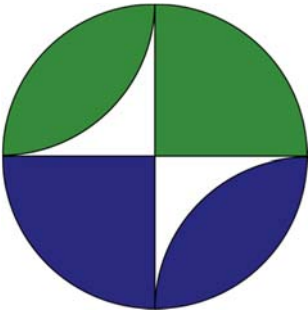


**INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS**  
UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE

# Annual Report 2017



**INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS**  
**UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE**

**Published by Secretary General**

**Alik Ismail-Zadeh**

**No ISSN: 1038-3846**

# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	<b>1</b>
<b>INTRODUCTION</b> .....	<b>2</b>
<b>GENERAL INFORMATION</b> .....	<b>5</b>
<b>MESSAGE FROM THE PRESIDENT</b> .....	<b>10</b>
<b>MESSAGE FROM THE SECRETARY GENERAL</b> .....	<b>12</b>
<b>IUGG ACTIVITIES</b> .....	<b>14</b>
<b>ACTIVITIES OF THE UNION ASSOCIATIONS</b> .....	<b>60</b>
International Association of Cryospheric Sciences (IACS).....	61
International Association of Geodesy (IAG).....	66
International Association of Geomagnetism and Aeronomy (IAGA) .....	70
International Association of Hydrological Sciences (IAHS) .....	74
International Association of Meteorology and Atmospheric Sciences (IAMAS) .....	78
International Association for the Physical Sciences of the Oceans (IAPSO).....	83
International Association of Seismology and Physics of the Earth’s Interior (IASPEI) .....	89
International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI).....	92
<b>ACTIVITIES OF THE UNION COMMISSIONS</b> .....	<b>95</b>
Union Commission on Climate and Environmental Change (CCEC).....	95
Union Commission on Mathematical Geophysics (CMG) .....	99
Union Commission on Geophysical Risk and Sustainability (GRC).....	100
Union Commission on the Study of the Earth’s Deep Interior (SEDI) .....	105
Union Commission on Data and Information (UCDI) .....	107
Union Commission on Planetary Sciences (UCPS) .....	111
<b>THE INTER-ASSOCIATION WORKING GROUP: ELECTRO-MAGNETIC STUDIES OF EARTHQUAKES AND VOLCANOES (EMSEV)</b> .....	<b>113</b>
<b>THE INTER-UNIONS COMMISSION: INTERNATIONAL LITHOSPHERE PROGRAMME (ILP)</b> .....	<b>118</b>
<b>IUGG FINANCIAL REPORT</b> .....	<b>122</b>
<b>ADDITIONAL UNION MATTERS</b> .....	<b>128</b>
Awards and Honors.....	128
Jubilees.....	130
Obituaries.....	132
<b>LIST OF ACRONYMS</b> .....	<b>135</b>

# INTRODUCTION

Established in 1919, the International Union of Geodesy and Geophysics (IUGG) is the international, non-governmental, non-profit organization dedicated to advancing, promoting, and communicating knowledge of the Earth system, its space environment, and the dynamical processes causing change. Through its constituent associations, commissions, and services, IUGG convenes international assemblies and workshops, undertakes research, assembles observations, gains insights, coordinates activities, liaises with other scientific bodies, plays an advocacy role, contributes to education, and works to expand capabilities and participation worldwide. Data, information, and knowledge gained are made openly available for the benefit of society – to provide the information necessary for the discovery and responsible use of natural resources, sustainable management of the environment, reducing the impact of natural hazards, and to satisfy our need to understand the Earth's natural environment and the consequences of human activities. IUGG Associations and Union Commissions encourage scientific investigation of Earth science and especially interdisciplinary aspects. Each Association establishes working groups and commissions that can be accessed by using the links on our website (see also the IUGG chart on the following page).

IUGG is one of 30 scientific unions adhering to the International Council for Science (ICSU). ICSU provides a global forum for scientists to exchange ideas and information and to develop standard methods and procedures for all fields of research. IUGG brings expertise on Earth studies from researchers in its International and Inter-Association Commissions. As a member of ICSU, IUGG strongly supports its policy of non-discrimination by affirming the rights and freedom of scientists throughout the world to engage in international scientific activity without limitation by such factors as citizenship, religion, creed, political stance, ethnic origin, race, color, language, age or gender.

IUGG has initiated and/or vigorously supported collaborative efforts that have led to highly productive world-wide interdisciplinary programs and projects, such as the International Geophysical Year (1957-58), the Upper Mantle Project (1964-70), the International Hydrological Decade (1965-74), the Geodynamics Project (1972-79), the Global Atmospheric Research Program (1967-80), the International Lithosphere Program, the World Climate Research Programme, the International Decade for Natural Disaster Reduction, Integrated Research on Risk Disasters, the International Heliophysical Year (2007-2009), the Electronic Geophysical Year (2007-2008), the International Year of Planet Earth (2007-2009), the International Polar Year (2007-2008), Extreme Natural Hazards and Societal Implications (2010-2014), International Year of Deltas (2013-2014), and the International Geosphere-Biosphere Programme (1987-2015). These programs have set a model for international, interdisciplinary cooperation. Representing all geophysical disciplines, IUGG is involved in the projects and programs related to climate change, global warming, and related environmental impacts.

# International Union of Geodesy and Geophysics (IUGG)

## Associations

**IACS**  
International Association of Cryospheric Sciences

- Snow and Avalanches
- Glaciers and Ice Sheets
- Sea Ice, Lake and River Ice
- Cryosphere, Atmosphere and Climate
- Planetary and other ices of the Solar System

**IAG**  
International Association of Geodesy

- Reference Frames
- Gravity Field
- Earth Rotation and Geodynamics
- Positioning and Applications
- Inter-Commission Committee on Theory

**IAGA**  
International Association of Geomagnetism and Aeronomy

- Internal Magnetic Fields
- Aeronomical Phenomena
- Magnetospheric Phenomena
- Solar Wind and Interplanetary Field
- Geomagnetic Observatories, Surveys, and Analyses
- Electromagnetic induction in the Earth and Planetary Bodies

**IAHS**  
International Association of Hydrological Sciences

- Continental Erosion (ICCE)
- Coupled Land-Atmosphere System (ICLAS)
- Groundwater (ICGW)
- Remote Sensing (ICRS)
- Snow and Ice Hydrology (ICSH)
- Statistical Hydrology (ICSH)
- Surface Water (ICSW)
- Tracers (ICT)
- Water Quality (ICWQ)
- Water Resources Systems (ICWRS)

**IAMAS**  
International Association of Atmospheric Sciences

- Atmospheric Chemistry and Global Pollution (ICAGCP)
- Atmospheric Electricity (ICAE)
- Climate (ICCL)
- Clouds and Precipitation (ICCP)
- Dynamic Meteorology (ICDM)
- Middle Atmosphere (ICMA)
- Ozone (IO3C)
- Planetary Atmospheres and their Evolution (ICPAE)
- Polar Meteorology (ICPM)
- Radiation (ICR)

**IAPSO**  
International Association for the Physical Sciences of the Ocean

- Mean Sea Level and Tides
- Properties of Seawater
- Permanent Service for Mean Sea Level
- Standard Seawater Service

**IASPEI**  
International Association of the Earth's Interior

- Earth Structure and Geodynamics
- Earthquake Generation Process - Physics, Modeling and Forecast
- Earthquake Hazard, Risk and Strong Ground Motion
- Earthquake Source Mechanisms
- Education and Outreach
- Seismological Observation and Interpretation
- Tectonophysics and Crustal Structure
- European Seismological Commission
- Asian Seismological Commission
- African Seismological Commission
- Latin American and Caribbean Seismological Commission

**IAVCEI**  
International Association of the Earth's Interior

- Volcanic Gases
- Volcanic Lakes
- Volcano Geology
- Geochemistry
- Collapse Calderas
- Explosive Volcanism
- Large Igneous Provinces
- Monogenetic Volcanism
- Submarine Volcanism
- Volcano Geohazards and Protected Volcanic Landscapes
- Volcanic Hazards and Risk
- Statistics in Volcanology
- Tephra Hazard Modelling
- Cities on Volcanoes
- Remote Sensing
- Volcano Geodesy

**Divisions**

- The World Glacier Monitoring Service (WGMS)
- IACS Standing Group on Mountain Glaciers and Hazards in Mountains (GAPHAZ)
- Global Terrestrial Network for Glaciers (GTN-G) Standing Committee

**Services**

- Bureau Gravimetric International (BGI)
- Bureau International des Poids et Mesures (BIPM) - Time Department
- International Earth Tide Service (IETS)
- International Centre for Global Models (ICGM)
- International Elevation Model Service (IEMS)
- International DORS Service (IOS)
- International Earth Rotation and Reference Systems Service (IERS)
- International Service for the Geoid (ISG)
- International Gravity Field Service (IGFS)
- International GNSS Service (IGS)
- International Laser Ranging Service (ILRS)
- International VLBI Service for Geodesy and Astrometry (IVS)
- Permanent Service for Mean Sea Level (PSMSL)

**Commissions**

- Interdivisional Commission on Developing Countries
- Interdivisional Commission on History
- Interdivisional Commission on Education and Outreach
- Interdivisional Commission on Space Weather
- International Service of Geomagnetic Indices

**Working Groups**

- Panta Rhei
- Education in Hydrological Sciences
- MOXXI

**Commissions**

- International Heat Flow Commission
- Commission on Physics and Chemistry of Earth Materials
- Commission on Volcano Seismology and Acoustics
- Commission on Electromagnetic Studies of Earthquakes and Volcanoes
- Working Group on Subduction Zones Located in Developing Countries

**Commissions**

- International Federation of Geodesy (IFG)
- International Federation of Geodesy and Geomatics (IFGG)
- International Federation of Geodesy and Geomatics (IFGG)
- International Federation of Geodesy and Geomatics (IFGG)

**Commissions**

- International Federation of Geodesy and Geomatics (IFGG)
- International Federation of Geodesy and Geomatics (IFGG)
- International Federation of Geodesy and Geomatics (IFGG)

**Commissions**

- International Federation of Geodesy and Geomatics (IFGG)
- International Federation of Geodesy and Geomatics (IFGG)
- International Federation of Geodesy and Geomatics (IFGG)

**Inter-Association Activities**

- Joint Tsunami Commission
- International Ocean Network
- Working Group on Subduction Zones Located in Developing Countries

**Union Commissions and Working Group**

- Commission on Volcano-Ice Interaction

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

**Working Group**

- Working Group on History

## Union Commissions and Working Group

**CCEC**  
CLIMATIC AND ENVIRONMENTAL CHANGE

**CMG**  
MATHEMATICAL GEOPHYSICS

**GRC**  
GEOPHYSICAL RISK AND SUSTAINABILITY

**SEDI**  
STUDY OF THE EARTH'S DEEP INTERIOR

**UCDI**  
DATA AND INFORMATION

**UCPS**  
PLANETARY SCIENCES

**WGH**  
WORKING GROUP ON HISTORY

IUGG Structure

IUGG supported and supports initiatives by ICSU, especially those in which Earth sciences have a role to play. IUGG cooperates with the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the study of hydrological (through IAHS) and oceanographic (through IAPSO) research; with the World Meteorological Organization (WMO) to promote studies in atmospheric sciences and

Current	Past
<ul style="list-style-type: none"> <li>• <b>International Lithosphere Program</b> (ILP, a joint IUGS-IUGG activity)</li> <li>• <b>Global Geodetic Observing System</b> (GGOS, an IAG program)</li> <li>• <b>World Climate Research Programme</b> (WCRP)</li> <li>• <b>Integrated Research on Disaster Risk</b> (IRDR)</li> <li>• <b>International Year of Global Understanding</b> (IYGU)</li> <li>• <b>Mathematics of Planet Earth</b> (MPE)</li> <li>• <b>World Data System</b> (WDS)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>International Geosphere-Biosphere Programme</b> (IGBP, 1987-2015)</li> <li>• <b>International Year of Deltas</b> (IYD, 2013-2014)</li> <li>• <b>Extreme Natural Hazards and Societal Implications</b> (ENHANS, 2010-2014)</li> <li>• <b>International Year of Planet Earth</b> (IYPE, 2007-2010)</li> <li>• <b>Electronic Geophysical Year</b> (eGY, 2007-2008)</li> <li>• <b>International Polar Year</b> (IPY, 2007-2008)</li> <li>• <b>International Heliophysical Year</b> (IHY, 2007-2008)</li> <li>• <b>International Decade for Natural Disaster Reduction</b> (IDNDR, 1990-1999)</li> <li>• <b>Geodynamics Project</b> (1972-1979)</li> <li>• <b>Global Atmospheric Research Program</b> (1967-1980)</li> <li>• <b>International Hydrological Decade</b> (1965-1974)</li> <li>• <b>Upper Mantle Project</b> (1964-1970)</li> <li>• <b>International Geophysical Year</b> (IGY, 1957-1958)</li> </ul>

*Programs and Projects initiated and/or supported by IUGG*

meteorology (through IAMAS) as well as in hydrology (through IAHS). Together with the International Civil Aviation Organization (ICAO) and WMO, IUGG promotes the studies, the monitoring and the modelling of volcanic ashes (through IAMAS and IAVCEI). IUGG also cooperates with the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in the studies related to seismology (through IASPEI), hydroacoustics, atmospheric transport modelling, and meteorology. In addition, IUGG places particular emphasis on the scientific problems of economically less-developed countries by sponsoring activities relevant to their scientific needs, e.g. Geosciences in Africa, eGY in Africa, Water Resources, Health and Well-Being etc.

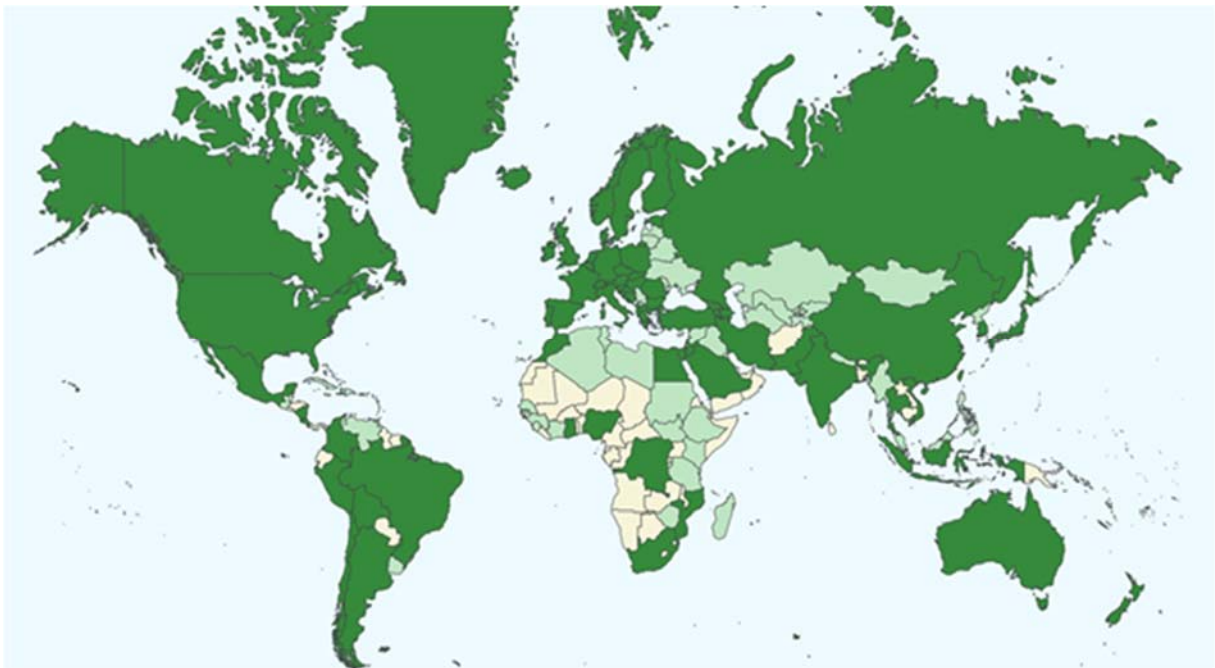
The website, available in English and French, can be found at [www.iugg.org](http://www.iugg.org).

# GENERAL INFORMATION

## MEMBERSHIP & FINANCE

By their very nature, geodetic and geophysical studies require a high degree of international co-operation. IUGG is critically dependent on the scientific and financial support of its member Adhering Bodies. The list of present and past IUGG Adhering Bodies is published in the IUGG Yearbook and posted on the website. Each Adhering Body establishes a National Committee for IUGG, and names Correspondents to each Association (as appropriate).

As of 31 December 2017, IUGG has 69 National Members including 59 countries in paying status. The paying members are placed in categories from 1 to 14 depending on their financial contribution to the Union (the membership dues rise with increasing category number). At present, the highest category used is category 11. The members pay dues according to a number of units assigned to their category (in category 1 the number of units is 1, and in category 11 the number is 35). According to a decision of the XXII IUGG General Assembly (Boulder, USA, 1995), the price of 1 unit is determined every year using an inflator index obtained from the Bureau of Labor Statistics, U.S. Department of Labor. In 2018, the price of 1 unit will be US\$ 1,975. The 59 paying members represent a total of 276 units, which is equivalent to a total income of US\$ 545,100. The funds received as dues are the basis for IUGG's operations as a scientific union, although Union associations may have their own funds earned via book selling or donations. The funds are spent to support (i) international scientific programs, projects and services, (ii) general and scientific assemblies, symposia, workshops, and schools; (iii) travel of students, early career scientists, and scientists from developing countries to attend scientific meetings; (iv) scientific activities of Union Associations and Commissions, (v) the International Lithosphere Program, (vi) the International Council for Science, and (vii) administration and management.



*Regional distribution of current (dark green) and former (light green) IUGG Member Countries (as of 31.12.2017)*

## STRUCTURE

Responsibility for directing the Union's affairs is vested in the IUGG Council by the Statutes and Bylaws. The IUGG Council consists of the Council Delegates, who are designated by the Adhering Body of their respective countries. The Council is convened at each quadrennial General Assembly but can make decisions by electronic voting in between General Assemblies. A Bureau, an Executive Committee and a Finance Committee administer IUGG affairs between Council meetings. The Executive Committee has the particular responsibility of overseeing the scientific programs of the Union. The IUGG Secretariat is located at the German Research Centre for Geosciences (GFZ) in Potsdam, Germany, and assists in the implementation of the decisions of the Bureau, Executive Committee and the Council.

### Associations

The Union brings together eight semi-autonomous Associations, each responsible for a specific range of topics or themes within the overall scope of the Union's activities and each with a sub-structure. The Associations convene their own assemblies and sponsor scientific symposia, often in partnership with one another. Within its own discipline each Association is responsible for determining its own program of investigations and for supporting the activities of its own component parts. All Earth scientists, worldwide, are eligible to participate in IUGG and Association activities, assemblies, workshops, and symposia, although only scientists from member countries with dues paid may serve as Association Presidents.

The eight International Associations are listed below, and short reports on their 2016 activities are included here. Additional information about each Association is given on their websites, which can be accessed from the IUGG [website](#).

- International Association of Cryospheric Sciences (IACS)
- International Association of Geodesy (IAG)
- International Association of Geomagnetism and Aeronomy (IAGA)
- International Association of Hydrological Sciences (IAHS)
- International Association of Meteorology and Atmospheric Sciences (IAMAS)
- International Association for the Physical Sciences of the Oceans (IAPSO)
- International Association of Seismology and Physics of the Earth's Interior (IASPEI)
- International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

### Union Commissions

Owing to the interactive nature of the subject fields addressed by the Union's Associations, a number of Union Commissions have been established that promote the study of particular interdisciplinary problems. In 2017, the following bodies were active:

- Commission on Climatic and Environmental Changes (CCEC)
- Commission on Mathematical Geophysics (CMG)
- Commission on Geophysical Risk and Sustainability (GRC)
- Commission on the Study of the Earth's Deep Interior (SEDI)
- Commission for Data and Information (UCDI)
- Commission on Planetary Sciences (UCPS)
- Working Group on History (WGH)



## Inter-Unions Commission

The International Lithosphere Program, guided by the Scientific Committee on the Lithosphere (SCL), was established in 1980 as the Inter-Unions Commission on the Lithosphere (ICL) by the International Council for Science (ICSU), at the request of IUGG and the International Union of Geological Sciences (IUGS). The name was formally changed to the Scientific Committee on the Lithosphere in 1999. According to Decision 8.4 from the 2005 ICSU General Assembly, ICSU decided "to withdraw ICSU sponsorship from SCL/ILP and to recommend that responsibility would then shift to IUGG and IUGS". Since that time, IUGG and IUGS have reaffirmed the ILP mission and have collaborated to re-define ILP as an Inter-Unions body.

## GENERAL ASSEMBLIES OF THE UNION

General Assemblies have been held since 1922 and, since 1963, at 4-year intervals. These assemblies provide an extraordinary opportunity for Earth scientists from around the world to gather and share expertise, research data, and results. Past IUGG General Assemblies are listed in the IUGG Yearbook and on the website. The most recent General Assembly was held in Prague, Czech Republic, 22 June-2 July 2015. The next IUGG General Assembly will take place in Montreal, Canada, 8-18 July 2019.

## OTHER SCIENTIFIC MEETINGS

Each Association organizes its own scientific assembly in the 4-year interval between Union General Assemblies in order to report scientific progress and conduct Association business. Associations sometimes meet jointly with the purpose of promoting interdisciplinary science. Topical and regional symposia and workshops are organized on other occasions by the Associations to provide opportunity for geodesists and geophysicists worldwide to discuss their respective methodologies, results and hypotheses and to plan collaborative research projects. The symposia, often held in less-visited, geophysically interesting locales, are intended to be attractive to the younger scientists from the developing countries of the world.

## IUGG OFFICERS FOR 2015-2019

### IUGG Bureau

President:	Michael Sideris	CANADA
Vice-President:	Kathryn Whaler	UK
Secretary General:	Alik Ismail-Zadeh	GERMANY/RUSSIA
Treasurer:	Aksel Hansen	DENMARK
Members:	Isabelle Ansorge	SOUTH AFRICA
	Pierre Hubert	FRANCE
	Chris Rizos	AUSTRALIA

### IUGG Executive Committee

IUGG Bureau members		
Immediate Past President:	Harsh Gupta	INDIA
IACS President		
(2015-2017):	Charles Fierz	SWITZERLAND
(2017-2019):	Regine Hock	USA
IAG President:	Harald Schuh	GERMANY
IAGA President:	Eduard Petrovsky	CZECH REPUBLIC

IAHS President		
(2015-2017):	Hubert Savenije	NETHERLANDS
(2017-2019):	Günter Blöschl	AUSTRIA
IAMAS President:	John Turner	UK
IAPSO President:	Denise Smythe-Wright	UK
IASPEI President:	Thorne Lay	USA
IAVCEI President:	Donald Dingwell	GERMANY

### **IUGG Finance Committee**

Chair:	Jan Krynski	POLAND
Members:	Nasser Abou-Assour	EGYPT
	Corina Risso	ARGENTINA
	Virendra Tiwari	INDIA

### **Association Presidents and Secretaries General**

#### International Association of Cryospheric Sciences

President		
(2015-2017):	Charles Fierz	SWITZERLAND
(2017-2019):	Regine Hock	USA
Secretary General:	Andrew Mackintosh	NEW ZEALAND

#### International Association of Geodesy

President:	Harald Schuh	GERMANY
Secretary General:	Hermann Drewes	GERMANY

#### International Association of Geomagnetism and Aeronomy

President:	Eduard Petrovsky	CZECH REPUBLIC
Secretary General:	Mioara Manda	FRANCE

#### International Association of Hydrological Sciences

President		
(2015-2017):	Hubert Savenije	NETHERLANDS
(2017-2019):	Günter Blöschl	AUSTRIA
Secretary General:	Christophe Cudennec	FRANCE

#### International Association of Meteorology and Atmospheric Sciences

President:	John Turner	UK
Secretary General:	Teruyuki Nakajima	JAPAN

#### International Association for the Physical Sciences of the Oceans

President:	Denise Smythe-Wright	UK
Secretary General:	Stefania Sparnocchia	ITALY

#### International Association of Seismology and Physics of the Earth's Interior

President:	Thorne Lay	USA
Secretary General:	Johannes Schweitzer	NORWAY

#### International Association of Volcanology and Chemistry of the Earth's Interior

President:	Donald Dingwell	GERMANY
Secretary General:	Roberto Sulpizio	ITALY

## **Union Commission and Working Group Officers**

### Union Commission on Climatic and Environmental Changes (CCEC)

Chair:	Tom Beer	AUSTRALIA
Secretary:	Keith Alverson	USA/JAPAN

### Union Commission on Mathematical Geophysics (CMG)

Chair:	Yehuda Ben-Zion	USA
Secretary:	Ilya Zaliapin	USA

### Union Commission on Geophysical Risk and Sustainability (GRC)

Chair:	John LaBrecque	USA
Secretary:	Paula Dunbar	USA

### Union Commission on Studies of Earth's Deep Interior (SEDI)

Chair:	Jonathan Aurnou	USA
Secretary:	Michael Bergman	USA

### Union Commission for Data and Information (UCDI)

Chair:	Sateesh Shenoi	INDIA
Vice Chair:	Anatoly Soloviev	RUSSIA

### Union Commission on Planetary Sciences (UCPS)

Chair:	Shuanggen Jin	CHINA
Secretary:	Scot Rafkin	USA

### Working Group on History (WGH)

Chair:	Hans Volkert	GERMANY
Vice-Chair:	Claude Boucher	FRANCE

### **Inter-Unions Commission: International Lithosphere Program (ILP)**

President:	Hans Thybo	TURKEY
Secretary:	Magdalena Scheck-Wenderoth	GERMANY

# MESSAGE FROM THE PRESIDENT



As the mid-year between IUGG General Assemblies (GAs), 2017 was a year full of activities for IUGG and its Associations. All our Associations held their Scientific Assemblies (SAs), and it was very encouraging to see that many of these were jointly organized, addressing scientific themes of common interest. In chronological order, they took place as follows: the IACS SA in Wellington, New Zealand, in February; the IAHS SA in Port Elizabeth, South Africa, in July; the IASPEI-IAG joint SA in Kobe, Japan, in July/August; the IAVCEI SA in Portland, Oregon, USA, in August; and the IAGA-IAMAS-IAPSO joint SA in Cape Town, South Africa, in August/September. Due to various other commitments, I was able to personally attend only the SA in Kobe, and I was represented in Wellington and Port Elizabeth by IUGG Bureau members Chris Rizos and Pierre Hubert, respectively, in Portland by IAVCEI Secretary General (SG) Roberto Sulpizio, and in Cape Town by IUGG Vice President Kathy Whaler. I would like to express my appreciation to all these colleagues. I should also mention that the Union Commission on Planetary Sciences (UCPS) held in July its first symposium in Berlin, Germany, and that the Union Commission for Data and Information (UCDI) was reactivated in 2017.

At the request of the Bureau, the Visioning Committee developed Implementation Actions for the 2016-2023 IUGG Strategic Plan. These address issues of internal and external collaborations of the Union, its promotion, visibility and outreach, improvements in the Union's governance structure, the strengthening of the role of National Committees, the promotion of fundamental geoscience research and education, and enabling under-represented geoscientists to participate in international science activities of the Union and its Associations. A Task Force (TF100) was established to develop a program for the celebration of the Union's Centennial Anniversary during the 2019 GA in Montreal, as well as other relevant activities. These include joint events/sessions with sister organizations (AGU, AOGS, EGU), national/regional celebrations organized by National Committees, the establishment of an Early Career Earth and Space Scientists Network, a book on the History of the IUGG, and the IUGG Centenary Day event planned for July 29, 2019, at the UNESCO Headquarters in Paris.

In September, the IUGG Bureau, Executive and Finance Committees, Scientific Program Committee for the 2019 IUGG GA, and the TF100 had their business meetings at, and inspected the facilities of, Palais des Congrès in Montreal, the venue of the next IUGG GA. The main agenda items were the Centennial GA in 2019, its organization and scientific program, and the Union's Strategic Plan and the actions for its implementation.

Also in September, I and our SG attended a meeting of the Steering Committee of the nine ICSU GeoUnions, hosted by GFZ in Potsdam, Germany. The main purpose of this meeting was the development of a common strategy regarding the merger of ICSU with ISSC (International Social Sciences Council) before our participation in 32nd ICSU General Assembly in Taipei on October 23 and 24. We also had another such meeting on October 21, and on October 22 we attended the 2017 International Symposium on Sustainability Science, both in Taipei. As it is now well known, at the Joint Meeting of ICSU and ISSC held on October 25-26 in Taipei it was decided to merge ICSU and ISSC into a new organization representing all of science, named International Science Council (ISC). ISC's inaugural GA will be held in July 2018 in Paris.

Throughout the year, IUGG continued its many international educational and research activities, was represented at many meetings and global forums, and promoted the importance of science for decision making on issues such as climate change, risk reduction and resilience to disasters, and

sustainable development. Specific details on these can be found in the SG's report and in our monthly e-Journals. In addition, our Statutes and By-Laws Committee worked very hard and submitted a set of proposed changes that will improve the operation and the governance of the Union. These changes have now (2018) been sent to the Council for their approval and after that the specific changes will be communicated to the wider IUGG community.

Since 2016, I have been an elected a member of the Program Board (PB) of the Group on Earth Observations (GEO). My term actually ended at the end of 2017, but I have been re-elected to the PB for another three-year period (2018-2020). It is also worth mentioning that IAG, though its Global Geodetic Observing System (GGOS), is now also elected on the PB for the same period, and thus the voice of geosciences has been strengthened in GEO. I attended three PB meetings, and I am contributing to the work of two PB Subgroups, the Sendai Framework Subgroup and the Paris Agreement Subgroup. Unfortunately, neither I nor our SG were able to attend the XIV GEO Plenary in Washington, DC, as it was held in October at the same time as the ICSU GA.

As always, I would like to acknowledge all members of IUGG's Bureau, EC and Council for their support and collaboration, and thank the Secretary General and the Secretariat of IUGG for their unwavering commitment to the Union.

Michael G. Sideris

# MESSAGE FROM THE SECRETARY GENERAL



The year 2017 was another successful year for the IUGG. The Union was involved in various activities during the last year and showed its strength in international cooperation and science promotion. Major activities and events are highlighted below.

– *Association and Union Commission activities.* The IUGG Associations organized their scientific assemblies: IACS in New Zealand, a joint assembly of IAG and IASPEI in Japan, a joint assembly of IAGA, IAMAS, and IAPSO in South Africa, IAVCEI in the USA, and IAHS in South Africa. The Union Commission on Planetary Sciences (UCPS) held its first symposium in Germany. The Union Commission for Data and Information (UCDI) was renewed to reactivate the commission supporting and strengthening IUGG science through integrated scientific data and information activities.

- *Scientific meetings.* IUGG co-sponsored nine scientific meetings in countries across the Caribbean, Europe, North America, and Oceania.
- *Research programs and projects.* IUGG together with the International Union of Geological Sciences (IUGS) continued to support the International Lithosphere Program (ILP).
- *Implementation of the IUGG Strategic Plan.* The IUGG Visioning Committee developed the Implementation Actions for the IUGG Strategic Plan, which now guides us in implementing the strategic plans until 2023.
- *Science education.* IUGG and the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, have continued their cooperation in geophysical and geodetic education and science collaboration. IUGG co-sponsored six geoscience education events in ICTP as well as in Guatemala, Rwanda, and Vietnam.
- *IUGG Centennial.* The Task Force for the IUGG Centennial (TF100) was formed to prepare the Union for its 100th anniversary in 2019 and to develop a program for the celebration, including activities related to publications, science and education, science policy and outreach, and the legacy of the centennial (the report of the TF100 is presented in article 5 of this issue).
- *Science policy.*
  - (i) IUGG issued a statement “The Earth’s climate and responsibilities of scientists and their governments to promote sustainable development” highlighting the importance of scientific knowledge in policymaking regarding climatic change.
  - (ii) IUGG presented a statement on the use of science in disaster risk reduction at the UNISDR Global Platform on Disaster Risk Reduction held in Cancun, Mexico.
  - (iii) IUGG highlighted the importance of scientific research as well as periodic synthesis and assessment reports aimed at decision makers at the Global Forum on Science and Technology for Disaster Resilience held in Tokyo, Japan.

- *International Science Council.* Since the inception of IUGG in 1919, the Union has been a member of the International Research Council (IRC, 1919-1931), and its successors, the International Council of Scientific Unions (ICSU, 1931-1998), and the International Council for Science (ICSU, 1998 - present). In October 2017, ICSU and the International Social Science Council (ISSC) members agreed to merge the two councils and to form a new International Science Council (ISC) to be inaugurated in 2018 in Paris, France.
- *Cooperation.*
  - (i) IUGG continued to strengthen its cooperation with scientific unions of ICSU including the GeoUnions and the International Union of Biological Sciences (IUBS). The IUGG President and Secretary General met with their colleagues from other eight GeoUnions (<http://www.icsu-geounions.org>) in Potsdam, Germany, and in Taipei, Republic of China to discuss joint activities and the future of the International Council for Science (ICSU). Together with IUBS and other international partners, IUGG participated in the ICSU project “Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding”.
  - (ii) IUGG also continued its cooperation with several interdisciplinary bodies of ICSU. Particularly, the Union participated in two workshops of CODATA held in Paris, France, and London, UK, as well as co-sponsored the 2017 CODATA Conference in St. Petersburg, Russia.
  - (iii) IUGG contributed to the development of the scientific program of the Science & Technology Conference of the Preparatory Commission on the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in Vienna, Austria.
  - (iv) IUGG took part in the World Landslide Forum in Ljubljana, Slovenia, organized by the International Consortium on Landslides under the auspices of UNESCO.
  - (v) IUGG participated in the work of the Program Board of the Group on Earth Observations (GEO).
  - (vi) IUGG continued its cooperation with the World Meteorological Organization (WMO), the Intergovernmental Panel on Climate Change (IPCC), the United Nations Education, Science and Culture Organization (UNESCO) via its International Hydrological Program (IHP), Earth Science and Geohazard Risk Reduction section, and the Intergovernmental Oceanographic Commission (IOC) as well as with scientific programs such as the World Climate Research Programme (WCRP), the Integrated Research on Disaster Risk (IRDR) Programme, the Global Framework for Climate Services (GFCS), Future Earth and with some other international and intergovernmental organizations, professional societies of geoscientists, and international programs.
- *Business meetings.* The meetings of the IUGG Bureau, the Executive Committee (EC), the Finance Committee (FC), the Scientific Program Committee (SPC) for the XXVII IUGG General Assembly (IUGG2019), and the Task Force on the IUGG Centennial (TF100) were held at Palais des congrès, Montreal, Canada, from 18 to 22 September 2017.

Alik Ismail-Zadeh

# IUGG ACTIVITIES

## IUGG SECRETARIAT

The IUGG Secretariat is located at the German Research Centre for Geosciences in Potsdam (GFZ-Potsdam, <http://www.gfz-potsdam.de/en/centre/international/iugg-secretariat/>). The Secretariat is managed by the IUGG Secretary General Dr. A. Ismail-Zadeh and the Assistant Secretary General / Executive Secretary Dr. F. Kuglitsch, with a support from Mrs. K. Gundrum. The Secretariat is responsible for implementing for the day-to-day operations of IUGG; this includes (i) maintenance of daily correspondence and communication with IUGG National Committees, Adhering Organizations, Union Associations, Executive and Financial Committees, Union Commissions and Committees; (ii) maintenance of IUGG electronic databases and technical documents; (iii) supervision of the IUGG web-master and preparation of updates for the IUGG web-page and social media in timely fashion; (iv) development of IUGG Yearbooks and Annual Reports; (v) negotiations with companies for production of IUGG-related publications, medals, pins etc.; (vi) publication of the IUGG E-Journal (monthly issues); (vii) assistance in technical screening of IUGG grant applications, medal and awards nominations; (viii) preparation work for IUGG General Assemblies, Council, Executive Committee, and Bureau Meetings; and some other activities. The Secretariat adopted a web-conferencing software, which provides a platform for business meetings of IUGG Bureau, Union Commission and other Union bodies across geographically dispersed locations through: text-based instant messages, voice and video chat, online presentations, web conferences, and desktop sharing enables participants to increase communication, reduce travel expenses and conserve time, increase productivity, and accelerate the decision-making process.

The IUGG Secretariat is co-sponsored by **GFZ-Potsdam** and **German Research Foundation (DFG)**. IUGG thanks the GFZ-Potsdam for the arrangement and financial support of the Secretariat, and DFG for generous support of the position of the Assistant to Secretary General and business trips of the Secretary General.

**IUGG Yearbook:** The Secretariat maintains the data related to the IUGG and its Association and produce annually a Yearbook which is available at the IUGG website electronically in PDF format (<http://www.iugg.org/publications/yearbooks>). The IUGG website maintains the directory of Union and Association officials and the archive of IUGG memberships and General Assemblies.

**IUGG Annual Report:** The IUGG Annual Report summarizes the activities of the Union, IUGG Associations and Union and Inter-Unions Commissions. The Annual Report 2016 has been posted on the website: <http://www.iugg.org/publications/reports/report2016.pdf>.

**IUGG Webpage and social media:** The IUGG website <http://www.iugg.org>, in English and French, was maintained by Dr. D. Krupsky, IUGG Web-master, and permanently updated for 2017. To learn more about IUGG and to keep individuals updated on Union's activities, the IUGG Secretariat maintains

FACEBOOK: <https://www.facebook.com/InternationalUnionGeodesyGeophysics>

TWITTER: <https://twitter.com/theIUGG>, and

YOUTUBE: <https://www.youtube.com/channel/UCgslvZyuEJ-RA9JkZv3MN-w>

**IUGG Electronic Journal:** The E-Journal, an informal newsletter, was published and distributed monthly keeping IUGG Member National Committees informed about the activities of IUGG, its Associations and Commissions, and the actions of the IUGG Secretariat. Also the journal publishes feature articles, news from the International Council for Science (ICSU), news and reports related to IUGG scientific



programs and co-sponsored scientific meetings, and a calendar of scientific meetings (<http://www.iugg.org/publications/ejournals/>).

**Implementation Actions for the IUGG Strategic Plan:** Strategic planning is an important visioning process to determine a strategy, mission, goals, and major activities of the organization for the near future. In 2016, the IUGG Council approved the IUGG Strategic Plan for 2016-2023 ([http://www.iugg.org/special/IUGG\\_StrategicPlan\\_2016-2023.pdf](http://www.iugg.org/special/IUGG_StrategicPlan_2016-2023.pdf)). To implement the Strategic Plan, the Bureau requested the Visioning Committee to develop Implementation Actions. The draft of the Actions was discussed by the Executive Committee and endorsed at its meeting in Montreal, Canada, in September 2017 with some suggested revision. The Visioning Committee revised the document and the Implementation Actions were approved by the IUGG Bureau on 15 December 2017. The Implementation Actions for the Strategic Plan can be found at: [http://www.iugg.org/special/IUGG\\_ImplementationActions4SP.pdf](http://www.iugg.org/special/IUGG_ImplementationActions4SP.pdf).

## IUGG BUSINESS MEETINGS

The IUGG Bureau, Executive Committee (EC), Finance Committee (FC), Scientific Program Committee (SPC) for the XXVII IUGG General Assembly (IUGG2019), and Task Force on IUGG Centennial (TF100) meetings were held at Palais des congrès, Montreal, Canada, from 18 to 22 September 2017. The TF100 members met on 18 September; the Bureau (President, Vice President, Secretary General, Treasurer, and three members at large) met on 19 September; and the IUGG EC held its meeting on 20-21 September. The IUGG EC is comprised of the IUGG Bureau, the immediate Past President of IUGG, and the Presidents of Union Associations. The Association Secretaries General, the Chairs of the IUGG FC, and of the Local Organizing Committee (LOC) for IUGG2019 were invited to attend the EC meeting.



*During the EC meeting, 20 September 2017, Palais des congrès, Montreal, Canada (photo: F. Kuglitsch)*

The IUGG President, the Secretary General, and the Presidents of the Union Associations reported on activities since the last EC meeting (Paris, France, June 2016). The IUGG Vice President reported on the activities of Union Commissions. The IUGG Executive Secretary reported on the activity of the IUGG Secretariat. The IUGG Treasurer and the Chair of the FC reported on the financial situation of the Union and about the IUGG membership. Other topics on the agenda included (i) the preparations for IUGG2019 in Montreal (LOC Chair Fiona Darbyshire reported on the activity of the Committee); (ii) the presentation by C-IN company, the Associate Professional Conference Organizer (hired by IUGG to run the abstract, scientific program and travel grant management for IUGG2019); (iii) the report on the preparation for the IUGG 100<sup>th</sup> anniversary in 2019 by the Chair of the TF100 Chris Rizos (a report will

be sent soon to the IUGG National Committees); (iv) relationship with the International Council for Science (ICSU) and on the merger of ICSU with the International Social Science Council; (v) Union activity in the GeoUnions consortium; (vi) reports of the IUGG liaisons to the ICSU Scientific Committees and to international and intergovernmental organizations; (vii) Union activities on capacity building and education; and (viii) a report on the implementation of the IUGG Strategic Plan.

On 18-19 September, the FC met to discuss the IUGG financial report, to review the IUGG accounts, and to take an overview of administrative matters and membership, IUGG grants, allocations, and inter-association activities. The IUGG Treasurer and the IUGG Secretary General were invited to attend the FC meeting. On 20 September, the IUGG EC and Association Secretaries-General met the members of the LOC for the IUGG2019 and had a tour of the Palais des congrès, the venue of the future General Assembly.

The SPC for the IUGG2019 met on 22 September. The SPC is comprised of the Chair (Spiros Pagiatakis), the IUGG Secretary General, Association Secretaries General, and the IUGG President (ex-officio). The Chair of the LOC and the representatives of the local and associate professional conference organizers were invited to the SPC meeting. The tentative draft of the science program was discussed including topics of Union and inter-Association symposia. The science program should be finalized by early 2018. IUGG signed a contract with C-IN company (responsible for the management of the IUGG General Assembly in Prague, Czech Republic in 2015) to develop and maintain a web-based system for the abstract, scientific program and travel grant management for the IUGG General Assembly in Montreal, Canada, in 2019. The IUGG Executive Committee endorsed the hiring of C-IN as an Associate Professional Conference Organizer (APCO)

## **TASK FORCE ON THE IUGG CENTENNIAL: REPORT**

One year ago, the IUGG established a Task Force to develop ideas, coordinate activities and take on some of the planning responsibilities for the centenary celebrations of the founding of the IUGG in 1919. The Task Force on the IUGG Centennial – known as TF100 – has the following members: *Chris Rizos* (Chair, IUGG Bureau Member and Chair of the Visioning Committee), *George Balmino* (IUGG Secretary General, 1991-1999), *Athena Coutenis* (Chair of the IUGG Honor and Recognition Committee), *Alik Ismail-Zadeh* (IUGG Secretary General), *Franz Kuglitsch* (IUGG Executive Secretary / Assistant Secretary General), *Johanna Salminen* (Secretary of the Finish National Committee for IUGG and early career scientist), *Michael Sideris* (IUGG President), *Hans Volkert* (Chair of the IUGG Union Working Group on History), *Denise Smythe-Wright* (IAPSO President), and *Gordon Young* (Member of the Local Organizing Committee of the 2019 IUGG General Assembly). At its face-to-face meeting in Montreal, Canada, on 18 September 2017, a work plan was proposed and is currently being implemented.

