Institut für Angewandte Geophysik

Themen für Abschlussarbeiten / *Topics for Theses*

Master-Arbeit / *MSc. Thesis*

Thema/*Topic*

DESMEX-MinD: Identification and Validation of Electrical Conductivity Signatures in the Harz Mountains Using 3D Electrical Resistivity Tomography

Beschreibung/*Description*

The Harz Mountains represent a structurally complex mineral province with significant exploration potential. Prior large-scale semi-airborne electromagnetic (sAEM) surveys have identified several conductivity anomalies that may be directly or indirectly associated with mineralization and related structural features. Within DESMEX-MinD, this MSc project will focus on the acquisition, processing, and interpretation of a 3D Electrical Resistivity Tomography (ERT) in a selected target area in the Harz.

The primary objective is to derive robust 3D resistivity models and identify characteristic conductivity signatures associated with mineral systems and structural features. The student will contribute to survey design, perform data quality control, define appropriate error models, and carry out advanced 3D inversion using pyGIMLi. Sensitivity and resolution analyses will be conducted to assess model reliability and depth of investigation. Integration of the 3D ERT results with available seismic data will enable improved imaging and interpretation of subsurface structures. While ERT is particularly sensitive to fluids, alteration zones, and conductive mineral phases, seismic methods primarily constrain structural geometry and mechanical contrasts. Where feasible, structurally constrained inversion approaches will be explored to enhance model consistency and geological plausibility. This integrated analysis will contribute to a more comprehensive understanding of subsurface architecture and the relationship between structural controls and conductivity anomalies.

The project will provide experience in field-based geophysical data acquisition, advanced 3D inversion, uncertainty and resolution analysis, and multi-method data integration. The results will directly contribute to the objectives of the DESMEX-MinD project and support the interpretation of conductivity anomalies identified in previous sAEM surveys.

Sprache/*Language*

English

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