



First Results from the DESMEX sAEM Survey in Goslar (Harz Mountains, Germany)

Anneke Thiede, Philipp Kotowski, Michael Becken, Olaf Cortes Arroyo, Raphael Rochlitz, Mathias Ronczka, Thomas Günther, Hauke Petersen, Pritam Yogeshwar, Volkmar Schmidt & Annika Steuer

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Innovative Technologien für Ressourceneffizienz
Forschung zur Bereitstellung wirtschaftsstrategischer Rohstoffe



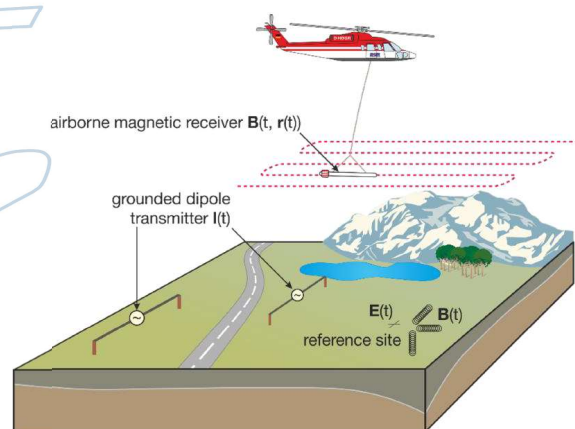
GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung



The **DESMEX**-Project

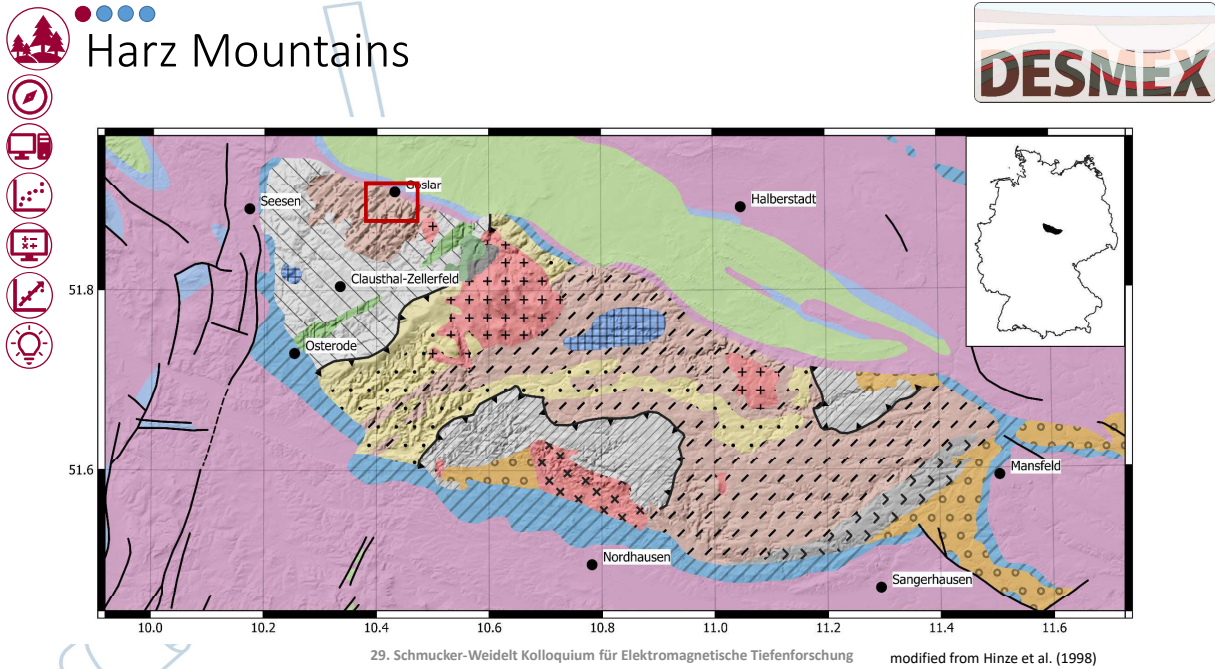
→ Deep Electromagnetic Sounding for Mineral Exploration

- Development of new methods for exploration of deep ore deposits
- Exploration of local deposits
- semi-Airborne ElectroMagnetics
 - High spatial resolution
 - Efficiency
 - Great depth



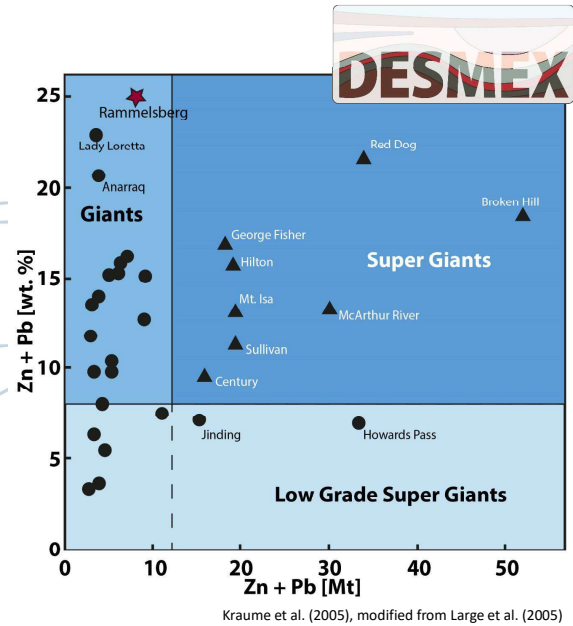
29. Schmucker-Weidelt Kolloquium für Elektromagnetische Tiefenforschung