“The History of the IUGG” will be written and published. The lead author is JoAnn Joselyn, IUGG Secretary General (1999-2007). JoAnn will cover topics such as the early development of the Union, from the early 20<sup>th</sup> century – its officers, changes to the structure of the IUGG, its assemblies, and more – to its position today and tomorrow. The second part of the book will focus on the Associations themselves, and will therefore be authored by nominees from these Associations. The first draft is expected to be ready for review by early 2018. It is planned that the book will be completed by December 2018.

The IUGG and its Associations will not be the only entities celebrating the IUGG’s centenary. Adhering Bodies have been contacted and are encouraged to organize their own celebratory activities and events. For example, they may organize scientific conferences or workshops, design posters or exhibitions, issue special stamps, and so forth. The IUGG’s centenary is an opportunity to promote the IUGG, its constituent entities, its partners, its projects and its achievements. While it is important to look back at highlights and achievements spanning one hundred years, TF100 believes that we must

also articulate how the IUGG can, and will, continue to encourage research and education in the geosciences, inform governmental and international policy, and foster global research coordination. (These reflect to some extent also the core principles of the IUGG, as articulated in its Strategic Plan 2016-2023.)

In order to raise the visibility of the IUGG it has been decided to participate in meetings of major professional geoscientific bodies such as the American Geophysical Union (AGU traces its history from 1919, when the U.S. National Committee for IUGG was set up), the Asia Oceania Geosciences Society (AOGS), and the European Geosciences Union (EGU). The IUGG will seek to co-organize appropriately themed sessions at these meetings in 2018 and 2019, as well as have an exhibition booth where promotional materials will be distributed.

The IUGG and its Associations have always had an international outlook, and have sought to engage with scientists from less developed countries, for example through the award of travel grants to attend symposia and workshops. Furthermore, to address its mission of promoting education and leadership, the priority for such travel support has been Early Career Scientists, so that they may attend workshops and schools, attend conferences to present the results of their research, and network with fellow geoscientists. As a legacy of the IUGG’s centenary celebrations TF100 is proposing the establishment of an Early Career Earth and Space Scientists Network.

The IUGG General Assembly 2019, to be held in Montreal, Canada, will provide an extremely valuable platform to celebrate the IUGG’s centenary. The Local Organizing Committee is working hard to ensure that the participants at the GA will be able to take part in the centennial celebrations. There will be a series of activities, including special sessions and events, displays and promotional materials.

Finally, an important activity that is being organized by TF100 is the IUGG Centenary Day, to be held on 29 July 2019, at the UNESCO Headquarters in Paris, France, with the theme “100 years of International Cooperation in the Earth and Space Sciences”. This event almost coincides with the day of the IUGG establishment on 28 July 1919 in Brussels, Belgium, by nine Founding Member countries: Australia, Belgium, Canada, France, Italy, Japan, Portugal, the United Kingdom, and the United States. The celebration of the IUGG’s centenary on this day will include welcoming speeches, keynote presentations that highlight the challenges for international geoscience in the coming decades, and awarding commemorative plaques (reported by Chris Rizos, TF100 Chair and IUGG Bureau Member).

## UNION GEORISK COMMISSION RENEWED

The Union Commission on Geophysical Risk and Sustainability (GeoRisk Commission or GRC) was inactive since 2015 after a renewal of its membership at the IUGG General Assembly in Prague, Czech Republic. It was mainly because of inability of the new chair to lead the commission. After several warning of the IUGG Bureau sent to the chair of the commission, the Bureau agree finally to renew the leadership of the Commission. The GRC membership for 2017-2019 is as follows:

Function	Name	Association	Country
Chair	John LaBrecque	IAG	USA
Vice-Chairs	Viacheslav Gusiakov	IAPSO	Russia
	Alan Thomson	IAGA	UK
Secretary-Treasurer	Paula Dunbar (F)	IAPSO	USA
Past Chair	Kuniyoshi Takeuchi	IAHS	Japan
Executive Committee Members	Mohsen Ghafory-Ashtiany	IASPEI	Iran
	Michael Krautblatter	IACS	Germany
	Joan Marti	IAVCEI	Spain
	Christa von Hillebrandt-Andrade (F)	IAPSO	Puerto Rico

	Chun-Chieh Wu	IAMAS	China – Acad. of Sciences in Taipei
GRC Members (in advisory capacity)	Tom Beer	IAMAS	Australia
	Harsh Gupta	IASPEI	India
	Alik Ismail-Zadeh	IASPEI	Germany/ Russia
	Katia Kontar (E, F)	IAHS	USA
	Vladimir Kossobokov	IASPEI	Russia
	Gordon McBean	IAMAS	Canada
	Ramesh Singh	IAG	USA

E – early career scientist; F – female scientist

## IUGG STATEMENTS AND RESOLUTIONS

### The Earth’s Climate and Responsibilities of Scientists and Their Governments to Promote Sustainable Development

Speaking for the international Earth and Space scientific community and for the National Members of the Union, the International Union of Geodesy and Geophysics (IUGG) is dismayed that the United States (US) seeks to renegotiate, or withdraw from, the Paris Agreement on Climate Change. This decision will potentially have a significant impact on the implementation of the 2030 Agenda for Sustainable Development and specifically its Sustainable Development Goal 13 “Take urgent action to combat climate change and its impacts”. The world expects that scientific excellence and scientific knowledge will be incorporated into decision-making and that internationally binding decisions, once made, will be honored by governments and their successors.

To reach the ambitious goals of the Paris agreement, appropriate financial flows, a new technology framework and an enhanced capacity building framework are needed to support capacity building in developing countries. Failure to do this will delay climate change mitigation. Thus, IUGG believes that the decision to terminate US funding to the Green Climate Fund is as damaging, or more damaging than a potential US withdrawal from the Paris agreement, because individual countries can benefit from the Fund set up with a recognition of climate change as a global problem and the need for participation in a multilateral framework.

We remind the international scientific community that in 2007 the IUGG General Assembly in Perugia, Italy, urged nations collectively to sharply reduce global atmospheric emissions of greenhouse gases and absorbing aerosols, with the goal of urgently halting their accumulation in the atmosphere and holding atmospheric levels at their lowest practicable value; and urged organizations around the world to join with IUGG and its member Associations to encourage scientists to communicate freely and widely with public and private decision-makers about the consequences and risks of on-going climate change and actions that can be taken to limit climate change and promote adaptation. In 2015, the IUGG General Assembly in Prague, Czech Republic, urged national and scientific leaders of all nations to recognize the substantial benefits to the overall well-being and economic progress, both nationally and globally, that will accrue through advancing the scientific understanding of, and the capabilities for predicting potentially disruptive environmental consequences and extremes.

IUGG scientists and affiliates work with the global community including industries and government organizations to provide sound information on the regional and country specific impacts. They value global cohesiveness in advancing the science and in dealing with issues, because building knowledge and helping humanity is best accomplished by working together. By withdrawing from a leadership role, the United States has lost the opportunity to help reduce emissions.

IUGG therefore encourages the United States to continue to meet the aspirations of the Paris Agreement through the efforts of the states, cities, industries and citizens.

*The statement was drafted by the IUGG Union Commission on Climatic and Environmental Change in co-operation with the IUGG's International Association of Meteorology and Atmospheric Sciences, and adopted by the IUGG Bureau on 12 June 2017. It is available at the IUGG web site:*

[http://www.iugg.org/resolutions/IUGGstatement\\_ParisAgreement\\_USA\\_12Jun2017.pdf](http://www.iugg.org/resolutions/IUGGstatement_ParisAgreement_USA_12Jun2017.pdf)

### **IAMAS Resolution Regarding Earth Observation**

The International Association of Meteorology and Atmospheric Sciences (IAMAS) of the International Union of Geodesy and Geophysics (IUGG) stresses the importance of the collection of data that supports an understanding of the Earth System, including its changes and evolution. We all depend on the Earth. Increasingly we rely on weather forecasts as well as predictions of high impact events such as hurricanes to both benefit our lifestyle and avoid catastrophe. Without the gathering of data, improvements to our ability to predict these events could not occur. We are concerned about current propositions within the United States of America to shut down a variety of efforts to gather data in support of understanding and maintaining our records of the atmosphere, the oceans, and other elements of the Earth system that enable improvements in our ability to predict and project future conditions on Earth. The economic benefits of improved weather prediction are well established, and we are just learning how to improve predictions on longer time scales. The cancellation of current satellite missions will cause great harm to these improvements and thereby can only lead to great economic as well as human harm. We urge the Congress of the United States to continue to stand by the scientific community that is working towards improvements of our livelihood by continuing to support these important satellite missions.

Whereas the development and maintenance of scientific data records regarding atmospheric, oceanic and earth sciences provides a great economic advantage to the world's people, we urge the United States to maintain and improve these records through its continued support of Earth observing systems (including scientific satellite missions).

#### Considering

- The importance of the collection of environmental data that supports an understanding of the Earth's geophysical processes, including its changes and evolution.
- That Earth as our habitat represents a resource on which we all depend.
- That increasingly we rely on weather forecasts as well as predictions of high impact events such as hurricanes to maintain infrastructure, enable commerce and benefit our lifestyle and avoid catastrophe and that without the gathering of data, improvements to our ability to predict these events could not occur.
- That these data enable improvements in our ability to predict and project future conditions on Earth.

#### Acknowledging

That the economic benefits of improved weather prediction are well established, continuing and improving observing systems are essential to monitoring, understanding, and prediction on longer time scales.

#### Urges

- That the Congress of the United States, as well as the legislative bodies of other nations, continue to stand by the scientific community that is working towards improvements of our livelihood by continuing to support these important satellite missions and fully support satellite missions that are aimed at improving scientific study of the Earth.

- That the United States, as well as all nations, maintains and improves the satellite data records through its continued support of scientific satellite missions.
- That observational systems in general continue to be supported.

Resolves

To continue and amplify national and international research efforts on the use of satellite data to improve prediction of the Earth System at all scales.

*The Resolution was approved by the Executive Committee of IAMAS in November 2017, and endorsed by the IUGG Bureau on 27 November 2017. It is available at the IAMAS website: <http://iamas.org/Resolution on Earth Observation.pdf>*

### **IACS Statement on Common Practices for Glacier Mapping for Inventories**

The International Association of Cryospheric Sciences (IACS) of IUGG has issued a statement regarding common practices for glacier mapping for inventories. The statement is prompted by the recent indictment of Dr. Ricardo Villalba (former Director of the Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales, Argentina) related to the application of a lower threshold for generating the Argentinian glacier inventory<sup>1</sup>. The statement mentions that “while we do not take any legal or political stand on the issue, we confirm that using a minimum threshold for mapping glaciers is not only common practice worldwide, but necessary to ensure that an object is in fact a glacier (defined by the Argentinian glacier law as any mass of perennial ice that is stable or flows slowly), and not a snowfield or snow patch; a distinction that is difficult to make for very small objects.”

“An IACS Working Group developed and published a Glossary of terms related to glacier mass balance (Cogley et al., 2011) which highlights this difficulty. We observe that the threshold of 0.01 km<sup>2</sup> adopted by Dr. Villalba is even lower than the one used in inventories in many other glacier regions of the world. For smaller objects, it becomes increasingly difficult to distinguish ‘real’ glaciers from snowfields or snow patches. Resolutions of satellite or airborne images which are typically used to map glaciers also provide constraints on how small the objects to be mapped can be. In summary, the use of a minimum threshold size to map glaciers is scientifically justified and necessary to avoid inclusion of objects that are not glaciers and to complete a glacier inventory in a timely fashion. The Argentinian glacier inventory established under Dr. Villalba’s direction is consistent with the standards adopted in glacier inventories worldwide.”

## **UNION MEMBERSHIP**

As of 31 December 2017, IUGG has 69 National Members including 59 countries in paying status (although some serious problems in payment exist for Bulgaria, Iran, F.Y.R. Macedonia, and Nicaragua). The paying members are placed in categories from 1 to 14 depending on their financial contribution to the Union (the membership dues rise with increasing category number). At present, the highest category used is category 11. The members pay dues according to a number of units assigned to their category (in category 1 the number of units is 1, and in category 11 the number is 35). According to a decision of the XXII IUGG General Assembly (Boulder, USA, 1995), the price of 1 unit is determined every year using an inflator index obtained from the Bureau of Labor Statistics, U.S. Department of Labor. In 2018, the price of 1 unit will be US\$ 1,975. The 59 paying members represent a total of 276 units, which is equivalent to a total income of US\$ 545,100. The funds received as dues are the basis for IUGG’s operations as a scientific union, although Union Associations may have their own funds earned through book selling or donations. The funds are spent to support (i) scientific activities of

---

<sup>1</sup> Tollefson, J., and Mega, E.R. (2017). Argentinian geoscientist faces criminal charges over glacier survey. *Nature*, 552, 159 (14 December 2017)

Union Associations and Commissions; (ii) international scientific programs, projects and services; (iii) general and scientific assemblies, symposia, workshops, and schools; (iv) the IUGG Grants Program; (v) the International Lithosphere Program; (vi) the International Council for Science; (vii) travel of students, early career scientists, and scientists from developing countries to attend scientific meetings; and (viii) administration and management. Because of the vacancy occurring after the death of the Chair of the Finance Committee (FC), and according to the Union By-Law 12c, the Executive Committee appointed Nasser Abou-Ashour (an IUGG Council Delegate) as a new FC Member for 2017-2019. The IUGG Council endorsed the appointment on 19 January 2017. The FC elected Jan Krynski as the Chair of the Committee. The FC consists now of four people: Nasser Abou-Assour (Egypt), Jan Krynski (Poland), Corina Risso (Argentina), and Virendra Tiwari (India). A meeting of the FC was held in Montreal in September 2017.

## REPORTS FROM NATIONAL COMMITTEES

### The annual meeting of the Austrian National Committee for IUGG

On the invitation of Dr. W. Lenhardt (Austrian National Delegate to the IASPEI) and B. Leichter (Austrian National Delegate to the IAGA), Members of the Austrian National Committee (ANC) for IUGG gathered at the Conrad Observatory (COBS) of the Zentralanstalt für Meteorologie und Geodynamik (ZAMG) on 25 and 26 September 2017. The head of the COBS, Dr. R. Leonhardt, welcomed the members of the ANC and gave an overview of the history of the ZAMG and its aims and presented the geophysical and geodetic instruments that so far have been set up at the COBS. During the ANC meeting the following topics were addressed: (i) the recent IUGG statement on the Earth's climate and sustainable development; (ii) National Delegate for IAPSO; and (iii) information exchange. With reference to the IUGG E-Journals Nos. 7/2017 and 9/2017, the ANC discussed the issue of climate change. On the one hand, a good communication of all involved scientists is necessary; on the other hand, an overreaction is not helpful. The position of the ANC is in a good agreement with the "Editorial comment" presented in E-journal No. 9/2017.



*Members of the ANC-meeting: (from the left to the right) I. Fritz, M. Schindelegger, W. Lenhardt, K. Richter, M. Rotach, B. Leichter, G. Kaser, J. Böhm, R. Leonhardt, and N. Höggerl (photo: N. Höggerl)*

Three papers were presented by young scientists addressing sea level rise and different aspects of palaeomagnetism. The ANC meeting was the perfect platform for the exchange of valuable information between the members of the different associations of the IUGG in a very relaxed atmosphere. Recent natural disasters have shown very clearly that the regular exchange of information and of results achieved in various fields of geosciences are indispensable for research on climate

change and natural disaster prevention. A guided tour was organized to the heart of the COBS: a 150 meters tunnel for seismology, and a 400 meters tunnel for Earth's magnetic field investigations. In the COBS and nearby a variety of different instruments are installed: borehole seismometer; superconducting gravity meter GWR C025; absolute gravity meter FG5; GNSS permanent station of the European Permanent Network (EPN) of EUREF (operated by the Austrian Federal Office of Metrology and Surveying/BEV); meteorological sensors; and testbed for the Comprehensive Test Ban Treaty Organization ([CTBTO](http://www.ctbto.org)). More information can be obtained on the following web-sites: <http://www.zamg.ac.at/cms/en/news>; <http://www.bev.gv.at>; <http://www.oegk-geodesy.at/index.html> (reported by Norbert Höggerl).

### **Meeting at the Jordanian Adhering Body to IUGG**

The IUGG Secretary General Alik Ismail-Zadeh visited the Royal Jordanian Geographic Centre in Amman, the Adhering Body to IUGG, and met the Centre's President Brig. Gen. Dr. Awni Khasawneh, who is the President of the Jordan National Committee for IUGG, and other members of the Jordan National Committee. They discussed recent activities of the Union, and how IUGG can help the Jordan National Committee in promoting international scientific cooperation for peace in the Middle East region (reported by Alik Ismail-Zadeh).

### **Workshops organized by the Argentinian National Committee for IUGG**

Since 2013, the Argentinian National Committee for IUGG (CNUGGI) the National Geographical Institute (IGN) organized a series of seven workshops with free admission on topics of the Earth, sea and atmospheric sciences. The workshops addressed professionals, high school and university level teachers, and the public. Each workshop was welcomed by the Director of IGN and the CNUGGI President followed by the movie about the IUGG activities and presentations of talks on the theme of the workshop. Also a round table discussion on the selected themes was held generating interaction between the workshop speakers, special guests and the audience. All workshops were held in Buenos Aires at the IGN, except one, which was held in San Juan, Argentina. Each workshop was attended by more than 150 people. Seven workshops addressed the following topics: (1) Volcanic eruptions: Causes and consequences; (2) Causes of the La Plata River flooding in Buenos Aires; (3) Earthquakes in Argentina and some associated phenomena; (4) Los Andes in movement - Seismic risk; (5) Changes on continental glaciers and ice; (6) El Nino phenomenon: Past, present, and future; and (7) GPS and modern geodesy. The eighth workshop will be held in 2018, and the scientific topic of the workshop will be the ocean (reported by Corina Risso).

## **ASSOCIATION SCIENTIFIC ASSEMBLIES**

### **INTERNATIONAL SYMPOSIUM ON THE CRYOSPHERE IN A CHANGING CLIMATE**

The *2017 IACS Scientific Assembly* held 12-17 February 2017 was the first international symposium to bring together three leading international organizations for promoting cryospheric research; the International Association of Cryospheric Sciences (IACS), the International Glaciological Society (IGS), and World Climate Research Programme (WCRP) Climate and Cryosphere Project (CLiC). Conceived and planned for at least 5 years, this meeting attracted 227 participants from 27 countries. The symposium consisted of 114 oral presentations and 100 poster presentations keynoted by 7 distinguished speakers who gave plenary lectures at the beginning of each day. The symposium not only attracted leading scientists, but also Michael White, senior editor at *Nature*, and Bronwyn Wake, Chief Editor of *Nature Climate Change*.





*Delegates visiting the Waiarapa Fault, site of the 1855 M8 earthquake, during the mid-conference field trip (photo: courtesy of IACS)*

The meeting was held at Victoria University in New Zealand's capital city of Wellington. It began with a traditional Māori welcome known as a *mihi whakatau*. Professor Chris Rizos opened the Symposium on behalf of IUGG President Michael Sideris. IACS held open- and closed-business meetings during and immediately following the symposium. The symposium experience was replete with enjoyable and informative trips and chances to engage in informal discussion with delegates. Just prior to the start of the symposium there was a 2-day trip to Tongariro National Park. All of the delegates who took this excursion managed to complete the famous Tongariro Alpine Crossing, a demanding hike over the top of a volcano in the North Island. On Wednesday afternoon of the symposium, a mid-week excursion was arranged to visit the local geology as well as to sample the wines of one of New Zealand's prime vineyard districts. A post-symposium excursion in the South Island was arranged for some participants to visit Aoraki/Mt. Cook and to see its many glaciers. The IACS Presidency was transferred from Charles Fierz to Regine Hock at the IACS Annual Closed Bureau Meeting held in Christchurch after the Aoraki field trip.



*Three generations of the IACS leadership visiting Aoraki/Mt Cook National Park. From left to right Regine Hock (President, 2017-2021), Charles Fierz (President, 2013-2017), and Ian Allison (President, 2009-2013) (photo: courtesy of IACS)*

Andrew Mackintosh chaired the Local Organizing Committee in his role as IACS Secretary General. Ian Allison, IACS Vice President, chaired the Scientific Programme Committee, which included 13 scientists

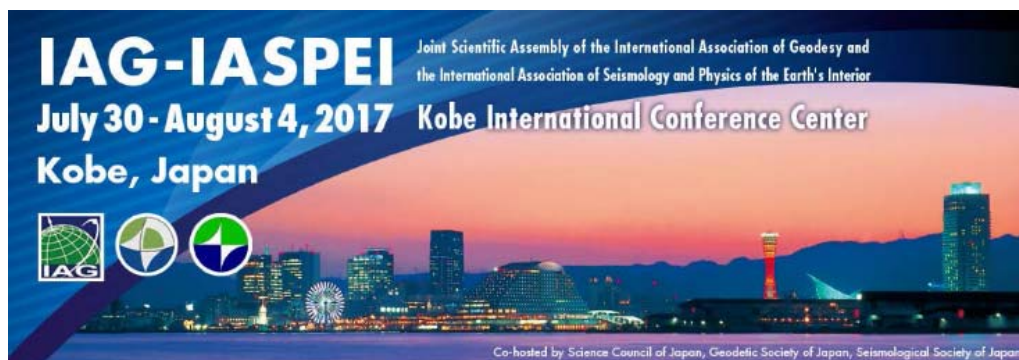
from 8 countries. Andrew wishes to thank his committee members, IACS colleagues, as well as Magnus Magnusson, IGS Secretary General, Doug MacAyeal IGS President (who co-wrote this article), and Gwénaëlle Hamon, Executive Officer of CLiC, for helping to organize a very successful symposium (reported by Andrew Macintosh and Douglas R. MacAyeal).

### IAHS SCIENTIFIC ASSEMBLY

The 10th Scientific Assembly of the International Association of Hydrological Scientists (IAHS) of IUGG was held in the Boardwalk Hotel Convention Center, Port Elizabeth, South Africa, from 10 to 14 July 2017. The assembly was organized by the South African National Committee of the IAHS (<http://cwrr.ukzn.ac.za/sanciahs>) together with Waternet (<http://www.waternetonline.org>), which is a southern Africa regional network of university departments and research and training institutes active in integrated water resources management.

The overall theme of the meeting was “Water and Development: Scientific Challenges in Addressing Societal Issues”; this theme is particularly appropriate in the context of an IAHS scientific assembly being held for the first time in sub-Saharan Africa, and is well aligned with the IAHS Panta Rhei decadal initiative. Pierre Hubert, IUGG Bureau Member, represented IUGG at the assembly on behalf of the IUGG President. The assembly garnered 223 participants from 42 countries including 40 participants from South Africa. 350 papers and posters were presented in the framework of two symposia (S1: Water security and the food-water-energy nexus: drivers, responses and feedbacks at local to global scales; and S2: Water quality and sediment transport issues in surface water) and 22 workshops. During the IAHS Plenary, Dan Rosbjerg (Denmark) and Zbyszek Kundzewicz (Poland) were respectively awarded the International Hydrological Prize Volker and the Dooge Medals (joint award by IAHS, UNESCO and WMO), and Mohammed Merheb (Lebanon) received the Tison Award (for the best young scientist publication). At the closing ceremony of the assembly, the President-Elect Günter Blöschl became President for the next four years, and Hubert Savenije became Immediate Past President. At the meeting of the new Bureau held on 15 July, Montpellier, France was chosen as the location of the next IAHS Scientific Assembly, 28 June - 2 July 2021 (reported by Pierre Hubert)

### IAG-IASPEI JOINT ASSEMBLY

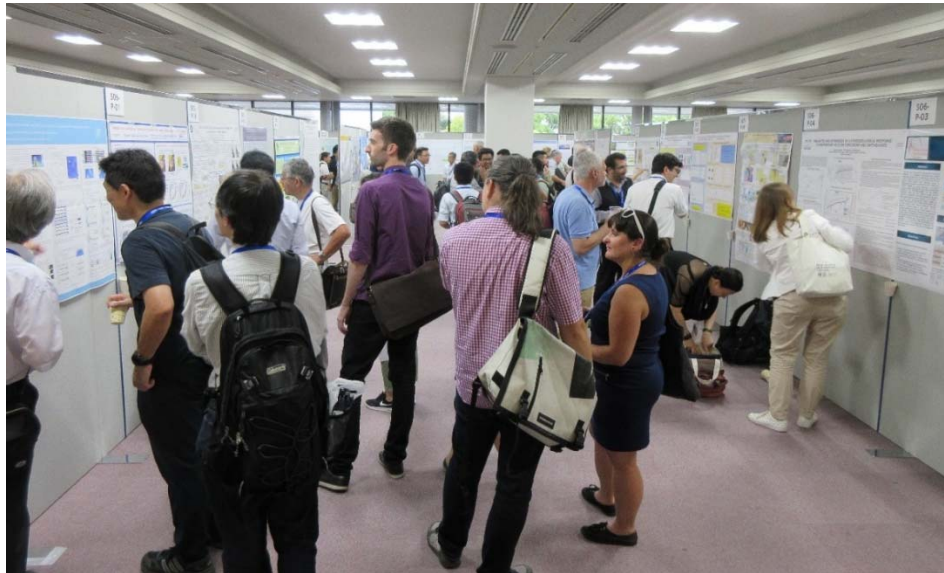


The first joint Scientific Assembly of the International Association of Geodesy (IAG) and the International Association of Seismology and Physics of the Earth’s Interior (IASPEI) was held at the Kobe International Conference Center in Kobe, Japan, from 30 July to 4 August 2017 (<http://www.iag-iaspei-2017.jp>) and was a great success. The scientific program included 43 symposia (7 IAG, 27 IASPEI and 9 Joint Symposia), and 1119 oral and poster presentations were given (IAG: 254; IASPEI: 564; Joint: 301). In particular, the nine Joint Symposia attracted many participants and had to be accommodated in two parallel sessions throughout the duration of the conference. The conference had 1107 registered participants from 65 different countries, 360 of those with preference for IAG and 747 for IASPEI. With this number of participants, the Kobe conference was, to our knowledge, the largest IASPEI Assembly ever, although with respect to IAG participants, it was typical in size.



*IAG-IASPEI joint ice-breaker (photo: K. Satake)*

The Assembly started with a well-attended ice-breaker on Sunday evening. During the joint Opening Ceremony on Monday, three invited plenary talks were delivered by: Kosuke Heki, who spoke about “Geodesy in Japan: Legends and highlights”, Barbara Romanowicz about “Imaging the Earth's deep interior using seismic waves in the age of high-performance computing”, and Manabu Hashimoto about “Evolution of earthquake science with space geodesy”. During the following IASPEI Opening Plenary, the third IASPEI Medal was awarded to Eric Robert Engdahl, and in the IAG Opening Plenary the Awards for best young authors in the Journal of Geodesy were presented to Xingxing Li (Germany) and Olga Didova (Netherlands).



*At the poster presentation area (photo: K. Satake)*

Due to the seismic area of the venue, the joint symposia included themes related to earthquakes and deformations:

- J01 Monitoring of the cryosphere;
- J02 Recent large and destructive earthquakes;
- J03 Deformation of the lithosphere: Integrating geodesy and seismology through modelling;
- J04 Geohazard early warning systems;
- J05 Crustal dynamics: Multidisciplinary approach to seismogenesis;

- J06 The spectrum of fault-zone deformation processes (from slow slip to earthquake);
- J07 Tracking the sea floor in motion;
- J08 Imaging and interpreting lithospheric structures using seismic and geodetic approaches;
- J09 Geodesy and seismology general contributions.

A perspective result of the joint Assembly was the new Inter-Association initiative between IAG and IASPEI to form a joint Sub-Commission on *Seismo-Geodesy*. The home of this new Sub-Commission within IAG will be the Commission 3 on Geodynamics and Earth Rotation, and in IASPEI it will be the Commission on Earthquake Source Mechanics – ESM (reported by Hermann Drewes, and Johannes Schweitzer).

#### IAPSO-IAMAS-IAGA JOINT ASSEMBLY



The IAPSO-IAMAS-IAGA Joint Assembly was held in Cape Town, South Africa, from 27 August to 1 September 2017. South Africa has a strong geographic advantage for conducting and directing research in the surrounding oceans (IAPSO) and atmosphere (IAMAS), the southern skies (IAGA) and as far south as Antarctica. Logistically, it is the closest African point to the South Pole and is a well-established gateway to Antarctica. Fundamental ongoing space physics research in South Africa includes the mechanisms of energy transfer across the upper atmosphere and the impact of space weather on modern electrical technologies. The surrounding oceans, atmosphere and the southern skies of Southern Africa provide excellent opportunities for raising public awareness and engaging with the future generation of earth-system scientists.

The IAPSO-IAMAS-IAGA Joint Assembly officially closed on Friday, 1 September 2017. The conference was a highly successful Joint Assembly organized at Cape Town's CTICC and the first of its kind between the three IUGG Associations. More than 1000 delegates from 54 countries participated in the Joint Assembly.

On 30 August, each Association hosted its Award Ceremony.

*IAGA Shen Kuo Award for Interdisciplinary Achievements to Jeffrey Forbes:* In recognition of Jeffrey Forbes' scientific achievements, including studies of the upper atmosphere environments of Earth, Mars, and other planets; coupling of these environments to lower altitudes and to solar variability; geomagnetic storm effects on satellite drag variability; the vertical propagation of tides and planetary waves in planetary atmospheres, and their electrodynamic and chemical effects.



*A truly African opening ceremony (photo: the IAMAS Secretary General Office)*

**IAGA Long Service Medal to Jean Rasson:** In recognition of Jean Rasson's efforts continuously dedicated to produce the highest quality geomagnetic field data in many observatories around the world and repeat stations, and his devoted work to make Dourbes observatory a center for absolute instrument and variometer development, comparison and testing.

**IAGA Young Scientist Award to Emma Douma, Katarzyna Dudzisz, and Federico Gasperini**

**IAMAS Early Career Scientist Medal to Corinne Hoose:** This medal is awarded to an early career scientist working in any area of atmospheric science, who has carried out excellent scientific research and has shown to have the potential to make a significant international contribution in the future



*Corinne Hoose receiving the Early Career award (photo: J. Turner and the IAMAS Secretary General Office)*

**IAPSO Prince Albert I Medal to Lynne Talley:** The Prince Albert I Medal is an award offered by the Foundation Rainier III of Monaco to a scientist who has made outstanding contributions to the enhancement and advancement of the physical and/or chemical sciences of the oceans. The Medal is awarded every two years to a most prominent scientist chosen by a specially appointed IAPSO Award Committee.



*Lynne Talley (left panel) and Jonathan Durgadoo (right panel) receiving their Awards (photo: C. Hildebrand)*

Lynne Talley has made outstanding scientific advances while contributing an exceptional level of service to ocean sciences spanning four decades of academic and professional excellence; including teaching in the Scripps educational programs, mentoring, and services. There are few who know the ocean as well as Lynne Talley, making her a most worthy recipient of the 2017 Prince Albert I Medal.

*IAPSO Eugene la Fond to Jonathan Durgadoo:* This medal is awarded to an early career scientist from a developing country who makes an outstanding presentation at scientific assemblies (reported by Isabelle Ansonge).

## **IUGG SYMPOSIUM ON PLANETARY SCIENCE**

Planetary science is an increasingly interdisciplinary field of research propelled forward by advances in space exploration and ground-based studies. Detailed characterization of planetary environments within and beyond our Solar System requires collaborative studies across the fields of geology, atmospheric science, geophysics, geodesy, seismology, aeronomy, planetary origins, chemistry and astrobiology.

The IUGG Union Commission on Planetary Sciences (UCPS) was established by decision of the IUGG Executive Committee in June 2015 to promote the advancement of scientific understanding of planetary science and exploration of the Solar System’s origin, formation and evolution including the search for life beyond Earth. The First IUGG Symposium on Planetary Science (IUGG-PS2017) “Interdisciplinary observation and understanding of the Solar System” organized and sponsored by UCPS, the International Association of Planetary Sciences (IAPS), and the German Aerospace Center (DLR) was successfully held from 3 to 5 July 2017 in Berlin, Germany. The IUGG-PS2017 brought together international experts, both scientists and engineers, who deal with interdisciplinary observations and Solar System analysis. The symposium had 11 sessions, and its topics included planetary geodesy, remote sensing, atmosphere, ionosphere/plasma physics, magnetic and gravity field, geomorphology, geophysics, geodynamics, geology, petrology, volcanology, geochemistry, interior physics, life & astrobiology. About 100 participants from 14 countries attended IUGG-PS2017 delivering 45 talks and presenting 25 posters. The IUGG-PS 2017 provided a very good platform for progress presentations and detailed discussion as well as communication. More information can be found at <http://www.dlr.de/iugg-ps2017> (reported by Shuanggen Jin).



*Symposium participants (photo: S. Jin)*

## SCIENTIFIC MEETINGS SELECTED FOR IUGG SUPPORT IN 2017

IUGG co-sponsors symposia and workshops appropriate to Union disciplines of study. IUGG allocated US\$15,000 to assist the following scientific meetings in 2017 supporting the participation of young and female scientists and scientists from developing countries (the IUGG Association that endorsed the meeting is indicated in brackets):

1. MagIC Workshop: Earth's Magnetic Field from the Beginning, La Jolla, CA, USA, 24-27 January (IAGA)
2. IndOOS Review Workshop, Perth, Australia, 30 January-1 February (IAPSO)
3. The Batsheva de Rothschild Workshop on the Atmospheric Global Electric Circuit, Mitzpe Ramon, Israel, 5-10 February (IAMAS)
4. Workshop on Processing of Cloud Particle Measurements, Oberpfaffenhofen, Germany, 7-9 July (IAMAS)
5. Past Antarctic Ice Sheet (PAIS) conference, Trieste, Italy, 10-15 September (IAPSO)
6. International School of Space Science. Advanced Course on Complexity and Turbulence in Space Plasmas, L'Aquila, Italy, 18-23 September (IAGA)
7. 8th Nordic Workshop - Paleography, Paleoclimate and the Geomagnetic Field, Hekla, Iceland, 30 September-7 October (IAGA)
8. Aerosol Training School as part of the Caribbean Aerosol-Health Network (CAHN), Camaguey, Cuba, 23-29 October (IAMAS), postponed
9. THEMES 2017, Venice, Italy, 29 November-1 December (IAPSO)

## REPORTS OF THE CO-SPONSORED EVENTS

### 2017 MagIC Workshop: Earth's Magnetic Field from the Beginning

The Magnetism Information Consortium (MagIC) held its third meeting in La Jolla, California from 24 to 27 January 2017 at the Scripps Institution of Oceanography, UCSD with over 70 participants. The MagIC group promotes information technology infrastructures for the international paleomagnetic, geomagnetic and rock magnetic community. Its main focus is the creation and hosting of an [online database](#) for archiving and searching Earth science related magnetic data sets and hosting a bi-annual meeting to bring together leading researchers and students. The meeting format consisted of two days of talks focusing on specific themes in research on Earth's magnetic field followed by two days of

hands-on workshops on how to use the MagIC database and other paleomagnetic and rock magnetic software systems. IUGG provided financial support to the workshop through IAGA thereby enabling the attendance of several of our international participants.

The 2017 MagIC workshop offered invited keynotes, short talks, and a poster session covering the evolution of the Earth's magnetic field. Day one was focused on magnetism of the early Earth. When did the geomagnetic field first form? How strong was it and how did it evolve over time? On day two the theme was on the more recent evolution of the Earth's geomagnetic field. How do sediments behave as recorders of the field? Sediments are critical for informing knowledge about geomagnetic field excursions and reversals but record the field in complex ways. Many of these talks were recorded and can be view on Magic's YouTube [channel](#).

On day three of the meeting, a smaller "Hands-on MagIC Data Upload Workshop" was held. This workshop was especially targeted to those who wanted to walk through the process of uploading and archiving data in the MagIC database (paper authors, researchers, senior graduate students, post-docs, lab managers, etc.). Presentations were made about the new online web service for uploading data and MagIC's new implementation of a simplified hierarchical data model for the database. In the afternoon an open session was convened where the attendees were encouraged to upload their own data with individual instruction available. The meeting concluded with a day-long workshop focusing on the PmagPy paleo and rock magnetic analysis software system. An overview of the software suite was given and then the conveners and workshop participants worked together in small groups on the codebase. Ad-hoc discussion groups were also held on the future of various PmagPy modules. More detail about the workshop can be found [online](#) (reported by MagIC Database Team Members [Nick Jarboe](#) and [Cathy Constable](#)).

### **IndOOS Review Workshop**

From 30 January to 1 February, the CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP) met for its 13th session in Perth, Australia. The main agenda item of the meeting was the Indian Ocean Observing System (IndOOS) Review Workshop, jointly organized with the Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER) panel. The workshop consisted of 24 review presentations along three themes: Past and present of IndOOS; new scientific drivers in the Indian Ocean; and new technologies for future IndOOS, as well as two discussion sessions charged with identifying the scientific drivers of IndOOS and their observing requirements. There were broad review talks on the essential science questions and societal needs for Indian Ocean observations on the first day of the workshop. On the second day, there were review talks on ten years of IndOOS and a look forward to the role of new technologies for the future of IndOOS. The last day of the workshop was dedicated to discussion sessions to outline the science drivers and observing requirements of IndOOS, to lead towards a framework for the IndOOS review white paper.

Important outcomes of the workshop were: a mission statement for IndOOS, terms of reference for the IndOOS Review and, most importantly, a list of scientific drivers and observational requirements for IndOOS. These science drivers will be used as a framework for the IndOOS review. One task of the subsequent white paper process is to further develop these requirements in terms of essential ocean variables, their spatial coverage and temporal/spatial resolution. A team of authors has been identified to write the IndOOS Review white paper, which is planned to be delivered by September 2017; and a panel review of the white paper is planned for February 2018, alongside the next IORP meeting. The IORP-13 was organized alongside annual meetings of IOGOOS-13, SIBER-7, and IRF-7, as well as the first Scientific Steering meeting of IIOE-2 and a Bio-Argo Workshop. More details of all these events can be found [here](#) (Reported by Lisa Beal, Nick D'Adamo, and Jing Li).





*Participants to the IndOOS Review Workshop (photo: IOC Perth Programme Office)*

### **The Batsheva de Rothschild Workshop on the Atmospheric Global Electric Circuit**

The workshop was held from 5 to 10 February 2017 in the remote Negev Desert in southern Israel and co-sponsored by IUGG and IAMAS. The workshop brought together fifty researchers and students from 16 countries to discuss the latest developments and directions in the field of fair weather Atmospheric Electricity. Since the time of Benjamin Franklin we know that, in fair-weather conditions, there is a quasi-static vertical electric field at sea level of  $\sim 150 \text{ V m}^{-1}$  pointing downwards to the Earth, associated with a conduction current density of  $\sim 2 \text{ pA m}^{-2}$  flowing continuously from the atmosphere to the ground. Much subsequent research has concluded that this electricity is generated, and modulated, by global thunderstorm activity. The thunderstorms act like huge batteries/generators of current in the atmosphere, driving electrical currents upwards towards the ionosphere above thundercloud tops in disturbed weather regions, with the return currents flowing in fair weather regions. This conceptual view is known as the atmospheric global electric circuit (GEC). In recent years, there has been a notable revival in fair-weather atmospheric electricity research because of the links found between atmospheric electricity and air pollution, radioactivity, cloud microphysics, dust outbreaks, climate change, biological processes and even space weather. Atmospheric electricity can be used as a sensitive diagnostic of changes in our environment, but may also have feedbacks on our environment itself. The vertical conduction current may impact the charging of cloud edges, influencing droplet interactions and possibly large-scale cloud properties themselves. Furthermore, new technologies are allowing us to expand the frontiers of atmospheric electricity research, using drones, balloons, and unmanned aerial vehicles for collecting data.

This workshop was divided into sessions dealing with *Processes and Generators in the GEC; Local Impacts on GEC parameters; New instrumentation for studying the GEC; and Numerical Modeling of the GEC*. In addition to the formal lectures and poster sessions, two evening discussions were held related to 1) developing uniform methodologies for data collection and analysis so that we can correctly compare and share data from widely-spaced locations around the globe, and 2) directions forward and future collaborations. Furthermore, two visits to the Atmospheric Electricity Observatories in Mitzpe Ramon and Mt. Hermon were organized for the workshop participants, including a balloon launch for measuring the cosmic-ray induced ionization profile above Israel. One key conclusion from the workshop was the need for the atmospheric science community to support the inclusion of affordable electric field meters on regular meteorological radiosondes launched every day by national Met Offices. Adding such small, cheap, disposable sensors will allow us to significantly advance our understanding of the GEC, its interaction with clouds, aerosols, cosmic rays and space

weather, while allowing us to monitor long term changes in the GEC, and hence long term changes in global thunderstorm activity. More information on the workshop can be found at the website <http://cgprice.wixsite.com/gec2017> (reported by Colin Price).

### Workshop on Processing of Cloud Particle Measurements



01 Regis DUPUY, Fr	07 Mengistu WOLDE, CA	13 Sorin VAJAIAC, RO	19 Max MAHN, US	25 Yvonne BOOSE, DE	30 Jonny Croisier, UK
02 Aaron BANSEMER, US	08 Stavros KEPPAS, UK	14 Victor PETROV, RU	20 Alexei KOROLEV, CA	26 Matt FREER, US	31 David Plummer, US
03 A. KIRCHGAESSER, UK	09 David DELENE, US	15 Valerian HAHN, DE	21 Pierre COUTRIS, FR	27 Jeff FRENCH, US	32 Greg McFARQUHAR, US
04 Graeme NOTT, UK	10 Thomas LACHLAN-COPE, UK	16 Larry OOLMAN, US	22 Mizanur RAHMAN, BD	28 Jea Min YEOM, KOR	33 Elisabeth OSTROM, GB
05 Tina JURKAT, DE	11 Marina SCHIMPF, UK	17 Max PORT, DE	23 C.G. DESHPANDE, IN	29 Joe FINLON, US	34 Darrel BAUMGARDNER, US
06 Nicolas GAPP, US	12 Junghwa LEE, DE	18 Christiane VOIGT, DE	24 Keshaw RAJHANS, IN		

Legend: **id number**, First name, FAMILY NAME, Country code (of work, not necessarily nationality)

Not shown: Colin GURGANUS, US, Alisia SADYKOVA, RU, Stefan KAUFMANN, DE, Jonas KLEINE, DE, Adam MAJEWSKI, US.

