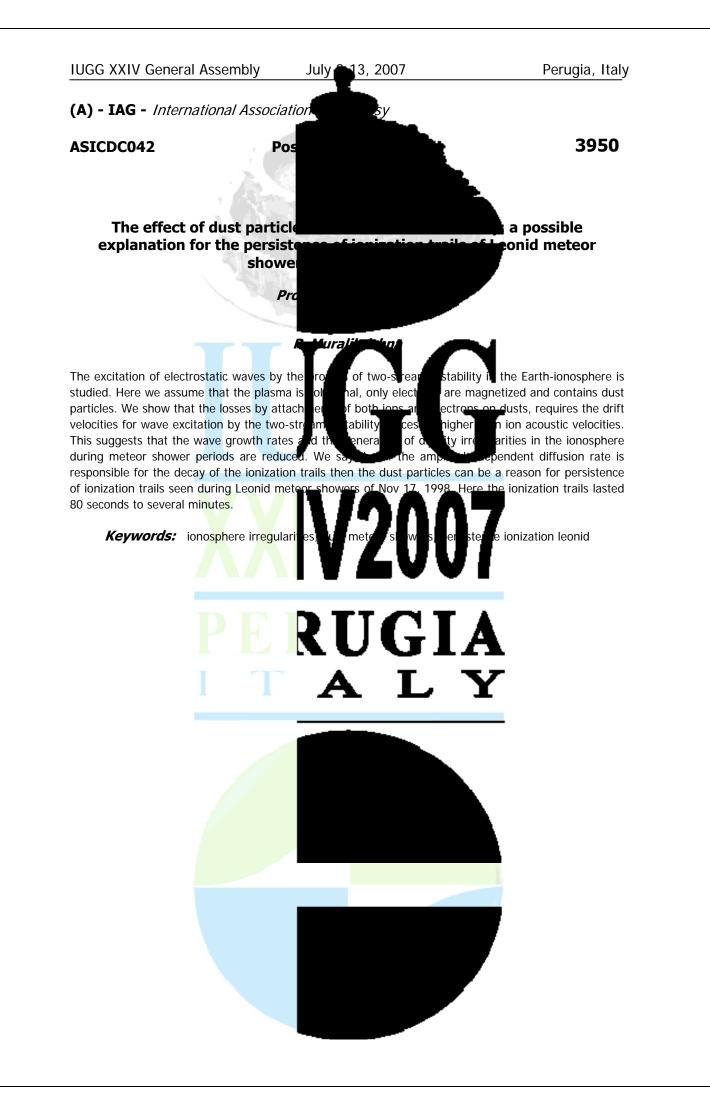


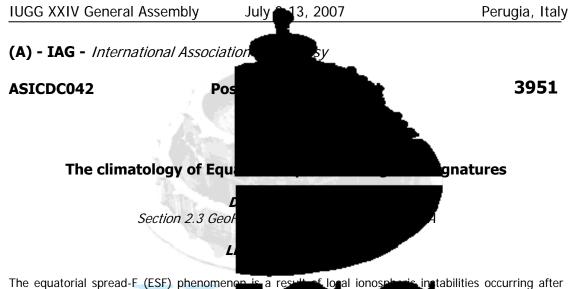












sunset. It is characterised by low electron involved steep electron density gradients a navigation and communication, such as GPS properties and the evolution of ESF has de been observed many times by ground-ba characteristics and evolution of an ESF eve are given by in situ satellite observation.

plasma depletion. Observational evidence for magnetic field perturbations associated with ESF was first provided in the early 1990th. Motivated by these data, electromagnetic modeling studies have been initiated to disclose the ESF magnetic signa number of observations was insufficient for magnetometers. The CHAMP satellite car resolution magnetic field measurements. orbit at an altitude of about 400km. An From these data we could reveal ESF magnetic signatures in the total field, as well as in the

mina Ensi gions cially critical ore, an increa during the p strume gave oossik proact Thes SFs

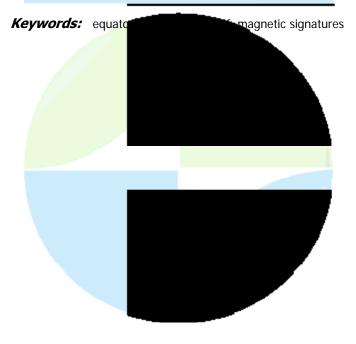
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agnetic flux tubes. The he reliability of radio wave based interest in the investigation of the decades. ESF plasma plumes have ortant insight into the e ESF global distribution their nature of sudden

of ESFs. However, the sions carrying sensitive etometer providing high hto a near-polar, circular en obtained until today. perpendicular components. An immediate explanation for the total field deflection is the diamagnetic

effect. Perpendicular deflections imply field the tetal field signatures enable us to provide a climatology of the occurrence ires. refore, we present their ity. Most of our results dependence on local time, magentic latitud dependence on local time, magentic latitude long tude, so sol and olar accepty. Most of our results confirm the ESF distributions found by plasma depletion monitoring, others differ due to their different nature. The long term and precise magnetic data To new aspects for the t up to 50 sampling understanding of the electromagnetic natural FSF ar be d for comparison with electromagnetic ESF modeling.

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## ASIDCH043

## Symposium The International Geophysical

Convener : Dr. Gregory A. Good, Dr.

The International Geophysical Year (July geosciences. Described at the time as the history of science, the IGY has had a geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Geophysical Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past half century. International Year (July geosciences during the past

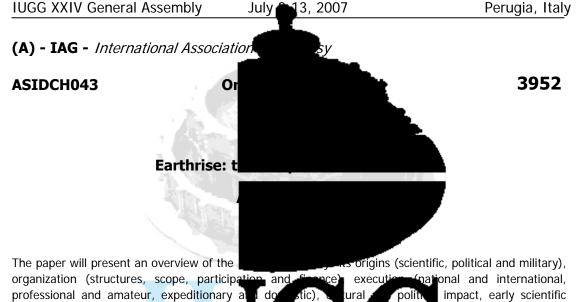
cooperating international scientific unions of Internationale. All domains of the geoscie symposium, which is coordinated with U.C development of the geosciences. The sympoare solicited on topics including, but not lim personal accounts of IGY activities/discoverivarious geophysical disciplines. Contribute session will be given as posters.

nurtured and carried the of the in h the icer om the in , consider the in /ill consist prifie e organisation s, retros ives prestation at c.