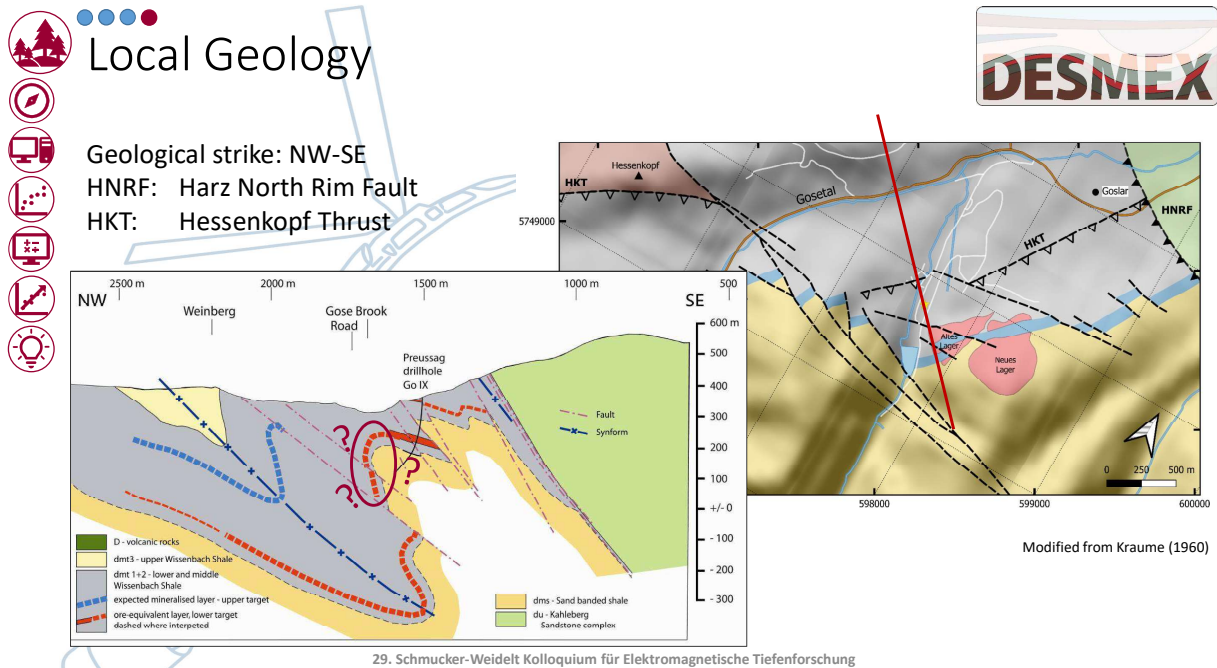
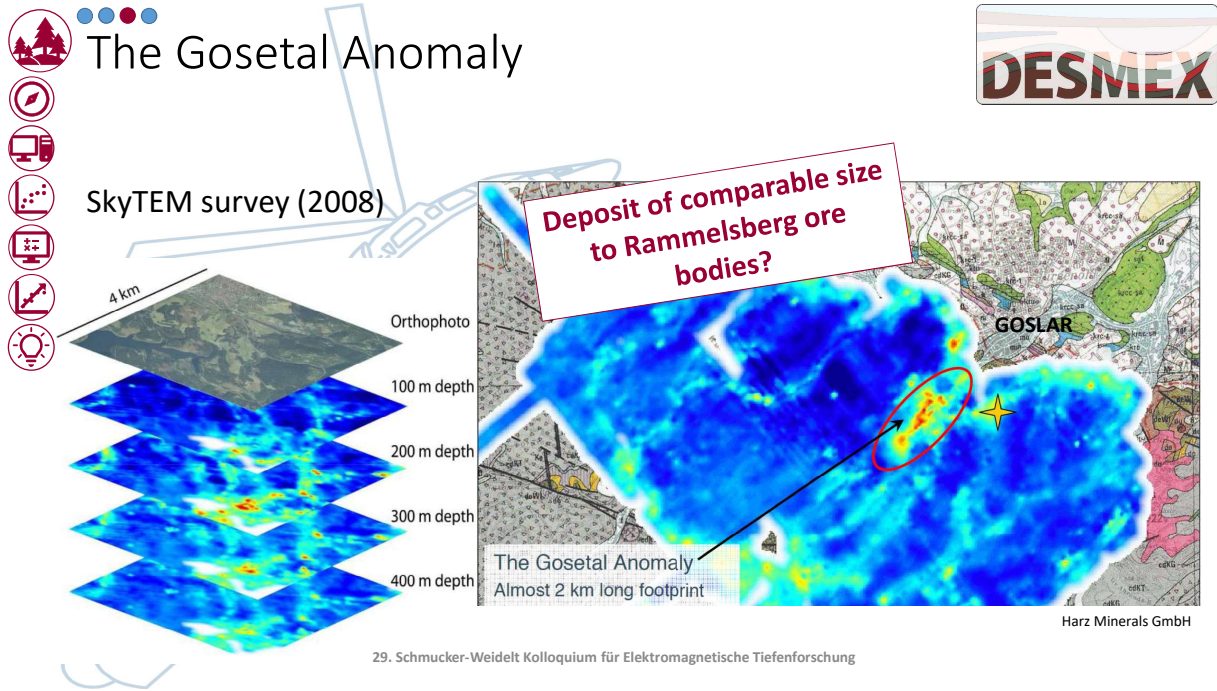
Harz Mountains



The Rammelsberg mine

- one of the **world-class** sediment-hosted massive sulphide (SHMS) deposits
- Zn, Pb, Cu, Au, Ag and barite
- ~1000 years of mining
- 27-30 Mt
- Fully exploited (closed in 1988)







Gosetal-Survey

- 20/09/2020 to 25/09/2020
- 4 Transmitter
 - 1-3 km long
- 4 Flights areas
 - ~6 x 3 km
- 12 Ground Stations