Photo: Voigt

Arrangement: Hans Volkert

*EUFAR/IAMAS/IUGG/ICCP workshop participants on 8 July 2017 at DLR, Oberpfaffenhofen, Germany*

The analysis of recent airborne campaigns shows differences in cloud products (e.g., size distributions, bulk cloud properties) resulting from different data analysis methods of imaging cloud probes. Hence experts and students from 26 institutions participated in the EUFAR/IAMAS/IUGG/ICCP Workshop on Processing of Cloud Particle Measurements at the German Aerospace Center (DLR) in Oberpfaffenhofen, Germany, to discuss, optimize and harmonize cloud data analysis in order to augment data quality of current optical array probes employed on aircrafts. 39 participants from 12 nations met from 7 to 9 July 2017 at the Institute for Physics of the Atmosphere to receive training on cloud probe software and to transfer knowledge on cloud probe data evaluation within the international cloud community. The workshop focused on data analysis of optical array cloud probes and hands-on training with the most commonly used software packages by students and early career scientists who will be working with cloud measurements in the future. By the close of the workshop, participants were proficient in manipulating, analyzing and graphing cloud data (reported by Christiane Voigt, Darrel Baumgardner, and Greg McFarquhar).

### Past Antarctic Ice Sheet Dynamics (PAIS) Conference

The PAIS Conference was held in Trieste, Italy, from 10 to 15 September 2017. It was organized by the Past Antarctic Ice Sheet Dynamics ([PAIS](#)) Programme of the ICSU Scientific Committee on Antarctic Research ([SCAR](#)), with financial support from several organizations including IUGG. There were 210 scientists and students from 18 countries attending the conference. More than half the participants were early career researchers and graduate students. There were 62 oral presentations in a single plenary session, which ensured cross-disciplinary participation and each day finished with a facilitated open plenary discussion, and 130 posters were up all week. The conference discussed the latest advances in the current state of Antarctic ice sheet and sea-level change, and identified the research gaps and future priorities for the next phase of the SCAR research programmes. Specific emphasis was placed on the research priorities of the Intergovernmental Panel on Climate Change (IPCC), Antarctic Treaty System (ATS), and the recent SCAR Horizon Scan. Keynote speakers highlighted new

multidisciplinary research directions related to the impact of Antarctic ice sheet and climate change on biological systems, on the global climate system and on sea-level change.



*A group photo of the conference participants (photo: L. De Santis)*

Steven Chown, SCAR President, discussed his vision for SCAR research to have more impact, both within the ATS and UN frameworks. Valerie Masson-Delmotte, Co-Chair of IPCC Working Group I, discussed how the SCAR community could contribute to the next assessment report. Chuck Kennicutt, leader of the SCAR Horizon Scan and the Council of Managers of National Antarctic Programs (COMNAP) road map processes, talked about how international logistics and operations could be aligned to address the big science questions. Several workshops were held during the Conference, and one of them was organized by the Association of Polar Early Career Scientists (APECS) on the use of social media to effectively communicate science to the wider public (<http://www.apecsitaly.it/social-media-and-science-communication>). Outreach side events, open to the public and media, with film shows, seminars, and educational activities for the secondary schools and high schools, were organized in collaboration with Museo dell' Antartide, the Italian branch of the International Ocean Discovery Program (IODP), APECS, Sissa media-lab, and scuola Roli Trieste. A [film about PAIS expeditions](#) was shown at the Conference, emphasizing the importance of collaborative efforts to address ambitious challenges. Rebecca Parker (University of Otago, Dunedin, New Zealand) and Rachel Bertram (Imperial College London, UK) were awarded the best student poster prizes. Editors of Nature Communications, Nature Geoscience, and Reviews of Geophysics attended the meeting. The outcome of the Conference will be a white paper that identifies the new strategic directions, as the basis for a future interdisciplinary SCAR research programme. More information on the conference can be found [here](#) (reported by Laura De Santis).

### **International Space Science School on “Complexity and Turbulence in Space Plasmas”**

The School on “Complexity and Turbulence in Space Plasmas” was held from 18 to 23 September 2017 in the International School of Space Science (ISSS) at the Gran Sasso Science Institute in L’Aquila, Italy. The School was oriented towards providing an extensive introduction to complexity and turbulence in space and astrophysical plasmas, covering different topics from kinetic processes, magnetohydrodynamics (MHD) and kinetic turbulence, and complexity on both theoretical and observational sides in view of current studies and space missions. The board of lecturers was composed of experts from research institutes and universities of several countries (Belgium, France, Italy,

Sweden, and US). The School was attended by more than 30 active students, post-docs, and young researchers from Argentina, Chile, China, Columbia, Czech Republic, India, Italy, Norway, Romania, Russia, and UK. Students could also present their work during the School. This allowed extensive discussion between participants and lecturers on the School's topics. The School was co-sponsored by IUGG. More information on the School can be downloaded [here \(pdf 234 KB\)](#) (reported by Umberto Villante).

### **The 8<sup>th</sup> Nordic Paleomagnetism Workshop “Paleogeography, Paleoclimate and the Geomagnetic Field”**

The 8th Nordic Paleomagnetism Workshop (NPW) was held in Leirubakki, Iceland, from 30 September to 7 October 2017, and co-sponsored by IUGG. It was the largest meeting to date bringing together 37 scientists from 14 countries with a variety of Earth Sciences backgrounds to work on the paleogeography, paleoclimate and paleomagnetism of the Phanerozoic and Precambrian, the Mesozoic geodynamo, and the Earth's magnetic field over the past 100,000 years. NPWs were initiated in 1986 with the aim of uniting Nordic scientists working in paleomagnetism to rigorously catalogue, evaluate and distribute a growing amount of paleomagnetic data, with the goal of tackling problems at the forefront of paleomagnetic research. Over the years the workshops have expanded to involve a number of international scientists, melding Nordic interests with those of the global community. The workshop also brought together young scientists and established leaders in the field, to work together in small groups to address well-defined scientific problems and produce tangible results. Presentations spanned topics such as updates to global paleomagnetic and geological databases, plate tectonic reconstructions, geomagnetic field modelling, and the relevance of numerical dynamo simulations to understanding the long-term evolution of Earth's magnetic field. More information is available at the [workshop web page](#) (reported by Maxwell Brown).

### **CODATA 2017 Conference “Global Challenges and Data-Driven Science”**

The CODATA 2017 Conference 'Global Challenges and Data-Driven Science' was held in Saint Petersburg, Russia, from 8 to 13 October 2017. This event brought together more than 150 research scientists and recognized experts in the field of data from 35 countries of the world, including France, Germany, Switzerland, Great Britain, USA, Canada, China, Russia, Japan, India, South Africa, Nigeria and others. The wide geographical coverage represented by the participants testifies to the scientific significance and high level of the conference. The conference covered a wide range of issues related to data science, including the collection and processing of large amounts of data, the use of methods of system analysis, machine learning and algorithms for artificial intelligence. Over 160 presentations at 25 scientific sessions, several business meetings and workshops took place during the conference. IUGG co-sponsored the Conference and the IUGG Union Commission on Data and Information (UCDI) organized a session at the Conference entitled: “Modern Strategies for Data Collection and Analysis for the Better Understanding of the Earth System” (lead convener: A. Soloviev, Vice Chair of the UCDI). The IUGG Secretary-General Alik Ismail-Zadeh and Bureau Member Isabelle Ansorge participated in the Conference (reported by Alik Ismail-Zadeh).



## THEMES 2017 workshop

The workshop “THEMES 2017 - Physics and biogeochemistry of marine environments: multiscale analysis of past and present variability” took place in the Ca’Foscari palace of the University Ca’Foscari of Venice, Italy, 15-17 November 2017. The workshop brought together more than 50 (including 20 female) climatologists, ecologists, oceanographers, and modelers from eight countries to discuss the present state of knowledge and the opportunities for progress about measuring, modelling and predicting marine environments. The workshop entailed nine sessions and a total of 52 talks, including four solicited talks by prominent international scientists including Werner Alpers (University of Hamburg, Germany), Sandro Carniel (CNR-ISMAR, Venice, Italy), Giuseppe Civitarese (OGS-Trieste, Italy), and Georg Umgiesser (CNR-ISMAR, Venice, Italy). Two evening discussion sessions and a closing open discussion paved the way toward improved cooperation between the different groups active in the climatological, ecological and oceanographic investigation of our planet. The workshop was co-sponsored by IUGG and IAPSO. More information on the workshop can be found [here](#) (reported by Angelo Rubino).



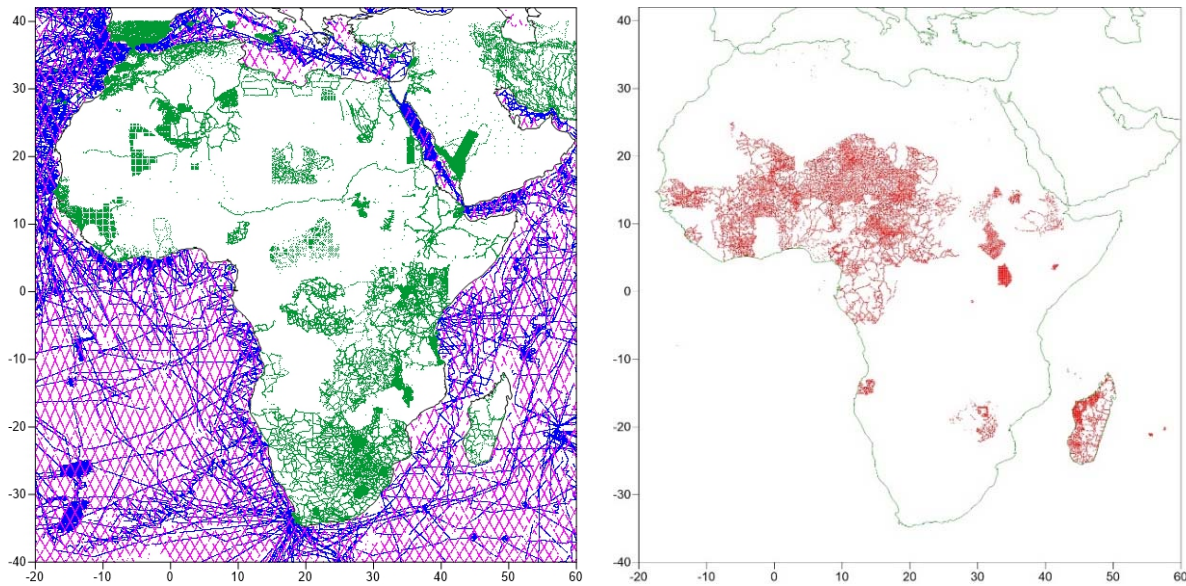
At the THEMES 2017 workshop (photo: Angelo Rubino)

## IUGG project “Determination of the Earth’s mathematical surface in Africa towards the realization of the International Height Reference System”

This report summarizes the main activities and achievements of the project “Determination of the Earth’s mathematical surface in Africa towards the realization of the International Height Reference System (IHRIS)” sponsored by IUGG. The grant ran in the period 2016–2017. The lead applicant was the International Association of Geodesy (IAG), and the supporting applicant was the International Association of Seismology and Physics of the Earth’s Interior (IASPEI). Principal Investigators of the project were Hussein Abd-Elmotaal of the Minia University, Egypt, an IAG representative, and Rashad Kebeasy of the National Research Institute of Astronomy and Geophysics, Egypt, an IASPEI representative.

*Collecting Gravity Data.* This task represented the core of the project. It was a difficult task as most institutions are reluctant to release their gravity data. The figure on the left shows the land, shipborne and altimetry derived gravity anomaly data available before the project started (Abd-Elmotaal et al., 2015). In 2016, a new dataset on land became available from the Bureau Gravimétrique International (thanks to Sylvain Bonvalot). This new data set is illustrated in the figure on the right, whose locations are mainly in the very large data gaps of the previously available dataset. The new data set consists of 33971 gravity data points, with little overlap between the old and the new data sets on land. The free-air gravity anomalies for the new data set range between -148.4 mGal and 453.6 mGal with an average of about 4.9 mGal and a standard deviation of 28.3 mGal. As illustrated, the current gravity database for Africa still contains significantly large data gaps. These large data gaps affect the interpolation precision of the reduced gravity anomalies needed for the determination of the Earth’s mathematical

surface for Africa. Hence, an interpolation technique that can be used for a gravity interpolation within large data gaps has been developed (Abd-Elmotaal and Kühtreiber, 2017).



Gravity anomaly data available before the project (left) and additional data set provided by BGI in 2016 (right)

*Detailed digital terrain model for Africa.* A fine digital terrain model (DTM) for Africa and the surrounding region covering the window ( $42^{\circ}\text{S} \leq \phi \leq 44^{\circ}\text{N}$ ;  $22^{\circ}\text{W} \leq \lambda \leq 62^{\circ}\text{E}$ ) using the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (GDEM) at a  $3'' \times 3''$  resolution (which corresponds to roughly 90 m resolution on the Earth's surface) has been created (Abd-Elmotaal et al., 2017). The ASTER-GDEM model, which is available only on land, has been smoothed from its original  $1'' \times 1''$  resolution to  $3'' \times 3''$  resolution using the block average operator technique employing special characteristics at the coastal borders. The  $30'' \times 30''$  Global Bathymetry and Elevation Data at 30 Arc Seconds Resolution (SRTM30+) has been used, after being interpolated to  $3'' \times 3''$  grid size, to fill-in the missing sea regions of the ASTER-GDEM model.

*Gravity Database of Africa.* The currently available land, shipborne, and altimetry-derived gravity datasets consist of 154037, 971945, and 119249 gravity data points, respectively. The land data have been filtered on a  $1' \times 1'$  grid (i.e., in each cell of  $1' \times 1'$ , only one data point, the closest to the cell-center, has been selected), and the number of land data after the grid filtering became 127067 points. The shipborne data have been filtered on a  $3' \times 3'$  grid, and the number of shipborne data after the grid filtering became 148858 points. The altimetry-derived data have been filtered on a  $3' \times 3'$  grid, and the number of altimetry-derived data after the grid filtering became 70732 points. A smart gross-error detection scheme carried out on the land, shipborne, and altimetry-derived datasets (Abd-Elmotaal and Kühtreiber, 2014) reduced the number of land data to 126202, 148674, and 70589 points, respectively (reported by Hussein A. Abd-Elmotaal, Project PI).

## References

Abd-Elmotaal, H. and Kühtreiber, N. (2014) Automated Gross Error Detection Technique Applied to the Gravity Database of Africa. General Assembly of the European Geosciences Union (EGU), Vienna, Austria, April 27 – May 2, 2014.

Abd-Elmotaal, H. and Kühtreiber, N. (2017) Optimum Gravity Interpolation Technique for Large Data Gaps: Case Study for Africa. General Assembly of the European Geosciences Union (EGU), Vienna, Austria, April 23 – 28, 2017.

Abd-Elmotaal, H., Seitz, K., Kühnreiber, N. and Heck, B. (2015) Establishment of the Gravity Database AFRGDB\_V1.0 for the African Geoid. International Association of Geodesy Symposia Journal, Vol. 144, 131–138, DOI: 10.1007/1345\_2015\_51.

Abd-Elmotaal, H., Makhloof, A., Abd-Elbaky, M. and Ashry, M. (2017) The African 3" × 3" DTM and its Validation. International Association of Geodesy Symposia Journal, DOI: 10.1007/1345\_2017\_19.

### **IUGG Special Publication Series**

A new book of the series "*Global Change and Future Earth*" will be published by the Cambridge University Press in August 2018. The book have been edited by Tom Beer, Jianping Li, and Keith Alverson. Global Change and Future Earth is derived from the work of IUGG several programs. It demonstrates how multi- and inter-disciplinary research outputs from the geoscience community can be applied to tackle the physical and societal impacts of climate change and contribute to the Future Earth programme of the International Council for Science. The volume brings together an international team of eminent researchers to provide authoritative reviews on the wide-ranging ramifications of climate change spanning eight key themes: Planetary Issues; Geodetic Issues; the Earth's Fluid Environment; Regions of the Earth; Urban Environments; Food Security; Risk, Safety and Security; and Climate Change and Global Change. Covering the challenges faced by urban and rural areas, and in both developed and developing counties, this volume provides an important resource for a global audience of graduate students and researchers from a broad range of disciplines, as well as policy advisors and practitioners.

## GEOSCIENCE EDUCATION

### IUGG grants to support geoscience education events in 2017

IUGG awarded six grants (US\$15,000 in total) to support workshops and training schools organized by the Abdus Salam International Centre for Theoretical Physics (ICTP) in 2017 as recommended by the IUGG Committee on Capacity Building and Education and in accordance with the Memorandum of Understanding between IUGG and ICTP signed in 2015. The list of the events co-sponsored by IUGG is as follows:

1. Conference on the Science of Climate Change: a Focus on Central America and the Caribbean Islands, Antigua, Guatemala, 15 - 17 March
2. Extended Workshop on Space Weather Effects on GNSS Operations, Trieste, Italy, 22 May - 2 June
3. Fourth Workshop on Water Resources in Developing Countries: Hydroclimate Modeling and Analysis Tools, Trieste, Italy, 12 - 23 June
4. School on Subseasonal to Seasonal Weather and Climate Prediction, Kigali, Rwanda, 4 - 8 September
5. Workshop-Conference on Near-Fault Observations and Models for Earthquake Hazard Assessment, Trieste, Italy, 10 - 13 October
6. Workshop on Earthquake and Tsunami Hazards in Vietnam and Surroundings from Theory to Applications, Hanoi, Vietnam, December.

Founded in 1964 by the late Nobel Laureate Abdus Salam and co-sponsored by UNESCO, IAEA, and the Italian government, the Abdus Salam International Centre for Theoretical Physics - [ICTP](#) seeks to accomplish its mandate by providing scientists from developing countries with the continuing education and skills that they need to enjoy long and productive careers. ICTP has been a major force in stemming the scientific brain drain from the developing world. The impact of ICTP extends well beyond the Centre's facilities to virtually every corner of the Earth. The Earth System Physics (ESP) Section of ICTP studies a wide spectrum of the Earth system, from its fluid components (oceans and the atmosphere) to the planet's interior.

### Report on the co-sponsored education events in 2016

IUGG and the Abdus Salam International Centre for Theoretical Physics (ICTP) continued cooperation in geosciences education. In 2016, IUGG co-sponsored six workshops and schools organized by ICTP and held in Brazil, Costa Rica, India, and Italy. Below are brief reports on the events.

#### ***Advanced School on Regional Climate Modeling over South America (15 - 19 February 2016, São Paulo, Brazil)***

The Advanced school included lectures and extensive hands-on sessions on the theory of regional climate modeling and regional climate change while providing a background on regional climate modeling studies focused on the South America (SA) region. One of the main motivations for developing Regional Climate Models (RCMs) was the need to produce climate information at the regional level to assess the impacts of climate change. The ICTP regional climate modeling system, RegCM, is one of the most used RCMs worldwide. Its latest version, RegCM4, has been augmented in several aspects, in particular, towards the application of the model to very high resolution simulations permitting convection. Among the main model improvements in this direction are the implementation of non-hydrostatic dynamics, the refinement of an advanced explicit cloud microphysics scheme and the full coupling with the [MIT general circulation model](#), the CHYM hydrological model (developed by Cetemps Center of Excellence at the University of L'Aquila), and the [CLM4.5 land-surface model](#) including interactive vegetation and an augmented version of a chemistry/aerosol module. The SA



region is affected by local climate feedbacks as well as large scale climate patterns, for example associated with Sea Surface Temperature (SST) anomalies, and RegCM4 has been shown to reproduce adequately SA climate and its variability.



*Participants of the Advanced School on Regional Climate Modeling over South America, 15 - 19 February 2016, São Paulo, Brazil*

The main purpose of the school was to make the participants aware of the available climate data, and to train them to analyze and downscale these data to an adequate resolution to reproduce phenomena of interest. IUGG funds supported participation of young scientists from Peru, Argentina (female), and Uruguay (female). For more information on the school, please visit the [website](#).

***Workshop on the Theory and Use of Regional Climate Models (23 May - 3 June 2016, ICTP, Trieste, Italy)***

The Workshop provided lectures and extensive hands-on sessions on the theory of regional climate change and regional climate modeling as well as on the use of the RegCM4 modeling system. The focus of the workshop was on the application of the RegCM4 to high resolution experiments, in particular within the framework of the CORDEX project (COordinated Regional Downscaling EXperiment) of the World Climate Research Programme (WCRP). During the workshop, the new features of the model were described and tested, and a new version of the model was released. In addition, the contribution of the RegCM community to the next phase of the CORDEX program was discussed. The workshop included a special session on the interactions between air quality, climate processes and climate change in diverse region of the world under the framework of the EU REQUA (Regional climate-air quality interactions) project. The workshop aimed at providing a forum for current and future model users to discuss relevant issues and formulate needs and priorities for further model development and dissemination.

IUGG funds supported participation of four scientists from Burkina Faso (young scientist), Ghana (female scientist), Phillipines (female young scientist), and Vietnam (female young scientist). For more information on the workshop, please visit the [website](#).



*Participants of the Workshop on the Theory and Use of Regional Climate Models, 23 May - 3 June 2016, ICTP, Trieste, Italy*

***Summer School on Aerosol-Cloud Interactions (27 June - 1 July 2016, ICTP, Trieste, Italy)***

Aerosol-cloud radiative, microphysical and dynamical interactions are a key determinant of the weather and climate. As reported by the Intergovernmental Panel on Climate Change (IPCC), these processes represent a major source of uncertainty for climate models. Aerosol-cloud interactions represent an active and fast moving research field. The Summer School consisted of basic and advanced lectures on the current knowledge of aerosol-cloud interactions physics and the representation of these processes in atmospheric models. About 50 international participants (including lecturers and local visitors) attended the school. During the first part of the school, basic lectures were given on warm and cold cloud microphysics, cloud condensation and ice nuclei activation as well as aerosol dynamical and microphysical processes. Lectures extended from basic thermodynamics knowledge at the aerosol and cloud droplet scale to more advanced processes dealing with populations of aerosol and droplets. This introduced the theoretical background on which state-of-the-art atmospheric models rely. In parallel, practical and theoretical introductions to the hand-on lab sessions based on the EULAG model (a simplified framework for studying cloud microphysics and dynamics) were also run.



*Participants of the Summer School on Aerosol-Cloud Interactions, 27 June - 1 July 2016, ICTP, Trieste, Italy*

During the second part of the school, examples of research including cloud to global scale studies were presented by diverse lecturers. Parameterizations of different complexity currently used in different modeling systems were introduced and discussed. Available web resources, useful for cloud studies (e.g., satellite observations) in general and modeling in particular were also presented. This made a very good introduction to the CFMIP international conference on cloud and climate that took place at ICTP during the week following the school, which all the selected participants attended. During the practical sessions, participants could also explore the sensitivity of a model to assumptions made, and critical parameters. Overall, there was a very positive atmosphere during the school. Many interactive discussions took place during the scientific presentations, lab sessions and coffee breaks thanks to very motivated participants and the availability of invited lecturers. For more information on the school, please visit the [website](#).

***Advanced School on Earth System Modelling for Climate Change and Regional Impacts over South Asia (18 – 29 July 2016, Pune, India)***

The school attracted climate modelers and 41 students and young scientists from several countries including Brazil, India, Iran, Kenya, Korea, Madagascar, Sri Lanka, and Tanzania. The school focused on the Indian Ocean and Monsoon dynamics and prediction. The training school was thus aimed at Ph.D. students, post-docs and early career scientists from research institutes and universities from the Indian Ocean rim countries. The school covered many topics of Earth system modeling from the ocean and atmosphere systems to land and ocean biogeochemistry. The newly developed IITM Earth System Model ([IITM-ESM](#)) was central to the school and was used for practical sessions. The model contributes to the next Intergovernmental Panel on Climate Change Assessment Report 6 (IPCC AR6) simulations. The ocean component of the IITM-ESM is the GFDL Modular Ocean Model ([MOM](#)). The activity was based on lectures from world experts in Earth system modeling from Brazil, India, Italy, UK, and USA. The school was organized in daily morning sessions with key lectures divided into two main streams (Part A: Fundamentals and Part B: Applications), and daily afternoon sessions devoted to practical training with the IITM-ESM (Part C: Hands-on sessions). Practical sessions were the backbone of the school, with hands-on training in the use of the IITM Earth System Model. The students were guided through the necessary steps for setting up a simulation, from generating the input fields to choosing the appropriate physical settings, to finally analyzing and post-processing the data. The IUGG grant allowed students from Kenya, Madagascar, Sri Lanka, and Tanzania to attend. For more information on the school, please visit the [website](#).

***School on Recent Advances in Analysis of Multivariate Ecological Data: Theory and Practice (24-28 October 2016, ICTP, Trieste, Italy)***

The school aimed to provide the theoretical and practical knowledge needed to perform advanced analysis of physical, environmental and ecological data. Ecosystems are facing cumulative impacts from a variety of stressors (e.g., pollution, climate change, exploitation of natural resources, invasive species) that can potentially alter their state and functionality, and possibly adversely impact both, human health and nature's own capability to provide goods and services. To tackle these challenges, a large number of institutional monitoring programs and research projects have been launched, so that the amount of available experimental information is steadily increasing. However, there is still a substantial lack of capability to use advanced quantitative methods to analyze these data and to plan more efficient data collection for the future. A proper analysis of the data requires an understanding of the theoretical assumptions used in the analysis to guide the choice of proper methodologies. Moreover, practical skills are needed to fully exploit the possibilities of appropriate data analysis software.



*Participants of the School on Recent Advances in Analysis of Multivariate Ecological Data: Theory and Practice, 24-28 October 2016, ICTP, Trieste, Italy*

The School was attended by 61 people from 21 countries. Morning lecture sessions were followed by practical training in the afternoons using an open-source, integrated suite of software facilities for data manipulation, calculation, and graphical representation. The atmosphere during the School was excellent, with participants actively involved during lectures and training, collaborating on their practical work and exchanging experiences. All the speakers were very satisfied with the level of progress achieved by the participants during the school. The IUGG funds were used to support travel of three researchers from Cuba, India, and Nepal. For more information on the School, please visit the website: <http://indico.ictp.it/event/7617>.

***Second Workshop on Climate Change, Variability, and Modeling over Central America and Mexico (14 - 18 November 2016, San Jose, Costa Rica)***

Central America and Mexico are regions vulnerable to extreme climatic events that cause socio-economical disasters as well as disasters due to natural events. These regions have also been highlighted as some of the most vulnerable to climate change. Recent research within the WCRP-CORDEX project framework focused over Central America has shown that the use of regional climate models (RCMs) allows for a better representation of local climate features and meso-scale phenomena (for example, tropical cyclones) when compared with coarser resolution of global models. Therefore, RCMs can be valuable tools to study climate change over the region. The main purpose of the workshop was to provide extensive sessions focused on the analysis of climate variability and climatic change over Central America and on the use of the RCMs (and specifically the ICTP model RegCM4) as a tool for studies of climate-related phenomena at high resolution. This workshop included theoretical lectures on climate variability and change over Central America and Mexico, along with tutorial sessions on the use of the RegCM4 model over the region. An important aim for this workshop was to strengthen the community of users of the RegCM4 model in Mexico and Central America. A limited number of participants were selected, with proven experience in handling climate data and running climate models (in particular, RCMs), and with an interest in using the RegCM4 as a tool for regional climate studies. IUGG funds supported participation of three students and a post-doc from Colombia (young female student), Jamaica (postdoctoral researcher and female student), and Mexico (female student). For more information on the workshop, please visit the website: <http://indico.ictp.it/event/7621>.

## IUGG IN THE INTERNATIONAL COUNCIL FOR SCIENCE (ICSU)

### *ICSU & ISSC strategy workshop on the future of science*

*An ICSU Perspective.* The International Council for Science (ICSU) and the International Social Science Council (ISSC) hosted a high-level meeting of scientists and experts in Paris on 30 and 31 January 2017 to discuss the future of a proposed new organization that would result from a merger of the ISSC and ICSU. The workshop kicked off with a high-level panel discussion on “Setting the challenge: the future for global science.” The panel consisted of Craig Calhoun (President of the Berggruen Institute, Los Angeles, USA), Philip Campbell (Editor-in-Chief, Nature, London, UK), Robert Dijkgraaf (Director of the Institute for Advanced Study at Princeton, USA), Nada Al-Nashif (Assistant Director-General for Social and Human Sciences at UNESCO, Paris, France), Helga Nowotny (Professor Emerita of Social Studies of Science, ETH Zurich, Switzerland), and Flavia Schlegel (Assistant Director-General for Natural Sciences at UNESCO Paris, France). The workshop was moderated by Andy Martin, Firetail Company (London, UK). There were about 25 participants including officers of the two Councils. Harsh Gupta (IUGG Immediate Past President) was invited to attend the workshop.

Major issues discussed were the future of science, and important priorities for a new council. It was mentioned that fundamental research remains critical in the work of the new council; inter- and trans-disciplinary co-productive research should become more focused bringing together natural and social scientists. However, bridging them is a great challenge, because of the existence of diverse incentives and methodological standards. The new council should construct new ways for cooperation, should avoid covering an expansive scientific terrain shallowly and concentrate its efforts on the promotion of more focused research. The new council would be well positioned to be engaged in monitoring of Sustainable Development Goals’ (SDGs) progress. There was debate around the importance of the UN’s Agenda 2030 on sustainable development as a “signature” program, as well as the challenge of tackling new topics such as artificial intelligence. Other important priorities could be scientific standards, ethics, and openness (particularly data openness). According to Thomas Rosswall (a former Executive Director of the ICSU), an advocacy role for the council is needed, “but it needs to demonstrate impact”. Participants saw a role for the new council in upholding the universality of science and freedom of scientific exchange (Source: ICSU website).

*An IUGG Perspective.* ICSU or a new body to come will face several challenges. First, the majority of active scientists do not know what ICSU or ISSC stands for and what the Councils are doing for science promotion. One of the major priorities of the new body should be high visibility in the world of scientists. This new Council should work for scientists via its scientific unions and national academies/research councils and for science policy via UN agencies. Second, scientists, especially early-career scientists, belong to their professional societies and participate in the activities of these societies. Usually, they are less interested in promoting international science. Third, presently, there are many international bodies<sup>2</sup> and inter-governmental institutions<sup>3</sup> dealing with various aspects of scientific and technological development. What would be the unique role of the new Council for science? Should it become a stronger voice for international science? These and many other challenges including those mentioned above should be carefully considered by the ICSU-ISSC Strategy Working

---

<sup>2</sup> Examples: the Council for International Organizations of Medical Sciences – CIOMS; the International Council for Philosophy and Human Sciences – CIPSH; the Global Network of Science Academies – IAP; the World Academy of Sciences – TWAS; the *World Federation of Engineering Organizations* – WFEO

<sup>3</sup> Examples: the Preparatory Commission for Comprehensive Nuclear-Test-Ban Treaty Organization – CTBTO; the Group on Earth Observations – GEO; the International Atomic Energy Agency – IAEA; the United Nations Educational, Scientific and Cultural Organization – UNESCO; the World Health Organization – WHO; the World Meteorological Organization – WMO

Group, which intends to prepare the strategy document to become the official strategy for the new merged organization (Alik Ismail-Zadeh, IUGG Secretary General)

### **ICSU General Assembly**

On 26 October 2017 at the joint general assembly of the International Council for Science (ICSU) and the International Social Science Council (ISSC) members of both world's leading scientific councils agreed to merge and create a new organization to be named "International Science Council". The new council will provide a stronger foundation for advancing science across the disciplinary spectrum and in all parts of the world, and promote its vital role in shaping humanity's future on planet Earth. It brings together the current members of ICSU and ISSC, including 40 international scientific unions and associations, and more than 140 national and regional organizations such as academies and research councils. The organization will be launched at a founding General Assembly to be held in Paris, France in 2018. Its mission will be to serve as the global voice of science, providing leadership in catalyzing, incubating and coordinating international action on issues of major public concern. The final vote count in favor of the merger was 97.6% (ICSU) and 90% (ISSC). It came at the end of four days of intensive discussions on issues ranging from the new strategy, statutes and governance arrangements and the legal framework. Gordon McBean, ICSU President and IUGG Fellow, said: "ICSU has been a pioneer in the 20th century for interdisciplinary science programs and policy impact. I am immensely proud that our members have voted to endorse this historic merger which carves out a new space for our proud historic legacy - to be the global voice of all sciences in a digitally connected world." Alberto Martinelli, ISSC President, said: "This vote comes at a crucial moment for science. Now more than ever before, a powerful and credible voice is needed to advocate the value and values of all science to society. The challenge of living sustainably and equitably in a rapidly changing world means that the need for scientific understanding has never been greater. The unified science council will champion all the sciences and their role in responding to today's global challenges." (Source: Press Release of ICSU and ISSC). IUGG President Michael Sideris and Secretary General Alik Ismail-Zadeh attended the ICSU General Assembly and took part in the joint ICSU-ISSC General Assembly.



*Participants of the ICSU-ISSC joint general assembly (photo: ICSU)*

### **GeoUnions**

The GeoUnions (GUs) is a network of representatives of the international scientific unions of the International Council for Sciences (ICSU) dealing with Earth and space sciences. The GUs established a Steering Committee in 2004 (in Paris, France) to promote the sciences worldwide, to communicate and

to coordinates scientific activities of individual unions, and to speak on behalf of GUs members to ICSU Executive Board, ICSU Members and its interdisciplinary bodies and at international level, especially to the United Nations organizations and other global stakeholders. The current Members of the GUs are:

- the International Astronomical Union (IAU),
- the International Cartographical Association (ICA),
- the International Geographical Union (IGU),
- the International Union for Quaternary Research (INQUA),
- the International Society for Photogrammetry and Remote Sensing (ISPRS),
- the International Union of Geodesy and Geophysics (IUGG),
- the International Union of Geological Sciences (IUGS),
- the International Union of Soil Sciences (IUSS), and
- the International Union of Radio Science (URSI).

More information on GeoUnions can be found at: <http://www.icsu-geounions.org>

### GeoUnions meeting in Potsdam

The GeoUnions network was formed in Paris, France, in 2004 with the aim to promote Earth and space sciences worldwide, to communicate and coordinate scientific activities of its individual unions, to enhance their operations based on the knowledge about and experiences of other unions, and to speak on behalf of Geounions to ICSU, UN organizations, and other global stakeholders (<http://www.icsu-geounions.org>).



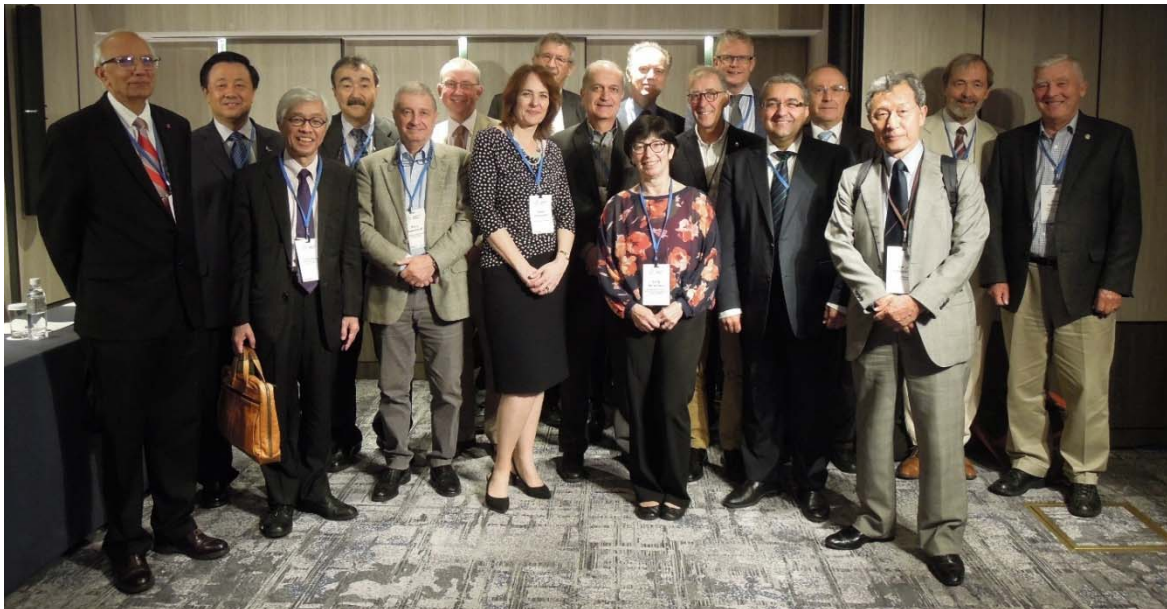
*Meeting participants from left to right: Franz Kuglitsch (IUGG), Menno-Jan Kraak (ICA), Alik Ismail-Zadeh (IUGG), Michael Sideris (IUGG), Paul Cannon (URSI), William Cavazza (IUGS), Orhan Altan (ICSU), Lena Halounova (ISPRS), Allan Ashworth (INQUA), Reinhard Hüttl (GFZ Scientific Executive Director), and Rainer Horn (IUSS)*

The Steering Committee of the nine International Geoscience Unions (GeoUnions) of the International Council for Science (ICSU) met on 1 September 2017 at the GFZ Potsdam, Germany. Chaired by the IUGG Secretary General, Alik Ismail-Zadeh, the officers of GeoUnions discussed important issues related to a possible merger of ICSU and the International Social Science Council (ISSC). The agenda included topics related to advancing science as a global public good and to the 32nd ICSU General

Assembly and Joint Meeting of the ICSU and ISSC membership to be held in Taipei, ROC, in October 2017.

### GeoUnions meeting in Taipei

The [GeoUnions](#) of ICSU met in Taipei, Republic of China, on 21 October 2017 to discuss the possible merger of ICSU and ISSC and future relationships with the (new) council. The meeting was chaired by Alik Ismail-Zadeh, Chair of the GeoUnions Steering Committee. The representatives of the GeoUnions attending the meeting agreed to make the following joint statement at the ICSU General Assembly: “The GeoUnions, an interdisciplinary consortium of nine ICSU International Scientific Unions, belonging to the Earth and Space Science Unions cluster, Physics/Chemistry/Mathematics Unions cluster, and the Social Science cluster, make the following statement. Considering the importance of the unified voice of science and challenging problems which society faces, the GeoUnions is in favor of the merger of two Councils: the International Council for Science and the International Social Science Council, and considers that the new title of the council should be the “International Science Council”. The GeoUnions call on the other Scientific Unions and National Members to vote in favor of the merger.



*GeoUnions representatives together with the ICSU Executive Director Heide Hackmann (in the center) (photo: O. Altan)*

Meanwhile, the GeoUnions consider that the merger provides possibilities for strengthening the cooperation between the Scientific Unions/Associations, National Members and interdisciplinary bodies.

- There has been a trend over the last few decades for ICSU to progressively distance itself from its member Unions. The merger provides an opportunity to reset this. ICSU and the new Council is largely underpinned by the expertise of its component Unions and Associations and this expertise should be better used. One way to do that is to ensure that the Council provides financial and logistic support to the Unions to enable them to reciprocally support the Council.
- The role of the international Scientific Unions/Associations should not be restricted to paragraph 5.4 “An engaged membership” within the document JM5 “Advancing science as a global public good”, but considered more broadly. For example, representatives of both Scientific Unions clusters and National Members (representing different regions) should be a part of the new Council Governing Board either as elected members of the



Board or as coopted Members. The Unions and National Members should feel that they are part of the Council and not passive observers.

- An annual increase in Union and National Member dues of 2% to ICSU has been proposed and approved. This is higher than the annual increase in the dues, which some Unions feel able to request from their National Members. This creates downward pressure on Union activities, activities which underpin ICSU. This inconsistency makes no sense, and the GeoUnions propose that the creation of a new Council is an ideal opportunity to rationalize this issue by informally linking the ICSU inflation rates to the inflation that the Unions impose on the adhering national bodies.
- The GeoUnions were disappointed to see that the ICSU flagship program reports make either no, or only passing, reference to Union activities in the same fields. The GeoUnions request that this be rectified in the reporting associated with the 2018 Council General Assembly. By so doing the flagship programs will be motivated to communication with the Unions.”



A. Ismail-Zadeh presents the GeoUnions statement at the ICSU General Assembly (photo: ICSU)

Allan Ashworth (INQUA) and Lena Halounova (ISPRS) are elected as new Chair and Vice Chair of the GeoUnions Steering Committee.

### ***Trans-disciplinary Research for Improving Climate Studies and Understanding***

The International Union of Biological Sciences (IUBS) and the International Union for Quaternary Sciences (INQUA) won one of three major grants of the International Council for Sciences (Euro 300,000 for 3 years) to promote trans-disciplinary research in climate studies entitled “*TROP-ICSU: Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding*”. This project proposal was supported by a number of international organizations including IUGG. Educating forthcoming generations about the causes and effects of global climate change is imperative since implementing solutions depends on an informed public. Research efforts, mostly in the domains of planetary science, ecology and evolutionary biology along with mathematical tools of big data analysis, have been initiated the world over to identify key factors that affect the ecosystem functions and services. These efforts need to be scaled up substantially and rapidly, requiring a whole new generation of multidisciplinary scientists, policymakers, and administrators. The project intends to identify, through a consultative mechanism, most relevant curricula and efficient pedagogical tools, outreach and citizen science programs to study the impact of climate change on biodiversity and ecosystem

functions and services and the ways to address these problems in the coming years. Keith Alverson (Japan), Secretary of the IUGG Commission for Climatic and Environmental Change (CCEC) will co-ordinate IUGG input for the project. Other project participants from IUGG are Tom Beer (Australia), Moira Doyle (Argentina), and László Szarka (Hungary).

ICSU grants were awarded also to the International Mathematical Union (IMU) and the International Union of Pure and Applied Chemistry (IUPAC) for the project “*A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure it? How to Reduce it?*” and to the International Union of Pure and Applied Physics and the International Union of Crystallography for the project “*Utilisation of Light Source and Crystallographic Sciences to Facilitate the Enhancement of Knowledge and Improve the Economic and Social Conditions in Targeted Regions of the World*”. More information is available at: <http://www.icsu.org/what-we-do/projects-activities/icsu-grants-programme/grants-2016-2019> (Source: ICSU website).

## REPORTS OF IUGG LIAISON OFFICERS

### **Sixth Session of the Partner Advisory Committee (PAC) for the Global Framework for Climate Services (GFCS)**

The meeting was held on 6 and 7 March in Rome, Italy, and hosted by the Food and Agricultural Organization of the United Nations (FAO). The meeting was attended by some 16 individuals, three of whom participated for part of the time by video links to the FAO office in Senegal, the EC in Brussels, and the Stockholm Environment Institute. Two additional organizations have recently joined the Committee: the European Centre for Medium-Range Weather Forecasts (ECMWF) and UNESCO, bringing the total number of formal members to 18. The meeting was opened by the FAO Assistant Director General. It was first chaired by Martin Frick, Director of the FAO Climate, Energy and Tenure Division, and then by FAO Natural Resources Officer Selvaraju Ramasamy. As in the past, the whole meeting was held in a very amicable and constructive atmosphere with the members recognizing the importance of working together to achieve the aims of the GFCS – not just on paper but out in the field. At least half the time was devoted to the reviewing progress with projects being implemented in each of the PAC Focus Countries, namely: Bhutan, Burkina Faso, Dominica, Moldova, Papua New Guinea, and United Republic of Tanzania. Some have made good progress but one or two could report no progress at all on this occasion. It is always necessary to work with the local meteorological services, but many were seriously understaffed and in one case the service had had seven directors in six years. By invoking the Chatham House Rule, participants were encouraged to be very open and frank about the challenges they face, a rare situation which greatly facilitated the discussion of sensitive issues.