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a party at the home of James Van Allen arried out by the IUGG and the other in the Earlie were covered. In this result, the function of the IGY on the rife out by the IUGG and the other in the unit shall de IAnne Gophysique un othe Earlie were covered. In this result, the Earlie were covered. In this result, the Earlie were covered of the IGY on the rife of invited talks but contributions in and institutional aspects of the IGY, we the sign cance of the IGY for the it can be been ommodated in the oral



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professional and amateur, expeditionary a achievements, internal divisions and other bb and other results. The IGY was shaped by the It was a high point of modernism in the ŀа elements, including a significant proportion the large-scale recruitment of amateurs towards a polycentric, de-colonized globar know

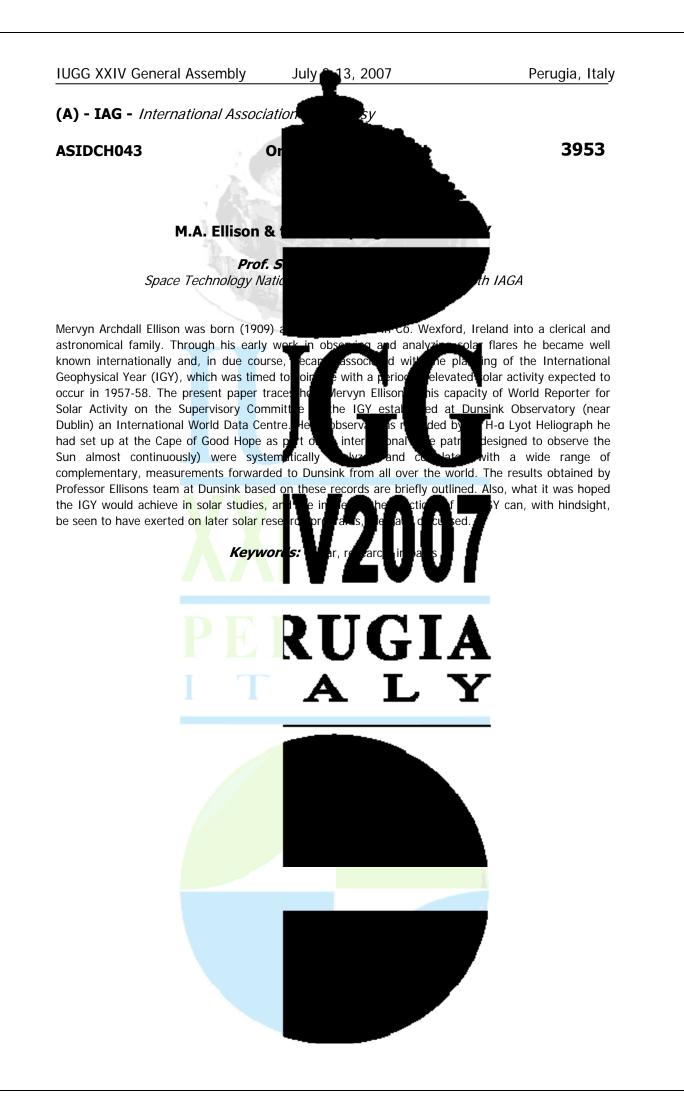
system, based on near-global cooperation. Lastly, it was temporary but also permanent, above all through its system of World Data Centres glance at certain figures whom there ha including Julio Escudero, Johannes Egedal,

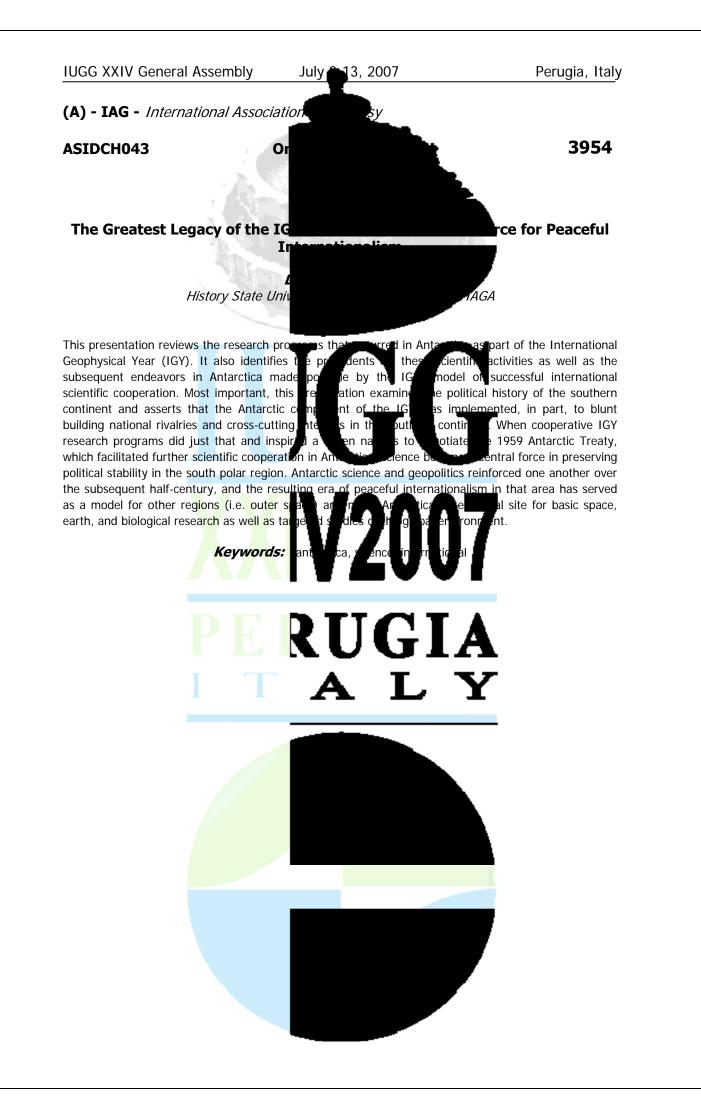
h losses) and long-term scientific (including h War, but pref d a future that might transcend it. lso included several post-modern scien<u>ces, bu</u>t