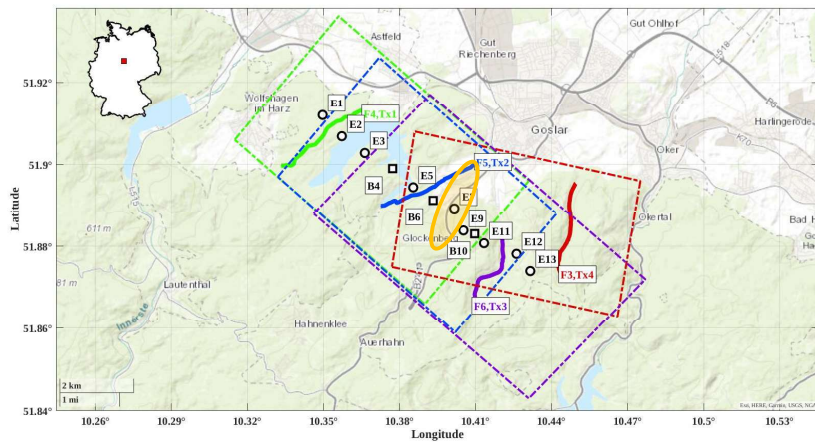


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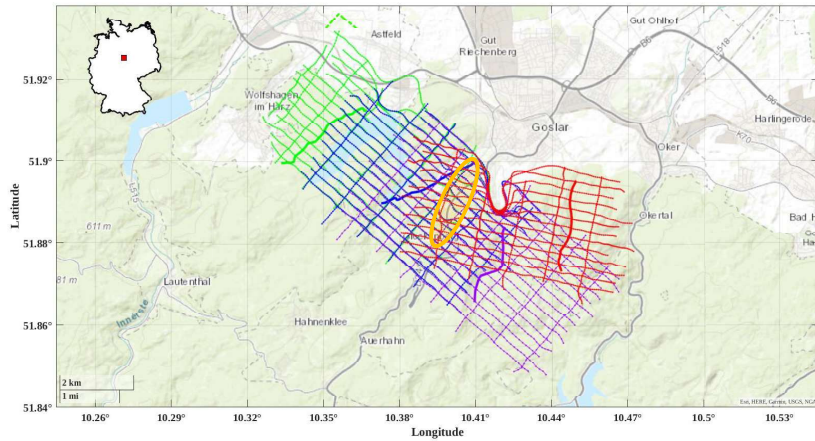


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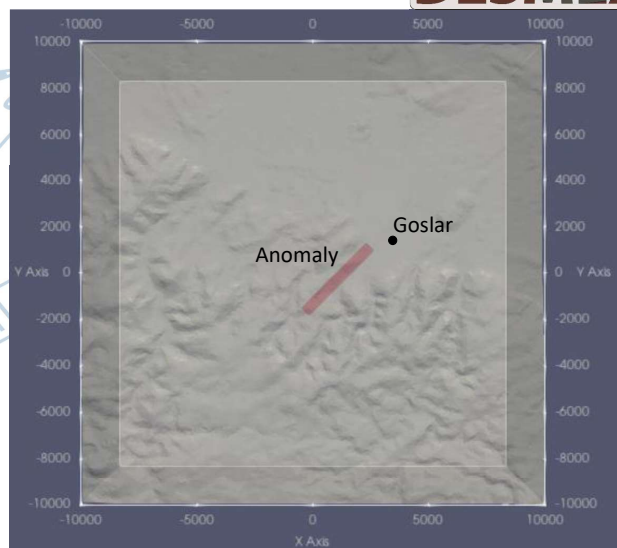
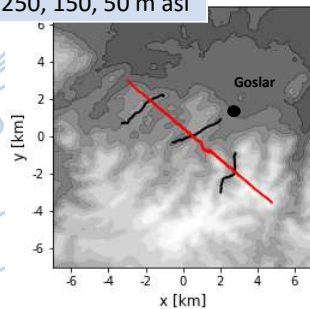