The GFCS was launched some five years ago to run, at least initially, for ten years. It has therefore been decided to undertake a mid-term review. For reasons that were not explained, this review will be undertaken by a team from the University of Arizona. It is very likely that they will contact IUGG as part of this study. It was agreed to support a proposal to extend the terms of reference of the PAC to include the promotion of co-ordination at international and national level. It was recognized that the PAC has no authority in this regard but is in a good position to promote greater integration and identify duplication. It was accepted that co-ordination at national level is ultimately the responsibility of the national governments concerned. While the documents submitted to PAC meetings include references to many projects and related activities, the Secretariat has never assembled these into a unified “work plan”. The Norwegian Refugee Council offered to compile such a plan over the next few months. There are plans to set up a “Help Desk” to facilitate access to the large amount of data and other information that can be exchanged world-wide in relation to climate services. There was strong support for the proposal, but some participants preferred to use terms such as “marketplace” or “clearing house”. The meeting was pleased to learn of the widespread interest in climate change and climate services but was concerned that this was leading to ever greater competition for scarce funds. For example, even the United Nations Refugee Agency (UNHCR) now wants to start a climate programme. Diogo De

Gusmão-Sørensen of the European Commission's Directorate on Research and Innovation spoke by video link at some length about the possibility of obtaining funding from the EC's various research funds. The next meeting of the PAC is expected to be held on 13 May 2017 in Geneva, Switzerland, and the GFCS Management Committee is next expected to meet on 17 and 18 October 2017 (reported by Arthur Askew, WMO and PAC/GFCS Liaison Officer)

### **IUGG at the GFCS Scoping Workshop**

The Scoping Workshop for the design and development of a Help Desk for the Global Framework of Climate Services (GFCS) of the Intergovernmental Board on Climate Services was held in the headquarters of Deutscher Wetterdienst (DWD) in Offenbach, Germany, on 19 and 20 June 2017. IUGG was invited to attend the meeting as GFCS Partner organization. The IUGG Secretary General Alik Ismail-Zadeh attended the meeting on 19 June.



*Workshop participants (photo: GFCS Secretariat)*

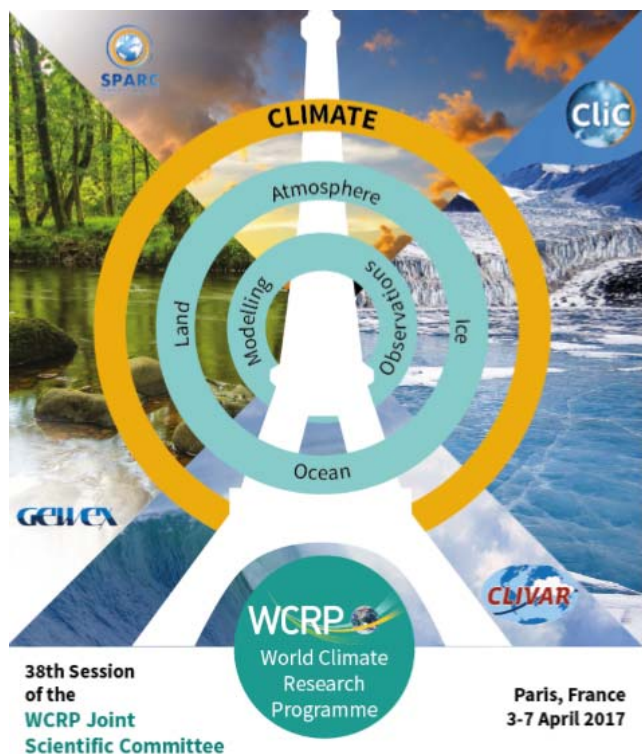
Some 20 people from international institutions and national agencies attended the meeting. The objectives of the workshop were to (i) discuss the scope, purpose and function of the GFCS HelpDesk; (ii) review a selection of existing climate service HelpDesks to define the niche; (iii) review and refine the GFCS HelpDesk content and prototype architecture and develop an action plan for designing and populating the HelpDesk; (iv) discuss the content management strategy to continually refresh/refine resources available on the HelpDesk to ensure the information is relevant and supports the needs of the climate service community; (v) address GFCS HelpDesk governance issues and define the process for coherent and coordinated community input; (vi) discuss lessons learned from other knowledge management platforms to design an interactive interface that facilitates use; and (vii) agree on performance evaluation strategy to track use and usefulness and the business case for the long-term sustainability of the HelpDesk. The agenda of the workshop can be downloaded [here](#).

The morning part of the workshop on 19 June was held in a very interactive way. Initially, participants were asked to present each other and their organization, and to propose a verb, which will characterize their potential involvement into the HelpDesk. IUGG verb was "to advise". Ismail-Zadeh mentioned a history of fruitful cooperation between the International Meteorological Organization / WMO / IUGG and its Scientific Associations, and the fact that IUGG was always considered by WMO as a scientific advisory body. Later during the meeting, all participants were split into four groups, and each group tried to answer specified questions, namely: (i) whom (target communities) the HelpDesk should address (e.g., hydro-met-offices, policymakers, farmers, citizens, scholars, students); (ii) which

categories of the end-users should be considered as the main users or interested users; (iii) how the HelpDesk should be organized and governed; and other questions. The second (afternoon) part of the workshop was more formal and related to presentations of participants: those who attended and those, who participated remotely (DWD provided very good video/audio/web connectivity). By the end of the day, Ismail-Zadeh presented IUGG's recent activities in general and in the area of climatic and environmental changes, and highlighted potential contributions to the development of the HelpDesk. IUGG could participate in the development of the GFCS Helpdesk providing a scientifically solid and politically neutral information. Particularly, IUGG could (i) participate in the GFCS HelpDesk advisory committee; (ii) coordinate specific topics, organize literature survey / syntheses; (iii) participate in a review of key scientific concepts and tools with which the HelpDesk is to be designed; (iv) work on knowledge-innovation-service pilots; (v) assist in developing technical tools and advisory material, e.g., a website tool presenting existing climate observation databases, tools for numerical climate modelling, and socio-economic modeling databases including engineering selection modeling and emission inventory reduction scenario; (vi) provide links to sites, where measurements and assimilated data are held; and (vii) provide links to educational material, etc. It would be appreciated to establish comprehensive yet flexible database for these contents to be accepted by intergovernmental and non-governmental organizations as well as business sector. The future HelpDesk may need a mechanism (e.g., an Engagement Committee) to make a bridge between the research and business sectors (reported by Alik Ismail-Zadeh)

### 38th Joint Scientific Committee meeting of the World Climate Research Programme

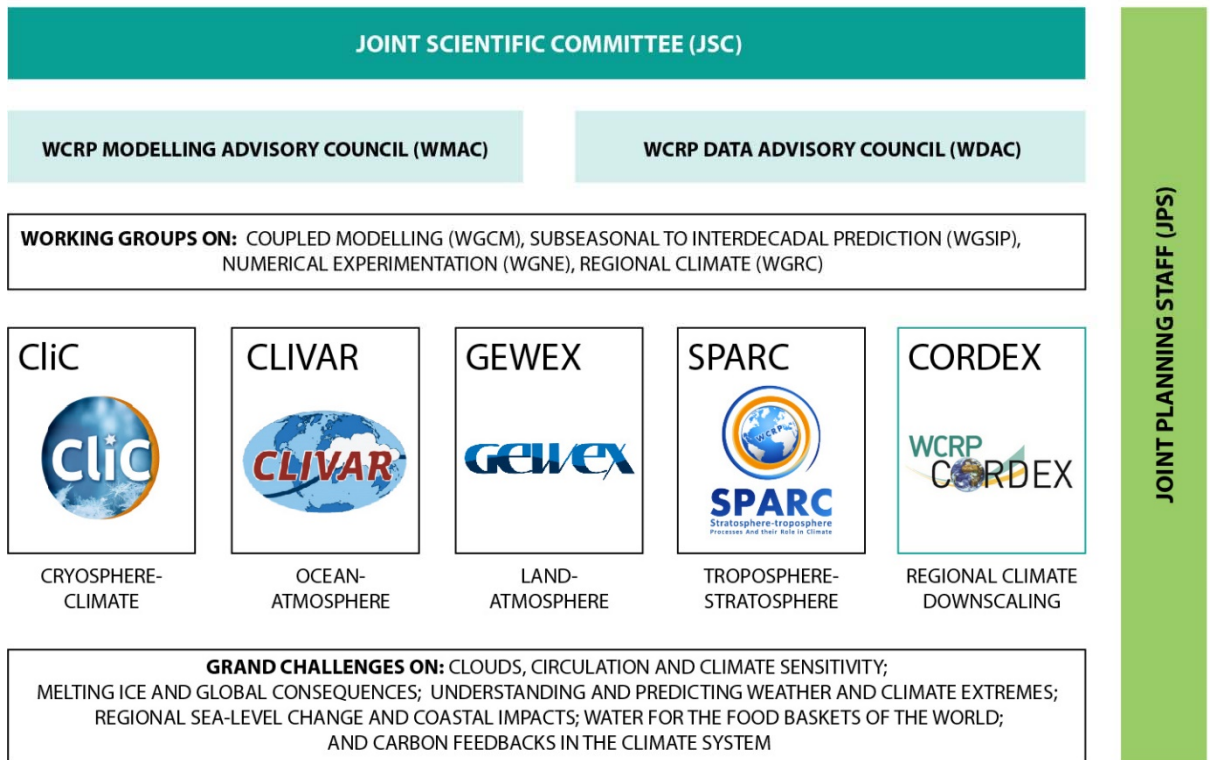
WCRP was established in 1980 under the joint sponsorship of the International Council for Science (ICSU) and the World Meteorological Organization (WMO). In 1993 the Intergovernmental Oceanographic Commission (IOC) of UNESCO also became a sponsor. The main objectives of WCRP, defined at its inception and still valid today, are to determine the predictability of climate and to determine the effect of human activities on climate. WCRP is composed of four core projects universally known by their acronyms as CliC, CLIVAR, GEWEX, and SPARC. The WCRP organizational chart (see Fig. 1) also emphasizes CORDEX, the regional downscaling project. WCRP has also identified seven Grand Challenges that use the expertise within the core projects to examine important and topical issues. They are listed in Fig. 1. The WCRP Grand Challenge on "Water for the Food Baskets of the World"<sup>4,5</sup> intends to examine some of the same issues as the IAHS program Panta Rhei and it is to be hoped that a means of collaboration can be found. As shown in Fig. 1, supreme operational, scientific, management and financial control of WCRP rests with the Joint Scientific Committee, JSC. The success of WCRP means that this operational model is the standard operational model for ICSU inter-disciplinary bodies.



<sup>4</sup> <https://www.wcrp-climate.org/grand-challenges/gc-water-availability>

<sup>5</sup> <http://www.gewex.org/about/science/wcrps-grand-challenges/water-for-the-food-baskets-of-the-world/>

# WORLD CLIMATE RESEARCH PROGRAMME ORGANIZATION



*Official organization chart for WCRP*

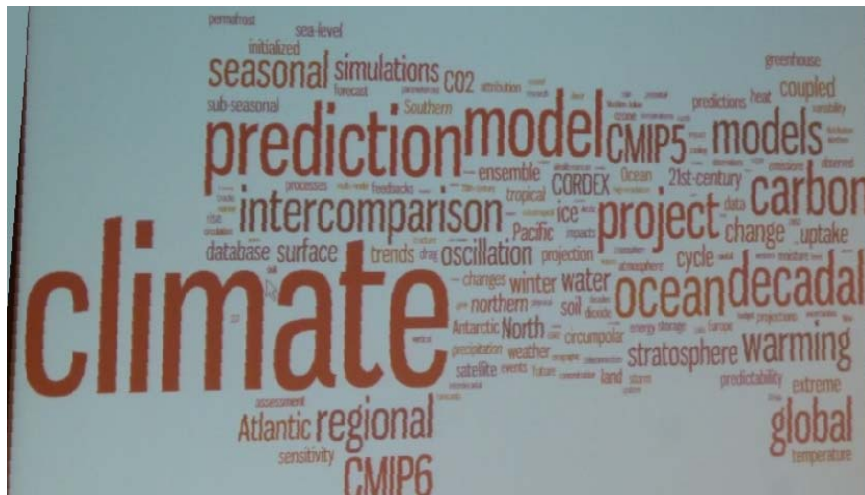
The 38<sup>th</sup> Session of the WCRP JSC (see the group photo of the committee below) included reports and discussions from the core projects, from the Grand Challenges, from the two advisory councils WMAC and WDAC (see Fig. above) and from partners (including IUGG and Future Earth) as well as the opening ceremony and discussions on communication and finances. The agenda, documentation and presentations can be found at: <https://www.wcrp-climate.org/jsc38-about>. A copy of the IUGG presentation can be downloaded from: <https://www.wcrp-climate.org/jsc38-agenda>.



*Attendees at the 38<sup>th</sup> meeting of the Joint Scientific Committee of WCRP in the grounds of the UNESCO building in Paris*

Tom Beer made a presentation on IUGG, which consisted of three parts: (i) IUGG- in which the Scientific Associations were enumerated; (ii) information on scientific assemblies of IACS (Wellington, New Zealand, 12-14 February 2017, co-sponsored by WCRP), IAPSO-IAMAS-IGA joint assembly in Cape Town, South Africa, 27 August -1 September 2017, and session M17 targets the WCRP Grand Challenge on Extremes, and IAHS assembly in Port Elizabeth, South Africa, 10-14 July 2017; (iii) major activities. The presentation highlighted: IAHS – Panta Rhei project and CCEC – Global Change and Future Earth: The GeoScience Perspective project.

WCRP is very active and continues to play a high profile in the international scientific community. The work on modelling intercomparison has been crucial to the work of the IPCC and is very heavily quoted in the literature as shown in the WordDoodle below.



*WordDoodle illustrating the frequency of words in the titles of scientific papers published under WCRP auspices. The larger the font, the more frequent the word*

The JSC meeting was run by the Chair of the JSC, Guy Brasseur, and by the WCRP Executive Director, David Carlson. There were three matters that were of obvious concern to them: The ongoing Review of WCRP; WCRP finances; and the state of climate science internationally.

The WCRP review panel includes: Julia Slingo (Chair), Mark New, Alan Thorpe, Steven Zebiak, Fumiko Kasuga (ex-officio member representing CSPR), Sergey Gulev, and Neville Smith. The panel is tasked to: a) provide strategic directions for future development of WCRP, b) review scientific achievements and impacts of WCRP since 2009, c) review appropriateness and effectiveness of the governance, operational structure, management and resourcing of WCRP, d) identify synergies between priorities of WCRP and its co-sponsors. In February 2017, WMO reduced its funding to WCRP<sup>6</sup>.

Various countries at various times in the past have elected governments that are not supportive of, and may be actively hostile, to the notion of climate change and as a consequence reduce or terminate funding to climate science. Such considerations motivated IUGG to pass Resolution Number 7 at its 2015 General Assembly. The finale of the resolution is that IUGG resolved to be steadfast in: (1) encouraging and supporting the participation of scientists in international scientific meetings and activities, (2) undertaking efforts to enhance fundamental understanding of geophysical processes and behavior, especially in the grand challenge areas, (3) increasing efforts to utilize scientific understanding for the benefit of society and the environment and for promotion of the economy and

---

<sup>6</sup> <http://www.nature.com/news/no-time-to-chop-funding-for-a-pivotal-climate-programme-1.21625>

societal resilience; and (4) providing an independent voice in support of undertaking and relying on the most rigorous and well-tested scientific findings (reported by Tom Beer, IUGG Liaison to WCRP)

### **WMO Executive Council Meeting**

The 69th Session of the World Meteorological Organization (WMO)'s Executive Council (EC) meeting was held in WMO Headquarters in Geneva, Switzerland, from 10 to 17 May 2017. IUGG was represented at the meeting by Arthur Askew (IUGG Principal Liaison to WMO) as well as Charles Fierz (IUGG Liaison to WMO on issues related to cryosphere), who travelled to Geneva to follow the discussion of polar and cryospheric matters within EC and to participate in a series of discussions and side events relating to the Launch of the Year of Polar Prediction.

WMO President David Grimes (Canada) chaired the EC meeting. Sessions of EC used to be eight days long. Now they are only seven days long and nearly one whole day is devoted to a Special Dialogue, which means that there is a lot of pressure to complete the agenda in the time available. Last year's Special Dialogue was on public private engagement (note: not public-private-partnership). The document reporting on the follow-up to this was presented in the form of a draft policy framework for eventual adoption by WMO Congress in two years time. 30 minutes was allotted for its discussion but the debate ran for a lively and at times quite emotional three hours. Those from developed countries accepted the need for such collaboration and were seeking win-win options, while those from developing countries were clearly worried about their vulnerability in the face of aggressive marketing by private operators. Following helpful remarks by the World Bank, the head of the US National Weather Service, and the WMO President himself, Arthur Askew intervened to encourage WMO to produce a clear policy on public-private engagement, as this would facilitate the cooperation of the academic/scientific community with all parties concerned.

The Special Dialogue this year was on aeronautical meteorology and was addressed by senior expert staff from the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA), the President of the WMO Commission for Aeronautical Meteorology (CAeM), The European Organization for the Safety of Air Navigation (Eurocontrol) as well as the head of a private airline briefing company and Cathy Pacific's senior pilot (the real end user, as he pointed out). The Dialogue led to some serious discussion about the challenges for the future, much of them related again to the role of private companies. IATA reported a forecast of 6.3 billion passengers per year by 2030, which they said would be equivalent to one flight per year for everyone on Earth! It was pointed out that, while ICAO/WMO rules oblige countries to provide meteorological briefings for pilots, the pilots are not obliged to use them. Pilots now receive all their information through their iPads and, according to some speakers, they are too easily "seduced" into using apps of private companies to provide meteorological advice. The Special Dialogue next year will be on "water". IUGG offered that IAHS could provide expertise on the current state of hydrological science, in particular, as regards its links with atmospheric science, oceanography and climate studies.

Congress had asked the EC to review the structure and operations of WMO. The last twelve months have seen a lot of debate inside WMO, especially because those leading the study seem to be starting from the assumption that there are too many Technical Commissions, Regional Associations and working groups and that the number should be reduced. It seems that the impact of such changes would be far reaching and much more complex than the proponents realize. The WMO Commission on Atmospheric Science (CAS) has stated that it sees no reason why research needs to be overseen by an intergovernmental body and so it is very likely that CAS will not continue beyond next Congress in 2019. What will replace it is unclear. Presumably some sort of science advisory panel under EC and the internal structure of the Secretariat could see a major reshuffle, possibly operating under a "Senior Scientist" appointed by the WMO Secretary General. The IUGG Principal Liaison pointed out that the work of the Commissions was undertaken by a large number of dedicated scientists who often worked in their own time, and that, by terminating the Commissions, there was a real risk that the loyalty of

these persons would not necessarily transfer to any new bodies established. He also asked that any changes be widely discussed and advertised so that the multitude of linkages between existing bodies and organizations external to WMO could be reviewed and replaced with new agreements. The final report reflected some of IUGG's concerns.

There is a strong push for a seamless development of meteorology: research-operations-services. Where this is coming from is unclear, but the WMO Secretary General is clearly in favor of it. This is driving a call for re-structuring the research activities within the Organization, which are at present scattered throughout a whole series of programs and divisions within the Secretariat. A "review panel" is studying the question and, as WCRP is within their remit, WCRP was not discussed at this session of the EC. Arthur Askew intervened to welcome any move to clarify research activities within WMO, which would make it easier for IUGG and other partner organizations to collaborate in common efforts.

In summary, some major changes in the governance of WMO and in the structure of the WMO Secretariat should be expected. It is clear that the WMO Secretary General wants to see change, but there are many who will resist this for a variety of reasons. Important meetings will be held in October 2017 and February 2018 to move ahead with these plans. Three inter-linked propositions will be prepared: one on the Executive Council itself, one on the Technical Commissions; and one on the Regional Associations. All will be presented to EC when it next meets in May 2018 and then finally to WMO Congress in 2019.

The Secretariat of the Global Framework for Climate Services (GFCS) organized an informal meeting of the Management Committee of the Framework. IUGG was invited as a member of the GFCS PAC. It was well attended, and there was some useful discussion. We learnt that the next formal meeting of the Management Committee will be hosted by the European Centre for Medium-Range Weather Forecasts (ECMWF) in Reading, UK, on 19 and 20 October 2017. We were also informed that the GFCS Office had been absorbed into the Climate and Water Department of the WMO Secretariat, which could be seen as compromising its status as a truly inter-agency initiative, but the change is probably just a matter of administrative convenience. We were shown the plans that had been laid for the review of the effectiveness of the GFCS that is being undertaken by a team from the University of Arizona consisting of a climate scientist, a geographer and a sociologist.

Weather modification is still a live issue. It was reported that some 44 members of WMO undertook weather modification activities. However, there were also complaints that some private companies, which had no scientific credibility, were lobbying governments even in Europe to invest in their activities behind the backs of the Met Services. 2023 will mark the 150<sup>th</sup> anniversary of the founding of the International Meteorological Organization (IMO), the direct precursor of WMO. Plans for the celebration will be drawn up for Congress to see in a couple of years time. Gordon McBean, the current President of ICSU and former IUGG Bureau Member, has been awarded the 2018 IMO Prize (reported by Arthur Askew, IUGG Principal Liaison to WMO).

## **COOPERATION WITH INTERNATIONAL AND INTERGOVERNMENTAL ORGANIZATIONS**

### **United Nations Global Platform for Disaster Risk Reduction**

The Global Platform for Disaster Risk Reduction (GP), as recognized by the United Nations General Assembly, is the main forum at the global level for strategic advice, coordination, partnership development and the review of progress in the implementation of international instruments on disaster risk reduction. It was established in 2006 and is now the world's foremost gathering of stakeholders committed to reducing disaster risk and building the resilience of communities and nations.



The GP Opening Ceremony was held on 24 May 2017 in Cancun and was attended by H.E. Enrique Peña Nieto, President of Mexico, who delivered a speech. He mentioned that: “To protect the population from natural disasters is one of the most important humanitarian responsibilities. This is a task in which we should all participate and where we can all contribute. We should work together, society and government, to greater protect our communities.” The GP2017 is characterized by a format that facilitates dialogue and exchanges among all stakeholders, both governmental and non-governmental. It features a high-level dialogue which brings together senior government officials, including heads of state and government, ministers, mayors and parliamentarians and leaders from the private sector, science and civil society.

To achieve Target E of the Sendai Framework that focuses on national and local disaster risk reduction strategies, countries will need to access and use credible and robust multi-hazard risk assessments. This includes evidence-based risk information provided by and developed together with the science and technology community. The Sendai Framework calls on the science and technology community to focus on understanding disaster risk factors and scenarios, support action by local communities and authorities, and enhance the interface between policy and science for decision-making.

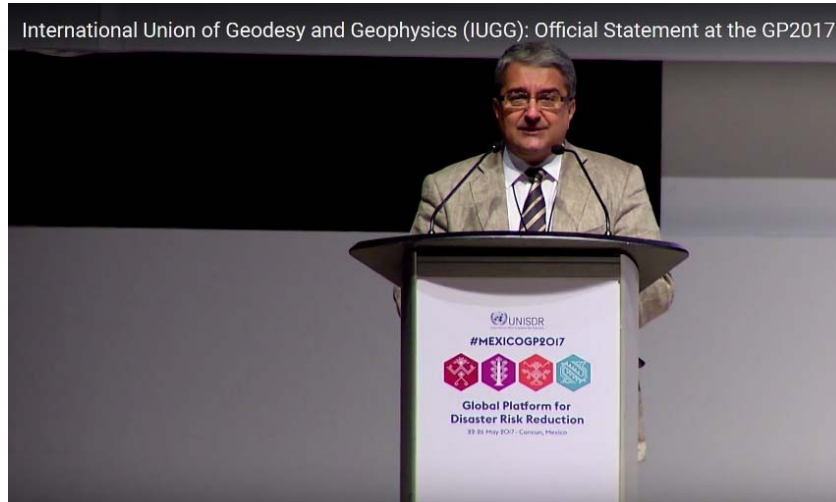
Together with several international and intergovernmental bodies, IUGG co-organized a session “Contribution of Science and Technology to Achieving the 2020 Sendai Target” at the GP. The session discussed the contribution of science and technology in achieving Target E of the Sendai Framework with a focus on illustrating how appropriate global, national and local disaster risk assessments and scientific analysis have been used to inform disaster risk reduction planning and monitoring at national and local levels. The concept note of the session can be downloaded [here \(pdf, 627 KB\)](#). More information on the session is available [here](#).



*Meeting participants (from left to right): V. Tsirkunov, T. Koike, G. McBean, C. Wannous, A. Hainsworth, J. U. Fucugauchi, T. Klose-Zuber, and A. Ismail-Zadeh*

At the GP, IUGG organized a meeting of representatives of several international and intergovernmental organizations to discuss cooperation plans to further develop the initiative on setting up an international panel for disaster risk assessment. The meeting was attended by: Jaime Urrutia Fucugauchi, President, Mexican Academy of Sciences; Alasdair Hainsworth, Chief Disaster Risk Reduction Services Division, World Meteorological Organization (WMO); Thorsten Klose-Zuber, Division for Humanitarian Assistance, German Federal Foreign Office; Toshio Koike, Chair, Committee on Disaster Risk Reduction and International Coordination, Science Council of Japan; Gordon McBean, President, International Council for Science (ICSU); Vladimir Tsirkunov, Global Facility for Disaster Reduction and Recovery, World Bank; Chadia Wannous, Senior Advisor, United Nations Office for Disaster Risk Reduction (UNISDR); Soichiro Yasukawa, Earth Sciences and Geo-Hazards Risk Reduction, United Nations Educational, Scientific, and Cultural Organization (UNESCO); and moderated by Alik

Ismail-Zadeh, IUGG Secretary General. The main topic of the meeting was how disaster risk synthesis and assessment should be implemented in policymaking. The participants discussed an IUGG initiative, supported by the international scientific community, to work together with international organizations, intergovernmental agencies and other stakeholders on setting up an intergovernmental panel on disaster risk assessment. It was agreed that further discussions and negotiations with representatives of national governments are required to develop a roadmap for this initiative.



The IUGG Secretary General delivered an [IUGG statement \(pdf, 58 KB\)](#) at the GP on 26 May, which can also be watched [here](#).

*Alik Ismail-Zadeh delivers official IUGG statement at the UN 2017 Global Platform for Disaster Risk Reduction, 26 May, 2017, Cancun, Mexico*

### **The Fourth World Landslide Forum**

The Fourth World Landslide Forum was held in Ljubljana, Slovenia, from 29 May to 1 June 2017. Scientists, engineers, and policymakers working in the area of landslide technology, landslide disaster investigation and landslide remediation attended the Forum to share their work with the global community. A high-level panel discussion was held at the Forum. Representatives of several international and intergovernmental organizations, including IUGG, were invited to contribute to the discussion. IUGG was represented by Alik Ismail-Zadeh, IUGG Secretary General. The major topics for discussion were (i) how can the implementation of the ISDR-ICL Sendai Partnerships be generally advanced?, and (ii) how do we achieve better commitment of the Partners to the ISDR-ICL Sendai Partnerships, and better networking and interaction to enhance cooperation among Partners and to provide substantive services to developing countries?

IUGG was one of the signatory organizations of the Sendai Partnership, and the IUGG's principal commitment is to promote science to benefit society. Considering the Sendai Partnerships, Ismail-Zadeh mentioned that contributions of the IUGG can include (but are not limited to) (i) scientific research related to understanding of landslide hazard and disaster risk; (ii) development of a scientific foundation for reliable prediction of landslides and for landslide early warning systems of increased precision; (iii) landslide hazard and vulnerability assessments, and multi-hazard risk identification; (iv) improved technologies for monitoring, testing, and analysis of landslides and their analogue and computer simulations; and (v) teaching courses and tools on natural hazards.

At present, commitments of the Partners may lead to multidisciplinary work, when each Partner determines its own priorities and tasks within the framework of the Sendai Partnerships declaration, but works independently considering specific questions, employing the methodologies related to their individual discipline, deriving independent conclusions, and disseminating their results independently. Ismail-Zadeh proposed to move from multidisciplinary to interdisciplinary and transdisciplinary work. Compared to a multidisciplinary approach, interdisciplinary work allows for transferring knowledge from one discipline to another, researchers informing each other about their work, comparing individual findings, developing common conclusions whilst still working independently using their own methodologies, but often coming up with new problem sets and approaches. Such interdisciplinary

work is co-designed and co-produced but still lacking the involvement of actors in public bodies, business and civil society in the academic research process. Transdisciplinary work would help the Partners work together to contribute their unique expertise. They can address a common problem and try to understand the complexities of the entire problem rather than its parts only. To achieve a common goal, Partners exchange data and information, share resources, create conceptual, phenomenological, theoretical, and methodological innovations, integrate disciplines, and move beyond discipline-specific approaches. Transdisciplinary work could allow for addressing the complexity of landslide disaster risk problems using a holistic view of the problems and the diversity of perceptions of them, involvement of actors from non-scientific fields, and implementation of research results by developing the solutions to be used in practice. Therefore, Ismail-Zadeh proposed to determine a few specific problems on which all Partners can work together in an interdisciplinary and perhaps even transdisciplinary way, all contributing to the implementation of the Sendai Partnerships on landslide disaster risk reduction.

### **World Science Forum**

The World Science Forum (WSF) was held in Jordan from 7 to 11 November 2017. Over 2500 science leaders from over 120 countries gathered at the WSF to call for a more responsible and ethical use of innovation to address the social and economic relevance, influence, and responsibilities of science. The WSF series was inspired by the success of the meeting “World Conference on Science for the Twenty-First Century: a New Commitment” held 26 June - 1 July 1999 in Budapest, Hungary, and convened by UNESCO and the International Council for Science (ICSU), in co-operation with other partners. Driven by the need for a forum for discussion between the scientific community and society, the Hungarian Academy of Sciences in partnership with UNESCO and ICSU established a series of follow-up events called WSF. This time the WSF was held in Jordan, its first time in the Middle East region. IUGG Secretary General Alik Ismail-Zadeh attended the WSF.

The Opening Ceremony of the Forum was attended by the King of Jordan and the President of Hungary. The Forum was welcomed by Princess Sumaya bint El Hassan, Chair, World Science Forum; László Lovász, President, Hungarian Academy of Sciences; Gordon McBean, ICSU President; Rush D. Holt, CEO, American Association for the Advancement of Science (AAAS). A Plenary Session “Science for Peace” was moderated by Michio Kaku, Theoretical physicist, bestselling author, acclaimed public speaker, renowned futurist, and popularizer of science, City University of New York. A keynote lecture was given Prince El Hassan bin Talal, Chair of the Jordan Higher Council for Science and Technology. Among the speakers were: Irina Bokova, Director-General, UNESCO (video message); Grace Naledi Pandor, Minister of Science and Technology, South Africa; Mark Ferguson, Chief Scientific Adviser to the Government of Ireland; Michinari Hamaguchi, President, Japan Science and Technology Agency (JST); and Lassina Zerbo, Executive Secretary, Preparatory Commission for Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).

Among many noteworthy sessions and panel discussions, two events organized by ICSU should be mentioned. The thematic session “The Future of the Universality of Science” was organized by the ICSU Commission on Freedom and Responsibility of Science. The universality of science in its broadest sense is about developing a truly global scientific community based on equity and non-discrimination. It is also about ensuring that science is trusted and valued by societies across the world. As such, it incorporates issues related to the conduct of science; capacity building; science education and literacy; access to data and information and the relationship between science and society. A Plenary Session “Energy and Water Nexus – Intelligent Management for Sustainability and Fairness” examined the most acute resource challenges in the host region through the critical interdependency of water and energy security. Water scarcity in Jordan and the Levant has the potential to further compromise social and political stability of the region. Scientists have a role to play in developing better management systems through enhanced cooperation, knowledge exchange and institutional strengthening; improving water conservation and energy efficiency; building local capacity in water and energy

sectors; and working together on transboundary resource sharing to build regional resilience. Opening channels of communication between states where there is political tension can, in turn, help to build trust and promote cooperation on other issues. Two IUGG experts, Prof. Gordon McBean, IUGG Fellow and ICSU President, and Prof. András Szöllösi-Nagy, Water World Council, participated in the panel discussion. More information on the Forum can be found at: <https://worldscienceforum.org/>

### **Global Forum on Science and Technology for Disaster Resilience**

The Global Forum on Science and Technology for Disaster Resilience was held in Tokyo, Japan, from 23 to 26 November. The Forum was organized by the Science Council of Japan (SCJ), the United Nations Office for Disaster Risk Reduction (UNISDR), the Scientific Programme “Integrated Research on Disaster Risk” (IRDR), the International Council for Sciences (ICSU), and co-sponsored by several international and national organizations including IUGG. The objectives of the Forum were to pursue steady implementation of the four priorities for action of the 2015 Sendai Framework for Disaster Risk Reduction, and to develop a plan for actions. H.E. Dr. Robert Glaser, Special Representative of the UN Secretary-General for Disaster Risk Reduction and Head of UNISDR, participated in the Forum. The Crown Prince of Japan Naruhito attended the Closing Ceremony of the Forum.

The Forum considered seven basic topics: Understanding disaster risk; strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience; “Build Back Better” in recovery, rehabilitation and reconstruction; promotion of interdisciplinary collaboration; strengthening of national platforms; and the concept of periodic synthesis reporting. To promote the use of science in DRR policy making and to promote coordination among scientific and technological research activities at national, regional and global levels, synthesis of scientific evidence should be produced in a timely, accessible and policy-relevant manner. This includes comprehensive knowledge on the state of science and technology related to the identification of disaster risks, the assessment of the socio-economic impact of disasters, and the approaches to substantial reduction of human and economic losses that should be presented in a clear, easy-to-understand way for the worldwide application of disaster risk reduction policies. Integrated synthesis reports should be produced periodically (i.e., mid-term and final reports during the period of the Sendai Framework) and by thematic areas of work under the Sendai Framework priorities for action by coordinating international scientific and technological research initiatives. Collaboration should be strengthened not only among the disaster risk reduction community but also with other areas closely related to disaster risk reduction, such as those concerning climate change mitigation and adaptation measures and the achievement of the sustainable development goals. IUGG Secretary General Alik Ismail-Zadeh participated in the Plenary Panel on “Periodic synthesis report on the state of science and technology for disaster risk reduction”.

The Forum concluded by accepting the statement “Science and technology action for a disaster-resilient world”. The Global Forum on Science and Technology for Disaster Resilience 2017 in Tokyo provided the best opportunity to ascertain the contribution and future actions through discussion among global scientists and to share the message with all stakeholders, including policy makers and the private sector. In support of the implementation of the Science and Technology Roadmap, the following needs under the four priorities for action of the Sendai Framework were identified to be urgently addressed:

- To develop a system for collection, archiving, management, analysis, modeling and using of data concerning disaster risk and disaster damage and losses. In support of policy makers and practice, to establish and use reliable scientific frameworks for evaluating disaster risk on a regular basis, as a function of the identification and assessment of hazards, vulnerability, and exposure including single and concatenated events. The use of scientific tools, including geospatial information systems, should be promoted for providing and sharing disaster risk information at different scales before, during and after disasters.

- To contribute to strengthening disaster risk governance to reduce disaster risk.
- To encourage investment in disaster risk reduction for resilience and to develop and implement tailor-made methods to assess disaster risks and share those among relevant government agencies and key stakeholders including international financial institutions and the private sector at large as the main investor in all countries.
- To promote "Build Back Better" in recovery, rehabilitation and reconstruction.
- To promote and implement interdisciplinary and transdisciplinary collaboration. To assess anthropogenic and technological risks as well as disaster risks associated with natural hazards, we should develop innovative approaches and technologies for risk assessment from both interdisciplinary and transdisciplinary perspectives including the humanities and social sciences.
- To produce periodic synthesis reports on the state of science and technology for risk-sensitive development and investment. To understand and measure the status and progress of science and technology in disaster risk reduction, we propose producing periodic synthesis reports in collaboration between "cognizing" science and "designing" science in a transdisciplinary way as well as to enhance resilience by promoting evidence-based policies for disaster risk reduction that clearly factor in prediction, prevention and response strategies.
- To contribute to national platforms for more effective use of science and technology.

Increased disaster risk demands an urgent response. Inaction is no longer an option. The support of all stakeholders is strongly requested.

### **UNESCO Conference on Landslides**

IUGG continues to work closely with various scientific programs of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The UNESCO Conference on Landslides was organized by the International Consortium for Landslides (ICL, an IUGG Affiliate Member) and the International Programme on Landslides (IPL) supported by UNESCO and other international and intergovernmental organizations. During the conference, ICL organized a business meeting related to the Sendai Partnerships in Disaster Risk Reduction (DRR) and Promotion of Landslide Science, signed in 2015 in Sendai, Japan, by several international and intergovernmental organizations including IUGG. Agenda topics of the business meeting included reports by the officers, actions after the last World Forum on Landslides (WFL) held in 2017 in Slovenia, actions toward the next WFL in 2020, and new projects approval. IUGG was invited to become a partner of the World Landslide Forum to be held in Kyoto, Japan in 2020, and was asked to co-organize a symposium on landslides-induced tsunamis at the forum attracting attention of governments to the problems of landslides and tsunamis. Alik Ismail-Zadeh represented the Union at the conference and the business meeting.

During the conference, Alik Ismail-Zadeh, as IUGG Secretary General and Council Member of the UNESCO-IUGS International Geoscience Programme, met with Dr. Flavia Schlegel, UNESCO Assistant Director General for Natural Sciences (ADG/SC), and discussed possibilities for strengthening the cooperation between IUGG and UNESCO in the International Geoscience Programme and to disaster risk reduction (DRR). DRR as an interdisciplinary subject is well developed by individual units of UNESCO, however, cooperation in DRR of the units (sectors and divisions of UNESCO) in education, mitigation and resilience sometimes seems to be weak. To integrate knowledge on DRR science and education and to coordinate the work among the UNESCO units and international NGOs like IUGG and other ICSU scientific unions and interdisciplinary bodies, Ismail-Zadeh proposed UNESCO to consider a possibility to organize a series of conferences on Disaster Science bringing together experts from UNESCO Natural Science and Social Science Sections, the Intergovernmental Oceanographic Commission, the International Hydrological Programme, and external organizations dealing with the topics of DRR including UNISDR.

# ACTIVITIES OF THE UNION ASSOCIATIONS

The following reports, prepared by the Secretaries General of the eight Associations of IUGG:

International Association of Cryospheric Sciences (IACS)  
International Association of Geodesy (IAG)  
International Association of Geomagnetism & Agronomy (IAGA)  
International Association of Hydrological Sciences (IAHS)  
International Association of Meteorology & Atmospheric Sciences (IAMAS)  
International Association for the Physical Sciences of the Oceans (IAPSO)  
International Association of Seismology and Physics of the Earth's Interior (IASPEI)  
International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

illustrate the impressive range of activities within each Association as well as their dedication to supporting science within developing countries.

# International Association of Cryospheric Sciences (IACS)



IACS website: [www.cryosphericosciences.org](http://www.cryosphericosciences.org)

*This report covers the period from February 2017 to January 2018.*

## INTRODUCTION

The International Association for Cryospheric Sciences (IACS) is the Association of the International Union of Geodesy and Geophysics (IUGG) that is concerned with snow and ice science and which provides expert advice on cryospheric issues to governmental and non-governmental organisations. The objectives of IACS are to:

- Promote studies of cryospheric subsystems of the Earth and solar system.
- Encourage research in the above subjects by members of the cryospheric community, national and international institutions and programmes, and individual countries through collaboration and international co-ordination.
- Provide an opportunity on an international basis for discussion and publication of the results of the above research.
- Promote education and public awareness on the cryosphere, and facilitate the standardisation of measurement or collection of data on cryospheric systems and of the analysis, archiving and publication of such data.

## ADMINISTRATION

A Bureau of 11 elected officers manages the business of IACS. The current IACS Bureau was elected at the IACS Plenary Administrative Meeting during the 26<sup>th</sup> IUGG General Assembly in Prague. It consists of *Regine Hock* (President), *Charles Fierz* (Immediate Past President), *Andrew Mackintosh* (Secretary General), *Olga Solomina* (Vice President), *Cunde Xiao* (Vice President), *Ian Allison* (Vice President), *Hiroyuki Enomoto* (Head, Sea Ice, Lake and River Ice), *Christine Schott Hvidberg* (Head, Planetary and other ices of the solar system), *Liss Andreassen* (Head, Glaciers and Ice Sheets), *Ethan Greene* (Head, Snow and Avalanches), *Valérie Masson Delmotte* (Head, Cryosphere, Atmosphere and Climate), *Anaïs Orsi* (Deputy Head, Cryosphere, Atmosphere and Climate).

To run the 'daily' business, the IACS Executive Committee (EC) consisting of President, Secretary General and Immediate Past President holds regularly teleconferences, in which all Bureau members are welcome to join.

## ACTIVITIES

### Transfer of Presidency

On February 22<sup>nd</sup> 2017, the IACS Presidency was transferred from Charles Fierz to Regine Hock. The IACS bureau and community thank Charles for his many years of outstanding service, which he will continue as Immediate Past President until Montreal. [Regine Hock](#), the new IACS President, is Professor of Geophysics at the University of Alaska, Fairbanks. Regine has previously served as a Vice President of the International Glaciological Society, and as Secretary of the [International Commission on Snow and Ice Hydrology](#) (2005-2015), an IAHS commission. She is also the Chief Editor of [Frontiers in Earth Science - Cryospheric Sciences](#).



*Transfer of IACS Presidency on February 22<sup>nd</sup> 2017 from Charles Fierz (right) to Regine Hock (left)*

### IACS Individual Membership

In 2017, IACS established free individual membership. We currently have more than 300 members who have signed up despite a limited amount of publicity to date. We hope that offering individual membership will help to create a stronger community around IACS, promoting its activities and its relationship with IUGG and its other seven constituent associations. Specifically, IACS members will receive regular information about IACS activities and opportunities, and will be eligible to engage in IACS activities and bodies. This includes the possibility of receiving IACS sponsorship and financial support for workshops, summer and winter schools, and other IACS-sponsored activities, as well as for the IACS early-career scientist prize (if members qualify). More information about IACS membership can be found [here](#). Everybody is welcome to join, including members of other IUGG associations.