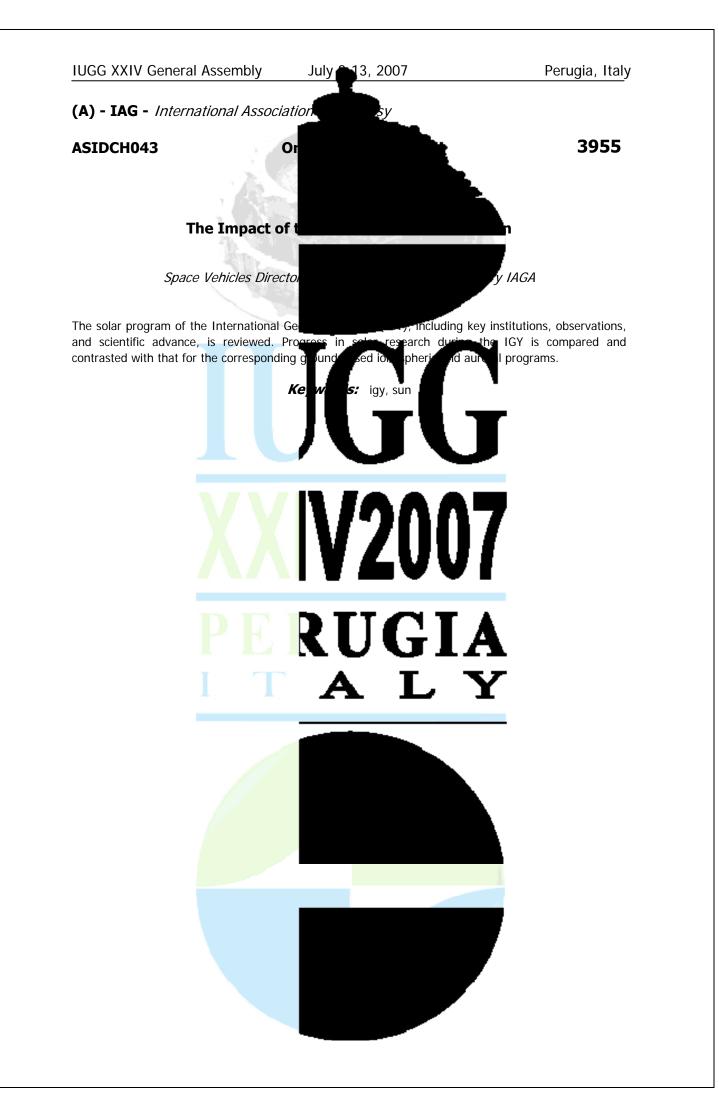
ipating hich v d with the local culture), ĥπ blic a upati vitł nunity gathering exercise, but initiated a new stage in scientific understanding of the Earth within the solar

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eness, and an opening finite, imperfect data-I. (The paper will also narrative of the IGY, Maria Klyonova.)