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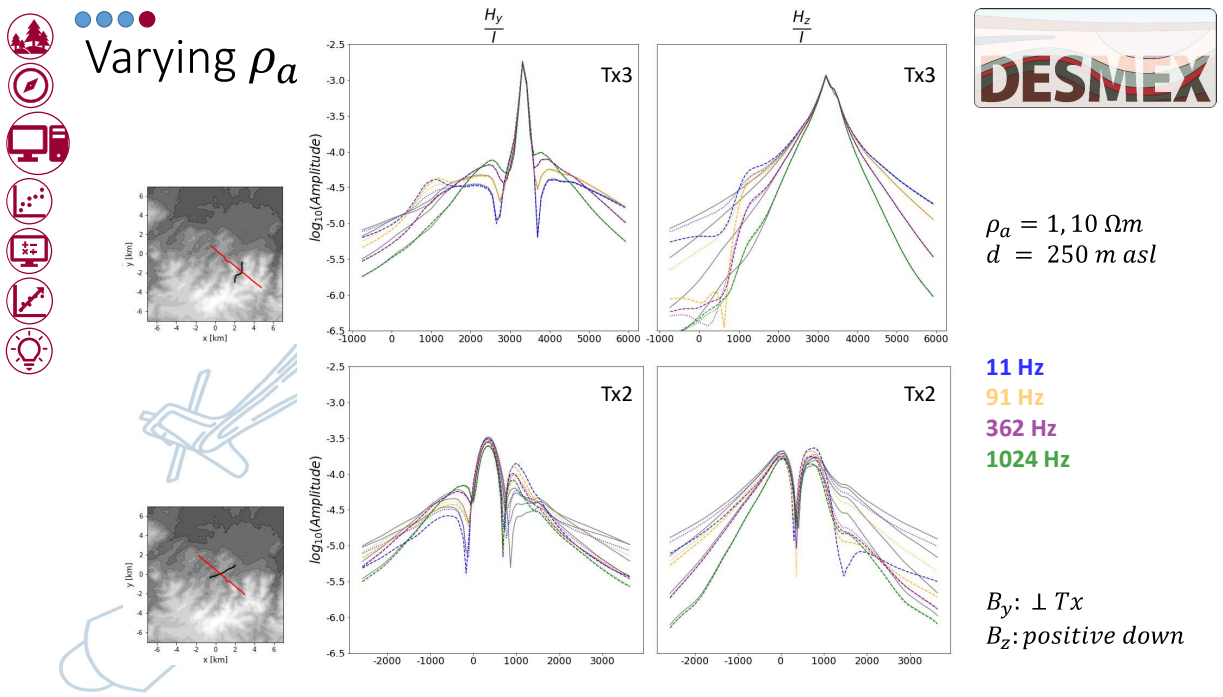
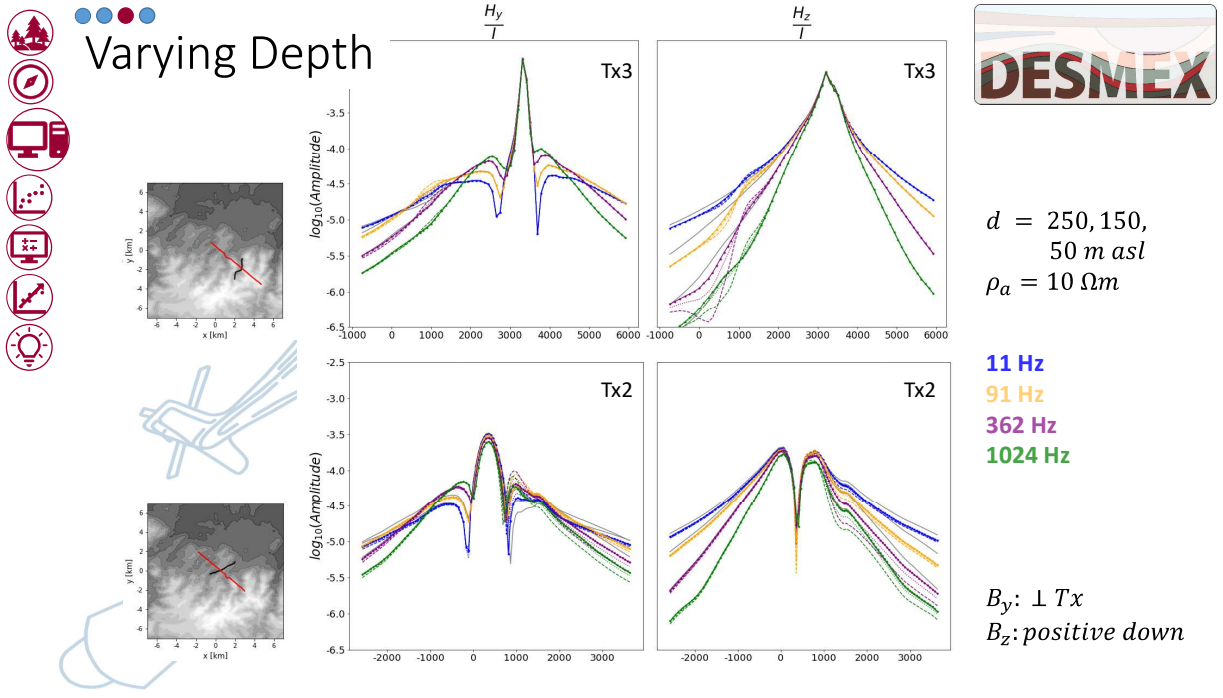