### IACS bureau members join Intergovernmental Panel on Climate Change

IACS is playing a leading role in the 5<sup>th</sup> Assessment Round of the Intergovernmental Panel on Climate Change (IPCC). IACS Division IV head [Valérie Masson Delmotte](#) is co-chair of IPCC Working Group 1. In addition, the following IACS officers and affiliates were selected in 2017 to write the IPCC [Special Report on the Oceans and Cryosphere in a Changing Climate](#):



1. IACS President Regine Hock is Coordinating Lead Author of Chapter 2 'High Mountain Regions'.
2. IACS Secretary General Andrew Mackintosh is Lead Author of Chapter 3 'Polar Regions'.
3. IACS Division III head Hiroyuki Enomoto is Lead Author of Chapter 1 'Framing and Context of the Report'.
4. IACS Vice President Xiao Cunde is Review Editor for Chapter 3 'Polar Regions'.
5. Former IACS President Georg Kaser is Review Editor for Chapter 2 'High Mountain Regions'.
6. IUGG Early Career Scientist awardee Ben Marzeion is lead author in Chapter 4 'Sea level rise and implications for low lying islands, coasts and communities'.
7. IACS MICROSNOW Working Group co-chair Samuel Morin is lead author in Chapter 2 'High Mountain Regions'.

### Working and Standing Groups

IACS facilitates the transfer of research methods and explores new avenues in cryospheric science through Standing Groups and Working Groups devoted to a theme or subject and composed of experts in the particular field of study. The currently active Working Groups (WG) of IACS are the [Randolph Glacier Inventory and infrastructure for glacier monitoring](#) working group (2014-2018) and the [Glacier ice thickness estimation](#) working group (2014-2018). Both WGs are very active.

The Randolph group was the first to provide a globally comprehensive glacier inventory; in 2017, it released version 6.0 of its database (<https://doi.org/10.7265/N5-RGI-60>). The inclusion of Randolph Inventory data into the GLIMS (Global Land Ice Measurements from Space) database is now complete, and the working group collaborates closely with the World Glacier Monitoring Service (WGMS; an IACS Service). The IACS Working Group on Glacier ice thickness estimation completed its first experiment and published a scientific paper (*The Cryosphere*, 11, 949-970, 2017). The Working Group collaborated with the World Glacier Monitoring Service to provide more glacier thickness data to the community ([GlaThiDa 2.0](#)). The working group is now continuing experiments, carrying out global modelling and collecting more ice thickness data. More information can be found [here](#).

The current Standing Groups (SG) are the *Joint Commission on Volcano-Ice Interactions* (with the International Association of Volcanology and Chemistry of the Earth's Interior - IAVCEI), *Glacier and Permafrost Hazards in Mountains* ([GAPHAZ](#), a joint SG with the International Permafrost Association IPA), and the *Steering Committee of the Global Terrestrial Network for Glaciers* (GTN-G). The latter was recently strengthened through the addition of Ben Marzeion (University of Bremen) and Stephen Briggs (European Space Agency). GAPHAZ also links IACS to the IUGG Union Commission on GeoRisk (M. Krautblatter is our representative). For a taste of what GAPHAZ does, please see their recent [Nature Geoscience paper](#) about a catastrophic glacier collapse in Tibet.

### Meetings and symposia

*International Symposium on the Cryosphere in a Changing Climate: Wellington, 2017.*

IACS held its 2017 scientific assembly from 12<sup>th</sup>-17<sup>th</sup> February 2017 in Wellington, New Zealand. A description of this event was provided in our 2016 report

In addition to our scientific assemblies, IACS also supports events that are of interest to the cryospheric community. Our contributions are either to cover part of the travel costs of attendees (early career scientists and scientists from developing countries) or towards IACS awards for scientists in these categories. Recent sponsorships are listed below:

- *International Glacial Seismology Training School*, 11-17 June 2017, Fort Collins, CO, USA. IACS provided support for student participation.
- Past Antarctic Ice Sheet Dynamics (PAIS) [conference](#), September 10<sup>th</sup>-15<sup>th</sup> 2017, Trieste, Italy. IACS provided support for student participation.

- IACS provided awards for best presentations at the *International Workshop on Cryospheric Change and Sustainable Development*, 1-2 August 2017, Lanzhou, China. An event report can be found here on [IACS website](#).



*International Glacial Seismology Training School sponsored by IACS. 11-17 June 2017, Fort Collins, USA*

### **IACS early career scientist award**

These prizes will be presented at bi-annual scientific assemblies (IACS, and IUGG General Assemblies). Information about the 2016 awardees can be found [here](#). The next round of awards will be made in time for the 2019 Montreal IUGG General Assembly.

### **IACS contribution to World Meteorological Organisation ‘Global Cryosphere Watch’**

IACS is contributing since 2011 to the development of the World Meteorological Organisation (WMO) cross-cutting initiative Global Cryosphere Watch (GCW). IACS was asked to join following our wish to contribute to WMO activities related to the cryosphere and in particular because of IACS experience in standards and terminology. Immediate Past President Charles Fierz currently represents IACS in various Task Teams and within the GCW Steering Group. After finalising the design of the CryoNet network comprising both research and operational stations and assessing more than 100 applications, work now concentrates on establishing Best Practices, making data exchange possible, and terminology. This is a crucial phase as GCW is due to become operational by 2023. GCW should thus progressively gain more importance within WMO and the goal is to provide the cryospheric community with a possibility to fund long-term monitoring tasks based on this partnership with GCW/WMO. A small step may be seen in IACS and GCW both sponsoring the development of the open source software [niViz](#) to record and visualise snow profiles based on the international IACS/CAAML standard format.

## FUTURE ACTIVITIES

### New Working Groups

IACS is currently seeking new Working Groups. We have currently received two preliminary enquiries; the first is from the *Microsnow Working Group*, who are putting together a new proposal to explore the feasibility of a Community Snow Model that would be as physically based as possible, covering snow from its deposition on the surface down to the transition of firn into ice. The model could then serve as a benchmark for evaluating less complex models. The second enquiry is from a multi-organisational group that proposes to investigate ocean and ice-sheet model ensembles, a highly topical area of research of direct relevance to the Intergovernmental Panel for Climate Change.

### IACS sponsorship of forthcoming meetings

- IACS will sponsor a Chilean student to attend the 4<sup>th</sup> Snow Science Winter School to take place at Col du Lautaret, France, from 11-17 February 2018. IACS Immediate Past President Charles Fierz will act as lecturer. More info is available at the school [website](#).
- IACS will co-sponsor the 2018 International Summer School in Glaciology from 5-15<sup>th</sup> June, to be organised by the University of Alaska Fairbanks in McCarthy, Alaska. We very much appreciate that IUGG are also providing some financial support for this summer school. The course provides glaciology graduate students with a comprehensive overview of the physics of glaciers and current research frontiers in glaciology. IACS President Regine Hock is the principal organiser of the course. More information is available [here](#).

Andrew Mackintosh, IACS Secretary General

# International Association of Geodesy (IAG)



International Association  
of Geodesy

IAG website: [www.iag-aig.org](http://www.iag-aig.org)

## INTRODUCTION

The mission of the International Association of Geodesy (IAG) is the advancement of geodesy as the discipline dealing with the measurement and time-dependent representation of the geometry and physics of the Earth. This includes the shape of the Earth's surface and its deformation, the Earth's orientation and rotation in space, the Earth's gravity field and dynamic behaviour, and parameters of the atmosphere and hydrosphere and their variations. The IAG implements its mission by furthering geodetic theory through research and teaching, collecting, analysing, modelling and interpreting observational data, stimulating technological development, and providing consistent, time-dependent geometric and physical parameters for global change research.

The structure of IAG includes four Commissions, the Inter-Commission Committee on Theory (ICCT), thirteen International Scientific Services, the Global Geodetic Observing System (GGOS), and the Communication and Outreach Branch (COB). The Commissions are divided into Sub-commissions, Study Groups and Working Groups. The ICCT investigates scientific geodetic problems in close cooperation with the Commissions. The Services generate scientific products by means of Operation, Data and Analysis Centres. One of the roles of the GGOS is the coordination of the different IAG components, related in particular to the maintenance of global reference frames for measuring and consistently interpreting global change processes, and to promote its use to the scientific community, policy makers and the public. The COB provides communication, public information and outreach links, in particular via the IAG Website and the monthly Newsletters.

IAG's administration is supervised by the Council and conducted by the Executive Committee, the Bureau and the Office. The Council is composed by the delegates appointed by the national adhering bodies; the Bureau comprises the IAG President, Vice-President and Secretary General; the Executive Committee consists of the Bureau and other members elected by the Council; and the Office assists the Secretary General. The detailed programme of the IAG is published in the quadrennial Geodesist's Handbook, and reports are published in the bi-annual IAG Reports (Travaux de l'AIG).

## ADMINISTRATION

### IAG Council

There was a Council meeting at the joint IAG-IASPEI Scientific Assembly in Kobe, Japan, July 31, 2017. Main topics were the mid-term reports of the IAG components, the IAG strategy discussion, and the start of a revision of the Statutes and Bylaws for adoption at the General Assembly 2019.

## **IAG Executive Committee (EC)**

The EC held two meetings in 2017, in Vienna, Austria, April 28, and in Kobe, Japan during the IAG- IASPEI Scientific Assembly with sessions on July 30 and August 3. Most important topics were the organisation of the Scientific Assembly in Kobe, the IAG strategy discussion, which shall lead to an update of the IAG Statutes and Bylaws, and the assessment of all IAG components based on the [mid-term reports](#). The EC meeting summaries are available [here](#).

## **IAG Bureau**

The IAG Bureau discussed the day-to-day decisions by e-mail exchange and met in person before the EC meetings. It decided, e.g., on IAG representations at external meetings and on travel award applications of young scientists for participation and presentation at IAG sponsored Symposia.

## **IAG Office**

Main activities of the IAG Office were the organisation of the Scientific Assembly in Kobe, Japan, and the preparations of Council, EC and Bureau meetings. The IAG Mid-term Reports 2017 with the complete description of the activities of IAG components 2015-2017 were collected, compiled and published (545 pages, [https://iag.dgfi.tum.de/fileadmin/IAG-docs/Travaux\\_2015-2017.pdf](https://iag.dgfi.tum.de/fileadmin/IAG-docs/Travaux_2015-2017.pdf)), and the IAG budget was managed. Minutes of the Council and EC meetings were written for internal use and meeting summaries for the IAG Homepage and Newsletter (published in the Journal of Geodesy). The individual IAG membership was handled.

# **ACTIVITIES**

## **Commissions, Inter-Commission Committee, and Services**

The four IAG Commissions (Reference Frames, Gravity Field, Earth Rotation and Geodynamics, Positioning and Applications), the Inter-Commission Committee on Theory (ICCT), and the thirteen Services maintain their individual Webpages (all accessible via the IAG Homepage). They held business meetings at the Scientific Assembly in Kobe and organised symposia and workshops together with their sub-components (Sub-Commissions, Working and Study Groups, Coordinating, Directing or Governing Boards, see below).

## **Global Geodetic Observing System (GGOS)**

The GGOS Chair was handed over to Richard Gross in early 2017. At the annual GGOS Days from October 31 to November 2, 2017 in Vienna, Austria, the GGOS Consortium (made up by representatives of the IAG Components) and the Coordinating Board (the elected decision making body) held their administrative meetings. The GGOS Bureaus (Networks & Observations, and Products & Standards) and the four GGOS Focus Areas (Unified Height Systems, Geohazards Monitoring, Sea Level Change, Geodetic Space Weather Monitoring) presented their activities in plenary sessions.

## **Communication and Outreach Branch (COB)**

Main activities of the COB were the publication of the monthly Newsletters (online and in the Journal of Geodesy), and the maintenance of the IAG Homepage. The IAG Newsletter is sent to the IAG officers and individual members, to the Presidents and Secretaries General of the IUGG and its Associations, and to the sister societies (FIG, ICA, ISPRS etc.).

## **Important Meetings of IAG Components and IAG Sponsored Meetings in 2017**

- 1st International Symposium “Applied Geomatics and Geospatial Solutions”, Rosario, Argentina, April 3-7, 2017;
- 9th IVS Technical Operations Workshop, Westford, MA, USA, April 30 – May 4, 2017;
- EUREF 2017 Symposium, Wroclaw, Poland, May 17-19, 2017;
- DORIS Analysis Working Group Meeting, London, UK, May 22-24, 2017;
- 21st Meeting of the Consultative Committee for Time and Frequency, Sèvres, France, June 6-9, 2017;
- 1st IUGG Symposium on Planetary Science (IUGG-PS), Berlin, Germany, July 3-5, 2017;
- IGS Workshop 2017, University of Paris-Diderot, France, July 3-7, 2017;
- IAG/GGOS/IERS Unified Analysis Workshop, Paris-Diderot, France, July 10-12, 2017;
- GNSS Tsunami Early Warning System Workshop, Sendai, Japan, July 25-27, 2017;
- IAG and IASPEI Joint Scientific Assembly, Kobe, Japan, July 30 – August 4, 2017;
- Asia-Pacific Space Geodynamics Symposium, Shanghai, China, August 15-18, 2017;
- Workshop on Glacial Isostatic Adjustment and Elastic Deformation, Reykjavik, Iceland, September 5-7, 2017;
- 3rd COSPAR Symposium "Small Satellites for Space Research", Jesu, South Korea, September 18-22, 2017;
- Workshop "Satellite Geodesy for Climate Studies", Bonn, Germany, September 19-21, 2017;
- Journées des Systèmes de Référence et de la Rotation Terrestre, Alicante, Spain, September 25-27, 2017 ;
- ILRS Technical Workshop 2017, Riga, Latvia, October 2-5, 2017;
- 9th ABLOS Conference, IHB Monaco, Monaco, October 10-11, 2017;
- International workshop on the inter-comparison of space and ground gravity and geometric spatial measurements, Strasbourg, France, October 16-18, 2017;
- EUREF Analysis Centres Workshop, Brussels, Belgium, October 25-26, 2017;
- GGOS Days, Vienna, Austria, October 31 – November 4, 2017;
- SIRGAS Workshop on GNSS Real-Time Positioning, Mendoza, Argentina, November 22-24, 2017;
- SIRGAS 2017 Symposium, Mendoza, Argentina, November 27-29, 2017;
- 5th High Level Forum of the UN-GGIM, Mexico City, Mexico, November 28-30, 2017;
- SIRGAS Workshop on SLR in Latin America, Mendoza, Argentina, November 30 – December 1, 2017;
- 12th Meeting of the International Committee on Global Navigation Satellite Systems, Kyoto, Japan, December 2-17, 2017.

## **Cooperation with other Organisations**

IAG maintains close cooperation with several organisations outside IUGG: Advisory Board on the Law of the Sea (ABLOS, presently with IAG presidency), Group on Earth Observation (GEO), ICSU Commission on Space Research (COSPAR, Sub-commission B2 and PSD), International Astronomical Union (IAU, Commission A2), International Standards Organisation (ISO, TC211 Geographic Information / Geomatics), Joint Board of Geospatial Information Societies (JBGIS), United Nations Initiative on Global Information Management (UN-GGIM), United Nations Offices for Outer Space Affairs (UNOOSA, with Space-based Information for Disaster Management and Emergency Response, UN-SPIDER, and International Committee on Global Navigation Satellite Systems, ICG).

## **Individual IAG membership**

By the end of 2017, there were 218 regular members and 10 student members.

## **Publications**

The main publications in 2017 were the monthly issues of the Journal of Geodesy, the IAG Symposia Series (Vols. 145: Geodesy for Earthquakes and Natural Hazards, 146: REFAG 2014, and 147: Earth and Environmental Sciences for Future Generations) and the IAG Reports Vol. 40 (Travaux de l'AIG 2015-2017).

## **Awards, Anniversaries, Obituaries**

Travel awards with a total of US\$ 19300 were granted to 23 young scientists for participating and presenting research results at the IAG/IASPEI Scientific Assembly and two other IAG Symposia. Four obituaries were published for former IAG officers and associates who passed away in 2017. The IAG President and Secretary General represented IAG in various anniversaries of the death of Friedrich Robert Helmert, Director of the Central Bureau of the International Geodetic Association 1886-1917.

## **FUTURE ACTIVITIES**

Main activities in 2018 concern the IAG strategy discussion and the cooperation in the Subcommittee on Geodesy of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM).

The status of the strategy discussion, described in the strategy document 2017, lists eight visions and three options that may lead to a revision of the present Statutes and Bylaws. Eventual changes must be formulated in 2018 in order to have them approved by the IAG Council at the General Assembly 2019.

IAG is represented in the UN-GGIM permanent Subcommittee on Geodesy. The main activity is the implementation of the Global Geodetic Reference Frame (GGRF). IAG wrote a [position paper](#) stating the geometric, gravimetric and height reference frames as the three principal components of the GGRF.

The nomination of new officers for the period 2019-2023 and the selection of the venue of the IAG Scientific Assembly 2021 are other important activities.

Hermann Drewes, IAG Secretary General

# International Association of Geomagnetism and Aeronomy (IAGA)



International Association  
of Geomagnetism and Aeronomy

IAGA website: [www.iaga-aiga.org](http://www.iaga-aiga.org)

## INTRODUCTION

**IAGA**, the International Association of Geomagnetism and Aeronomy (AIGA - Association Internationale de Géomagnétisme et d'Aéronomie) is one of the eight Associations of the International Union of Geodesy and Geophysics (IUGG). It is a non-governmental body funded through the subscriptions paid to IUGG by its Member Countries. IAGA has a long history and can trace its origins to the Commission for Terrestrial Magnetism and Atmospheric Electricity, part of the International Meteorological Organization, which was established in 1873.

IAGA is the premier international scientific association promoting the study of terrestrial and planetary magnetism, and space physics. IAGA is concerned with the understanding and knowledge that result from studies of the magnetic and electrical properties of:

- the Earth's core, mantle and crust
- the middle and upper atmosphere
- the ionosphere and the magnetosphere
- the Sun, the solar wind, the planets and interplanetary bodies.

## ADMINISTRATION

Since 2015, IAGA is organized in [six Divisions and four Inter-divisional Commissions](#), each led by a Chair and a Co-Chair. Each Division may form Working Groups in given specialized topics and elects officers to run the business of the Working Groups. During the XXVI IUGG General Assembly in Prague (2015), IAGA renewed its officers.

IAGA is administered by an Executive Committee on behalf of IUGG Member Countries in accordance with the Association's Statutes and By-Laws. The current Executive Committee members are:

**President:** Eduard Petrovsky (Czech Republic)

**Vice-President:** Monika Korte (Germany)

**Secretary General:** Mioara Manda (France)

**Members:** Inez Batista (Brazil), Archana Bhattacharyya (India), Brian J. Fraser (Australia), Pieter Kotze (South Africa), Renata Lukianova (Russia), Alan Thomson (UK), and Andrew Yau (Canada).



IAGA communicates with Member Countries through National Correspondents nominated by appropriate national bodies. Member Countries are represented at IAGA Assemblies by accredited Chief Delegates who may vote on matters, according to the voting rules set out in the Statutes and By-Laws, at meetings of the Conference of Delegates. Information on the EC members and National Correspondents can be found [online](#).

## ACTIVITIES

### Joint IAPSO-IAMAS-IAGA Assembly

The main event in 2017 was the Joint IAPSO-IAMAS-IAGA Assembly which officially closed on Friday 1st September 2017. The conference was a highly successful Joint Assembly organised at Cape Town's CTICC, and the first of its kind between the three IUGG associations. Lasting a full 5 days, the Joint Assembly had a total of 1038 registrations (383 for IAGA). IAGA was indeed well represented, with 557 out of 1356 abstracts (the conference abstracts are available on the IAGA web).

The IAGA programme efficiently ran in a conference centre which provided an excellent space, giving us the chance to catch up with latest developments in our own research specialities, as well as take in some of the more inter-disciplinary topics. The meeting provided many opportunities for scientists to discuss different topics, over breaks, poster sessions, and the IAGA special dinner party!

On Thursday 30th August each association hosted their medal awards. For the first time, IAGA organised a special event, including the ceremony itself and an invited lecture given by the Shen Kuo awardee, Jeffrey Forbes.



The IAGA awards ceremony: [IAGA Shen Kuo Award](#) for Interdisciplinary Achievements to Jeffrey Forbes (USA), [IAGA Long Service Medal](#) to Jean Rasson (B); [Young Scientist Award](#) to Emma Douma (NZ), Katarzyna Dudzisz (PL) and Federico Gasperini (USA)

### The 3rd IAGA School

The third IAGA Summer School took place at SANSa Space Science in Hermanus, South Africa, from 20-26 August 2017 (the week before Scientific Assembly of IAPSO-IAMAS-IAGA). The event was attended by 19 post-graduate students from 15 countries worldwide (e.g., Algeria, Brazil, Mexico, India, Japan, Russia, Poland, UK, South Africa). The attendees included students nominated for the IAGA Young Researcher Award, or nominated by the IAGA Division and Working Group leaders. Altogether 6 topics

across all the disciplines of IAGA were covered by lectures given by experts in their fields. Lectures were accompanied by practical projects that the students worked on in groups and presented on the last afternoon. Interactions among students and between students and lecturers were very friendly and informal and friendships and networks were formed. Both the students and the lecturers gave very positive feedback on the event.



*The 3<sup>rd</sup> IAGA school (Hermanus, South Africa)*

### **Sponsored Topical Meetings**

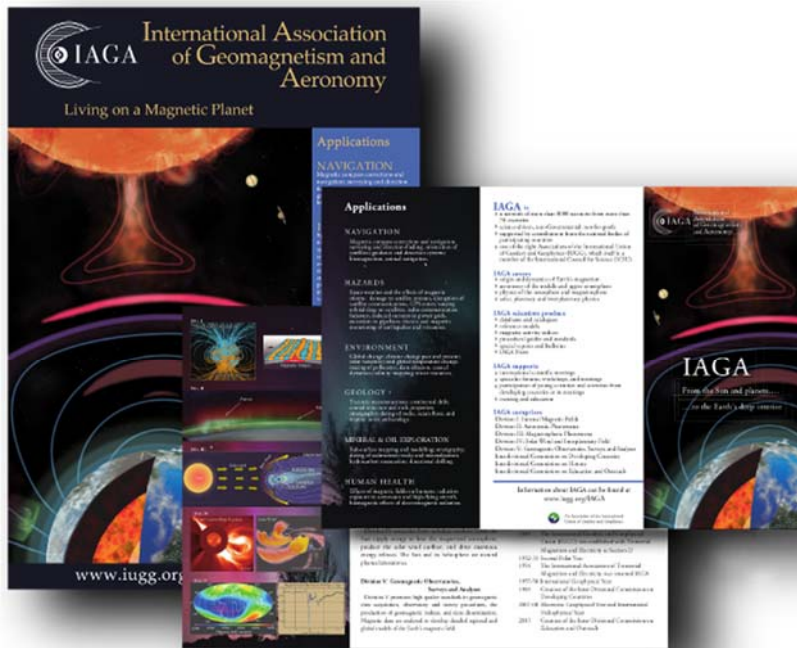
IAGA sponsored several topical meeting during 2017. The main achievements are published in the last IAGA newsletters.

25 Jun – 1Jul	2nd Conference on Natural Dynamos	Bratislava, Slovakia	Jan Simkanin
17 - 21 Jul	Space Weather of the Heliosphere: Processes and Forecasts	Exeter, UK	Claire Foullon
18 - 22 Sep	V LATINMAG	UNAM Juriquilla Campus, Mexico	Roberto S. Molina Garza

### **Publications**

*IAGA Newsletters*. 54; the last issue of IAGA Newsletters was distributed at the end of December 2017. It can be downloaded from the IAGA [website](#).

*New Flyer and Poster*. The new version of the IAGA flyer is also available [online](#).



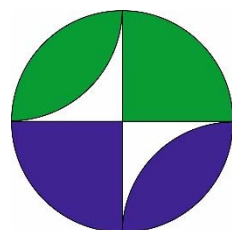
## FUTURE ACTIVITIES

### Preparations for IUGG 2019

During 2018 IAGA will be involved in organising several topical meetings, as well as in preparing of an attractive programme for the 2019 IUGG Assembly, when 100 years of IUGG will be celebrated.

Mioara Manda, IAGA Secretary General

# International Association of Hydrological Sciences (IAHS)



IUGG



International Association  
of Hydrological Sciences

IAHS website: <http://iahs.info>

## INTRODUCTION

IAHS promotes the study of all aspects of hydrology through discussion, comparison, and publication of research results and through the initiation of research that requires international cooperation. IAHS Press publishes the Hydrological Sciences Journal, the Proceedings of IAHS (PIAHS, open access, successor of the Red Book Series), the Benchmark Paper series, and other specialised publications. IAHS maintains strong connections with the International Hydrological Programme of UNESCO and with the Hydrology and Water Resources Programme of the World Meteorological Organisation (WMO), and is partner of the UN Water coordination mechanism.

## ADMINISTRATION

The following International Commissions, Working Groups and Initiative of IAHS conduct conferences, symposia, workshops, courses, and research programs:

- International Commission on Continental Erosion (ICCE)
- International Commission on the Coupled Land-Atmosphere System (ICCLAS)
- International Commission on Groundwater (ICGW)
- International Commission on Remote Sensing (ICRS)
- International Commission on Snow and Ice Hydrology (ICSIH)
- International Commission on Statistical Hydrology (ICSH)
- International Commission on Surface Water (ICSW)
- International Commission on Tracers (ICT)
- International Commission on Water Quality (ICWQ)
- International Commission on Water Resources Systems (ICWRS)
- Working Group MOXXI on Measuring and Observing in the XXIst century
- Working Group CANDHY on Citizens AND HYdrology
- Working Group on Education
- Decadal Initiative Panta Rhei 2013-2022

## ACTIVITIES

The main event of 2017 has been the Xth Scientific Assembly of the Association held in Port Elizabeth, South Africa, from 10 to 14 July 2017. The assembly was organized by the South African National Committee of the IAHS, with legal responsibilities endorsed by Rhodes University, Grahamstown; ultimately by Denis Hughes, Graham Jewitt and their teams, in close cooperation with the IAHS secretariat. Waternet, a major Southern African regional network of universities and institutes in the

field of integrated water resources management, has been involved as a key partner. The overall theme of the meeting was “Water and Development: Scientific Challenges in Addressing Societal Issues”; which is particularly appropriate in the context of an IAHS scientific assembly being held for the first time in sub-Saharan Africa, and is well aligned with the IAHS Panta Rhei decadal initiative. The assembly gathered 240 participants from 42 countries including 40 participants from South Africa. 350 papers and posters were presented in the framework of two symposia (S1: Water security and the food-water-energy nexus: drivers, responses and feedbacks at local to global scales; and S2: Water quality and sediment transport issues in surface water) and 22 workshops. Three PIAHS volumes are being edited as outcomes of this assembly, with a particular focus on African hydrology and water-energy-food nexus. UNESCO, WMO and UNU co-convened several sessions, and UNESCO further inscribed a specific workshop on Hydro-diplomacy in the Assembly. WMO, UNESCO, Taylor and Francis allocated funds to IAHS to support delegates from countries in need to participate. IAHS further allocated proper funds to support delegates identified by the Local Organizing Committee and the Waternet partner.



*Group picture of the IAHS Assembly in Port Elizabeth, South Africa*

During the IAHS Plenary, Pierre Hubert (France) addressed the audience on behalf of the IUGG President. Dan Rosbjerg (Denmark) and Zbyszek Kundzewicz (Poland) were respectively awarded the International Hydrological Prize Volker and the Dooge Medals (jointly bestowed by IAHS, UNESCO and WMO), and Mohammed Merheb (Lebanon) received the Tison Award (for the best publication over the last two years by a young scientist). The President-Elect Günter Blöschl (Austria) became President for the next four years, and Hubert Savenije (Netherlands) became Immediate Past President, taking the opportunity to summarize transitions incepted and operated over the past four years. Similarly, Presidencies have changed for the ten commissions.

An editorial retreat of Hydrological Sciences Journal was held over two days prior to the Assembly itself, supported by Taylor and Francis, publisher of the Journal. Strategic decisions have been taken by the Editorial board. Special recognition has been granted to Demetris Koutsoyiannis (Greece) for many years of service as co-editor and then Editor in chief of the Journal, prior to a formal stepping

down on 31<sup>st</sup> December. Mike Acreman (UK) also stepped down in April 2017 as co-editor and Secretary of the board of IAHS Ltd, the UK Charity legal body supporting IAHS. Attilio Castellarin (Italy) and Ross Woods (UK, New Zealand) were confirmed as co-editors, A. Castellarin becoming Editor in chief. Decision was taken to identify a third co-editor early 2018. Helen Houghton-Carr became secretary of the Ltd board. Mike Acreman and Helen Houghton-Carr are staff members of the UK CEH, which hosts the IAHS Press office and executive secretariat. IAHS acknowledges the long standing constructive support from CEH.

A special session has been held during the Assembly to close the second biennium 2015-2017 and open the third one 2017-2019 of the Panta Rhei Decade. Hillary McMillan (USA, New Zealand) and Giuliano di Baldassare (Italy, Sweden) were acknowledged as the outgoing and incoming chairs, respectively, together with their respective biennium steering teams. Achievements of the first four years have been listed and put into perspectives, including Montanari *et al.* (2013) and McMillan *et al.* (2016) agenda setting and progress synthesis articles published in Hydrological Sciences Journals, the expanding series of Panta Rhei Opinion papers therein, ongoing works of Working Groups across the world, dedicated sessions organized in Assemblies and specific events organized in different settings.

At the meeting of the new Bureau held on 15 July, Montpellier, France was chosen as the location of the next IAHS Scientific Assembly (28 June - 2 July 2021); and the working group CANDHY on Citizen AND Hydrology was created, chaired by Fernando Nardi (Italy).

In addition to the Port Elizabeth Assembly, many events have been organized, sponsored or supported by IAHS and its Commissions and Working Groups in 2017. Among them, we would like to quote the followings: Panta Rhei sessions at the EGU General Assembly (Vienna, Austria, 23-28 April) and AGU Fall Assembly (New Orleans, USA, 11-15 December); the first Atlas Georesources International Congress, Hammamet, Tunisia (20-22 March); The International Conference on the status and future of the World's large rivers, New Delhi, India (18-21 April); HydroEco, Birmingham, UK (19-22 June); Summer school on Prediction in Ungauged Basins PUB, Vienna, Austria (3-7 July); Stahy (Statistical Hydrology) 2017 conference, Warsaw, Poland (21-22 September); Drought in the Anthropocene Panta Rhei workshop, Freiburg, Germany (8-11 October); Scientific days of the Medjerda river, Medjez el Bab, Tunisia (25-27 October); 18<sup>th</sup> Waternet Symposium, Swakopmund, Namibia (25-27 October).

The second IAHS Panta Rhei workshop focused on Developing countries has been organized in Gorgan, Iran (20-22 November) to follow up on the first edition organized in Shenzhen, China late 2016. Decision has been taken to have the third edition, late 2018 in Zimbabwe.

As the outcome of the long standing cooperation between IAHS and the WMO Commission of Hydrology and corresponding programme and secretariat, the second topical workshop of the MOXXI working group has been organized in WMO headquarters in Geneva, Switzerland (4-5 December) jointly with the launching event of the WMO Hydrohub initiative on metrological innovations in hydrology. The event was organized with a hybrid format, mixing talks and brainstorming sessions on innovation and putting into practice, with perspectives and inputs by scientists, operational hydrometeorological services and private companies. The MOXXI community article Tauro *et al.* (2018, in press at the moment in Hydrological Sciences Journal) has been strongly acknowledged. The joint workshop hosted a specific segment offered to the new European COST Network Harmonious on the use of UAVs in the field of water and vegetation.

16 issues of Hydrological Sciences Journal have been published, containing 184 papers. The end of bilingualism decided two years ago by the Bureau led to the publication of the last paper in French in December. The special series of HSJ Opinion Papers directly linked to Panta Rhei, launched in 2016, was fed by several articles:

- Kreibich, H., *et al.*, Editorial: Scientific debate of Panta Rhei research – how to advance our knowledge of changes in hydrology and society? *HSJ* 62 (3), 331–333.
- Blume, T., *et al.*, The role of experimental work in hydrological science – insights from a community survey. *HSJ* 62 (3), 334–337.
- Srinivasan, V., *et al.*, Prediction in a socio-hydrological world. *HSJ* 62 (3), 338–345.
- Westerberg, I.K., *et al.*, Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example. *HSJ* 62 (11), 1705–1713.
- Liu, J., *et al.*, Challenges in operationalizing the water–energy–food nexus. *HSJ* 62 (11), 1714–1720.
- Carisi, F., *et al.*, Is anthropogenic land subsidence a possible driver of riverine flood-hazard dynamics? A case study in Ravenna, Italy. *HSJ* 62 (15), 2440–2455.

Volume 375 of PIAHS has been published following the 2016 ICCE Symposium, entitled Integrating monitoring and modelling for understanding, predicting and managing sediment dynamics, edited by A. Collins, M. Stone, A. Horowitz, and I. Foster. Three other volumes have been processed following the Port Elizabeth Assembly, to be published early 2018.

In Port Elizabeth, the President Günter Blöschl initiated the UPH – Unsolved Problems in Hydrology initiative. A discussion has been invited and facilitated on LinkedIn in a dedicated discussion group, articulation with other organizations has been engineered, and the procedure to lead the collective process and formalize the agenda setting outcome has been decided for 2018.

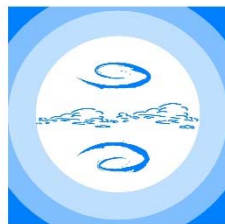
The close cooperation of IAHS with UNESCO, WMO, the UN-Water coordination mechanism has been continued. We have contributed to the UN World Water Development Reports – WWDR 2017 (water quality) and 2018 (nature-based solutions); attended the UNESCO IHP Bureau meeting, the WMO CHy Advisory Working Group meeting and two semestrial UN Water steering meetings; and participated to the Task Force to shape the 2018-2028 UN Water Decade for action towards sustainability.

## **FUTURE ACTIVITIES**

The near-future activities are well organized around many events of commissions and working groups, HSJ and PIAHS publications, the reinforcement of the financial fund to support scientists from countries in need, joint activities with UN agencies including the kick off of the 2018-2028 UN Decade on water, the planning for the IUGG 2019 Montreal Assembly, the third biennium of Panta Rhei, and the cristallisation of the Unsolved Problem in Hydrology initiative.

Christophe Cudennec, IAHS Secretary General

# International Association of Meteorology and Atmospheric Sciences (IAMAS)



International Association of Meteorology and Atmospheric Sciences

IAMAS website: [www.iamas.org](http://www.iamas.org)

## INTRODUCTION

IAMAS is the specialized Association of the International Union of Geodesy and Geophysics (IUGG) that deals with all aspects of the gaseous envelope around the Earth and other planets. The main research work is carried out, coordinated and communicated through IAMAS's ten International Commissions (IC), which are in alphabetical order the:

- International Commission on Atmospheric Chemistry and Global Pollution (ICACGP)
- International Commission on Atmospheric Electricity (ICAE)
- International Commission on Climate (ICCL)
- International Commission on Clouds and Precipitation (ICCP) including the Committee on Nucleation and Atmospheric Aerosols (CNAA)
- International Commission on Dynamical Meteorology (ICDM)
- International Commission on the Middle Atmosphere (ICMA)
- International Commission on Planetary Atmospheres and their Evolution (ICPAE)
- International Commission on Polar Meteorology (ICPM)
- International Ozone Commission (IOC)
- International Radiation Commission (IRC)

All the ICs, and IAMAS as a whole, play a leading role in global coordination, communication and discussion of the latest research through organization of and participation in a wide range of scientific meetings that are open to all scientists.

## ADMINISTRATION

The IAMAS Bureau elected Steven A. Ackerman (USA) as the new Deputy Secretary General, a replacement for Peter Pilewskie. IAMAS is very grateful for the contributions of Peter Pilewskie to the association over the last few years. The Bureau members communicated regularly during the year through monthly teleconferences and emails. The 2017 physical meeting of the Bureau meeting was held on 27 August in Cape Town, South Africa during the IAPSO-IAMAS-IAGA Assembly. The Bureau reviewed the IAMAS financial status and activities, and discussed important items related to the IAMAS management. During the two IAMAS EC meetings held on 27 and 31 August, the host of the 2021 IAMAS Science Assembly (Busan, South Korea) was selected. The commissions also presented their activity reports. A new commission officer was elected as follows:

ICDM: Vice-President      Thomas Spengler



## ACTIVITIES

### IAMAS Scientific Assembly 2017:

The IAPSO-IAMAS-IAGA 2017 joint Scientific Assembly was held successfully over 27 August - 1 September in Cape Town, South Africa. This was the first full IAMAS assembly to be held in Africa. The IAMAS-registered participants constituted 36% of the total attendees of more than 1,000 scientists from 64 countries. IAMAS supported the registration fee/accommodation of 21 young scientists and scientists from developing countries. This Assembly was an effective platform for discussion and planning of cross-association science, with 11 joint symposia involving the three associations. The four IAMAS-led joint symposia were:

- Observing Our Planet from Space (IAMAS, IAGA, IAPSO)
- Climate Variability and Change On All Scales (IAMAS, IAPSO)
- Thunderstorm Coupling to the Upper Atmosphere (IAMAS, IAGA)
- Future Climate for the African Continent (IAMAS, IAPSO).

Fifteen IAMAS-only symposia were held.

IAMAS Plenary Session: The IAMAS Plenary Session was held on 31 August, which was a great opportunity for the whole IAMAS community to meet together and discuss the possible future direction of the association. Another highlight of the plenary session was the presentation of the 2017 IAMAS Early Career Scientist Medal to Corinna Hoose (Karlsruhe Institute of Technology, Germany).

IAMAS Early Career Scientist Event: An early career scientist (ECS) event was held on 31 August with about 40 scientists participating, including ECSs, officers of IAMAS and its commissions, mid-career scientists and scientists involved with other ECS organisations. The event was a mixture of talks and networking.



*IAMAS Executive committee and National Delegates*



*Corinna Hoose, the Medal Awardee and Joyce Penner, the chair of the Awards Committee*

### Publications

*Advances in Atmospheric Sciences* (AAS) — the IAMAS associated journal

- [“Special Issue: Impact of a Rapidly Changing Arctic on Eurasian Climate and Weather”](#) (Guest Editor Andrew Orr from ICPM)

- [“Special Issue: Aerosols, Clouds, Radiation, Precipitation, and Their Interactions”](#) (Guest Editors Teruyuki Nakajima and Byung-Ju Sohn from IRC)
- [“Putting faces to names: Snapshots of two committee meetings, 95 years apart, emphasize continuous international cooperation in the atmospheric sciences”](#) (Hans Volkert, past Secretary General of IAMAS)
- [The Quadrennial Ozone Symposium 2016](#) (IO3C)
- [Atmospheric precursors of and response to anomalous Arctic sea ice in CMIP5 models](#) (James Screen, IAMAS Early Career Scientist Medalist)
- [Aerosol microphysical and radiative effects on continental cloud ensembles](#) (Yuan Wang, IAMAS Early Career Scientist Medalist)
- [3rd ANtarctic Gravity Wave Instrument Network \(ANGWIN\) science workshop](#) (ICPM)
- [A new IASI channel selection and assessment of its impact on Met Office NWP forecasts](#) (Byung-Ju Sohn, IRC President)

## Highlights from the IAMAS International Commissions

### [ICACGP](#)

The IAMAS meeting in Cape Town, 27 August – 3 September 2017, iCACGP organised the session M01 (Atmospheric Chemistry and Physics for the 21st Century) with 44 oral presentations and 11 posters, and also participated in other sessions including JM1 (Observing our Atmosphere from Space, Anne Thompson co-convenor) with John Burrows, Jim Drummond and Anne Thompson giving oral presentations. The commission has also been involved in planning the joint 14th iCACGP Quadrennial Symposium and 15th IGAC Science Conference in Japan, 25-29 September 2018. The Commission also supported the following meetings, which were funded in part by IAMAS and IUGG: The 3rd ACAM (Atmospheric Composition and Asian Monsoon) Workshop, Jinan University, Guangzhou China, 5-9 June 2017. Participants consisted of 160 scientists from 18 countries. There were 80 oral presentations and 50 posters. This was followed by the 2nd ACAM training school with participants from seven Asian and three European countries. An AGU session at the Fall 2016 meeting honouring Jack Calvert and Donald Stedman (A13J: Emissions and Tropospheric Photochemistry on the Urban Scale I). The commission has also written letters of support for numerous regional, national and international experiments in atmospheric chemistry.

### [ICAE](#)

ICAE has published two issues of its newsletter. The two ICAE newsletters were well received by ICAE colleagues and can be accessed through the ICAE [website](#). ICAE organized one session for the IAPSO-IAMAS-IAGA Scientific Assembly. The website and mailing list were updated.

### [ICCL](#)

Two business meetings of ICCL concerned the ICCL Biennial Report (2015-2017) as well as the relevant symposia of the 27th IUGG Assembly in 2019 in Montreal were held in Cape Town, South Africa. ICCL co-organized and co-sponsored five IAMAS symposia and one joint symposia at IAPSO-IAMAS-IAGA 2017 Assembly in Cape Town, South Africa. ICCL co-organized the 2nd international workshop of Marine Heatwaves – Global Patterns of Impacts and Risks at Ao Nang Beach, Krabi, Thailand from 21-23 February 2017, co-sponsored the Fourth international conference of Hydrology delivers Earth System Sciences to Society (HESSS) in Tokyo, Japan from 16-19 May 2017, and co-organized the IUGG/WCRP-SPARC Training School on stratosphere-troposphere interactions at University of Cape Town, Cape Town, South Africa from 2-5 September 2017.

## [ICCP](#)

A business meeting of ICCP concerned with the planning of the symposia of the IUGG conference in Montreal in 2019 for the 100 years of IUGG/IAMAS was held in Cape Town, South Africa. The EUFAR/IAMAS/IUGG/ICCP Workshop on Processing of Cloud Probe Data was held at the German Aerospace Center (DLR) Oberpfaffenhofen over 7 to 9 July 2017. The 20th International Conference on Nucleation and Atmospheric Aerosols was held in Helsinki, Finland during 25- 30 June 2017. The monograph, "Ice Formation and Evolution in Clouds and Precipitation: Measurement and Modeling Challenges." is now published and available as open access [here](#).

## [ICDM](#)

ICDM reached a milestone in late 2017, having been established 50 years ago (25 September – 9 October 1967) in Zurich Switzerland at a plenary session of the International Association of Meteorology and Atmospheric Physics (IAMAP) (now IAMAS). There is some uncertainty about the exact date, as a variation on ICDM may have existed prior to 1967. In 2017, the commission co-sponsored and commission members helped plan three joint and eight IAMAS-only symposia at the IAPSO-IAMAS- IAGA Joint Assembly in Cape Town, South Africa. ICDM also proposed three joint and seven IAMAS-only symposia for the next IUGG Assembly in Montreal in July 2019. ICDM also promoted IAMAS and IUGG support for 'The 8th GEWEX Science Conference: Extremes and Water on the Edge' to be held in Canmore, Alberta, Canada on 6-11 May, 2018.