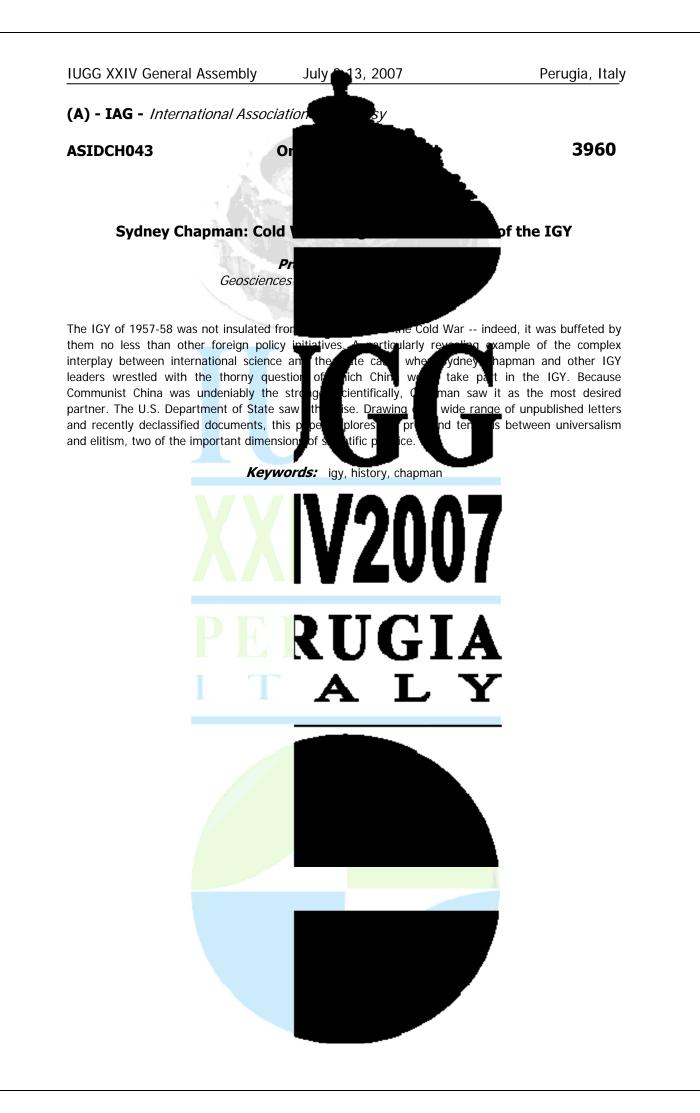


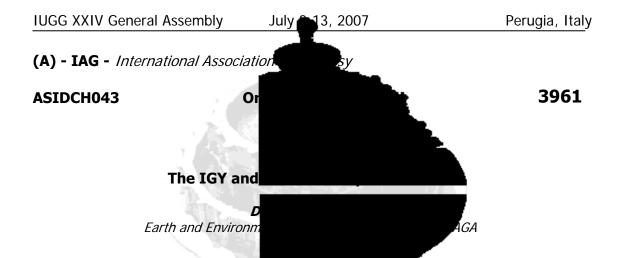












Twenty-five years after the International band Steely Dan, released the song I.G.Y many of us growing up in the U.S. in the vantage point as a geophysicist and a child culture. How was the IGY imagined by the finest? The epitome of space age science? manifestation of the Cold War?To consider memorabilia, mostly contemporary with the portion of the collection, ranging from popular bo

journalists (Walter Sullivans Assault on the Unknown) and scientists (J. Tuzo Wilsons IGY: The Year of the Moons; Sydney Chapmans IGY: Year of Discovery); to multiple-part magazine layouts in Life (5 issues) and National Geographic (8 issues) by happenstance (Sir! magazines Did the fiction (James Blish, The Frozen Year; Curt which also contains Are nude Tibetan lama Admiral George Dufek, Operation Deep Fre childrens literature (Martin Gardner, TGY. Sciences

Donald Fagen, longtime co-leader of the The ima eveked by 950 бw, ears her d ties som as an public? W plora<u>tion</u> into uestid aw u well dia. \

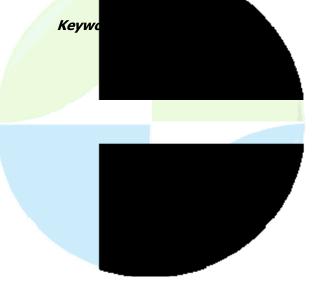
ong influenced the lives of will consider from my of the TY and American popular his international cooperation at its Ims little known? Or just another a personal collection of ngs comprise the major mplete IGY endeavor by

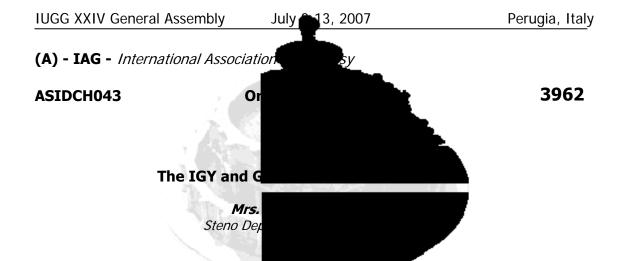
O. Fizzickle Pogo) and ophysicist?); to science lagazine, the same issue ooks on Antarctica (Rear Man-Made Satellites); to greatest challenge, in Childrens Digest). Two

contemporary jazz charts used the IGY as a theme (Shorty Rogers A geophysical ear, and Gil Melles Dedicatory piece to the geophysical year q t in th e contextualization of the IGY. Around the World in 80 Days (1956) king rld, and soon thereafter ed in Antarctic Crossing satellites were orbiting the Earth in 80 min ng ∉kpik w b (1958), Journey to the Center of the Earth (1959), and Voyage to the Bottom of the Sea (1961). Yet there was also fear of the unknown, embodied a horror r theater seat as a young boy, First Man Into Space (1959). The t The cringing beneath my ovie that so vere ramifi tions of this era for many aspects of American culture, including a re-emphasis on science education, prompted by fears that we were falling behind our IGY collaborators and cold War opponents (Arthur S. Trace, Jr., What Ivan Knows That Johnny Doesn't). Perhaps t which molded some students of that generation to become the scientists we are

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Today ice core research is a significant restudy of ice cores that are up to several kilometres inmany hundred thousand years back in time as atmospheric composition, prevailing win can be studied simultaneously in the ice core on global climate change. The first drillings early 1950s the Swiss-born geologist Henri caps. Around the same time Danish phys thermometer, and in an article in 1952 h paleotemperatures. Thus the basic ideas of climatological ice core studies were present in the early 1950s but the methods of ice core analysis were still in their infancy and most important of all the financial and technological means necessa how the International Geophysical Year 19 research. In the planning of the US IGY Academy of Sciences Committee on Polar Res

same time the strategic and military interest support for the IGY provided the means for conducting deep drillings in northern Greenland. During the French IGY expedition to the Greenland ice cap, Expdition Glaciologique Internationale au Groenland, a series of short ice cores were drilled. Becau French program and established a contact activities in Greenland . This collaboration to proved Dansgaards concept. I will also discuss how the success of the ice coring program during the IGY led to the establishment of a post-IGY program, ich resulted Camp Century in northern Greenland in 1964 A Danish group and the program was established and the revolutionizing study of the Camp Century core that revealed climate changes more than a hundred thousand years back in time was accomplished.