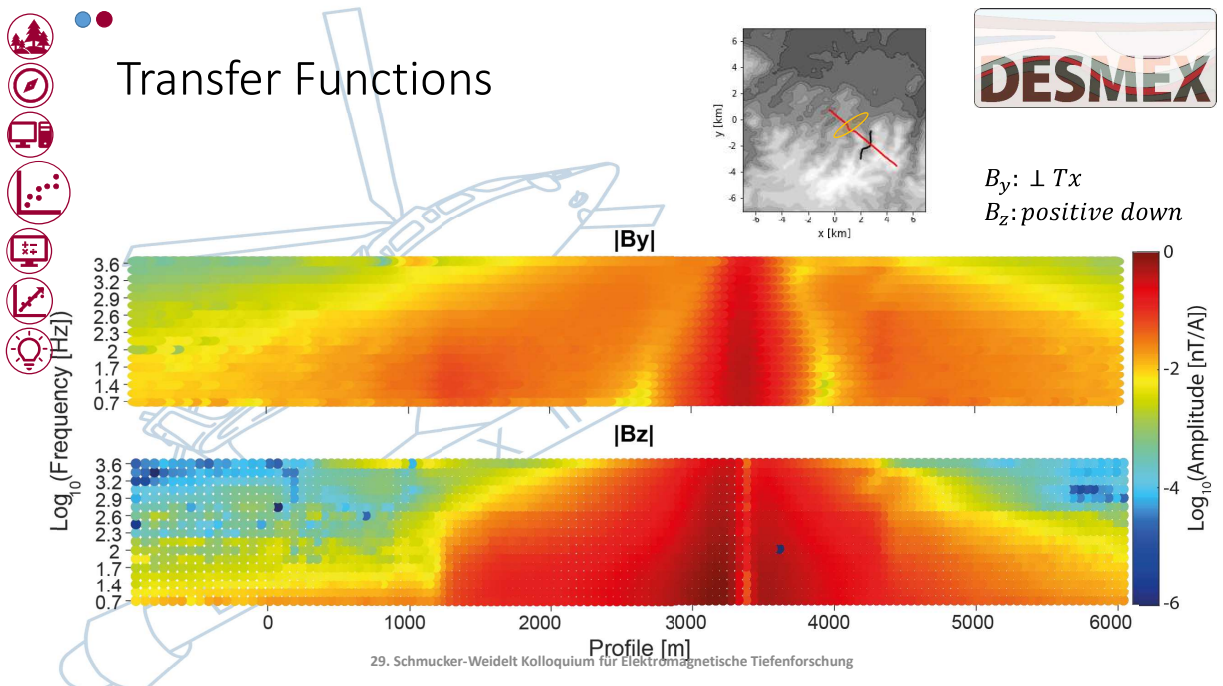
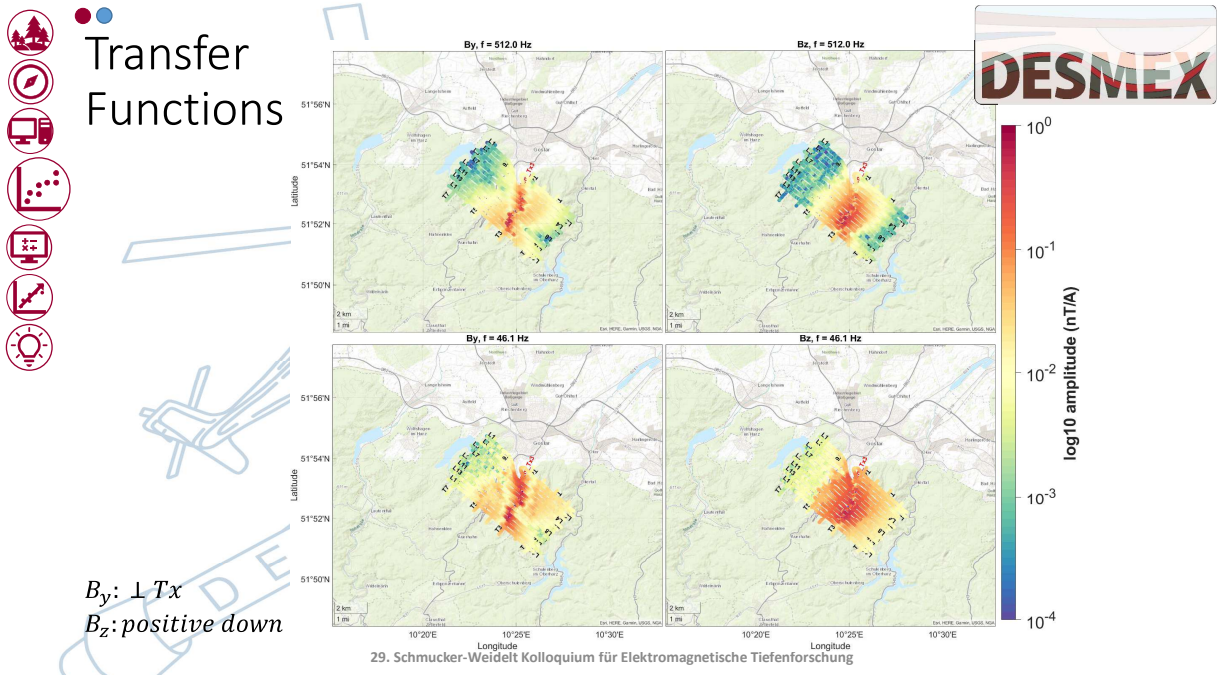
Simulations - Anomaly in the Gosetal