## [ICMA](#)

ICMA held the symposium on Middle Atmosphere Science at the IAPSO-IAMAS-IAGA General Assembly "Good Hope for Earth Sciences". The Middle Atmosphere Science symposium lasted four days (seven sessions) and had over 40 abstracts submitted. ICMA also co-led the joint IAGA-IAMAS JA4 Solar-related Variability of the Atmosphere Symposium and co-sponsored a few other symposia with IAGA. During the Assembly, ICMA held its business meeting on 30 August 2017. Following the IAPSO-IAMAS-IAGA Scientific Assembly in Cape Town, the [training school on Stratosphere-Troposphere Interactions](#) was held from 2-5 September 2017 at the University of Cape Town. The training school was partially funded by the IUGG Grant Programme. The report of the school was presented in the IAMAS InfoEmail of October 2017.

## [IOC](#)

IO3C sent recommendations to the total ozone observation community to convert Dobson and Brewer data to the new ozone cross sections recommended by the Absorption Cross Sections of Ozone (ACSO) working group, taking into account the sensitivity of the cross-sections to atmospheric temperature in the new processing. IO3C sent letters of support for ozone observation stations under danger of closing (e.g. Paramaribo, Suriname and Pearl Observatory, Canada). It organized the [Symposium for the 30th Anniversary of the Montreal Protocol](#) in September 2017 in Paris.

## [ICPAE](#)

ICPAE endorsed a proposal for funding of student travel support for the 74th Fujihara seminar, "[International Conference on Venus](#)" to be held in Niseko, Hokkaido, Japan during 11-14 September 2018. The conference will cover all areas of Venus science with special focus on new results obtained from Japan's Venus Climate Orbiter "Akatsuki". The organizers invite papers on new results from past missions and on future exploration of Venus.

For the IUGG 2019 assembly, ICPAE is organizing a symposium on Clouds and Circulations in Planetary Atmospheres (M28). It is pleased to sponsor four joint symposia with other IAMAS commissions (JA5 -

Solar Influence on Atmosphere and Climate; JA6 - Space Weather Throughout the Solar System: Bringing Data and Models Together; JG6 - Remote sensing and modelling of the atmosphere; and JP6 - Paleoceanography and paleoclimatology).

## ICPM

ICPM had an active year in 2017. Efforts from the commission, with support from IAMAS, supported travel for several students and young scientists to attend the 12th Workshop on Antarctic Meteorology and Climate (WAMC) held in Boulder, Colorado over June 26-28, 2017. WAMC is a workshop endorsed by the ICPM as one of the key international meetings on Antarctic meteorology. It also featured an additional meeting day on June 29th hosted by the Year of Polar Prediction (YOPP) Office. This extra day focused on the planning of YOPP. ICPM was also involved with several sessions at the EGU 2017 meeting. Over July 7-9, 2017 ICPM members were in attendance at the EUFAR/ICCP/IAMAS Expert Workshop on Processing of Cloud Particle Measurements, held at DLR, Oberpfaffenhofen, Germany. Several sessions were sponsored and chaired by ICPM members at the Good Hope for Earth Sciences, 2017 Joint IAPSO-IAMAS-IAGA Assembly in Cape Town, South Africa.. Efforts at the end of the year have turned toward planning for the 2019 IUGG meeting in Montreal and researching the history of the ICPM. Those who have any historical information on the ICPM are encouraged to contact Matthew Lazzara, Secretary of the ICPM at [mlazzara@madisoncollege.edu](mailto:mlazzara@madisoncollege.edu).

## IRC

The International Radiation Commission Business Meeting 2017 was held during the IAMAS-IAPSO-IAGA Joint Conference, at Cape Town, South Africa. At the meeting, the formation of a new Working Group entitled “Hyperspectral radiation: measurements and modeling”, proposed by Dr. Piet Stammes from KNMI, Netherlands, was approved. Some working groups had changes in leadership, such as GEWEX Radiation Panel (GRP), now chaired by Dr. Remy Roca (CNES); ICLAS chaired by Dr. Alex Papayannis (National Technical University of Athens); ASA chaired by Dr. Iouli Gordon (Harvard-Smithsonian Center for Astrophysics); and Baseline Surface Radiation Network (BSRN) now led by Dr. Amelie Driemel (WRMC).

## **FUTURE ACTIVITIES**

The next IAMAS Bureau meeting will be held from 5 to 6 April 2018 in Cambridge, UK. All the commissions are engaged in the planning of the next IUGG General Assembly which will be held from 9 to 18 July 2019 in Montreal, Canada. IAMAS will lead six joint sessions:

<b>ID</b>	<b>Title of symposium</b>	<b>Convenor</b>
JM1	Adapting in the Anthropocene (Featuring of ‘Anthropocene’)	Keith Alverson
JM2	Cryosphere-ocean-atmosphere system interactions	Thomas A. Lachlan-Cope, Elisa Manzini, Thomas Spengler
JM3	Anthropogenic changes in chemistry and physics of the Atmosphere: evidence and attribution studies	John P. Burrows, Maria Kanakidou
JM4	Monsoons and their interaction with hydrology, vegetation and land processes	Iracema Cavalcanti
JM5	Extreme weather and their impact to the hydrology and land processes	Laxmi Sushama, Richard Grotjahn
JM6	Role of Ocean-Atmosphere Interactions in Climate Variability, Change and Predictability	Tim Woollings, Hisashi Nakamura, Richard Grotjahn

Teruyuki Nakajima, IAMAS Secretary General

# International Association for the Physical Sciences of the Oceans (IAPSO)



International Association  
for the Physical Sciences of the Oceans

IAPSO website: <http://iapso.iugg.org>

## INTRODUCTION

IAPSO has the prime goal of 'promoting the study of scientific problems relating to the oceans and the interactions taking place at the sea floor, coastal, and atmospheric boundaries insofar as such research is conducted by the use of mathematics, physics, and chemistry'. IAPSO works mainly through 1) biennial scientific assemblies; 2) working groups; 3) commissions; 4) services; and 5) website information. Of special importance to IAPSO is the involvement of scientists and students from developing countries in oceanographic activities.

IAPSO maintains formal liaison with other scientific commissions and committees. These include the ICSU's Scientific Committee on Oceanic Research (SCOR), and UNESCO's Intergovernmental Oceanographic Commission (IOC). More information can be found [here](#).

## ADMINISTRATION

The 2015-2019 Bureau of IAPSO comprises:

President:	Denise Smythe-Wright, (UK)
Past President:	Eugene Morozov, (Russia)
Secretary General:	Stefania Sparnocchia (Italy)
Treasurer:	Ken Ridgway (Australia)

The Executive Committee comprises the Bureau members and

Vice-Presidents:	Isabelle Ansorge (South Africa) Trevor McDougall (Australia)
Members:	Agatha de Boer (Sweden) Hans van Haren (Netherlands) Toshiyuki Hibiya (Japan) Christa von Hildebrandt-Andrade (USA and Puerto Rico) Chris Meinen (USA) Satheesh Chandra Shenoi (India)

The IAPSO office is located at the Institute of Marine Science of the National Research Council of Italy, Trieste, and day-to-day business is managed by Secretary General (SG), Stefania Sparnocchia. The SG is responsible for the IAPSO website and in July 2015 a new [IAPSO Facebook page](#) was created, with

the aim of facilitating the spreading of information in the community. Together with the President, the SG also prepares and distributes a bi-annual newsletter to IAPSO delegates and interested parties.

Financial management is presently split between Australia and Sweden. The previous Secretary General, Johan Rodhe, was co-opted by the IAPSO executive committee to assist the Treasurer, Ken Ridgway, with day-to-day banking until the Assembly in Montreal, Canada, in 2019..

IAPSO business meetings were conducted in August 2017, during the Joint IAPSO-IAMAS-IAGA Scientific Assembly in Cape Town, South Africa. These included four meetings of the Executive Committee, on 28, 29 and 31 August and 1 September 2017, and one General Business meeting also involving National Correspondents or their Delegates on 31 August 2017. Other business has been conducted by email where appropriate.

## ACTIVITIES

### 2017 Assembly

Three of IUGG's constituent Associations, IAPSO, IAMAS and IAGA, met for a Joint Scientific Assembly entitled "Good Hope for Earth Sciences" in Cape Town, South Africa, during the week 27 August - 1 September, 2017. The Assembly had a total of 1038 registrations from 64 different countries, although there were 57 'no-shows' despite being paid up.. About 230 registered as IAPSO scientists. The LOC secured a number of registration fees for participants from Africa plus 8 registration fees for participants from other countries. In addition 48 delegates from countries other than Africa were supported directly by IAPSO, including 9 members of the Executive Committee and the Albert I Medal winner. In detail, 42 registration fees were awarded (34 by IAPSO and 8 by LOC) plus 26 fees for lodging on IAPSO funds. 54% of the funds allocated to countries other than Africa have been granted to allow scientists to participate from other developing countries.

The Assembly's opening day was marked by a joint plenary session with a lecture from each Association. The plenary lecturer for IAPSO, Dr Essam Yassin Mohammed (United Kingdom), emphasized the importance of investing in the blue economy, discussing the why and what of investing in marine and coastal ecosystems. A range of critical services were discussed, from fishery production to flood protection, from recreation and tourism to ecosystem-based adaptation and carbon storage. Yet such services are rapidly degraded by pollution, overfishing, climate change and habitat destruction. Dr Mohammed stressed the need for greater investment to be directed towards conserving, restoring and enhancing marine ecosystems and also presented some innovative financing mechanisms.

Each Association offered a broad programme of lectures and posters, organized in parallel sessions. IAPSO organised 6 IAPSO symposia (107 oral presentations and 59 posters), 3 IAPSO-lead Association-Joint symposia (89 oral presentations and 43 posters). In addition IAPSO co-sponsored 5 Joint symposia lead by another Association (88 oral presentations and 29 posters).

On Thursday 30th August each association hosted their medal awards. IAPSO presented the Prince Albert I Medal 2017 to Prof Lynne Talley (United States) and the Eugene LaFond Medal 2017 to Dr. Jonathan Durgadoo from Mauritius.

Prof. Talley, awarded for her seminal contributions to our understanding of all ocean basins, including landmark discoveries in the Pacific, Atlantic and Southern Oceans, delivered the Albert I Memorial Lecture "A case for sustained observations of the ocean: observing the overturning circulation and its variability".

Dr. Durgadoo was awarded for his oral presentation "Indian Ocean sources of Agulhas leakage", delivered within the IAPSO-IAMAS joint symposium "The Second International Indian Ocean Expedition (IIOE-2) and related oceanic and coupled Atmospheric research in the Indian Ocean".



*Prof. Talley and Dr. Durgadoo showing their awards at the Medal Award Ceremony, Cape Town August 31<sup>st</sup>, 2017 (photo: S. Durante)*

### **Next Assemblies**

In September 2017 President Denise Smythe-Wright and SG Stefania Sparnocchia participated in the IUGG EC meeting and the SPC meeting (SS only) in Montreal, Canada. Most important was the planning of the IUGG General Assembly 2019.

Following a discussion during a meeting on August 31, 2017, the IAPSO EC voted for Busan, Republic of Korea to host the next Joint Assembly with IAMAS and IACS in 2021. These associations had also reached the same decision so the next venue will be in Busan.

### **SCOR Administration**

IAPSO has maintained its formal relations with SCOR during the year. The EC members have been involved in the evaluation of the 2017 Working Group proposal to be funded by SCOR in the next years. President, Denise Smythe-Wright participated in the SCOR Annual Meeting in Cape Town, South Africa, 4-6 September 2017. While much of the business centered around reports from current SCOR working groups and affiliated organizations, substantial time was devoted to the evaluation of five working group proposals submitted for the 2017 round of funding. The IAPSO President presented the IAPSO views alongside those of other organizations and after robust discussion it was decided to fund three proposals:

FLOTSAM - a plan to address the problem of floating litter in the open ocean at the global scale by disentangling coastal processes, with their short timescales, from the open ocean low frequency processes.

EBUS – this will focus on the integration of existing knowledge of eastern boundary upwelling systems to formulate recommendations for setting up regional observational systems and climate modeling approaches to monitor and understand physical and biogeochemical ocean-atmosphere interactions.

P-OBS – a proposal to identify methods and technologies that can be incorporated into large-scale sampling programmes.

### **IUGG/IAPSO support to scientific meetings**

IAPSO endorsed three scientific meetings that were supported by IUGG in 2017:

- The IndOOS Review Workshop was held from 30 January to 1 February 2017 in Perth, Australia. It consisted of 24 review presentations along three themes: Past and present of IndOOS; new scientific drivers in the Indian Ocean; and new technologies for future IndOOS, as well as two discussion sessions charged with identifying the scientific drivers of IndOOS and their observing requirements. The last day of the workshop was dedicated to discussion sessions to outline the science drivers and observing requirements of IndOOS, to lead towards a framework for the IndOOS review white paper. Two scientists from USA benefited from IUGG funds to attend the workshop that gathered 36 participants.
- The Past Antarctic Ice Sheet (PAIS) conference was held from 10 to 16 September 2017 in Trieste, Italy. It was attended by 210 scientists and students from 18 countries. More than half the participants were early career researchers and graduate students. 62 oral presentations took place in a single plenary session, which ensured cross-disciplinary participation and each day finished with a facilitated open plenary discussion. 130 posters were up all week. The conference show-cased the latest advances in the current state of Antarctic ice sheet and sea-level science and identified future research gaps and priorities for the next phase of the SCAR Research Programmes. IUGG funds were used to support travel, accommodation and registration expenses for an early career scientist and a student from India.



*Participants of the Past Antarctic Ice Sheet (PAIS) conference, Trieste, Italy, 10-16 September 2017 (Photo courtesy – Laura De Santis, Italy)*

- The workshop “THEMES 2017 - Physics and biogeochemistry of marine environments: multiscale analysis of past and present variability” took place in Venice, from 15 –17 November, 2017. The



workshop brought together more than fifty climatologists, ecologists, oceanographers, and modelers to discuss the present state of knowledge and the opportunities for progress about measuring, modelling and predicting marine environments. The workshop entailed nine sessions and 52 talks, including four solicited talks by prominent international scientists. Two evening discussion sessions and a closing open discussion paved the way toward improved cooperation between the different groups active in the climatological, ecological and oceanographic investigation of our Planet. IUGG funds were used to support travel of the four participants from Croatia, France, Italy and Spain.

## **Anniversary**

Prof. emeritus Walter Heinrich Munk of the Scripps Institution of Oceanography at the University of California San Diego, celebrated his 100th birthday this year. Prof. Munk is arguably the most distinguished living oceanographer, and one of the founding fathers of modern Physical Oceanography. His innumerable contributions to our field are milestones in the evolution of Physical Oceanography during the last fifty years. He pioneered wartime wave forecasting, tide prediction, ocean sound transmission, ocean circulation, deep-sea tides and much more. His talk at the last IUGG General Assembly in 2015 in Prague, Czech Republic, attracted the attention of the entire geophysical community. He has received numerous national and international medals and awards, including IAPSO's first Albert I Medal in 2001.

## **Obituary**

IAPSO scientist *Dr. Christopher Michael Duncombe-Rae*, a Specialist Scientists in physical oceanography and data management in the Oceans and Coast branch of the Department of Environmental Affairs in Cape Town, passed away unexpectedly on October 11, 2017, while on a flight from South Africa to the USA.

His research interests included the ocean and shelf environment of Marion island a Subantarctic island south of Africa and the Benguela and Agulhas ecosystems, he participated in many research cruises in the North Atlantic and North Pacific Oceans and recently had turned his attention to data stewardship and marine information systems, leading South Africa in the development of its Marine Information Management System (MIMS).

He was coordinating the South Africa's IIOE-2 planning committee and was also one of the co-convenors of the international symposium on "Second International Indian Ocean Expedition (IIOE-2) and related Oceanic and Coupled Atmospheric Research in the Indian Ocean which was organized alongside the IAPSO-IAMAS-IAGA Joint Assembly in Cape Town from 27 August to 1 September, 2017.

Dr Duncombe-Rae is survived by his wife, Dr Deidre Byrne, who is also an ocean scientist and his 11 year-old son Jacob. He will be sadly missed by the oceanographic community.

## **FUTURE ACTIVITIES**

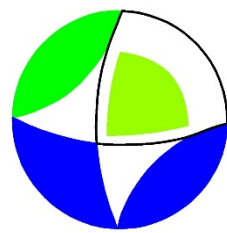
An important initiative over the next year is the development of an IAPSO Early Career Scientists (ECS) network. In December 2017, the President invited expressions of interest in setting up such a network and three suitable candidates were identified at the end of January 2018 and have been asked to take the initiative forward.

Other activities in 2018 are the following IUGG/IAPSO sponsored meetings, selected for support in 2017:

- [2nd IndOOS Review](#) Workshop, Lombok, Indonesia, 22-23 March, the final workshop of international experts aiming to review the sustained Indian Ocean Observing System and to propose a way forward in the context of new scientific frontiers and observing technologies. It is co-sponsored by WCRP, US CLIVAR, OOPC, IMBeR, IOC Perth Office, IOGOOS.
- Understanding the Problems of Inland Waters: Case Study for the Caspian Basin (UPCB), Baku, Azerbaijan, 12-14 May, a conference aimed at strengthening the exchange of international scientific cooperation on the Caspian Sea, the Aral Sea and the Urmia and Van Lakes, all remnants of the ancient sea of Paratethys. It is co-sponsored by ECOSF, COMSTECH, BP, IFS, AEHMS.
- X Jornadas Nacionales de Ciencias del Mar, Buenos Aires, Argentina, 30 July-3 August, a regional conference encompassing marine science abroad, bringing together local scientists and invited foreign experts.

Stefania Sparnocchia, IAPSO Secretary General  
Denise Smythe-Wright, IAPSO President

# International Association of Seismology and Physics of the Earth's Interior (IASPEI)



International Association of Seismology  
and Physics of the Earth's Interior

IASPEI website: <http://iaspei.org>

## INTRODUCTION

The International Association of Seismology and Physics of the Earth's Interior is the leading international association promoting studies in seismology, earthquake processes, and structure and ongoing geodynamical processes within the Earth's interior. IASPEI achieves its goals primarily through scientific conferences organized by IASPEI and its Commissions, but also sponsors other international initiatives, fosters international cooperation, both in monitoring of seismic sources and research and education activities, especially in countries that are working towards full scientific development.

Most of the IASPEI efforts during 2017 were directed towards the First Joint Scientific Assembly of IASPEI together with IAG in Kobe, Japan, 30 July – 4 August 2017.

However, several important additional scientific meetings have been supported or sponsored by IASPEI and several ongoing projects continued.

## ADMINISTRATION

### EC & Bureau meetings

The IASPEI Bureau and EC met two times during the Scientific Assembly. Several e-mails regarding important questions on financial support or business to be solved immediately have been exchanged with the members of the Bureau and EC throughout the year.

### Changes in administration

During the Joint Scientific Assembly of IAG and IASPEI in Kobe, Japan a new inter-association working group for "Seismo-Geodesy" had been initiated.

### Other matters

Website The IASPEI website has the address <http://iaspei.org>.

Statutes. The statutes were slightly modified during the Scientific Assembly in Kobe, Japan. The new Statutes can be downloaded from the IASPEI website. IASPEI is registered as a Norwegian organization (Norwegian Org. Number 916 047 495).

Newsletters. IASPEI Newsletters have been regularly sent as pdf-file attachments to 2000 – 3000 e-mail addresses. The Newsletters are also available for downloading from the IASPEI website. Four issues were distributed in 2017.

## ACTIVITIES

### Joint Scientific Assembly of IAG and IASPEI in Kobe, Japan (2017)

The first joint Scientific Assembly of IAG (International Association of Geodesy) and IASPEI was held at the Kobe International Conference Center, Japan, from July 30 through August 4, 2017 (<http://www.iag-iaspei-2017.jp/>) and became a big success.

The conference had 1107 registered participants from 65 different countries of which 747 gave IASPEI as their primary Association. The scientific program consisted in total of 43 symposia (7 IAG, 27 IASPEI and 9 Joint Symposia), and 1119 oral and poster presentations were given (IAG: 254; IASPEI: 564; Joint: 301). In particular the 9 Joint Symposia attracted many participants and had to be accommodated in two parallel sessions throughout the duration of the conference.

During the Assembly, the IASPEI Commissions and the IASPEI sponsored bodies also had their business meetings, and several of the Commission Chairs changed. The actual names of the Commission chairs can be found on the Commission web-pages (<http://iaspei.org/commissions>).

An important result of this 1st Joint Assembly was the new Inter-Association initiative between IAG and IASPEI to form a new joint sub-Commission on Seismo-Geodesy. The home of this new sub-Commission within IASPEI will be the Commission on Earthquake Source Mechanics (ESM).



*Opening Ceremony of the 1st IAG-IASPEI Joint Scientific Assembly (photo: LOC)*

### Other meetings

In 2017, IASPEI additionally supported (and partly sponsored) the following activities:

- a) the IRIS Workshop 'Managing Data for Seismic Networks', which was held in Pretoria, South Africa, 20 – 26 August 2017 (<http://ds.iris.edu/ds/workshops/>),
- b) the 12th International seismological workshop "Modern Methods of Processing and Interpretation of Seismological Data", which was held in Almaty, Kazakhstan, 11 – 15 September 2017,

- c) the 6th Scientific Biennial Conference “Problems of Complex Geophysical Monitoring of the Russian Far East”, which was held Petropavlovsk-Kamchatsky, Russia, 1 – 7 October 2017 (<http://www.emsd.ru/en/conf2017/>), and
- d) the 2nd Cargèse ‘School on Seismogenesis’, which was held in Cargèse, France, 2 – 6 October, 2017 (<http://earthquakes2.sciencesconf.org/>).

### Activities of CoSOI Commission

Some 2,000 hard copies of the first printed edition of the IASPEI New Manual of Seismological Observatory Practice (NMSOP 2002) are currently in use in more than 100 countries at seismological observatories, data and analysis centers, in teaching, research, and field applications, used as basic material in national and international seismology training courses, or by private enterprises and individual scientists. In 2014, a rigorously updated and amended electronic second edition, NMSOP-2, was completed and put online, thanks to the efforts of the late Peter Bormann. This version, as well as future ones, are professionally maintained, further developed and edited by the GFZ German Research Centre for Geosciences under a long-term commitment and the auspices of IASPEI and its Commission on Seismological Observation and Interpretation (CoSOI). All versions are [freely available and downloadable](#) from the web-site of the GFZ library.

### Scientific Projects

The IDEA (International Digital Earthquake Archives) project of the Committee for Preservation of WWSSN and Historical Seismograms (also called Seismoarchives: Seismogram Archives of Significant Earthquakes of the World), continued its mission. IRIS is archiving the scanned seismograms. During the General Assembly in Prague it was decided that Graziano Ferrari (INGV) takes over the IDEA Project from W.H.K. Lee. The Project for scanning old Batavia seismograms continued in 2017.

### Awards, obituaries

The *IASPEI Medal* is awarded for merits in seismology: for sustaining IASPEI goals and activities and for scientific merits in the field of seismology and physics of the Earth's interior.

During the IASPEI Opening Plenary in Kobe, the 2017 IASPEI medal was awarded to the former IASPEI President and former IASPEI Secretary General of IASPEI Dr. Eric Robert Engdahl.

In 2016, the IASPEI Bureau established an *IASPEI Early Career Scientist Award program* aimed at engaging excellent young researchers in the IASPEI community. Each of the four IASPEI Regional Commissions were asked to select one Early Career researcher (graduate student, postdoctoral research, pre-tenure faculty member) from their commission at each even-year Assembly of that Regional Commission. The first four awards are expected in 2018.

*Obituaries* for prominent scientists were regularly published in the IASPEI Newsletters.

## FUTURE ACTIVITIES

- In 2018, the main focus will be on the General Assemblies of the four regional commissions of IASPEI (AfSC, ASC, ESC, LACSC), which will be held in Morocco (April), China (May), USA (May) and Malta (September).
- Another main activity in 2018 will be preparational work for the 2019 Centennial General Assembly in Montreal, Canada.
- The 2021 Scientific Assembly of IASPEI is planned as a joint Assembly together with IAGA, which will be held in Hyderabad, India in August 2021.

Johannes Schweitzer, IASPEI Secretary General

# International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)



International Association of Volcanology  
and Chemistry of the Earth's Interior

IAVCEI website: [www.IAVCEIvolcano.org](http://www.IAVCEIvolcano.org)

## INTRODUCTION

At the First General Assembly of IUGG (Rome, 1922), the *Section de Vulcanologie* became one of the constituent sections of the Union. This name was changed into *Association Internationale de Vulcanologie* at the Fourth General Assembly (Stockholm, 1930). It took its present name at the Moscow General Assembly (1971).

The IAVCEI is the primary international focus for research in volcanology and for efforts to mitigate volcanic disasters. Scientists also participate in IAVCEI research in closely related disciplines, such as igneous geochemistry and petrology, geochronology, volcanogenic mineral deposits, and the physics of the generation and ascent of magmas in the upper mantle and crust. Work is carried out in the following special Commissions:

- Chemistry of Volcanic Gases
- Cities and Volcanoes
- COSIV-Statistics in Volcanology
- Arcs Magmatism
- Collapse Calderas
- Explosive Volcanism
- Large Igneous Provinces
- Monogenetic Volcanism
- Remote Sensing
- Submarine Volcanism
- Tephra Hazard Modelling
- Volcanic Lakes
- Volcanic Hazards and Risk
- Volcanogenic Sediments
- Volcano Geoheritage and Protected Volcanic Landscapes
- Volcano Geology
- Volcano Geodesy
- International Volcanic Health Hazard Network
- Working Group on Volcano Acoustics
- World Organisation on Volcano Observatories

The members of the Executive Committee for the 2015-2019 term are:

President	Donald Bruce Dingwell	GERMANY
Secretary General	Roberto Sulpizio	ITALY
Vice-President	Patrick Allard	FRANCE
Vice-President	Shanaka Da Silva	USA
Immediate Past President	Raymond Cas	AUSTRALIA
Members	Eliza Calder	UK
	Jan Lindsay	NEW ZEALAND
	Michael Ort	USA
	Lizzette Rodriguez	PUERTO RICO

## ADMINISTRATION

### IAVCEI Executive Committee activities

- Revision of IAVCEI Finances, funding support, and potential funding sources and strategies;
- Update of the IAVCEI Commissions and Working Groups, conducted by the two Vice-Presidents and approved by the EC, in which active commissions have been identified and several inactive commissions have been deactivated;
- The web domain was changed into [www.IAVCEIvolcano.org](http://www.IAVCEIvolcano.org);
- Continuous updating of web site. Publication of a Facebook page and Twitter messages;
- Creation of sub-domains in the IAVCEIvolcano website for hosting commission webpages;
- Update of the Editorial Board of Bulletin of Volcanology;
- Creation of a sub-domain for BV in the IAVCEIvolcano domain;
- Revision and publication of rules for IAVCEI prizes and awards.

### Discussion on the current state of IAVCEI and its relationships with IUGG

- Adoption of the Principle of Freedom of Participation in Learned Societies following the submission of Proposal to Modernise IUGG and ICSU to IUGG and ICSU, focussing on adoption of self-governance of the associations;
- Agreement of the need to reintroduce compulsory individual membership fees along the lines of the AGU membership fee structure, to ensure the dramatic decline in financial reserves between end 2013 and 2014 is arrested.

## ACTIVITIES

### Members

In 2017 the IAVCEI membership increased to more than 1000 members at the end of 2017. Among them, the life members are 100, around 600 regular members and around 300 student members.

### Website

After the complete redrawn of web page in 2015, the refurbishment of IAVCEI web page has been continued, and now the site contain more info about IAVCEI activity, structure and initiatives.

## Newsletters

Four issues of the newsletter "IAVCEI News" have been published through the website, during 2017.

## 2017 Meetings, workshops and courses

The following meetings, workshops, and courses have been (co-) organised or sponsored by one (or more) of the IAVCEI commissions in 2017:

- IAVCEI SA, Portland, Oregon (USA), August 14-18, 2017;
- 4<sup>th</sup> International Workshop on Volcano Geology, October 3-6, 2017, Romania;
- 13<sup>th</sup> CCVG workshop, September 24-October 3, 2017, Ecuador;
- 10<sup>th</sup> International AIV summer school, September 2-9, 2017, Bolsena, Italy;
- [6<sup>th</sup> International Post-graduate Course of Volcanology](#), Olot, Girona, Spain, 12-25 October 2017;
- [XXIV Central Andes Volcanological Field Course](#), Universidad Nacional de Salta, Salta, Argentina, November, 11-21, 2017:

## FUTURE ACTIVITIES

Foreseen activities for 2018:

- Publication of 4 IAVCEI newsletters;
- Revision of Commission activity and definition of minimum requirement for a commission to be considered active;
- Funding of workshops and meetings;
- Completion of IAVCEI website.

Meetings in 2018:

- COV 10 meeting, September 2-7 2018, Naples, Italy;
- 7th International Maar Conference, May 21-28, 2018, Olot, Catalunya, Spain;
- 11th International AIV summer school, September 2-9, 2018, Bolsena, Italy;
- [7th INTERNATIONAL POST-GRADUATE COURSE IN VOLCANOLOGY](#) (in Spanish), Olot, Spain, e-mail: [ageytraver@gmail.com](mailto:ageytraver@gmail.com)
- 5th Course: Italian Association for Volcanology (AIV), [2017 International School in Volcanology: The use of geological data for hazard mapping](#), Trento, Italy.

Roberto Sulpizio, IAVCEI Secretary General



# ACTIVITIES OF THE UNION COMMISSIONS

The following reports illustrate the impressive range of activities within each Union Commission as well as their dedication to supporting science within developing countries. Each Union Commission has a website where much more information can be found.

## Union Commission on Climate and Environmental Change (CCEC)



CCEC website: [www.ccec-iugg.org](http://www.ccec-iugg.org)

### INTRODUCTION

The Union Commission on Climatic and Environmental Change (CCEC) was established by the Executive Committee of IUGG in June 2012 to promote scientific understanding of climatic and environmental change, to define criteria for collaborative trans-disciplinary research on climate and environmental change, to provide an all-Union perspective on climatic and environmental change, and to make available the knowledge and insights developed through scientific research to the benefit of society and planet Earth, including consideration of the science of global change, related vulnerability and impacts, and potential responses.

CCEC is distinct from the IAMAS Commission on Climate (ICCL) in that CCEC seeks to establish links across IUGG disciplines and across ICSU disciplines by collaborating with the Associations, Geo-Unions, and other scientific members of ICSU.

### ADMINISTRATION

The following are current officers and members of the Commission:

#### Executive Committee:

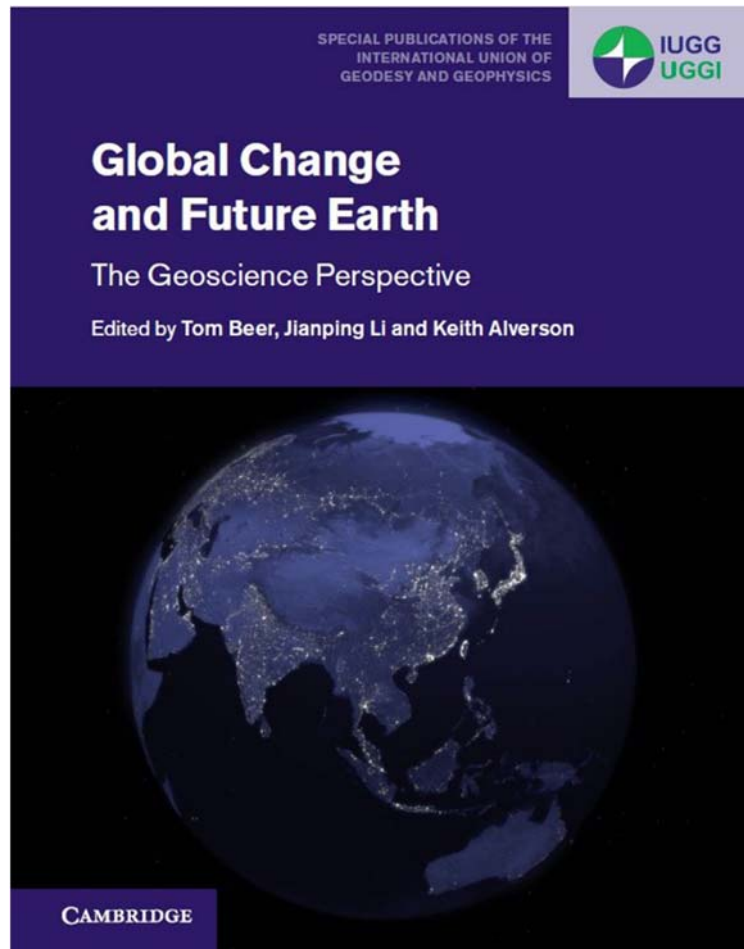
Chair:	Tom Beer (Australia)
Vice Chair:	Jianping Li (China)
Secretary-Treasurer:	Keith Alverson (USA)

Members of the Commission are listed in the IUGG Yearbook.

## ACTIVITIES

### CCEC Publication

The members of the Executive Committee are the editors of the monograph “Global Change and Future Earth: The Geoscience Perspective” to be published by the Cambridge University Press (CUP) in July 2018, which will be the third in the IUGG Series of CUP monographs.



*Cover of the monograph “Global Change and Future Earth: The Geoscience Perspective”*

The final contributed Chapters are:

1. International Drivers to Study Climatic and Environmental Change: A Challenge to Scientific Unions (*Tom Beer*)
2. Future Earth and Expected Mega Changes (*Serhat Sensoy, Mustafa Coskun, Necla Turkoglu and Ihsan Cicek*)
3. Global Change, Space Weather and Climate (*Eigil Friis-Christensen*)
4. Climate Issues from the Planetary Perspective and Insights for the Earth (*Athena Coustenis, Fred W. Taylor and Christina Plainaki*)
5. Satellite Remote Sensing of Hydrological Change (*Alberto Montanari and Michael G. Sideris*)
6. Geodetic Observations as a Monitor of Climate Change (*Tonie van Dam, Jianli Chen and Thierry Meyrath*)
7. Future Earth and the Cryosphere (*Ian Allison, Regine Hock, Matt A. King and Andrew N. Mackintosh*)
8. Geographical Research and Future Earth (*Michael E. Meadows*)

9. Water Security: Integrating Lessons Learned for Water Quality, Quantity and Sustainability (*Elaine M. Faustman, Heidi Foth, Luis Schiesari, Julio Alejandro Navoni, Silvia Berlanga de Moraes Barros, Gisela de Aragão Umbuzeiro, Salmaan H. Inayat-Hussain and Marissa N. Smith*)
10. Decadal Coupled Ocean-Atmosphere Interaction in North Atlantic and Global Warming Hiatus (*Jianping Li, Cheng Sun and Ruiqiang Ding*)
11. Sea Level Rise and Future Earth (*Anny Cazenave and Hindumathi Palanisamy*)
12. Ocean Circulation: Knowns and Unknowns (*Harry L. Bryden and Lawrence A. Mysak*)
13. Asian Groundwater Perspectives on Global Change and Future Earth (*Makoto Taniguchi*)
14. Africa's Broken Food Systems: Unravelling the Hidden Fortune under Climate Change (*Richard Munang and Robert Mgendi*)
15. Nutrition, Urban Environments and Future Earth (*Godwin D. Ndossi and Keto E. Mshigeni*)
16. Nutrition Science and Future Earth: Current Nutritional Policy Dilemmas (*Mark L. Wahlqvist*)
17. Air Pollution and Human Health Risk Reduction: The Case Study of Delhi Megacity, India (*R. B. Singh and Aakriti Grover*)
18. Targeting Research towards Achieving Food Security in an Era of Climate Change (*Bruce M. Campbell, D. Dinesh and Sophia Huyer*)
19. The Contribution of Food Engineering to Achieve Global Food Security (*Walter E. L. Spieß*)
20. Supply Chains and Future Earth (*Albert McGill*)
21. The Impact of Global Climate Change on Nutrition Security: A Multidimensional Challenge (*Ibrahim Elmadfa and Alexa Leonie Meyer*)
22. Marine Systems, Food Security and Future Earth (*Elizabeth A. Fulton, Éva Plagányi, William Cheung, Julia Blanchard and Reg Watson*)
23. Geophysical Studies, Natural Hazards and Climate Change (*Jaime Urrutia-Fucugauchi and Ligia Pérez-Cruz*)
24. Climatic Consequences and Agricultural Impacts of Nuclear Conflicts (*Owen B. Toon, Alan Robock, Michael Mills, Lili Xia and Charles Bardeen*)
25. Advancing Spring Flood Risk Reduction in the Arctic through Interdisciplinary Research and Stakeholder Collaborations (*Yekaterina Y. Kontar, Sarah F. Trainor, Tuyara N. Gavrilyeva, John C. Eichelberger and Nikita I. Tananaev*)
26. Geohazard Analysis for Disaster Risk Reduction and Sustainability (*Alik Ismail-Zadeh*)
27. Geothermal Energy and a Future Earth (*Ladislav Rybach and Thomas Kohl*)
28. Future Earth, Climate Change and Global Change: Future Earth's Ocean (*Martin Visbeck and Anke Schneider*)
29. Asia's Sustainability Challenges and Future Earth (*Tetsuzo Yasunari, Hein Mallee and Reiichiro Ishii*)
30. Looking Back to Move Forward: Institutional Capacity Required by Global Governance Changes (*Jane E. Rovins and Sarah Beaven*)

### **CCEC Conference Sessions**

In addition to the preparation of the CUP monograph, CCEC co-organized sessions at various conferences and Scientific Assemblies during 2017:

1. M18: Advances and Frontier challenges in Global Monsoon Studies Climate Change (The IAPSO-IAMAS-IAGA Assembly 2017, 27 August to 1 September 2017, Cape Town, South Africa)
2. M16: Resilience: The science of Adapting to Climate Change (The IAPSO-IAMAS-IAGA Assembly 2017, 27 August to 1 September 2017, Cape Town, South Africa)
3. AS1.18/CL3.09: The global monsoons in current, future and palaeoclimates and their role in extreme weather and climate events (EGU 2017, April 23-28)

4. AS13: Seasonal to Decadal Climate Variability in Southeast Asia and Indo-pacific: Impact and Predictions (AOGS 14th Annual Meeting, 6-11 August 2017, Singapore)

### **Liaison with other Unions**

In March 2016, CCEC was represented by the CCEC Chair at a conference in New Delhi organised by the International Geographical Union (IGU). The proceedings of that conference have been published as a Springer monograph "Climate Change, Extreme Events and Disaster Risk Reduction" available at: <http://www.springer.com/gp/book/9783319564685>.

The contribution of the CCEC Chair comprises Chapter 8:

Beer, T (2018) The Impact of Extreme Weather Events on Food Security. In, Suraj Mal et al. (Eds): Climate Change, Extreme Events and Disaster Risk Reduction, Springer Sustainable Development Goals Series, pp. 121-133.

## **FUTURE ACTIVITIES**

CCEC is taking the lead in planning for an all-Union symposium, U01, at the IUGG General Assembly in Montreal in July 2019 with the title:

"Achieving Sustainable Development: What role for Earth Sciences?"

Tom Beer, CCEC Chair

# Union Commission on Mathematical Geophysics (CMG)

## INTRODUCTION

During 2017 the commission was working on organizing the 32th biennial CMG meeting in Nizhny Novgorod, Russia.

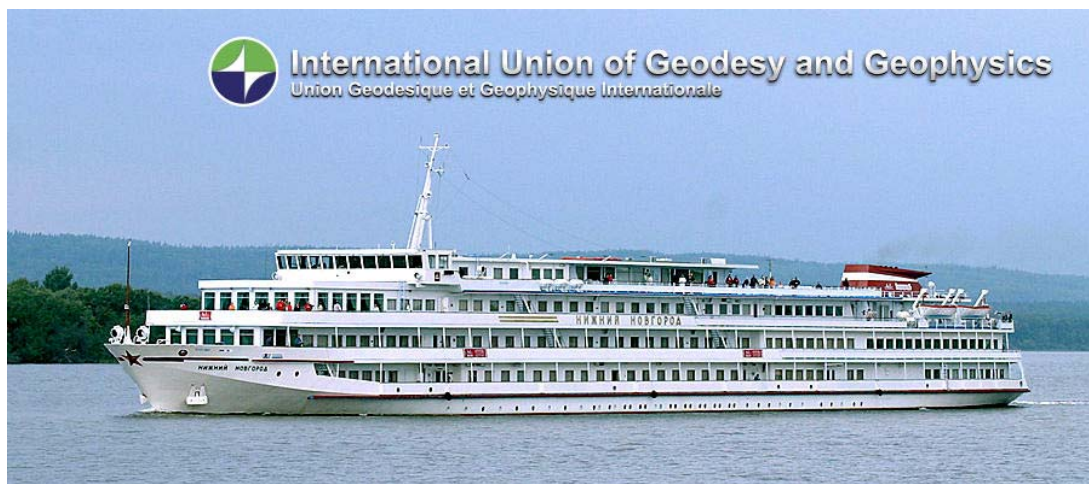
## ADMINISTRATION

**Membership.** The CMG membership remained the same in 2017. *Chair:* Yehuda Ben Zion (USA); *Vice-Chairs:* Einat Aharonov (Israel) and Claudia Pasquero (Italy); *Secretary:* Ilya Zaliapin (USA); *Past Chair:* Dan Rothman (USA).

## ACTIVITIES

### CMG biennial meeting 2018 in Nizhny Novgorod, Russia

During 2017, CMG was working on organizing its 32nd CMG biennial meeting. The meeting will take place during June 23-28, 2018 in Nizhny Novgorod, Russia. The conference will take place on a boat that cruises the Volga River with daily stops at historic sites. The CMG meeting covers a wide range of current research topics in mathematical geophysics. The conference aims to discuss key theoretical and observational aspects of solid earth, ocean, atmosphere, cryosphere, climate and other contemporary topics.



*32nd CMG biennial meeting will take place on a boat that cruises the Volga River*

The conference web site is launched at <http://cmg2018.iapras.ru/>

The conference will be organized in 8 special sessions that will combine oral and poster presentations. The local organizing committee is based at the Institute of Applied Physics of the Russian Academy of Sciences and is chaired by Dr. Alexander Feigin.

## FUTURE ACTIVITIES

The Commission is working on organizing a symposium on “Mathematics of Planet Earth” at the IUGG General Assembly in Montreal, Canada, July 9-18, 2019.

Ilya Zaliapin, CMG Secretary

# Union Commission on Geophysical Risk and Sustainability (GRC)



GRC website: [www.iugg-georisk.org](http://www.iugg-georisk.org)

## INTRODUCTION

The IUGG Commission on Geophysical Risk and Sustainability (IUGG GeoRisk Commission, or GRC) established by the IUGG Bureau in August 2000 is dedicated (i) to promoting scientific studies applied to the reduction of risk from natural hazards in an increasingly urbanized world and sustainability and (ii) to reducing death and destruction from natural and technological hazards by providing hazards data and information to emergency managers, policy-makers, scientists and the general public in the most timely and effective manner as possible. This includes the integration of knowledge concerning environmental, social and economic processes. The fundamental scope of this Commission is to facilitate communications – between scientists via meetings, workshops and publications, as well as between scientists and decision makers, between scientists and the public, and between scientists and schools.