Since then ice core research has grown to cores being drilled in both polar areas as w breaking knowledge on the mechanisms of

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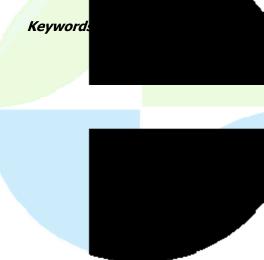
empnstruct climate changes limatic parameters such precipitation and volcanic activity phificant role in the current debate onducted around 1950 and in the p-drill into the polar ice theory of the isotope ice cap to reconstruct

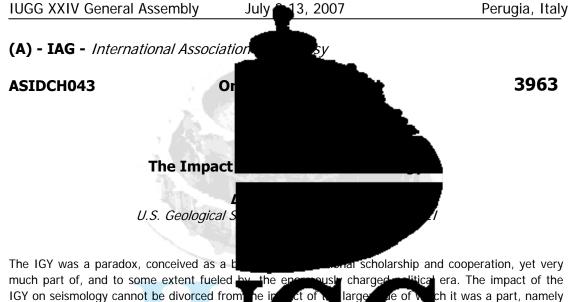
e field of paleoclimatology. Through the

t.In the talk I discuss herging field of ice core bership of the National ling program and at the portant factor in the U.S.

ory Willi Dansgaard heard of the brities at oversaw all research tudies of ice cores and isot pe n the first neuration of an ice sheet at etween Willi Dansgaards boration

arch program with short and deep ice and it continues to provide ground-





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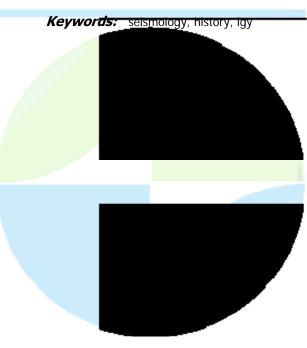
IGY on seismology cannot be divorced from that set into motion by the advent of the r The formerly small discipline of seismology support that had previously been unimagina might have found itself co-opted, its scientif not happen. Instead, within the span of energized, transformed. Within this transformat Seismology was only a small part of the overall IGY program, receiving about 2% of the funds committed by the United States. While modest, this represented a significant infusion to the field at the time. For example, the US-IGY contributi operating budget of the Caltech Seismolod period seismometers were deployed in fa -flÌ again, a modest effort that represented a

ubs monitoring relied on a patchwork of resea ι:h The contribution of the IGY to seismology was quickly expanded upon by far more substantial efforts aimed at monitoring and discrimination funded by the Vela Uniform Project, initiated by President Eisenhower in 1959. Under this program, built. It comprised 120 standardized instrum

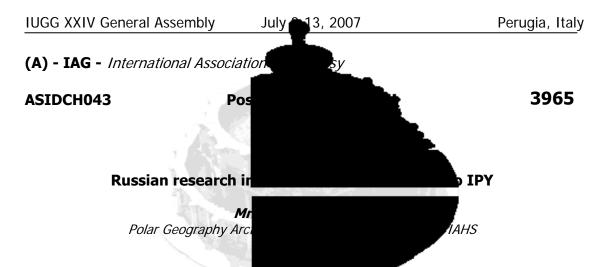
ch it was a part, namely e of ant need for nuclear monitoring. hter stage, with levels of financial ous infusion of resources, the field y poli agenda. This clearly did of se ology was modernized, all but important role.

> five times the annual uring the IGY, 16 longhd, notably, Antarctica--. Prior to the IGY, global etwork in North America.

ing network, the WWSSN, was rly 1 hillion U.S. dollars (1960s dollars). The WWSSN and the support for sumolatical reliant function of the field of seismology. Arguably the most important impact of the IGY was the extent to which it set dollars). The WWSSN and the support for s iform truly transformed the tone for these later efforts, in particular establishing the le advisory groups in setting the directions of future programs. dership role The field's stop scientific







The International Geophysical Year (IGY) international scientific research in Antarctica. One, scientific exploration of Antarctic oases ice thousands square kilometers. These are the situated, and in last years they also became systematizes details of Russian scientific acti the International Polar Year (IPY). Types biology, cartography, geology, geomorpho multifaceted and the most successful scientific re-

most extensively studied objects in East Antarctic. Data obtained in analysis of the oases water reservoirs sediments provides chronologica the Holocene. The results of the Antarctic Atlas of Antarctica and in numerous publica Arctic and Antarctic Research Institute understanding of some dynamical charac necessity of generalization of the already available scientific data, planed to be made during the period

uered as the starting point in extensive faces of e. ee coast 5 in ones s where nos err of tourism w ast Antarctic ations of eogec hydi bhy bbtain

investigations was active Antarctica from tens to the Antaletic scientific stations are rowing anthropogenic load. Author s for the last 50 years-from IGY to Jaciology, meteorology, y are listed. The most ans in Bunger Oasis, in

Schirmacher Oasis and in Larsemann Hills. They put the lakes ecosystems of these oases among the

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y in the region during number of maps in the pt in library funds of the so shows the gaps in Antarctic oases and the

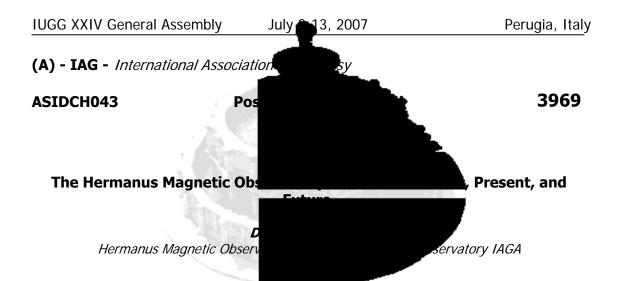
of IPY. Importance of international scientific exchange in future investigations and estimation of the anthropogenic load on the Antarctic oases

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The Hermanus Magnetic Observatory (HM Year (IPY 2); consequently, 2007 and the 75th anniversary. Since its establishment, th magnetic observatories, whose core function field. Over the years, the scope of the fundamental and applied space physics res field related services. The HMO is responsi near Earth space environment, including the main

which forms part of SuperDARN, and the collection and distribution of data from the South African ionosonde network. In celebration of it 75th launching a project entitled Ihlabathi: Co central theme is based on features of the regions, which arise in the Earths core a IGY+50 anniversary, the HMO will registe las Africa under the auspices of the Internation