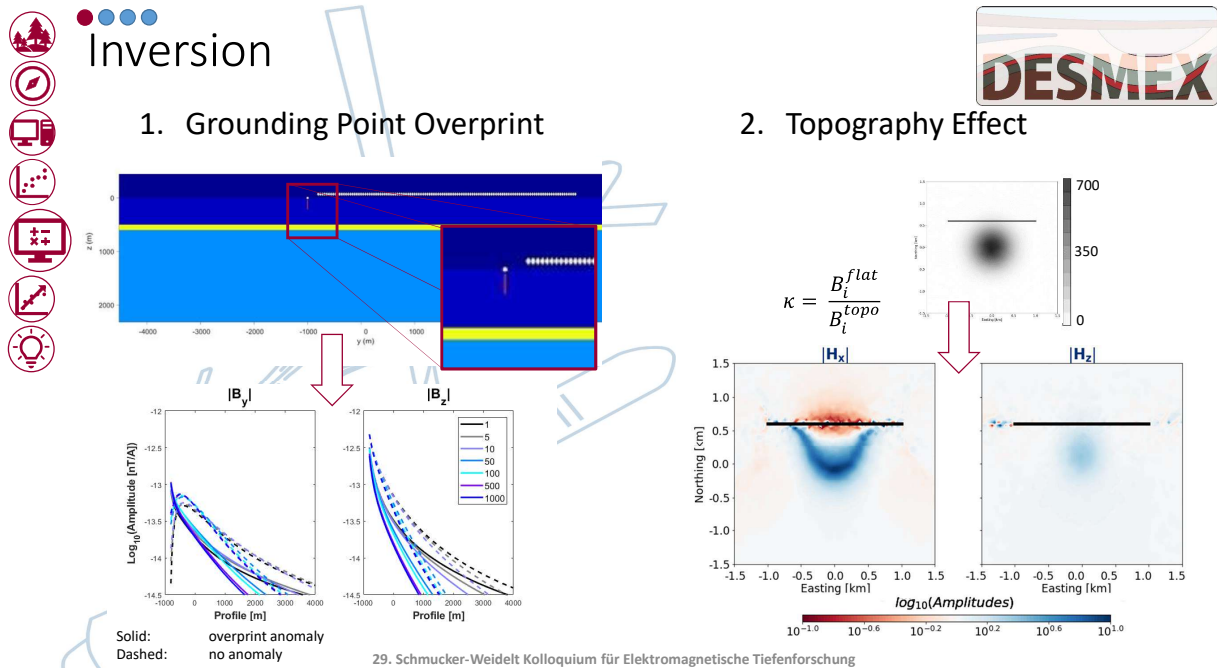
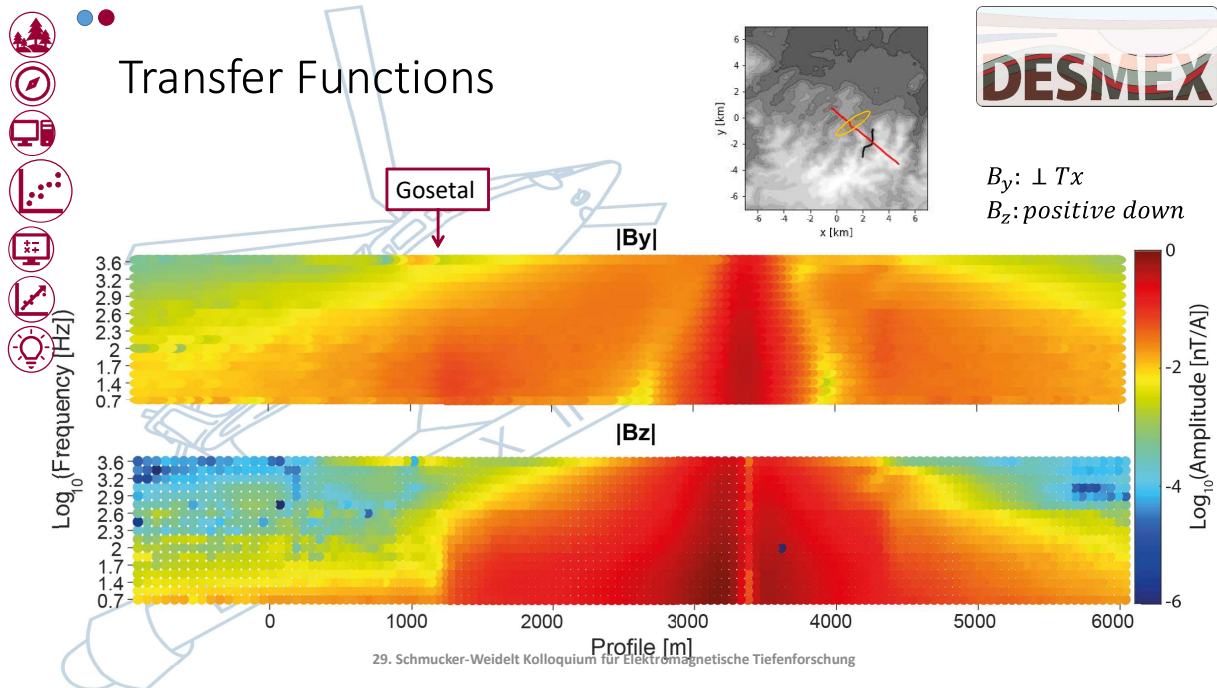
Parameter	Value
ρ_{bg}	500 Ωm
ρ_a	1, 10, 100 Ωm
Transmitter	Tx1, Tx2, Tx3
Anomaly	4000 x 500 x 50 m
Location	250, 150, 50 m asl