## ADMINISTRATION

The IUGG Bureau renewed the GRC Executive Committee on 1 November 2017. The current Executive Committee membership is:

John LaBrecque	Chair	IAG, USA
Vyacheslav Gusiakov	Vice-Chair	IAPSO, RUSSIA
Alan Thomson	Vice-Chair	IAGA, UK
Paula Dunbar	Secretary-Treasurer	IAPSO, USA
Joan Marti	Past Chair	IAVCEI, SPAIN
Kuniyoshi Takeuchi	Past Chair	IAHS, JAPAN
Mohsen Ghafory-Ashtiany	Member	IASPEI, IRAN
Michael Krautblatter	Member	IACS, GERMANY
Christa von Hillebrandt-Andrade	Member	IAPSO, PUERTO RICO
Chun-Chieh Wu	Member	IAMAS, CHINA: ACAD. OF SCIENCES IN TAIPEI

### Members in Active Advisory Capacity:

Tom Beer	Honorary Member	IAMAS, Australia
Harsh Gupta	Advisory Board	IASPEI, India
Alik Ismail-Zadeh	Honorary Member	IASPEI, Germany/ Russia
Katia Kontar	Early Career Scientist	Disaster Diplomacy IACS, IAHS, USA
Vladimir Kossobokov	Past GRC Vice Chair	IASPEI, Russia
Gordon McBean	Advisory Board	IAMAS, Canada
Ramesh P. Singh	Honorary Member	IASPEI, USA
Linda Rowan	Advisory Board	IAG, USA

A *Business meeting* was held via teleconference with the GRC Officers and the IUGG Secretary General on November 16, 2017. The primary discussion topics were:

- Revision of the GRC website

- Financial support
- Consideration of 2018 Meeting Venues
- AGU 2018 in Washington, D.C., USA
- IUGG2019 in Montreal, Canada
- Proposal by the International Institute of Earthquake Engineering and Seismology (IIEES), to organize a GRC conference in Tehran, Iran
- AGU 2018 and IUGG2019 were recommended as because of the Centennial Year celebrations. The IIEES invitation was recommended for consideration in 2020.

## ACTIVITIES

The GRC participated in *GTEWS 2017*, the GNSS Tsunami Early Warning Workshop in Sendai, Japan on July 25-27, 2017 co-sponsored by the IAG/GGOS, NASA, APRU, and the NEID of Tohoku University. The workshop explored the status and implementation of the GNSS Enhancement to Tsunami Early Warning as recommended by the 2015 IUGG General Assembly's Resolution #4. Resolution #4 calls for the enhancement of "existing tsunami early warning systems with the augmentation of GNSS network observational systems. Resolution #4 recommends a focus upon the Pacific region because the high frequency of tsunami events constitutes a large risk to the region's large populations and economies, by developing a prototype system, together with stakeholders, including scientific, operational, and emergency responders. The GTEWS 2017 workshop report is in preparation. The presentation viewgraphs and videos can be accessed [here](#).



### REGISTRATIONS RECEIVED (61)

Arif Aditya	Satoshi Kawamoto	David Phillips
Miguel Angel Arestegui Espinal	Attila Komathy	Ariandy Pratama Arbad
Andrey Babeyko	Shunichi Koshimura	Queen Surajini Rajendran
Gerald Bawden	John LaBrecque	Linda Rowan
Beldjitali Bilal	Molly Luginbuhl	Christine Ruhl
Mattia Crespi	Clen Mattioli	John Rundle
Elizabeth D'Anastasio	Tim Melbourne	Joseph Sackey
John Dawson	Diego Melgar	Victor Sardina
Edilson Fernando	David Mencin	Asuka Sato
James Foster	Salazar Monroy	Giorgio Savastano
Jeff Freymueller	Hector Mora-Paez	Y. Tony Song
Eiichi Fukuyama	Luis Moya	Tim Stough
Jianghui Geng	Sebastian Munoz	Raza Tabassam
Alexis Giguere	Andrew Newman	Hiroaki Takahashi
Ken Gledhill	Giovanni Occhipinti	Inoue Takuya
Dara Goldberg	Keitaro Ohno	Kristy Tiampo
Emma Hill	Yusaku Ohta	Safi Ullah
Lorraine Hwang	Jun Okada	Christian Walls
Daisuke Inazu	Makoto Okubo	Steven Ward
Teruyuki Kato	Shinichi Okuma	John Wilson
		Ankit Yadav



The GTEWS 2017 workshop explored the status and implementation of the GNSS Enhancement to Tsunami Early Warning as recommended by the 2015 IUGG General Assembly's Resolution #4. The workshop was co-sponsored by the Global Geodetic Observing System of the IAG

John LaBrecque received the [Gilbert F. White Distinguished Lecture Award](#) from the AGU Natural Hazards Program. The Lecture entitled *The New Geodesy: A Powerful Tool in the Mitigation of Natural Hazards* was presented at the AGU 2017 Fall Meeting. The Lecture can be viewed [here](#).

The GRC Sponsored a Panel Discussion on Seismo-Geodesy- IAG-IASPEI meeting Kobe, Japan Session J04-7; *The Promise and Challenges of Seismo-Geodesy for Earthquake and Tsunami Early Warning* on August 4, 2017. Though it was the very last event of the IAG-IASPEI meeting, the panel discussion was well attended and involved significant audience participation. Presentations were made on the

combined interpretation of seismic and geodetic data relevant to tsunami early warning and multi-GNSS analysis.

Panelists were: Jeffrey Freymueller- U. Alaska,  
Dara Goldberg- U. California, San Diego,  
Gerald Bawden- NASA,  
Janghai Geng- Wuhan University,  
Yusaku Ohta- Tohoku University,  
Diego Melgar- Oregon State University,  
Sebastian Requelme- U. Chile.

Moderators were: John LaBrecque, John Rundle.

The GRC led the development of a *Memorandum of Understanding between the IUGG and the Science Diplomacy Center, Fletcher School of Law and Diplomacy of Tufts University* to strengthen our efforts to build a global society more resilient to natural disasters by fostering international collaborations among natural hazards experts, while simultaneously strengthening diplomatic ties between countries with shared risks.

The GRC is participating in the development of an MOU with AGU-IUGG-US National Academy for jointly sponsored meetings on *Disaster Science* during AGU 2018 Fall Meeting and the IUGG 2019 General Assembly.

A session *Contribution of Science and Technology to Achieving the 2020 Sendai Target* was co-organized at the United National Global Platform for Disaster Risk Reduction held in Cancun, Mexico, 25 May 2017. The session discussed the contribution of science and technology in achieving Target E of the Sendai Framework with a focus on illustrating how appropriate global, national and local disaster risk assessments and scientific analysis have been used to inform disaster risk reduction planning and monitoring at national and local levels. The concept note of the session can be downloaded [here \(pdf file\)](#).

A meeting of representatives of international and intergovernmental organizations dealing with disaster risk reduction was organized in Cancun during the Global Platform to discuss cooperation plans to further develop the initiative on disaster risk assessment. The meeting was attended by representatives of the Mexican Academy of Sciences; World Meteorological Organization (WMO); German Federal Foreign Office; Science Council of Japan; International Council for Science (ICSU); World Bank; United Nations Office for Disaster Risk Reduction (UNISDR); United Nations Educational, Scientific, and Cultural Organization (UNESCO).

GRC participated in the *Fourth World Landslide Forum* held in Ljubljana, Slovenia, in June 2017. Scientists, engineers, and policymakers working in the area of landslide technology, landslide disaster investigation and landslide remediation attended the Forum to share their work with the global community. A high-level panel discussion was held at the Forum with participation of IUGG.

GRC participated in the *UNESCO Conference on Landslides* organized by the International Consortium for Landslides (ILC) and the International Programme on Landslides. During the conference, ILC organized a business meeting related to the Sendai Partnerships in Disaster Risk Reduction (DRR) and Promotion of Landslide Science, signed in 2015 in Sendai, Japan, by several international and intergovernmental organizations including IUGG. GRC discussed possibilities to participate in the World Landslides Forum in Kyoto, Japan in 2020 and to organize a session of landslide-induced tsunamis.

GRC participated in the *Global Forum on Science and Technology for Disaster Resilience* held in Tokyo, Japan, 23-25 November 2017.





GRC at the Global Forum on Science and Technology for Disaster Resilience, Tokyo, Japan, 23-25 Nov 2017. 1: Takashi Onishi, President of the Science Council of Japan, and Robert Glasser, Special Representative of the U.N. Secretary-General for Disaster Risk Reduction; 2: Naruhito, Crown Prince of Japan; 3: Gordon McBean, President of the Internat. Council for Sciences, IUGG Fellow, and GRC Advisory Member; 4: K. Satake, IUGG Bureau Member (2011-2015); 5: Group photo; 6: Irasema Alcantara-Ayala, Vice President, Internat. Consortium on Landslides; 7: Shuaib Lwasa, Chair of the Integrated Research on Disaster Risk Scientific Committee; 8: Kuni Takeuchi, GRC Chair (2007-2015); and 9: Alik Ismail-Zadeh, IUGG Secretary General, and GRC Chair (2003-2007) (photos: T. Koike)

Vyacheslav Gusiakov, GRC Vice Chair, co-authored a paper to extend the existing *historical catalog for the Black and Azov Seas* (containing 26 events): Nikonov A.A., Gusiakov V.K., Fleifel' L.D. Assessment of the tsunami hazard on the Russian coast based on a new catalogue of tsunamis in the Black Sea and the Sea of Azov, *Russian Geology and Geophysics*, 2018, 59, Issue 2, 193-205, DOI: 10.15372/GiG20180208. The historical catalog was largely extended and now contains 50 events of different level of validity (taking into account its large time coverage - almost 3000 years). Note that the Global Historical Tsunami Database lists 18 events for this region. It was demonstrated that in restoration of regional earthquake/tsunami history any new systematic search for the data on regional and local level and in languages others than English (in this study, sources in Russian, Ukrainian, Bulgarian, Polish, Romanian, Italian, German, Turkish languages were used) reveals a wealth of data previously inaccessible on the international level. However, even this new catalog is still incomplete and has obvious gaps in the data (for instance, the large gap spanning from 6th to 13th century AD can be clearly seen in Fig.3 of the paper). Such a gap can be filled only by the extensive search for geological traces of paleotsunami that is still in the infancy stage in this region. These new observations are being incorporated into the ["Web-Encyclopedia on Natural Hazards"](#).

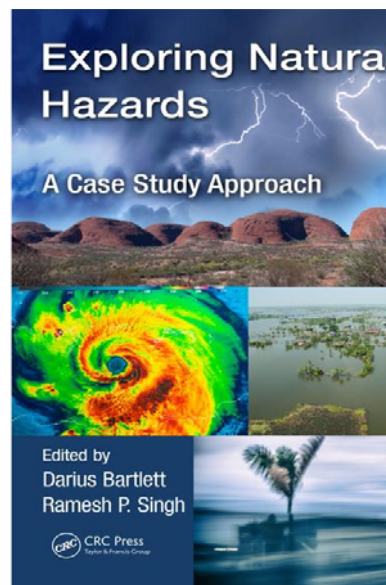
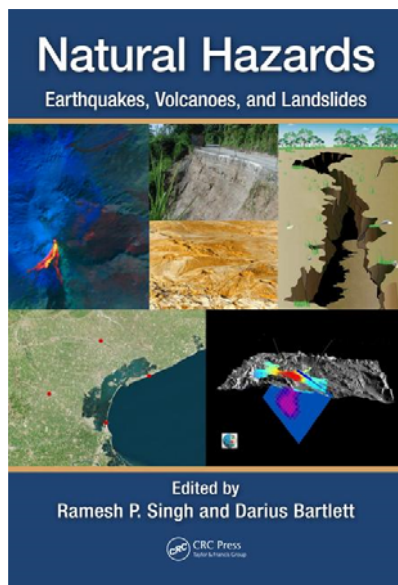
Ramesh P. Singh, member of GRC Advisory Panel, held the following presentations:

- Growing air pollution in the Indo-Genetic Plains and its impact on human *health*, inaugural Planetary Health/GeoHealth meeting in April at Harvard Medical School in Boston, MA. Planetary Health Conference April 28-30, 2017
- *Interaction between Land-Ocean-Atmosphere Along East and West Coasts of India*, Integrated Ocean Drilling Program workshop in July 2017 at the University of Rhode Island's Narragansett Bay campus.

- *Changes in Ground Water Level and Linkage with the Meteorological/Atmospheric Parameters Associated with Earthquakes*, International Workshop on Earthquake Preparation Process in Chiba, Japan, May 2017.
- Key note presentation *Ground and Space Observations to study Land-Ocean-Atmosphere coupling Associated with Natural Hazards*, International Conference on Earth Observations and Natural Hazards- ICEO-NH, Hanoi, Vietnam, November 21-26, 2017.

*Ramesh P. Singh* further organized panel discussion and scientific sessions at the Fall AGU meeting held in New Orleans, December 2017 and co-edited two publications on Disaster Science:

- Bartlett, D. (Ed.), Singh, R. (Ed.), (2018). *Exploring Natural Hazards: A Case Study Approach*, Boca Raton, ISBN 9781138054424, CRC Press.
- Singh, R. (Ed.), Bartlett, D. (Ed.). (2018). *Natural Hazards: Earthquakes, Volcanoes, and Landslides*. Boca Raton, ISBN 9781138054431, CRC Press.



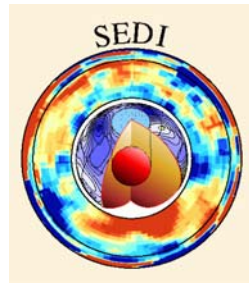
*Katia Kontar*, Early Career Scientist Disaster Diplomacy, co-authored a well-noted paper (Kontar, Yekaterina Y., John C. Eichelberger, Tuyara N. Gavriyeva, Viktoria V. Filippova, Antonina N. Savvinova, Nikita I. Tananaev, and Sarah F. Trainor. Springtime Flood Risk Reduction in Rural Arctic: A Comparative Study of Interior Alaska, United States and Central Yakutia, Russia. *Geosciences* 8, no. 3 (2018): 90. Doi: 10.3390/geosciences8030090) and gave an invited presentation on the subject of science diplomacy with an emphasis on disaster risk reduction at the AGU Fall 2017 Meeting.

## FUTURE ACTIVITIES

- Revise GRC Web Page
- Co-sponsor pre-meeting on Disaster Science at AGU 2018 Fall Meeting
- Co-sponsor meeting on Disaster Science at IUGG 2019 General Assembly

John LaBrecque, GRC Chair

# Union Commission on the Study of the Earth's Deep Interior (SEDI)



SEDI website: [www.sedigroup.org](http://www.sedigroup.org)

## INTRODUCTION

**SEDI** is an international scientific organization dedicated to the **Study of the Earth's Deep Interior**. The scope of SEDI includes the core and lower mantle, but interest may extend to the surface. The scientific questions and problems of interest to SEDI include: 1) the investigation of the origin, evolution, structure, geochemical and mineralogical composition of the inner core, outer core, mantle and crust, 2) the investigation of core magnetohydrodynamics at all time scales, both from a theoretical point of view and from an observational point of view, and of more general fluid rotational dynamics that can affect the core, 3) the investigation of mantle dynamics, both from a theoretical point of view and observational point of view, 4) the investigation of mechanical, electromagnetic, thermal and chemical interactions between the inner-core, core, mantle, crust and possibly outer layers on a planetary scale, particularly in view of a global understanding of the Earth as a globally interacting system, with special emphasis on investigation of interfaces, and 5) the thermodynamics of the Earth and the investigation of its long-term thermal evolution.

Since 1987, SEDI has been a Union Commission of the International Union of Geodesy and Geophysics ([IUGG](#)). As such, it cuts across the traditional discipline-oriented bounds of the Associations of the IUGG [such as the International Association of Geodesy ([IAG](#)), the International Association of Geomagnetism and Aeronomy ([IAGA](#)), the International Association of Seismology and Physics of the Earth's Interior ([IASPEI](#)), and the International Association of Volcanology and Chemistry of the Earth's Interior ([IAVCEI](#))], which normally study the Earth from a particular point of view. The intent of SEDI is to amalgamate all sources of data and all points of view to generate the most coherent and consistent picture of the workings of the Earth's deep interior.

## ADMINISTRATION

SEDI is currently chaired by Jonathan Aurnou (UCLA, USA), vice-chaired by Christine Thomas (University of Münster, Germany), with Michael Bergman (Simon's Rock College, USA) acting as Secretary General. It has a membership of about 600, as recorded on the email list used to broadcast information related to SEDI activities, upcoming meetings, funding opportunities, and academic openings.

## ACTIVITIES

### IAG-IASPEI Meeting 2017

The joint scientific assembly of IAG and IASPEI was held from July 30 to August 4, 2017, in Kobe, Japan. Various SEDI-related symposia (7 IAG, 27 IASPEI and 9 joint symposia) were convened there.

## **IAPSO-IAMAS-IAGA Meeting 2017**

The IAPSO/IAMAS/IAGA Joint Assembly was held from August 27 - September 1, 2017, in Cape Town, South Africa. It features over 60 total sessions covering a variety of SEDI-focussed topics. These sessions included “A02 - Earth’s core dynamics and planetary dynamos,” which featured 2 oral sessions with attendance of ~30 scientists in each session, and “Geomagnetic secular variation and rapid core dynamics,” which featured a single oral session attended by ~50 researchers.

## **SEDI Meeting 2018**

The planning has all been finalized for the 2018 SEDI meeting in Edmonton, Canada. The lead local organizers at the University of Edmonton are Profs. Matthieu Dumberry and Moritz Heimpel. Between 150 and 250 participants are expected to attend. The [website](#) for the meeting has recently opened.

The registration page is nearly open as well, as it is undergoing final testing at this time. Overall, this meeting is shaping up well and will likely be yet another highly successful event.

## **FUTURE ACTIVITIES**

This summer, the SEDI meeting will be held at the University of Alberta in Edmonton, Canada. This is SEDI’s first meeting held in Canada in 22 years, the last being in Whistler, BC, in 1996. Meeting information can be found at <https://sedi2018.sciencesconf.org>.

At next summer’s IUGG meeting in Montreal, there will also be a number of SEDI sessions, including a Union Session entitled “Geophysical constraints on the Earth’s core and its relation to the mantle.” This session will be linked between IAGA/SEDI and IASPEI.

Jonathan Aurnou, Chair, SEDI  
Christine Thomas, Vice-Chair, SEDI  
Michael Bergman, Secretary General, SEDI

# Union Commission on Data and Information (UCDI)



UCDI website: [www.iugg-ucdi.org](http://www.iugg-ucdi.org)

## INTRODUCTION

In 2008 the IUGG established the Union Commission on Data and Information (hereafter UCDI) to provide IUGG's eight Associations an entity to deal with data and information issues at the Union level and engage with similar bodies in other Unions and Societies. Accordingly, UCDI is expected to enable a high level of cooperation within and between scientific communities. This cooperation is needed in order to ensure the availability of modern data and information systems and services, which are globally distributed, provide universal open access, and are sustainable. Hence, UCDI targets to provide a focused and single voice within IUGG, connecting all IUGG Associations and inter-Association bodies, connect IUGG and its scientists to other bodies/agencies/initiatives that have interest and responsibility on matters of geo-data, advocate and facilitate research and development in the growing field of informatics to improve data and information systems and practices, and promote open access to data and adoption of interoperable data sets.

## ADMINISTRATION

**Membership:** Following the approval of the Bureau of IUGG, the President of IUGG appointed the following members on the Union Commission on Data and Information (UCDI) vide letter dated 13 February 2017.

Chair:	Satheesh Shenoj (India, IAPSO)
Vice-Chair:	Anatoly Soloviev (Russia, IAGA)
Members:	Sonia Maria Alves Costa (Brazil, IAG)
	Ellen Clarke (UK, IAGA)
	Michelle Guy (USA, IASPEI)
	Robert M. Key (USA, IAPSO)
	Silvia Massaro (Italy, IAVCEI)
	Yasuhiro Murayama (Japan, IAMAS)
	Bruce H. Raup (USA, IACS)
Co-opted members:	Aude Chambodut (France), WDS Executive Committee
	Alena Rybkina (Russia), CODATA Executive Committee

**Business Meetings:** The newly appointed committee had its first meeting over telepresence on 3 April 2017. Eight members of UCDI attended the meeting. Dr. Alik Ismail Zadeh, Secretary General, IUGG and Dr. Franz Kuglitsch, Executive Secretary, IUGG also attended the meeting as observers and guides.

The meeting discussed on the major items like the activities to be taken up by UCDI during the next two years, collaborations with other organizations, symposia/conferences to be organised by UCDI or in collaboration with other organisations, etc. It was decided that, though UCDI has no plans to set up the infrastructure for the generation or management of data, UCDI shall advocate on the cross utility of data available with various associations of IUGG. For example, the utility of geodetic data for ocean sciences and vice versa. It was also decided to work in close collaboration with WDC on formats and

contents of meta-data. The meeting also decided to organise a session at the CODATA conference in St. Petersburg scheduled to be held in October 2017.

## ACTIVITIES

(i) **Organised a session titled “Modern strategies for data collection and analysis for the better understanding of the Earth system” at the CODATA conference in St. Petersburg** scheduled to be held during 8-13 October 2017. UCDI Vice-chair Anatoly Soloviev and UCDI member Ms. Silvia Massaro took the lead in organising the session.

The international scientific conference of the Committee on Data for Science and Technology (CODATA) “Global Challenges and Data-Driven Science” was held in St. Petersburg on 8-13 October 2017 (<http://codata2017.gcras.ru/>). The CODATA conference was held in the Russian Federation for the first time. It brought together more than 150 participants from 35 countries<sup>7</sup>. Among the participants were leading scientists, specialists in BIG DATA and modern methods of data processing, pattern recognition and data mining, data collection engineers and technologists. International multidisciplinary scientific dialogue between representatives of various fields of knowledge was held under the aegis of promoting Open data principles and FAIR (Findable, Accessible, Interoperable and Re-usable) data. The conference covered a wide range of issues related to data science, including the collection and processing of large data amounts, the use of system analysis methods, machine learning and artificial intelligence algorithms. During four days of the conference, more than 160 scientific presentations were delivered at 25 scientific sessions; several business meetings and workshops were held.

The session “Modern strategies for data collection and analysis for the better understanding of the Earth system” (ID 10) was organized by the Union Commission for Data and Information (UCDI) established by the IUGG. The session provided modern insights into creation of integrated systems for Earth and environmental observations, their collection and analysis in order to manage efficiently the increasing data volumes and provide easy access to the research and civil communities. The session also considered the state-of-the-art and perspectives in data science relevant to Earth observations and environmental research. It brought together more than 30 scientists from South Africa, USA, Japan, Russian Federation and several European countries. The session was convened by the UCDI co-chair Dr. Anatoly Soloviev (Geophysical Center RAS, Russia).



*During the session “Modern strategies for data collection and analysis for the better understanding of the Earth system”, CODATA conference, St. Petersburg, Oct 2017*

---

<sup>7</sup> Armenia, Australia, Austria, Bangladesh, Brazil, Canada, China, Egypt, Fiji, Finland, France, Germany, Ghana, Hong Kong, India, Ireland, Israel, Italy, Japan, Jordan, Kenya, Laos, Morocco, Namibia, New Zealand, Nigeria, Poland, Russian Federation, Sweden, Saudi Arabia, South Africa, Sri Lanka, Switzerland, United Kingdom, USA

(ii) **Participation in the First workshop on Data Standards for Science organized by CODATA** in Paris during 19-21 June 2017. Dr. Alena Rybkina represented UCDI at the workshop.

Twenty-five data experts and researchers attended the workshop. The general goal of the workshop was to consider an ambitious, coordinated programme of work to promote shared vocabularies and standards to enable data interoperability and integration. This initiative is expected to contribute to the integration between ICSU bodies/ICSU Programms/ISSC on the first stage and broader scientific community on the second stage. Dr. Alena Rybkina presented the past and future activities of UCDI and reported on its new membership and enthusiasm for future collaboration. UCDI's decision to organize a special session at the St. Petersburg conference of CODATA also was reported.

During the workshop, the gaps in the existing data infrastructure and possible technical solutions were discussed. In short term, a road map will be developed and distributed among the ICSU Unions. Though the initiative is very ambitious, the beginning of this long path is expected to acquaint the Unions on identifying their needs and the needs of ICSU in general.

(iii) **Participation in the Second workshop on “Science and the Digital Revolution: Data, Standards and Integration” organized by CODATA** at the Royal Society in London during 13 to 15 November 2017. Ms. Silvia Massaro represented UCDI at the workshop.

Main discussion in the workshop revolved around (i) to exploit emerging online data collections to unleash the potential for game-changing discoveries across the whole spectrum of research domains and (ii) on the development of user-friendly processes that enables linking and integration of datasets between disparate disciplinary areas in ways that are compatible with existing disciplinary standards. Basically, the outcome of the three-day meeting was expected to prepare a roadmap for better understanding the complex phenomena that are vital for the human condition and the planetary function through interdisciplinary collaboration in data-rich world.

Hence, the discussions at the workshop stressed on mobilizing community support and advice for discipline-based initiatives to develop online data capacities and services, priorities for work on interdisciplinary data integration and projects, funding and coordination, and on the issues of international data governance.

Presentations on the first day provided different case-studies from (i) specific disciplines (Earth observations; Health system; Food security; Resilience in cities; Natural disasters), (ii) interdisciplinary Research Areas and (iii) global monitoring and observation. The speakers highlighted on the major scientific questions on monitoring issues, the requirement of data from multiple disciplines, and the challenges of data interoperability and integration.

The second day was devoted to explore how disciplines and interdisciplinary initiatives have addressed the specific challenges of interoperability and data integration. Example surveys, scientific impacts, tools necessary for effective data registration and sharing, etc. were explored to illustrate some case-studies and platforms for interoperability and data sharing. Finally as a possible next step towards providing a roadmap it was proposed to take up a pilot project to promote the integration and interoperability of scientific data, covering practices, support, coordination and governance.

The final recommendations of the workshop include:

- Identify interdisciplinary pilot projects;
- Coordination of efforts: union and association liaisons, data science and standards organizations liaison, and other existing efforts;
- Create timescales: updates on the work plans of unions and, community engagement;
- Find funding: funding agencies, foundations, and international consortia;

- Talk more efficiently with the Governance.

## **FUTURE ACTIVITIES**

Organise a union symposium titled "Data-driven science for Earth and Space exploration" (U04) at the XXVII General Assembly of the IUGG together with IAPSO.

Lead convenor – Dr. Satheesh Shenoi (UCDI), Co-convenor - Robert M. Key (IAPSO)

Satheesh Shenoi, UCDI Chair



# Union Commission on Planetary Sciences (UCPS)

UCPS website: <http://202.127.29.4/geodesy/ucps>

## INTRODUCTION

The IUGG Union Commission on Planetary Sciences (UCPS) was established by the IUGG Executive Committee in June 2015 to promote and coordinate scientific (physical, chemical, and mathematical) studies of planets in the solar system and around other stars. UCPS intends to advance planetary science through advocacy of solar system and extrasolar exploration, seeking insights on the origin, formation and evolution of planets and systems, including a search for habitable worlds beyond Earth. The UCPS together with other IUGG Associations will share knowledge through scientific research and comparative studies between planetary objects and the Earth in the fields of atmosphere, surface and interior science.

Additional information about UCPS can be found [online](#).

### Objectives

- To advance and foster the study of scientific problems in the planetary sciences;
- To promote and coordinate international cooperation in planetary science, and promote planetary science activities in developing countries;
- To facilitate, on an international basis, discussion and publication of the results of the studies, research and work indicated above;
- To contribute to coordinating activities for future space missions.

## ADMINISTRATION

### Executive Committee

- Shuanggen Jin (IAG, China) (Chair)
- Athena Coustenis (IAMAS, France) (Vice-Chair)
- Joern Helbert (IASPEI, Germany) (Vice-Chair)
- Scot Rafkin (IAMAS, USA) (Secretary/Treasurer)

### EC Members

- Christine Schott Hvidberg (IACS, Denmark)
- Michael Purucker (IAGA, USA)
- Fabrizio Capaccioni (IAHS, Italy)
- Philippe Lognonne (IASPEI, France)
- Jose Luis Macias-Vasquez (IAVCEI, Mexico)

### Members (NON-Executive Committee membership)

- Oliver Baur (Austria, IAG)
- Jean-Pierre Bibring (France, IAHS)
- Anil Bhardwaj (India)
- Shane Byrne (USA)
- Nader Haghighipour (USA)
- Paul Hartogh (Germany)
- Masato Iguchi (Japan)
- Wing-Huen Ip (Taiwan, China)

- Takahiro Iwata (Japan)
- Catherine Johnson (Canada, IAGA,)
- Sanjay Limaye (USA)
- Jesus Martinez-Frias (Spain)
- Jürgen Oberst (Germany)
- Rosanna de Rosa (Italy)
- Binod Sreenivasan (India, IAGA)
- Darrell Strobel (USA)
- Feng Tian (China, IAMAS)
- Dmitri Titov (Germany)
- Pieter Visser (Netherlands, IAG)

## ACTIVITIES

- **1st IUGG Symposium on Planetary Science (IUGG-PS 2017) and 3rd IAPS Scientific Assembly (IAPS2017)** - Interdisciplinary observation and understanding of the Solar System, July 3-5, 2017, Berlin, Germany, <http://www.dlr.de/iugg-ps2017>

The IUGG-PS 2017 and IAPS2017 brought together international scientists and engineers focused on interdisciplinary observation and understanding of the Solar System with 11 sessions. Topics include planetary geodesy, remote sensing, atmosphere, ionosphere/plasma physics, magnetic and gravity field, geomorphology, geophysics, geodynamics, geology, petrology, volcanology, geochemistry, interior physics, Life & Astrobiology. About 100 participants attended IUGG-PS 2017 from 14 countries with about 45 oral talks and 25 posters. The IUGG-PS 2017 provided a very good platform for progress presentations and detailed discussion as well as communication. More information can be found [online](#).

Shuanggen Jin, UCPS Chair  
Jörn Helbert, UCPS Vice-Chair

# THE INTER-ASSOCIATION WORKING GROUP: Electro-magnetic Studies of Earthquakes and Volcanoes (EMSEV)



EMSEV website: [www.emsev-iugg.org/emsev](http://www.emsev-iugg.org/emsev)

## INTRODUCTION

EMSEV ('Electromagnetic Studies of Earthquakes and Volcanoes') is an Inter-Association Working Group of the International Union of Geodesy and Geophysics ([IUGG](http://www.iugg.org)). The three International IUGG Associations of Geomagnetism and Aeronomy ([IAGA](http://www.iaga.org)), Volcanology and Chemistry of the Earth's Interior ([IAVCEI](http://www.iavcei.org)), and Seismology and Physics of the Earth's Interior ([IASPEI](http://www.iaspei.org)) powerfully support EMSEV and promote its activities.

Since its foundation in 1999 at the Birmingham IUGG meeting, EMSEV has retained its focus on investigating the tectonic and geological setting of active faults and active volcanoes as well as the physical and dynamical processes leading to fault rupture and volcanic eruptions. We support new research and findings in electromagnetism (EM), integration of new methodologies and inclusion of other geophysical data to describe, monitor, analyse, and model fault systems and volcanoes.

EMSEV objectives are: (1) evaluation and the promotion of advanced studies in the electromagnetic field through international cooperation, conferences and workshops, and high levels international publications, (2) integration of electromagnetic methods together with other geophysical techniques to identify physical processes on all scales before, during and after earthquakes and volcanic eruptions, (3) organization and management of international and regional workshops including sponsorship of sessions at international meetings that describe these results and (4) participation in educational programs relating observed results to reduction of earthquake and volcanic hazards.

## ADMINISTRATION

More than 320 scientists are now actively working on EMSEV-related activities. They have expanded methodologies, increased ground observations, used satellite data and carried out laboratory measurements to understand earthquake and volcanic processes and seismo- and volcano-electromagnetic effects.

At the EMSEV business meeting held during the 2015 IUGG General Assembly in Prague (Czech Republic), a search for new leadership was implemented. Furthermore, during the last International EMSEV meeting held in Lanzhou in September 2016 (China), the EMSEV community decided to upgrade the [EMSEV website](http://www.emsev-iugg.org/emsev). This upgrade has been completed. The election of new leadership will occur during the [next EMSEV meeting](#) in Potenza, Italy on September 17-21, 2018.

The EMSEV body consists of the 1) Executive Bureau, 2) Working Group Members that include all scientists interested and involved in EMSEV activities, 3) National Representatives (about two per country), and 4) EMSEV collaborators that include all interested scientists from other geophysical disciplines. The executive bureau is elected every four-years. Currently, the EMSEV body is as follows:

Bureau. Chairperson (J. Zlotnicki), Vice-Chairperson (M.J.S. Johnston), and Secretary (T. Nagao). T. Hashimoto from Hokkaido University was nominated and accepted during the 2015 IUGG Prague meeting to be the IAVCEI liaison member with Y. Sasai assisting him during the next few years. J.Y. Liu from the Institute of Space Science in Taiwan continues to be the IAGA liaison and M. Johnston is the IASPEI liaison. T. Harinarayana continues the position of IAGA WG1-2 corresponding liaison member. Several other scientists provide advice and expertise in EM research: Q. Huang (China), V. Lapenna (Italy), A. Meloni (Italy), V. Korepanov (Ukraine), and R. Singh (India-USA). Finally, Seiya Uyeda who was Past-Chairperson (2001-2007) remains very active in EMSEV activities.

Working Group Members. This includes all who have other responsibilities, all students, young scientists, senior scientists, engineers, and experts, interested in EMSEV activities. Information is exchanged through EMSEV website, direct mailing list, business meetings, and conferences.

National Representatives. At present, 32 key scientists involved in EM and promoting EMSEV activities in their countries and abroad have been selected to be EMSEV National Representatives. They represent 15 different countries: China, France, Greece, India, Indonesia, Italy, Japan, Kyrgyzstan, Philippines, Poland, Romania, Russia, Taiwan, Ukraine, and USA. Some concern was voiced that some countries, particular in South America and Africa, are clearly under-represented.

Collaborators. EMSEV collaborators provide a very important independent contributions and insight from related fields to the EMSEV community. Currently, two scientists have been nominated to be collaborators. These include V.G Kossobokov, a seismologist from Russia, and Alain Bernard, a geochemist from Belgium.

Business meetings are regularly organized at the EMSEV meetings and International General Assemblies. Minutes of the meetings are distributed through EMSEV mailing list. Information, activities, and annual and business meetings reports are kept on the EMSEV web site that is mainly managed by [T. Nagao](#). Messages and information on activities are distributed by T. Nagao through the EMSEV mailing list.

## ACTIVITIES

In 2017, EMSEV maintained a high level of activities thanks to the energetic participation of many EMSEV working group members. EMSEV was involved in several international meetings, organizing sessions devoted to EM phenomena. EMSEV also kept a high level of activities through international cooperation as well as on Taal volcano in the Philippines and in Kyrgyzstan.

It should be emphasized that some articles published in international journals clearly mention the support and the sponsorship of IUGG and EMSEV.

### Meetings and workshops

Among the sessions in international conferences sponsored, organized, or including a high level of participation by EMSEV members, some are:

*EGU, April 23-28, 2017, Vienna (Austria)*

- NH4.5/AS4.31/EMRP4.4/SM9.3: Short-term Earthquakes Forecast (StEF) and multi-parametric time-dependent assessment of seismic hazard (t-DASH). Conveners: V. Tramutoli, P.F. Biagi, K. Hattori, J.Y. Liu, V. Kossobokov, G. Papadopoulos, D. Ouzounov, G. Martinelli.

*JpGU-AGU-2017, May 20-25, 2017, Chiba (Japan)*

- HDS13: Remote Sensing of Natural Hazards and Mitigation of Impacts on Human/Ecosystem. Conveners: R. Singh, K. Goto, P. Patra.
- M-IS04: Interdisciplinary studies on pre-earthquake processes. Conveners: K. Hattori, J.Y. Liu, D. Ouzounov, Q. Hunag.

*4<sup>th</sup> International Workshop on Earthquake Preparation Process - Observation, Validation, Modeling, Forecasting, May 26-27, Chiba (Japan).*

- Organizers: K. Hattori, J.Y. Liu, D. Ouzounov.

*Conférences-Débat. Institut de France, Académie des Sciences, June 13, 2017, Paris (France).*

- Les catastrophes naturelles: Observations spatiales et prévision. La prévision des éruptions volcaniques. Une réalité? J. Zlotnicki

*7<sup>th</sup> International Symposium on Problems of Geodynamics and Geoecology of intracontinental orogens, June 19-23, Bishkek, Kyrgyzstan.*

- EMSEV Participation and cooperation: T. Nagao and J. Zlotnicki

*IAG-IASPEI-2017, July 30-August 4, 2017, Kobe (Japan)*

- S11: Geo & space technologies to study pre-earthquake processes: Observation, modeling and forecasting. Conveners: D. Ouzounov, K. Hattori, J.Y. Liu, M. Nakatani.
- S12: Interdisciplinary approach towards earthquake prediction studies. Convener: D. Ouzounov, S. Pulinets, K. Hattori, J.Y. Liu, Q. Huang.

*USRI-GASS, August 19-26, 2017, Montreal (Canada)*

- GEH: Seismo Electromagnetics (Lithosphere-Atmosphere- Ionosphere Coupling). Conveners: S. Pulinets, Y. Hobara, H., Rothkaehl.
- EFGH: Natural Electromagnetic Noise and Radio Sensing Applications in Terrestrial and Planetary Environments. Conveners: Y. Hobara, C. Price, T. Ushio, M. Fullerkrug.

*IAVCEI General Assembly, August 14-18, 2017, Portland (USA)*

- III-2: Precursors to eruptions: Geophysical multi-parameters techniques for monitoring active volcanoes. Conveners: K. Neuberg, J. Zlotnicki, M.J.S. Johnston, T. Hashimoto, S. Prejean, B. Taisne.

*AGU, December 10-15, 2017, New Orléans (USA)*

- NH21C: Pre-Earthquake Processes: An Interdisciplinary Approach to Earthquake Prediction Studies II Posters. Conveners: D. Ouzounov, K. Hattori, P. Taylor.

### **Joint international activities**

**EMSEV activity on volcanoes.** A cooperative program on Taal volcano between EMSEV and the Philippines Institute of Volcanology and Seismology ([PHIVOLCS](#)) evolved from a Workshop in Manila, the capital of the Philippines, in 2003. Taal volcano is considered a very dangerous and hazardous volcano with the potential to cause serious death and devastation on Luzon Island. Past eruptions have not been forecast with sufficient time to allow orderly evacuation of people living on and around the edifice and, for some recent eruptive events, such as the 1911 eruption, ash fell on the nearby capital, Manila, located 60 km away.

Electromagnetic methods were used first for imaging the 3-dimensional structure of the volcano then combined later with other geophysical monitoring systems to monitor the ongoing activity. Structural information indicates a shallow magmatic source located at a depth between 4 and 6 km below the current Main Crater Lake on Volcano Island. Volcano Island is surrounded by Taal Lake that fills the prehistoric caldera of Taal Volcano. Volcanic activity is a consequence of the complex converging plate boundaries and fault systems in this region. Current deformational and seismic activity has currently its focus under the northern part of the volcano. Taal Lake and the nearby South China Sea provide the possibility of huge water transfer into the volcano. Heating during infiltration gives rise to a huge hydrothermal system under the Main Crater Lake, the top of which can be clogged up by mineralisation with time. It becomes very understandable that this kind of thermo-dynamical system can abruptly give rise to phreatic, phreato-magmatic, and even plinian surges.

To monitor this system, EMSEV and PHIVOLCS have installed a number of multi-parameter stations sending data to the local Buco Observatory and to PHIVOLCS headquarters every two seconds. Magnetic, electric, tilt, resistivity, ground and water temperature data were recorded at field sites and telemetered to PHIVOLCS (leading EMSEV team, J. Zlotnicki, Y. Sasai, M.J.S. Johnston, T. Nagao). A recent result was the identification of a large seismovolcanic crisis that occurred in April 2010 with deformation, strongly felt seismicity, temperature changes, magnetic field changes, electric field changes and gas emission but without any external eruptive products.

The latest results clearly indicate that the longer the inter-eruption period is, the more likely the next eruption will be large ( $VEI \geq 4$ ) and more likely the eruption may occur from subsidiary cones surrounding the Main Crater. This international cooperative program has involved teams from Japan, France, USA, Greece, Italy, and Belgium. During these past 15 years of cooperative work, EMSEV provided training to PHIVOLCS members on the installation techniques, analysis of electromagnetic data and the best way to monitor the volcano. Further education of the PHIVOLCS team has included scholarships in Japan (PhD in Japan directed by T. Nagao and Y. Sasai) and Belgium. These skilled scientists from PHIVOLCS can now take over the monitoring tasks and EMSEV will continue to deliver expertise to PHIVOLCS when requested. A number of articles have been jointly published and some others are still in process.



*Telemeter multiparameter station on Taal volcano*



*Teams from France, Greece, Japan and United States with PHIVOLCS team on Taal volcano (2010)*

**EMSEV activity related to Earthquake Processes.** In 2011, EMSEV started a new research effort focused on understanding fault failure and the failure mechanisms of earthquakes. This was developed through a cooperative research program with the Bishkek Research Station (Bishkek RS) in Kyrgyzstan under the Russian Academy of Sciences where some outstanding research on the relation between EM phenomena and electrical resistivity changes with earthquakes has been being carried out during the last 30 years.

This cooperative agreement between EMSEV and the Bishkek Research Station was signed in November, 2011 and renewed during EMSEV workshop in Athens in April 2015. A paper titled, "Seismic Electric Signals in seismic prone areas" was published in 2017 (Sarlis et al., 2017). Further efforts in the development of joint field studies and data analysis were completed in 2017. EMSEV also participated in the 7th International Symposium on: *Problems of Geodynamics and Geoecology of Intracontinental Orogens*. During this visit, EMSEV and Bishkek RS upgraded the two EMSEV stations that record the electric field in different horizontal directions and added seismic monitoring.

It should be noted that the Bishkek Research Station has a very advanced electrical current system that is able to inject more than 700A of electrical current into 4.2 km long electrical lines. Monitoring these lines can provide information on:

- Changes of the electrical resistivity of the ground in relation to crustal stress and regional seismicity,
- Effects of large current injection on the induced local seismicity which may provide insights into controlling earthquakes,
- Disturbances of the long term behaviour of the magnetic field,
- Pre and post seismic electrical signals.

All these items are in the scope of the joint studies and EMSEV will continue to make efforts for sustaining the Bishkek research station and in analysing of data.

**Chinese Seimo-Electric Satellite mission and EMSEV.** Following the promising results obtained during the [DEMETER mission](#) between 2006 and 2010 on the possible statistical significant occurrence of disturbances of the ionosphere a few hours prior to large earthquakes (Magnitude above 5), the Chinese Earthquake Administration has implemented a new satellite monitoring program in which a flotilla of dedicated satellites will be regularly launched. The first EM satellite should be launched from China in February 2018. Professor Xuhui Sen (Head Scientist and Coordinator of China Earthquake-related Satellite Missions and Director of the Center of Earthquake Observation from Space, CEA) is also member of EMSEV.