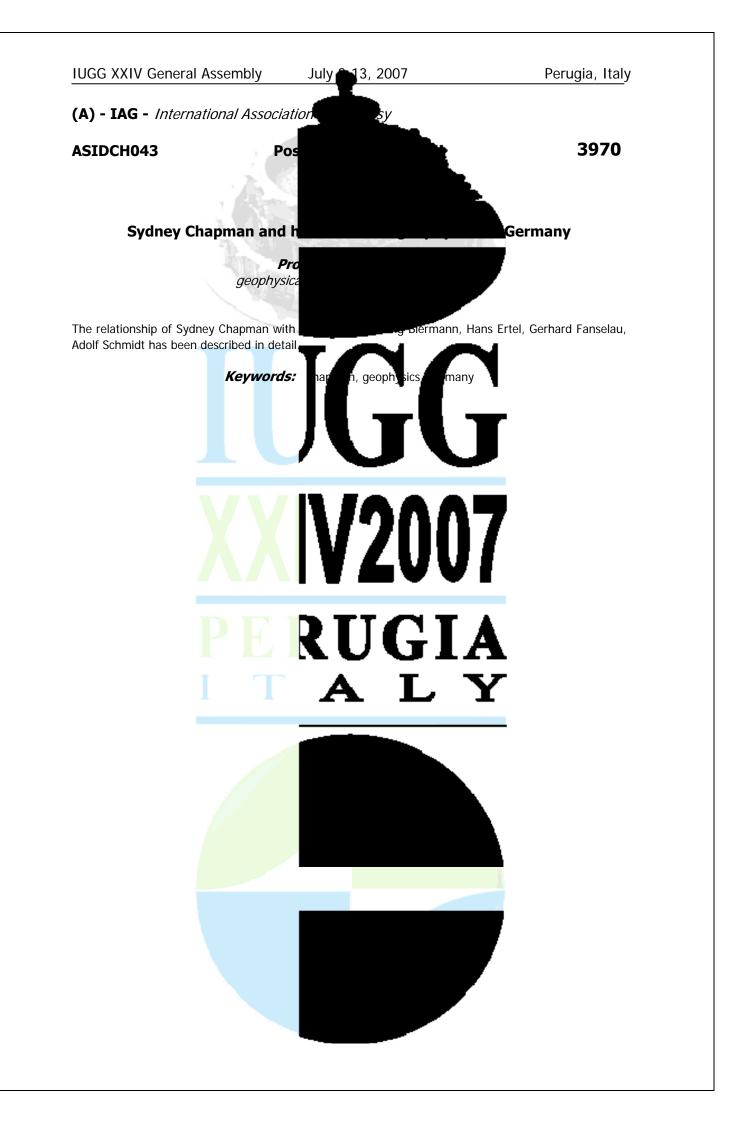
had its 1932 c ationa has active nonitor and m activities cience rea searc rast d oper

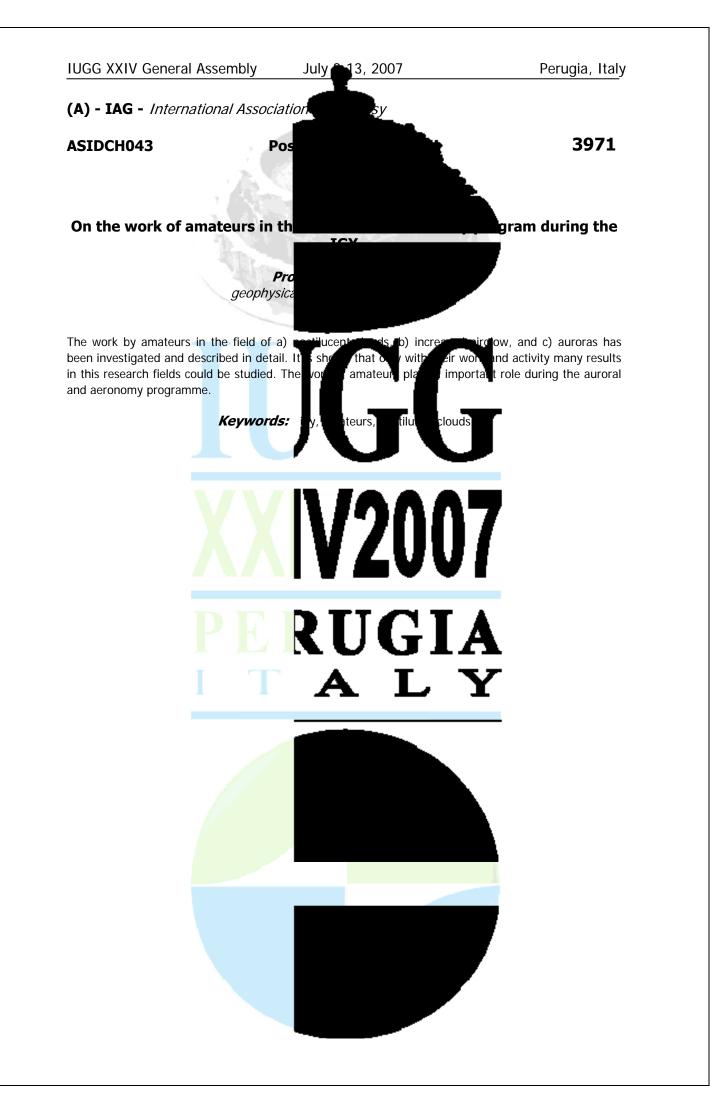
2nd International Polar (IPY coincide with the HMOs pated in the worldwide network of variations of the Earths magnetic increased and presently include ovision of geomagnetic and th ata used to monitor the re ar HF radar in Antarctica,