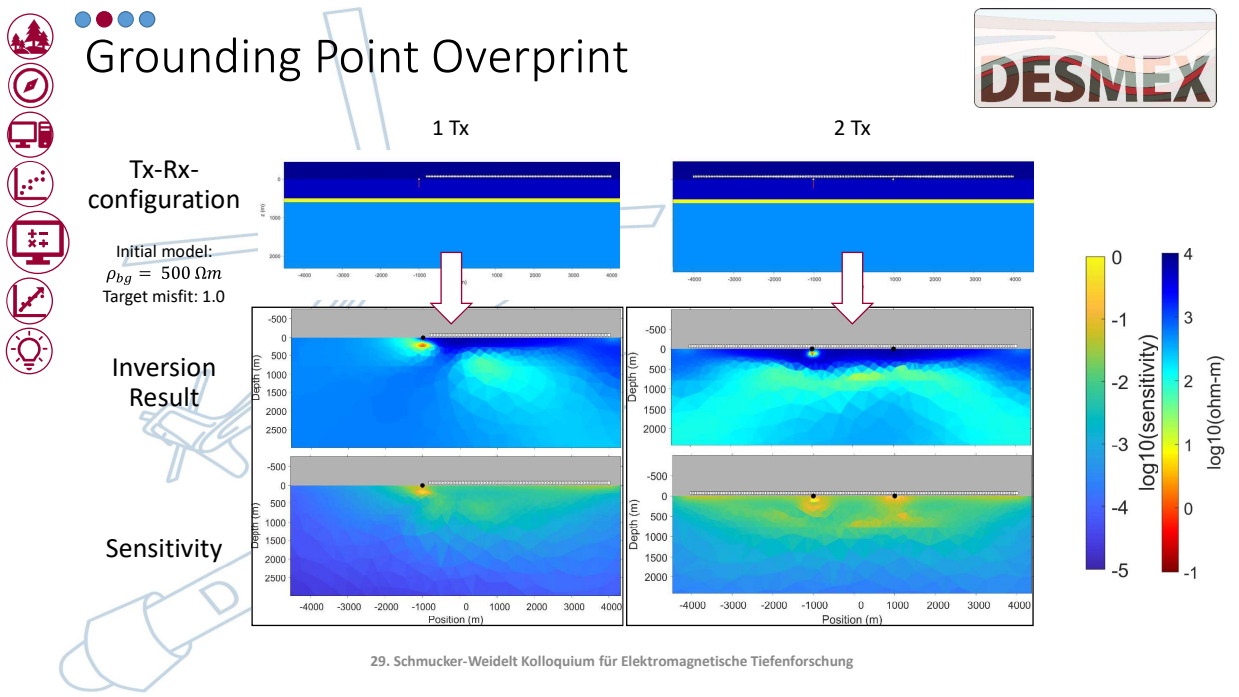
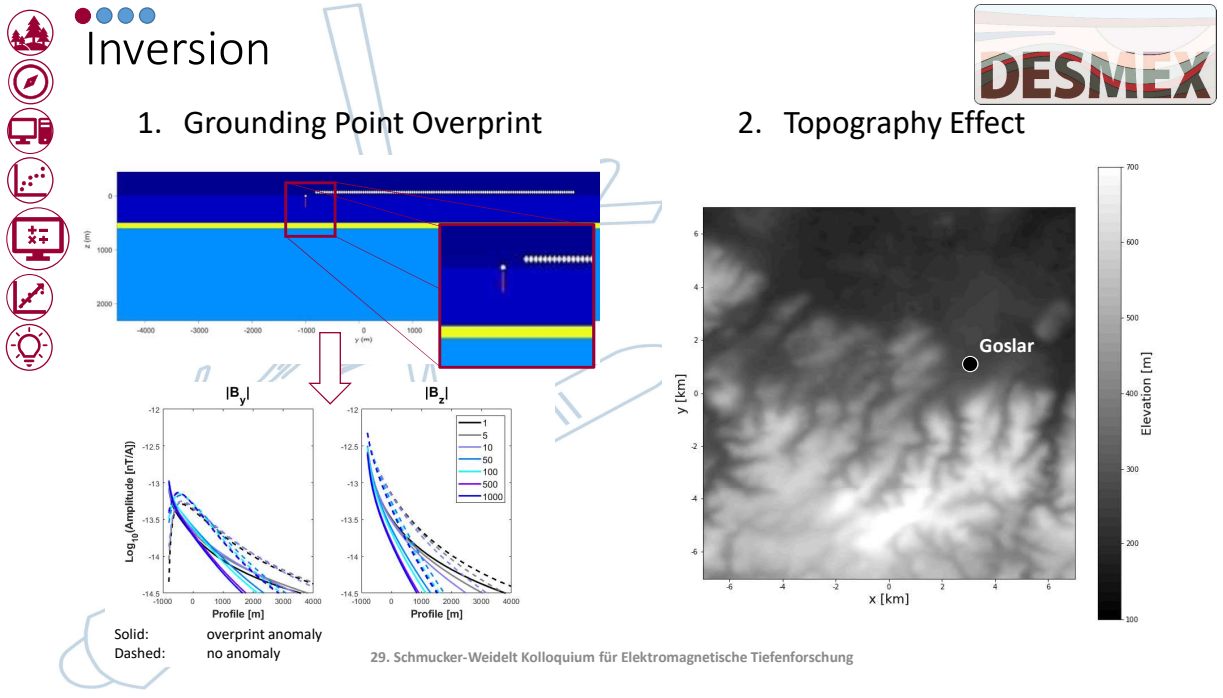


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Codes for sAEM data



3DINV	custEM	MARE2DEM
<ul style="list-style-type: none"> • 3D FD • Integration of high resolution topography complicated 	<ul style="list-style-type: none"> • 3D FE • Topography • Inversion in progress (not yet available) 	<ul style="list-style-type: none"> • 2D FE • Pseudo 2D topography • Linear Transmitter
Grayver et al. (2013)	Rochlitz et al. (2019)	Key (2016)

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Topography Effect

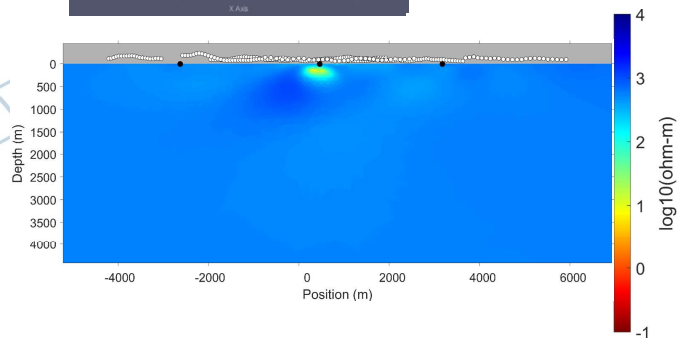
- Normal Field Correction:

$$\vec{B}_{inv} = \vec{B}_{obs} - \vec{B}_{topo} + \vec{B}_{flat}$$

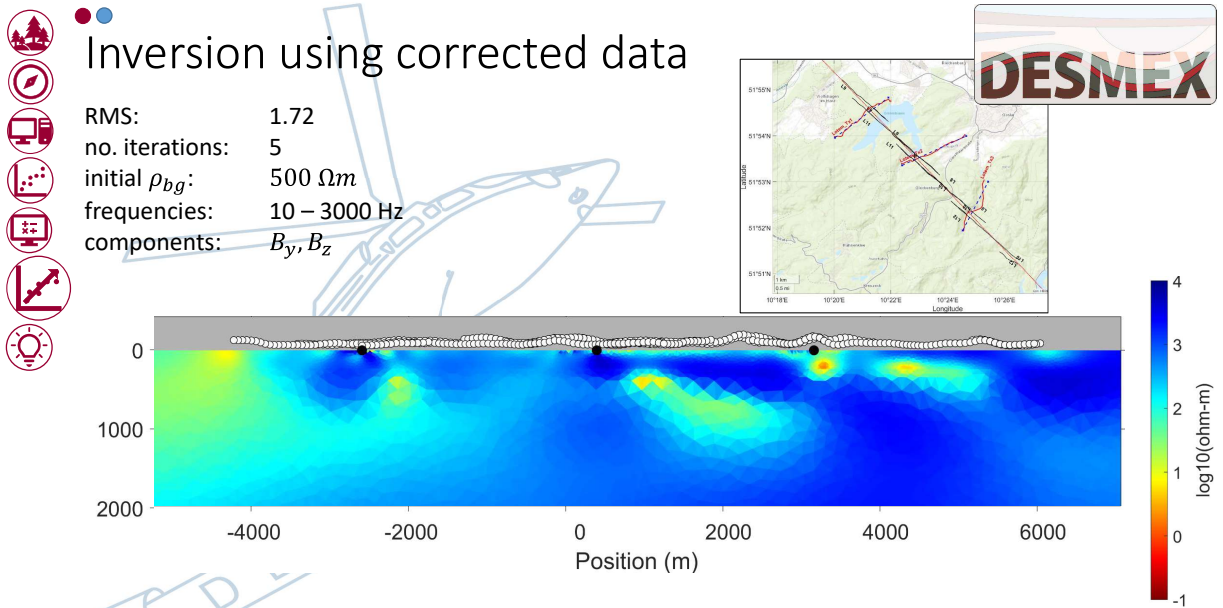
- topo: Homogeneous half space model with topography using custEM
- flat: Homogeneous half space model using MARE2DEM or INV3D