Since 2016, EMSEV and Professor Sen are working to merge the Chinese and EMSEV scientific community in order to develop joint programs and analyses, as well as to promote the exchange of researchers. A Memorandum of Agreement is almost finalized and should be signed in 2018. It would largely increase the knowledge base of the scientific community working on the preparation of earthquakes.

## FUTURE ACTIVITIES

In 2018, EMSEV will continue to be deeply involved in major meetings such as AOGS-EGU (Philippines), EGU (Austria), the International Conference for Decade Memory of the Great Wenchuan Earthquake (China), JpGU (Japan), 24<sup>th</sup> Electromagnetic Induction Workshop (Denmark), Cities of Volcanoes 10 (Italy), AGU (USA).

In addition, EMSEV will organize its biannual international workshop at Potenza (Italy) between September 17 and 21 (<http://web.unibas.it/emsev2018/index.php/en/>). It will also offer a great opportunity to join CoV10 meeting in Napoli that will be held prior to the EMSEV meeting early in September, 2018 (<https://www.citiesonvolcanoes10.com/>).

Submitted by Jacques Zlotnicki, EMSEV Chair  
M.J.S. Johnston, EMSEV Vice-Chair  
T. Nagao, EMSEV Secretary

# THE INTER-UNIONS COMMISSION: International Lithosphere Programme (ILP)



ILP website: <http://ilpdev.gfz-potsdam.de>

## INTRODUCTION

The International Lithosphere Program (ILP) is a joint project of IUGG and IUGS and receives additional funding from several member states (see financial report). ILP seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere through international, multidisciplinary geoscience research projects – Task Forces (TFs) and Regional Coordinating Committees (CCs) addressing major ILP themes: I. Geoscience of global change, II. Contemporary dynamics and deep processes, III. Continental lithosphere, IV. Oceanic lithosphere

All TFs and CCs are led by international teams and supported by ILP with 4,000 US \$ per year over a period of 5 years. This “seed money” is used by the project leaders to raise additional funds and build strong interfaces with other projects (ICDP, TOPO-EUROPE, MEDINA, etc.).

## ADMINISTRATION

ILP operates on the base of terms of reference and has an International Bureau. They meet regularly to monitor the progress and to select new projects in close consultation with the representatives of National Committees. The Bureau is chaired by the President with support from the Secretary General (SG). The ILP Secretariat is located in the German Research Centre for Geosciences (GFZ) in Potsdam, Germany, and is headed by the Executive Secretary A. Rudloff (Germany). The current ILP Bureau membership is presented below:

President:	H. Thybo	Turkey
Secretary General	M. Scheck-Wenderoth	Germany
Representative of IUGG	H. Gupta	India
Representative of IUGS	K. Asch	Germany
Chair Committee National Representatives:	A. Tibaldi	Italy

The Bureau is also supported by the past president S. Cloetingh (Netherlands) and by the associate members: J.-P. Burg (Switzerland), A. Morozov (Russia), F. Roure (France), M. Zoback (USA), and P. Mc Keever (UNESCO); by the lifetime members M. von Knorring (Sweden) and H. Gupta (India) as well as by Honorary President A. Green (Switzerland) and ILP Fellow J.F.W. Negendank (Germany).

### **Bureau and Business meetings of ILP, Vienna, Austria, 2017**

The annual business meeting was held following a meeting of the ILP bureau at EGU. It was attended by most of the PIs in ILP as well as by guests from IUGG and IUGS. A short report has been given by the president and SG as well as by representatives of IUGG and IUGS on new developments and all active TF and CC reported on their activities and future plans.



President Cloetingh reported that delegates from Azerbaijan, Moldova, and Ukraine and Serbia raised their interest of joining ILP. ILP's new national committees from Hungary and Romania were welcomed. SG Scheck-Wenderoth was reappointed by the mother unions for a second term (2017-2020). IUGG SG Alik Ismail-Zadeh reports that the IUGG will celebrate its 100th anniversary in 2019. The centennial ceremony is foreseen on 29 July 2019 at UNESCO in Paris. New IUGS vice president and ILP's officer Kristine Asch informs that in Cape Town 2016 the host for 2024 was selected: 37th IGC will take place in Busan, South Korea. IUGS also had elections for council. New president is Qiuming Cheng from Canada/ China, new SG is Stan Finney from U.S.A. The initiative "Resourcing Future Generations" is active and an international conference is being organised under this topic in Vancouver/Canada, in July 2018. SG reports on the YES congress to be held in Iran in summer 2017: Germany is preparing the next one in 2019. ESA is sponsoring a Carpathian project, working on Sentinel satellite data. Meetings have been held in Budapest and Sibiu. IUGG SG Ismail Zadeh encourages ILP to link itself to UNESCO programs on geodynamics and geo-hazards.

The Flinn Hart Awardee for 2016 is Mojtaba Rajabi from Adelaide/Australia, but could not attend EGU this year (see his [portrait](#) in WSM-Newsletter, July 2017 - Page 7).



*Sierd Cloetingh (left) hands over to the new ILP president Hans Thybo, EGU's vice president*

New President Thybo points his agenda to bring ILP to internationality and interdisciplinary. He understands ILP as a bottom up initiative with minimal resources, driven by maximal enthusiasm.

IUGG officer and former IUGG president Harsh Gupta thanks Sierd Cloetingh on behalf of the community for his 12 years of passionate leading the ILP.

The minutes were distributed among the Bureau Members and are available on request. The next business meeting at EGU 2018 in Vienna, Austria is scheduled for 9 April 2018 - 18:00 hrs.

## ACTIVITIES

### Scientific meetings, developments for the different TFs and CCs:

Scientific meetings, developments for the different TF and CC, selected publications: see Appendix. As every year most of the ILP TF and CC have been visible at the large international meetings EGU AGU, etc. Moreover, most TF and CC contributed to specific conferences within their thematic fields and held dedicated smaller international workshops. The publication activity was significant for most teams and some TF and CC produced Special Issues in peer-reviewed journals.

**CC 1 MEDYNA:** (Chairs: Carlos J. Garrido, Spain and J.-L. Bodinier, France): ILP-Medyna organized and co-organized the following international meetings: First Atlas Georesources International Congress "AGIC 2017": 20-22th March 2017, Hammamet, Tunisia; Medyna Shortcourse on Applied Geochronology.13-14 November 2017. Granada, Spain; 2017 Medyna Workshop and Geodynamic Seminars. 15-17 November 2017.

**TF2:** Structural and rheological constraints on magma migration, accumulation and eruption through the lithosphere (Chairs: A. Tibaldi, Italy and A. Gudmundsson, U.K.): Activities concentrated upon the collection of interdisciplinary data focused on the themes of this Task Force 2. New project funded by the E.U.: Novel applications of aerial unmanned vehicles and submarine drones for investigating and teaching the volcanic environment in 3D. Results have been published in 97 peer reviewed papers

among others in Geology, Scientific Reports-Nature, etc. (see the complete [list of publications](#) on the website dedicated to TF II).

**TF 3:** The seismic cycle at continental transforms from seismological observation and forward simulation (Chairs: M. Bohnhoff, Germany and O. Heidbach, Germany): A statistical tool was developed that reduces the uncertainties of stress inversion from focal mechanisms significantly. This potentially enables to resolve stress build-up expressed as stress tensor rotation at plate boundaries: S. Specht, O. Heidbach, F. Cotton and A. Zang (2017): Data-driven earthquake focal mechanism cluster analysis, Scientific Technical Report [STR 17/01](#), Potsdam: GFZ German Research Centre for Geosciences.

**TF 4:** Fate of the subducted continental lithosphere: insight through analytical mineralogy and microstructures (Chairs: L. Dobrzynetska, U.S.A. and J. Zhang, China): International Workshop on Source Process of Large Earthquakes and Deep Dynamics, Wuhan, China, 17 July, 2017. Session “Deep Continental Subduction” at the International Workshop: “Extreme metamorphism: records from ultrahigh-pressure and ultrahigh-temperature rocks”, Northwest University, Xian, China, September 21-25, 2017.

**TF 6:** Sedimentary Basins. (Chairs: L. Matenco, Netherlands and F. H. Nader, France): The 12th Workshop of The International Lithosphere Program Task Force VI Sedimentary Basins, took place in Cyprus, 29 October – 2 November 2017, 59 participants and a new Springer volume dedicated to this meeting is in preparation. The 13th Workshop of Task Force 6 will take place as a special session “Evolution of sedimentary basins: from deep structures to surface processes” by M. Malo (INRS, Québec), L. Matenco (Utrecht University), F.-H. Nader (IFPEN, Paris) at the International Sedimentological Congress 2018, Quebec City, Canada, 13-17 August 2018.



*Participants of the 12th Workshop of the ILP Task Force VI Sedimentary Basins, Cyprus, 29 Oct – 2 Nov 2017*

**TF 8:** Lithosphere dynamics: interplays between models and data (Chair: T. Gerya, Switzerland): Memorial Tectonophysics Volume to Evgenii Burov “Modeling and understanding of lithospheric processes”, with T. Gerya as one of the volume editors will be published 2018. Networking activities in 2017 were devoted to proposal preparation for the new European Research Infrastructure project GALaCTiC (GeodynAmics Lithosphere CommuniTy Code) aimed at the development of the high-end-high-performance 3D community code for thermomechanical modelling of lithospheric processes. Project submission is planned for 2018.

**TF 9:** Subduction across scales (Chairs: P. Agard, France, A. Okay, Turkey, B. Hacker, USA, T. Gerya, Switzerland): The Subduction Interface Processes - SIP - Conference (>100 participants Barcelona, April 18-21, 2017) was organized in the frame of the European project ZIP and was co-funded by the ILP SAS task force. The Conference aimed at bridging the gap between the various Earth Science communities and enhancing future collaborations on subduction processes. Contributions addressed surface processes, structural geology and geodynamics, petrology, rheology, geochemistry, geophysics and numerical modelling.

## FUTURE ACTIVITIES

- Further implement science plan developed during the 35th ILP Anniversary Workshop and the subsequent Bureau Meeting for 2016-2020
- Invite new Task Forces/Coordinating Committees
- Several sessions with TF and CC contributions at EGU-GA Vienna, 2018
- Several workshops of individual task forces
- ILP Business and bureau meetings at EGU-GA in Vienna, April 2018
- First E. Burov medal and respective medal lecture at EGU 2018
- Strengthen links with other IUGG and IUGS programs

Budget request for 2018: To assure continuity and enable us to support our Task Forces and Coordinating Committees we ask for the annual IUGS subvention of 15,000.00 USD.

Hans Thybo, ILP President  
Magdalena Scheck-Wenderoth, ILP Secretary General  
Alexander Rudloff, ILP Executive Secretary

# IUGG FINANCIAL REPORT

## INTRODUCTION

This report describes in short the status of the IUGG finances for the year 2017, the second year of the IUGG quadrennium 2016-19. The report will be discussed at the 2018 Bureau meeting.

The 2016-19 budget was approved at the Council meeting in Prague, July 2015.

The price of 1 unit in 2017 was \$1,935.

By the end of 2017/beginning of 2018 IUGG has 70 members representing 276 units. 11 members are associate members. On page 7 one can find more details about memberships.

The membership dues paid by members are the economical basis for the activities of IUGG. The situation is right now relatively steady in the sense that the union has a constant number of members and thereby also a constant income basis. There is an ongoing debate of value for money regarding memberships of scientific organizations like IUGG. Therefore, IUGG must continue to have focus on the membership issue in the foreseen future.

The accounts of the treasurer's office are audited by a chartered auditor, PWC.

The accounting is a cash flow system. Therefore, the 4-year accounting for the full budget period gives a more precise description of the financial status of the union than the individual accountings year by year.

A student assists me with the keeping order in my files, writing letters etc. Since 2007 I have not had an Assistant Treasurer.

### Content:

Summary of the IUGG accounts in US dollars for 2017	page 123
General comments and highlights	page 124
Overview of IUGG grants and allocations	page 126
Membership information and statistics	page 127

## SUMMARY OF THE IUGG ACCOUNTS IN US DOLLARS FOR 2017

US dollars	Accounts	Budget
<b>RECEIPTS</b>		
1. Membership Subscription	552,562.86	534,600.00
2. ICSU Grants	0.00	
3. Assembly Surcharge	0.00	
4. Sales of Publications	101.86	200.00
5. Miscellaneous		
a. Interest	-1.28	
b. Gain on exchange	3,325.69	
c. Other	0.00	
d. Associations, surcharge	0.00	
6. Total Receipts	555,989.13	534,800.00
7. Cash in hand	747.07	0.00
8. Bank balance on 1/1 2017	665,783.86	513,800.00
9. Check Sum	1,222,520.06	1,048,600.00
<b>EXPENDITURES</b>		
11. Administration		
11.1 Personnel	11,138.05	15,000.00
11.2 Equipment	1,801.42	1,000.00
11.3 Supplies	45.09	4,000.00
11.4 Communications	86.89	4,000.00
11.5 Travel, Administration only	89,485.28	80,000.00
11.6 Miscellaneous	5,784.34	1,000.00
11.6a surcharge	0.00	0.00
11.7 Travel, representation	287.80	
12. New initiatives		
12.1 Education and outreach	15,000.00	20,000.00
12.2 Science	5,014.46	20,000.00
13. General Assemblies		
13.1 Organization	0.00	
13.2 Travel	0.00	
14. Symposia	7,917.95	20,000.00
15. Annual allocations		
15.1 Annual allocations	255,843.76	261,900.00
16. Dues and Grants		
16.1 ICSU	25,233.10	30,000.00
17. ICSU grants		
17.1	0.00	0.00
18. Union activities		
18.1 GRC, SEDI, CMG, UCIDI	0.00	26,000.00
18.2 Inter-Union Science (ILP)	14,277.70	15,000.00
18.3 Liaison Officers	725.08	10,000.00
18.4 International Scientific Programs	2,000.00	6,000.00
18.5 New commissions UCPS	11,628.61	5,500.00
19. Countries in need		
19.1 Travel Grants, General Assemblies	0.00	
20. Fees		
20.1 Professional services	0.00	5,000.00
20.2 Bank fees	2,210.29	3,000.00
21. Contingencies	0.00	2,500.00
22. Loss on exchange	0.00	
23. Total Expenditures	448,479.82	529,900.00
24. Balance on 31/12 2017	774,040.24	518,700.00
25. Check sum	1,222,520.06	1,048,600.00

Exchange rates: **USD/DKK**

March 7, 2018	Line 8	7.103 JAN 1, 2017=DEC 31, 2016
Aksel Walløe Hansen	Line 24	6.232 DEC 31, 2017
	Other lines	6.629 annual average

**USD/EUR**

Line 8	0.956 JAN 1, 2017=DEC 31, 2016
Line 24	0.837 DEC 31, 2017
Other lines	0.891 annual average

## GENERAL COMMENTS AND HIGHLIGHTS

The annual balance of the IUGG economy is of the same size or bigger than 1 year's turnover. In 2017 IUGG ended up with a surplus of more than \$100K.

It should be emphasized as also stated above that we do the accounting as a cash flow system. Therefore the summary for a full period will be a more robust sign of the economy of IUGG than the individual years.

The summary of the IUGG accounts is shown in USD. It is the sum of three different Danske Bank accounts in USD, EUR and DKK respectively. In addition IUGG also has a Mastercard account which is used mostly in connection with traveling and I have a little cash in hands too.

A new account has been opened to handle the economy of the IUGG commission on climate, CCEC. But this account is not included in the present report.

Since 2008 the EUR account allows European members to pay dues directly in EUR and IUGG to do relevant transfers in EUR (several associations have accounts in EUR).

### Some highlights:

#### Receipts

##### **Line 1, Membership Subscription**

Right now (March 7, 2018) IUGG has received payments equivalent to a total of 251 units for 2017. This number also includes payments received in 2018 for 2017. But this money is not included in the account summary shown here. The 251 units should be compared to the numbers for the three previous years 2014-2016: 269, 267 and 261 respectively. The number for 251 is expected to increase when members pay dues in arrears. As will the numbers for the years 2014 – 2016.

##### **Line 3, Assembly Surcharge**

No income

##### **Line 4, Sales of Publications**

A small amount of money is received from our agreement with Cambridge University Press.

##### **Line 5.a, Interest**

There is no interest paid to the union accounts in 2017.

##### **Line 5.b, Gain on exchange**

This line together with the corresponding line 22 is used to balance the accounts. In 2016 there was a loss on exchange. In 2017 we had a gain. We loose on exchange when we keep money in EURO and Danish Kroner when the dollar goes up. It should also be noticed that I use an averaged exchange rate during the year.

## Expenditures

By and large there is a good correspondence between accounting and budget although there are some specific deviations.

### **Line 11, Administration**

--

### **Line 12, New Initiatives**

In 2016 there were several payments of grants covering the years 2016-2017. Therefore, the amounts in 2017 are smaller.

### **13, General Assemblies**

--

### **Line 14, Symposia**

The expenditure is smaller compared to the budget as several 2017 payments of line 14 grants were done late 2016.

### **Line 15.1, Annual allocations to Associations**

The annual IUGG allocation to the associations (50% of the dues paid the year before) is installed when the financial reports for the previous year are received. The distribution percentages for the period 2016-2019 and the allocations in 2017 are shown in the following table:

	%	2017 amount according to the applied algorithm
IACS	10.46	\$26,672
IAG	11.68	\$29,783
IAGA	15.19	\$38,734
IAHS	12.39	\$31,594
IAMAS	15.81	\$40,315
IAPSO	10.82	\$27,590
IASPEI	13.19	\$33,634
IAVCEI	10.46	\$26,672
		<u>\$254,994</u>

By definition IACS will get the same contribution as that of IAVCEI.

The amount shown in line 15.1 of the account summary, page 125, differs from the \$ 255K shown here due to the way I handle the fluctuating exchange rates over a year.

### **Line 17, ICSU grants**

No ICSU grant was received in 2017.

### **Line 18, Union activities**

In 2017 only one travel reimbursement was paid. Thanks to everybody for finding other sources of funding of the travel expenses.

See page 128 for more details.

### **Line 22, Loss on exchange**

See line 5.b for explanatory details.

## OVERVIEW OF IUGG GRANTS AND ALLOCATIONS

IUGG is supporting science in different ways:

- i) Annual allocation to Associations, line 15 (see further comments on page 127)
- ii) New initiatives, line 12
- iii) Smaller scientific meetings, line 14
- iv) Special grants with ICSU, line 17
- v) Union activities, line 18
- vi) Travel grants in connection with General Assemblies, line 13.2 and line 19.1

Here follow some main figures for the amounts allocated in 2015:

<b>i) Line 15.1 (Associations)</b>		
8 Associations		<b>\$ 254,994</b>
<b>ii) Line 12 (New initiatives)</b>		
12.1 ICTP training course activities	\$ 15,000	
12.2 IUGG grants program to IUGG bodies	<u>\$ 5,967</u>	
Total		<b>\$ 20,967</b>
<b>iii) Line 14 (Symposia grants)</b>		
5 grants paid in calendar year 2017	<u>\$ 8,000</u>	
Total		<b>\$ 8.000</b>
<b>iv) Line 17 (ICSU grants)</b>		
No ICSU grant in 2017	<u>€ 0</u>	
Total		<b>\$ 0</b>
<b>v) Line 18 (Union activities)</b>		
18.1 No payment in 2017	\$ 0	
18.2 ILP	\$ 15,000	
18.3 Liaison officers	\$ 646	
18.4 CODATA	\$ 2,000	
18.5 UCPS	<u>\$ 11,000</u>	
Total		<b>\$ 28,646</b>
<b>vi) Lines 13.2 and 19.1 (Grants in connection with General Assemblies)</b>		
No payments in 2017		<b>\$ 0</b>



## MEMBERSHIP INFORMATION AND STATISTICS

As of December 31, 2017 IUGG has 69 members representing 276 units. This number is unchanged compared to the situation one year earlier. However, in early 2018 Serbia became a new associate member no. 11.

As of January 1st, 2018, 59 members are paying members, 11 members are in associate status. 19 paying members representing 38 units were in observer status.

As of today, March 7th, 2018 three observers have already paid their dues in arrears. They are not listed here. Consequently, 16 members are today in observer status, representing 25 units.

### In category 1, 9 members, 9 units

Bulgaria (7. year as observer)	payment in progress
Iran (7. year as observer)	payment in progress
Macedonia (6. year as observer)	
Azerbaijan (3. year as observer)	
Colombia (3. year as observer)	
Indonesia (3. year as observer)	
Nicaragua (2. year as observer)	
Vietnam (2. year as observer)	
Jordan (1. year as observer)	

### In category 2, 5 members, 10 units

Nigeria (4. year as observer)
Saudi Arabia (2. year as observer)
Pakistan (1. year as observer)
Greece (1. year as observer)
Egypt (1. year as observer)

### In category 3, 2 member, 6 units

Brazil (2. year as observer)
Argentina (1. year as observer)

In summary, the membership overview is

Category	No. of members	No. of units/ member	Total units
11	1	35	35
8	3	20	60
7	1	15	15
6	5	10	50
5	3	7	21
4	6	5	30
3	5	3	15
2	15	2	30
1	20	1	20
A	11	0	0
In total	70		276

# ADDITIONAL UNION MATTERS

## Awards and Honors

**Emma Douma** (New Zealand), **Katarzyna Dudzisz** (Poland) and **Federico Gasperini** (USA) were awarded 2017 IAGA Young Scientists Award.

**Robert Engdahl**, IUGG Fellow, has been awarded the IASPEI Medal 2017 for ground-breaking contributions to seismology and our understanding of the Earth.

**Jeffrey Forbes** (USA) was awarded the 2017 IAGA Shen Kuo Award for Interdisciplinary Achievements, and **Jean Rasson** (Belgium) the 2017 IAGA Long Service Medal.

**Harsh Gupta**, IUGG President (2011-2015), was awarded Honorary Membership of the Asia Oceania Geosciences Society (AOGS).

**Corinna Hoose** (Germany) was awarded the 2017 IAMAS Early Career Scientist Medal.

**Gordon McBean, IUGG Fellow, was awarded** the 62nd International Meteorological Organization (IMO) Prize. The IMO Prize, the most important award in meteorology, is named after WMO's predecessor organization the International Meteorological Organization and is awarded annually to scientists that have made outstanding contributions to meteorology, hydrology and geophysical sciences.

**Lynne Talley** is the IAPSO Prince Albert I Medal recipient 2017 for her seminal contributions to our understanding of all ocean basins, including landmark discoveries in the Pacific, Atlantic and Southern Oceans.

*The American Geophysical Union (AGU) announced its Union, Section and Focus Group awardees and named lecturers who will be honored at the 2017 AGU Fall Meeting in New Orleans, LA, USA. Among the honorees are those scientists, who have been active in IUGG/Associations for years:*

**Robert A. Duce** (USA), Former President of IAMAS and IUGG Fellow, was awarded the 2017 Ambassador Award.

**Brian Kennett** (Australia), Former President of IASPEI and IUGG Fellow, was awarded the 2017 Inge Lehmann Medal.

**Hubert Savenije** (Netherlands), Immediate Past President of IAHS, was awarded the 2017 International Award.

**Tonie M. van Dam** (Luxembourg), Member of the IUGG Union Commission on Climatic and Environmental Change, who will deliver the *William Bowie Lecture* (Geodesy Section);

**John L. LaBrecque** (USA), Vice Chair of the IUGG Union Commission on Geophysical Risk and Sustainability, who will deliver the *Gilbert F. White Distinguished Lecture* (Natural Hazards Focus Group);

**Paola Malanotte-Rizzoli** (USA), Former President of IAPSO and IUGG Fellow, who will deliver the *Rachel Carson Lecture (Ocean Science Section)*;

**Teruyuki Nakajima** (Japan), Secretary General of IAMAS, who will receive the *Yoram J. Kaufman Unselfish Cooperation in Research Award (Atmospheric Science Section)*; and

**Thorsten Wagener** (UK), Former Vice President of IAHS, who will deliver the *Paul Witherspoon Lecture (Hydrology Section)*.

At the Fall Meeting of the American Geophysical Union (AGU) in New Orleans, USA, in December 2017, a new class of AGU Fellows were honored for their “exceptional scientific contributions and gained prominence in their respective fields of Earth and space sciences”. Among the 2017 AGU Fellows are **George Helffrich** (Japan) and **Paul Tackley** (Switzerland), both Members of the Executive Committee of the IUGG Union Commission on the Study of the Earth's Deep Interior (SEDI); **Alberto Montanari** (Italy), President of the IAHS International Commission on Water Resources Systems (ICWRS); **Teruyuki Nakajima** (Japan), IAMAS Secretary General; and **Daniel Schertzer** (France), Member of the Executive Committee of the IUGG Union Commission on Mathematical Geophysics (CMG).

**Christopher Bean** (Member, Irish National Committee for IUGG), **Alexei Gvishiani** (President, Russian National Committee for IUGG), **Alik Ismail-Zadeh** (IUGG Secretary General), and **Zbigniew Kundzewicz** (Member, Polish National Committee for IUGG) were elected to the Academia Europaea. **Sierd Cloetingh** (Immediate Past President of the International Lithosphere Program of IUGG and IUGS) was elected President of Academia Europaea.

The European Geosciences Union (EGU) has named the recipients of 2018 Union and Division Medals, who are honored for their important contributions to the Earth, planetary and space sciences. They will receive their Medals at the EGU 2018 General Assembly, which will take place in Vienna on 8–13 April 2018. Among the medalists are **Mioara Manda** (IAGA Secretary General) who was awarded the Petrus Peregrinus Medal, and **Giuseppe De Natale** (Member of the Italian Committee for IUGG) who was awarded the Sergey Soloviev Medal.

The Intergovernmental Panel on Climate Change (IPCC) announced selected experts to contribute to the *Special Report on the Ocean and Cryosphere in a Changing Climate*. Among the experts are five experts of the International Association of Cryospheric Sciences (IACS) of IUGG: **Hiroyuki Enomoto** (Japan), IACS Bureau Member, **Regine Hock** (USA), IACS President, **Andrew Mackintosh** (New Zealand), IACS Secretary General, **Ben Marzeion** (Germany), 2017 IUGG Early Career Scientist Awardee, and **Xiao Cunde** (China), IACS Vice President.

## Tom Beer's 70th birthday



Congratulations to **Tom Beer**, IUGG President 2007-2011, on the occasion of his 70th birthday! Since retiring from the Commonwealth Scientific and Industrial Research Organization (CSIRO), Tom Beer has worked for his son's company, Safe System Solutions Pty Ltd, an Australian road safety and traffic engineering consultancy that was awarded the 2017 Prince Michael International Road Safety Award. Prior to his current position, he led the Climate Research Program of the Centre for Australian Weather and Climate Research (CAWCR), a partnership between CSIRO and the Australian Bureau of Meteorology.

Tom Beer was a founder of the IUGG Union Commission on Geophysical Risk and Sustainability (GRC) in 2000, becoming its first Chair. He served IUGG as Bureau Member and Vice President before he was elected President in 2007. He was a founder of the IUGG Commission for Climatic and Environmental Change (CCEC) in 2011, and currently is the Commission's Chair. Tom serves as an IUGG Liaison officer to the World Climate Research Programme (WCRP) and on the Committee for Scientific Planning and Review of the International Council for Science (ICSU). In 2016, he received both the University of Sydney Alumni Award for International Achievement and the American Geophysical Union International Award. He has been elected as an Academician of the Hungarian Academy of Sciences and in 2016 was invited by the President of the Academy to be a member of the International Advisory Board for the National Water Sciences Research Programme.

Tom Beer is an international expert on environmental risk management, including greenhouse gas and air quality issues and particularly their application to transport and to health. He was part of the team that won the CSIRO Chairman's medal in 2000 with his component being the analysis of greenhouse gas emissions from hybrid electric vehicles. He was elected a Fellow of the Australian Institute of Energy, having set up the Alternative Fuels research stream of the CSIRO Energy Transformed Flagship, and was also elected a Fellow of the Clean Air Society of Australia and New Zealand, having founded their Risk Special Interest Group specifically to examine issues related to the environmental sustainability of fuels. From 2001 to 2010 he applied life-cycle assessment and risk assessment methods to alternative transport fuels and coordinated a number of influential studies. He has been a lead author, and an expert panel member, for the Intergovernmental Panel on Climate Change (IPCC), which sent him a certificate of appreciation when the IPCC was awarded half of the 2007 Nobel Peace Prize. Tom Beer is the author or editor of over twenty-five books, over 100 articles in refereed journals, a similar number of book chapters and papers in conference proceedings, and over 50 specialized restricted consultancy reports. We wish Tom great health and happiness!

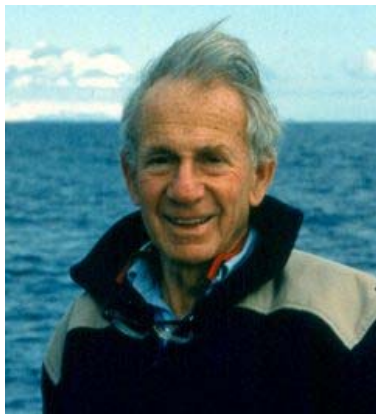
### Harsh Gupta's 75th birthday



Congratulations to **Harsh Gupta**, Immediate Past President of IUGG, on the occasion of his 75<sup>th</sup> birthday! The life of Harsh Gupta is a wonderful example of extraordinary service for geoscience and society. He has held leadership roles in national and international scientific organizations, e.g., the Asia Oceania Geosciences Society (AOGS), the Asian Seismological Commission (ASC), the International Association of Seismology and Physics of the Earth Interior (IASPEI), the International Council for Science (ICSU), the International Lithosphere Program (ILP), IUGG, the International Union of Geological Sciences (IUGS); in education as Vice Chancellor of Cochin University of Science and Technology; and in research management as Director of the Indian National Geophysical Research Institute (NGRI) in Hyderabad.

As the Leader of the Third Indian Scientific Expedition to Antarctica he, together with his Indian colleagues, succeeded in establishing a permanent base station for scientific research in a record time of one Antarctic Summer. As Secretary to the Government of India, Department of Ocean Development, he contributed to detailed Indian Ocean surveys for submitting India's claim for Legal Continental Shelf and to the foundation of the Indian Tsunami and Storm Surge Warning Center. As a Member of the National Disaster Management Authority of the Government of India, Harsh coordinated and administered the necessary work in those areas within zones of high earthquake vulnerability. Harsh's scientific achievements are significant. Particularly, he provided the first geophysical evidences of an enormously thick crust below the Himalaya and Tibet Plateau region, contributed to the understanding of the impact of artificial water reservoirs on triggered seismicity, and to comprehension of the genesis of earthquakes in stable continental regions. All these activities helped to advance geosciences and to bridge our science with societal needs. We wish Harsh great health and happiness!

### Walter Munk's 100<sup>th</sup> birthday



Professor Walter Munk, a scientist at the Scripps Institution of Oceanography at the University of California San Diego, is arguably the most distinguished living oceanographer, and one of the founding fathers of modern Physical Oceanography. He *pioneered wartime wave forecasting, tide prediction, ocean sound transmission, ocean circulation, deep-sea tides and much more*. His talk at the last IUGG General Assembly in 2015 in Prague, Czech Republic, attracted the attention of the entire geophysical community. He has received numerous national and international medals and awards, including IAPSO's first Albert I Medal in 2001.

Born in Austria-Hungary on 19 October 1917, Walter Munk celebrated his **100th birthday** at home in California. The UC San Diego welcomed His Serene Highness Prince Albert II of Monaco to campus for a Centennial Conversation with Walter Munk on 26 October. More information about Walter Munk can be found at: <https://scripps.ucsd.edu/symposiums/munk100>.

## **Attia A.-S. Ashour (1924-2017)**



Professor Attia Abdel-Salam Ashour, President of IUGG (1975-1979), peacefully passed away on Monday, 17 April 2017, at his Dokki residence in Cairo, at age 93. Born on 13 September 1924 in Damietta, Egypt, Attia Ashour graduated from the Faculty of Science, Fouad 1-st University (later to become Cairo University) in 1944. He obtained his Ph.D. Degree in Mathematics from Imperial College in London, UK, in 1948. His tutors were no less than the famous scientists Sydney Chapman and Albert Price. In 1967, Ashour was granted the D.Sc. Degree in Mathematics from London University, thus becoming one of the very few Egyptians to hold such a degree.

Ashour's career started at the Department of Mathematics, Faculty of Science, Cairo University in 1944 as a teaching assistant, then as a lecturer, and he received a professorship in Applied Mathematics in 1966. He was Head of the Department for a long period of time, and became a professor emeritus in 1984. Ashour acquired an international status through his innovative work in mathematics, with applications in geophysics. He contributed to several fields of mathematics including theory of special functions and boundary-value problems as well as to theoretical geomagnetism. He led an active school of research in these fields and several scientists have obtained their M.Sc. and Ph.D. degrees under his supervision. He was one of the few world experts on the mathematical theory of electromagnetic induction. Several applications carry his name. Ashour was Visiting Professor to many scientific Institutions worldwide. Ashour was elected a member of the Egyptian Academy of the Arab Language in 1990. Ashour was the holder of many national and international prizes for his scientific work and for his national and regional efforts in diffusing and strengthening mathematical knowledge, The Order of Merit of Arts and Sciences First Grade, three times in 1966-1986 and 1988, The Order of Merit of the Republic of Egypt of the Fifth Grade in 1954 and of the second Grade in 1984, The Medal of the African Mathematical Union in 1990. Ashour was granted Chevalier dans l'Ordre de La Palme Académique by the French Government in 1985, and Chevalier dans l'Ordre National de Mérite from the French President in 1995 for his efforts in developing Egyptian-French scientific cooperation. Ashour was a Fellow of the Royal Astronomical Society (RAS) since 1954, and was elected a Foreign Associate of RAS, the highest recognition offered by this society for foreign scientists, in 1978. He served as a member of the Advisory Board to the Director General of UNESCO on *Science and the 21st Century*, President of the Arab Union of Mathematicians and Physicists (1975-1977), Vice-President of the African Mathematical Union (1976-1986). He was Chairman of the IAGA Interdivisional Working Group on International and External Fields (1973-1979). Ashour was elected Vice-President of the IUGG in 1971 and President of IUGG in 1975. Ashour was the Head of the International Center for Pure and Applied Mathematics (CIMPA) at Nice, France (1992-1996), and member of its Administrative Council (1997-2000). He is a founding member of the Arab Academy of Sciences. Ashour was a member of the Institut d'Egypte, and a multitude of other national and international scientific organizations. He will be missed by his numerous students and colleagues, and all who knew him. He is survived by his wife Karima and his daughter Zeinab, currently Professor at the Faculty of Medicine, Cairo University. May God bless his soul (Ahmed Hady).

### ***Stanley Ruttenberg (1926-2017)***



Stanley Ruttenberg, Secretary General of the International Association of Meteorology and Atmospheric Physics (IAMAP, now IAMAS) from 1975-1987, died in Boulder, Colorado, USA on 12 February 2017. He was 90. Born in St. Paul, Minnesota, he received his Bachelor of Sciences degree in Physics from the Massachusetts Institute of Technology in 1946 and his Master's from UCLA in 1951. Stan's career began at the National Academy of Science in Washington, D.C., where he was Technical Advisor and production team member of the award winning series "Planet Earth" in 1960-62 (updated in 1980-85).

Stan was Head of the Program Office for the U.S National Committee for the International Geophysical Year (IGY) and was Executive Secretary to its follow-on program, the International Year of the Quiet Sun (IQSY). Through the IGY, he became acquainted with Walter Orr Roberts, who invited Stan to work at the National Center for Atmospheric Research (NCAR) in Boulder. At NCAR, he organized many international workshops and served a tour of duty in 1970-71 at the World Meteorological Organization (WMO) headquarters in Geneva, Switzerland. Starting in 1983, Stan was Scientific Advisor to the NASA Advisory Council's Earth System Science Committee (ESSC), which identified key research questions and priorities for studying climate change. Stan was the assistant to the Joint Planning Staff for the Global Atmospheric Research Program (GARP), and oversaw the student program in the GARP Atlantic Tropical Experiment (GATE). He also served as the Chairman of the Panel on World Data Centers of the International Council for Science (ICSU). After a 30-year career at NCAR, Stan retired in 1994 but continued to stay involved in the scientific community. Music was a significant part of Stan's life. He never missed a chance to attend a symphony or opera performance wherever his travels took him. As he eased out of work travel, he began to organize travel around specific performance events, and racked up many a Wagner Ring cycle. He served as President of the Colorado MahlerFest and held that position for 15 years. Stan enjoyed many adventures with his wife, Patricia Lee, for nearly 50 years. They had two daughters, Alison and Rebecca, and shared a love of classical music, gourmet cooking and learning about the world. Stan is remembered for his diplomacy and mentorship in all of his spheres of influence, and for his boundless energy in 'getting things done'. He leaves as his legacy his vision and ability to 'think outside the box' (Becky Ruttenberg and JoAnn Joselyn).

### James J. O'Brien (1935-2016)



IUGG Fellow James J. O'Brien, Professor Emeritus of Meteorology/Physical Oceanography in the Department of Earth, Ocean and Atmospheric Science at Florida State University (FSU), died peacefully on 20 September 2016 at Tallahassee Memorial Hospital from complications following open heart surgery. Prof. O'Brien, the Robert O. Lawton Distinguished Professor of Meteorology and Oceanography, founded the Center for Ocean-Atmospheric Prediction Studies at FSU. He served as a weather officer in the U.S. Air Force from 1958 to 1960, promoted to the rank of Captain. He took advantage of the Air Force's financial assistance and training to earn both his Masters (1964) and Ph.D. (1966) degrees in Meteorology at Texas A&M University. He is internationally known for mentoring young scientists, and under his guidance, 44 students completed their Ph. D. degree and over 80 students completed their M.S. degree. He was particularly proud of his success in dramatically increasing the number of women scientists in oceanography and meteorology. Once nicknamed "Dr. El Niño", he was a pioneer in using early supercomputers to model atmospheric and oceanic interactions which led to new breakthroughs in understanding and prediction of coastal upwelling, El Niño, La Niña, and hurricane effects on the ocean. Prof. O'Brien served as the President of the International Association for Physical Sciences of the Oceans (IAPSO), from 1987 to 1991, and retired in December 2006 after 38 years at Florida State. He will be sadly missed by the oceanographic community.

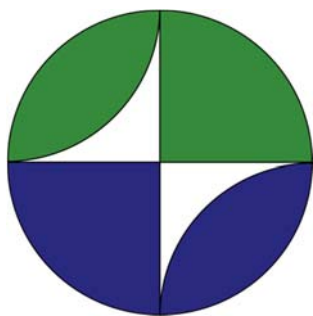
Denise Smythe-Wright, IAPSO President



# LIST OF ACRONYMS

AAAS	American Association for the Advancement of Science
AGU	American Geophysical Union
AOGS	Asia Oceania Geosciences Society
APECS	Association of Polar Early Career Scientists
CAST	China Association for Science and Technology
CCEC	Commission on Climatic and Environmental Changes
CCTF	Consultative Committee for Time and Frequency
CEA	China Earthquake Administration
CMG	Commission on Mathematical Geophysics
CNC-IUGG	Chinese National Committee for Geodesy and Geophysics
CODATA	Committee on Data for Science and Technology
COSPAR	Committee on Space Research
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
DFG	German Research Foundation
EGU	European Geosciences Union
EMSEV	IAGA/IASPEI/IAVCEI Inter-Association Working Group on Electromagnetic Studies of Earthquakes and Volcanoes
GEO	Group on Earth Observation
GGOS	Global Geodetic Observing System
GOOS	Global Ocean Observing System
GRC	Commission on Geophysical Risk and Sustainability
IACS	International Association of Cryospheric Sciences
IAEA	International Atomic Energy Agency
IAG	International Association of Geodesy
IAGA	International Association of Geomagnetism and Agronomy
IAHS	International Association of Hydrological Sciences
IAMAS	International Association of Meteorology and Atmospheric Sciences
IAPSO	International Association for the Physical Sciences of the Ocean
IASPEI	International Association of Seismology and Physics of the Earth's Interior
IAU	International Astronomical Union
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
ICACGP	International Commission on Atmospheric Chemistry and Global Pollution
ICAE	International Commission on Atmospheric Electricity
ICAO	International Civil Aviation Organization
ICCL	International Commission on Climate
ICCP	International Commission on Clouds and Precipitation
ICDM	International Commission on Dynamical Meteorology
ICMA	International Commission on the Middle Atmosphere
ICPAE	International Commission on Planetary Atmospheres and their Evolution
ICPM	International Commission on Polar Meteorology
ICSU	International Council for Science
ICTP	Abdus Salam International Centre for Theoretical Physics
IGCP	International Geoscience Programme
IGOS-P	Integrated Global Observing Strategy Partnership
IGU	International Geographical Union
IHP	International Hydrological Programme
ILP	International Lithosphere Program
INQUA	International Union for Quaternary Research

INTERMAGNET	International Real-time Magnetic Observatory Network
IOC	UNESCO Intergovernmental Oceanographic Commission
IOC	International Ozone Commission
IRC	International Radiation Commission
IRDR	Integrated Research on Disaster Risk
ISC	International Seismological Centre
ISPRS	International Society for Photogrammetry and Remote Sensing
ISSC	International Social Sciences Council
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUSS	International Union of Soil Sciences
IUTAM	International Union of Theoretical and Applied Mechanics
JBGIS	Joint Board of Geospatial Information Societies
NKGG	German National Committee for Geodesy and Geophysics
OECD	Organisation for Economic Co-operation and Development
ÖNK	Austrian National Committee for IUGG
PAIGH	PanAmerican Institute of Geography and History
PHIVOLCS	The Philippines Institute of Volcanology and Seismology
ROA	ICSU Regional Office for Africa
ROAP	ICSU Regional Office for Asia & the Pacific
ROLAC	ICSU Regional Office for Latin America and the Caribbean
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Ocean Research
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SEDI	Study of the Deep Interior of the Earth
UCDI	Union Commission on Data and Information
UCPS	Union Commission on Planetary Sciences
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISDR	United Nations International Strategy on Disaster Reduction
UNOOSA	United Nations Office for Outer Space Affairs
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
URSI	International Union of Radio Science
WCRP	World Climate Research Programme
WDS	ICSU World Data System
WMO	World Meteorological Organization
WPMG	Western Pacific Geophysics Meeting
WSF	World Science Forum
VAACs	Volcanic Ash Advisory Centers
VASAG	Joint WMO-IUGG Volcanic Ash Scientific Advisory Group



**INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS**  
**UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE**

**IUGG Secretariat**

**Helmholtz Centre Potsdam  
GFZ German Research Centre for Geosciences  
Telegrafenberg A17, 14473 Potsdam, GERMANY**

**How to cite:**

IUGG AR17 (2018). Annual Report 2017, International Union of Geodesy and Geophysics, Potsdam. 138 p. Available at: <http://www.iugg.org/publications/reports/report2017.pdf>