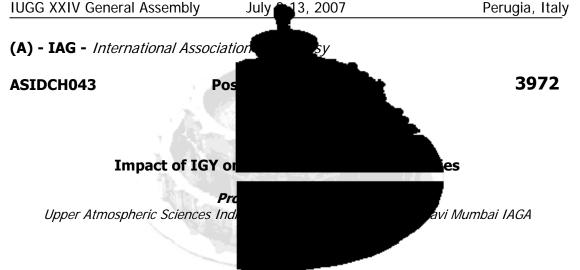
anniversary and as part of its IPY 4 activities, the HMO is word for Earth.) The ern African and Atlantic o space. As part of the arning Center (RWC) for

Keywords: magnetic observatory, superdarn, ionosonde network









The International Geophysical Year (IGY) provided a techniques for atmospheric and space scien collaborative programmes is almost two ce expansion activities took a leap with the set low latitudes in India during IGY. Utilizing having the position of the magnetic equate extend up to the latitudinal position of the international programmes were initiated

mangnetic observatory, which was set up during IGY almost at the magnetic equator, provided support for the Indian rocket programme which grew into a full fledge Indian space programme leading to the birth of Indian Space Research Organization phenomena, brought out by IGY, the Colal a full-fledge autonomous research organ Mumbai, currently functioning under th programme of the magnetic meridian pro study of geomagnetism in the entire low latitude belt.

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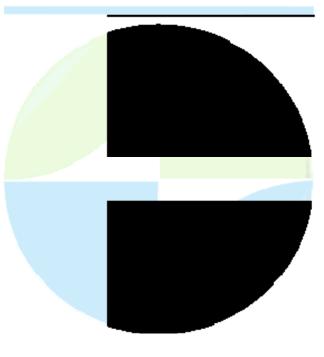
velopment of observational ation in the international parti geomagetic measurements, the etic observatories in the equatorial ne geographical location of India, India latitudinal coverage to orthe nd, various national and magnetism. Trivandrum

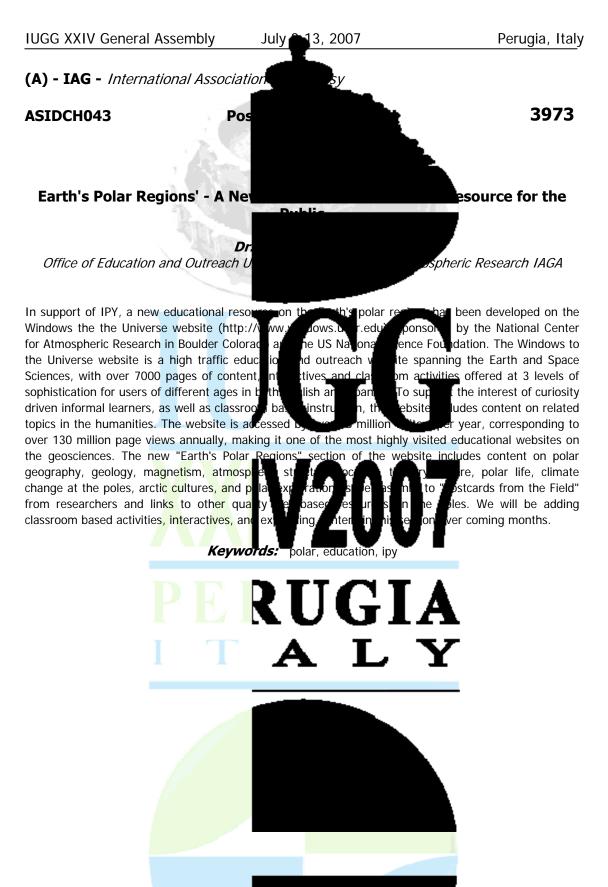
agnetism to the space were reconstituted into tute of Geomagnetism, echnology. The special gave an impetus to the Participation in the International Magnetosphere Study, Solar-Terrestrial Energy Programme (STEP) etc. led to new infrastructure developments in India nd the Indian scientists

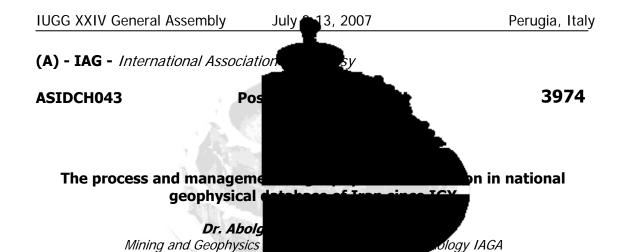
t of the planet earth.

in the field of upper atmosphere, mag contributed significantly in the exploration of









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The IGY was a year and a half of comprenations in 1957-58. Discoveries by the eart about oceans, and new developments in ge advances for the time. Now in the age acquisition, processing and use of geop development appear to be essential, espec fields. In addition, as discussed below, the new technologies, especially GIS and Web technologies

Although the use of geophysics in Iran is dated to the first half of the twentieth century, unfortunately the collected geophysical data had not been compiled comprehensively and extensively by any organisations or institutions until recently. carried out the geophysical surveys, are s So far, A few ten thousands large or sma been performed in the country. Even some times unnecessarily. This means that eith previous geophysical studies in the area, or the previous geophysical data and results have been

unavailable or inaccessible. Therefore, it is necessary to consider the establishment and development of a database for keeping all the geophysical get benefits of the previous studies and also to the existence of many geophysical of geophysical data or projects carried out in the country, in this stage we have only considered to establish a land geophysical database as the executed airborry and marine country, are less important and much less in number out in the country. Considering the difficulties and also conclusions and recommendations made as a

the establishment of the database and col of Iran (NGDIR). The policy was decided v Information System or GIS-based meth confidentiality or other justified reasons) vi recognise private companies and entern organisations involving in geophysical p experience in this field inside the country. single geophysical work carried out in the

completed for every geophysical project complicated and lengthy form containing n impracticality. Some of the fields in the for of the project, company or persons involvi etc.) while the other fields were design

ies by the scientists of 67 ew geophysical findings vear or mineral exploration were great nunication Technology (ICT), the sustainable and comprehensive increa applications in various and o buter facilities as well as ears ago, is unavoidable.