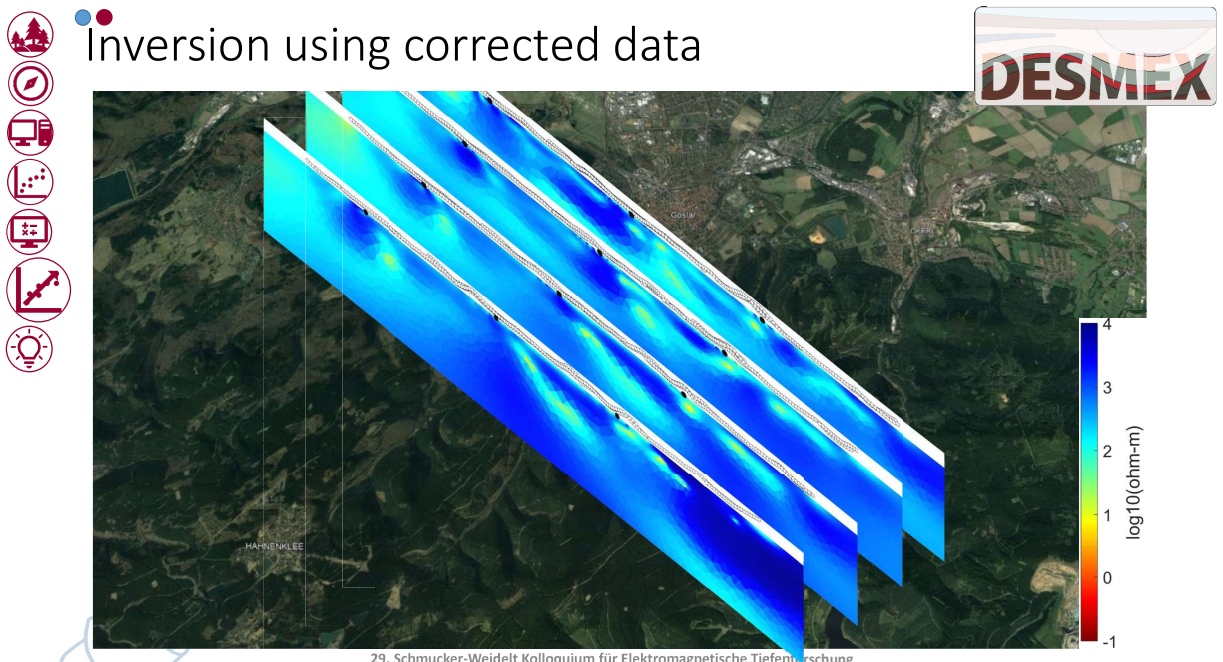
RMS: 1.09
 no. iterations: 5
 initial ρ_{bg} : 500 Ωm
 frequencies: 10 – 3000 Hz
 components: B_z



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Conclusion

- Raw data indicate the presence of good conductor
- Data interpretation difficult:
 - Topography
- 2D inversion tests of corrected field data
 - Expected 3D effects in the data set

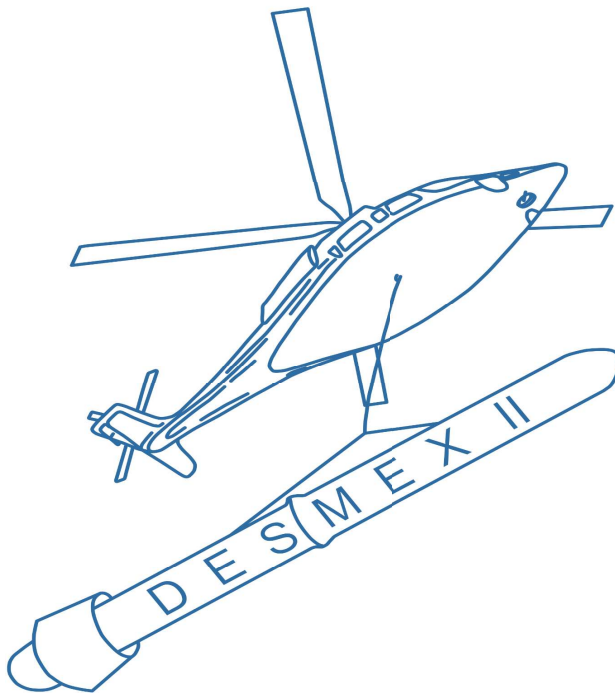


Outlook

- Simulated data
 - 3D investigation of grounding point overprint
 - Topography correction tests using INV3D
- Field data
 - 3D Inversion



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Thank you for your attention