> npanies or institutions, ophysical surveys exist. aims or purposes, have in a specific area several we been unaware of the

geophysical experts, in order to d cost for their repetitions. Due

ons an enormous amount of

ophysical projects in the the land ophysical surveys carried result of investigation of geophysical databases in other countries, the policy and later the strategies for ided by National Geosciences Database geophysical data in a Geographic (except some data due to I phases of this work was to as well as governmental ne basic expertise and as not to miss even any hase to take a lengthy

period to be accomplished. As a result of the completion of this phase of work, an almost comprehensive list of geophysical experts and companies in the country was published. In the next phase of the work, a unique simple questionnaire form comprising about 50 fields was prepared to be vas not to generate a

e of the work due to its filled (such as the name dinates of the survey area, pleting the form for every

## **IUGG XXIV General Assembly**

geophysical project carried out by the compa collected in the form were needed to be ch were taken in this phase of work. Finally, 1 database equipped with powerful Graphic and quickly, it was decided to use a Q programming or code was developed for web page in internet.

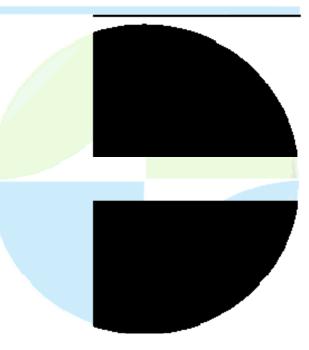
sations or persons inside the country, the data pme cases corrected. Many precautions eeded to be present in a standard ties. To visualize the data simply urpose. Ultimately some web by public from a dynamic

Keywords: information, management, database

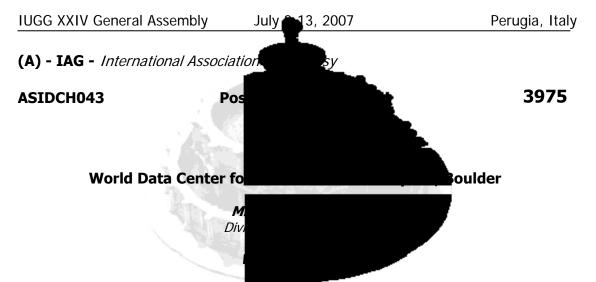
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July

## <u>'</u> **V2007** UGIA



Perugia, Italy



The World Data Center for Solar Terrestrial Physic datasets concerning the sun, interplanetary space The predecessor organization for the WDC-S A for Airglow and Ionosphere. Subsequent Activity and WDC-A for Aurora (Instrume organizations and combined with the WDC-Atmosphere Geophysics in 1968 which wa 1972. Other functions related to solar-induced geo

(DC\_STP) in iona he e urin formed IGY the WDC d Vi<u>sual) w</u>e fd glow lor name lat lе

er Colorado specializes in geomagnetic variations. ére a IGY period in 1957 as the WDCor Cosmic Rays, WDC-A for Solar nove<u>d from</u> their respective host m the WDC-A for Upper ar-Terrestrial Physics in also transferred into the

Boulder WDC-A between the IGY and 1970. In 1999 the designation WDC-A was removed and renamed

ere to

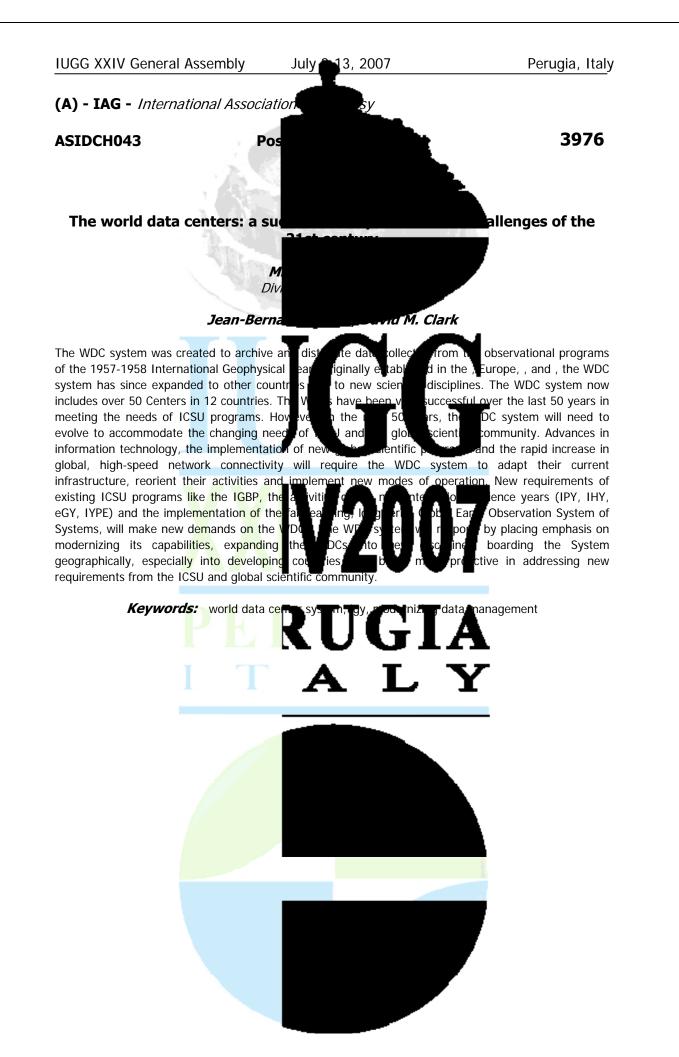
A for

real time availability of geophysical data b computer processing resources. In addition data mining and discovery and, within NOA Challenges the WDC-STP, Boulder must ad ever-increasing volume and diversity of new



nication networks and dvanced capabilities for system for data storage. bases while acquiring an

Keywords: solar terrestrial physics, world data center, data management



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