

# Application of airborne electromagnetics for groundwater investigations in the vicinity of salt structures

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## ABSTRACT

To map and monitor the occurrence of mineralized groundwater surrounding several salt structures in Germany, extensive hydrogeological exploration programs were executed. Numerous airborne electromagnetic surveys (AEM) were performed between 1996 and 2013, with frequency-domain helicopter borne electromagnetic (HEM) systems (Barnasch & Beer, 2012; Siemon et al., 2011; Siemon et al., 2010), or time-domain helicopter borne (HTEM) systems, respectively.

After interpolation of the 1D inversion results, an analysis of observed resistivity profile maps identified the general hydrogeological system and large-scale geological structures (e.g. salt domes) in the investigated areas. The interpretation of AEM data under consideration of further hydrological and geological information led to the identification of distinctive areas of mineralized groundwater and transition zones between fresh and saline waters. In this context, AEM applications are a powerful tool to support monitoring networks, geological mapping and groundwater models.

The process of complementing knowledge from AEM surveys with information from wells, boreholes, geophysical borehole logs, surface geophysics, groundwater samples and 3D subsurface models is illustrated by means of case studies, improving hydrogeological and geological interpretations. Advantages and constraints of the chosen method are shown.

## REFERENCES

Barnasch, J., & Beer, W. W. 2012. Aerogeophysikalische Messungen im Werra-Kaligebiet. Kali und Steinsalz, 1/2012.

Siemon, B., Steuer, A., Ullmann, A., Vasterling, M., & Voß, W. 2011. Application of frequency-domain helicopter borne electromagnetics for groundwater exploration in urban areas. *Physics and Chemistry of the Earth*, 36: 1373-1385.

Siemon, B., Ullmann, A., Vasterling, M., Meyer, U., Beer, W. W., & Plümacher, J. 2010. Airborne Electromagnetic Survey of the Groundwater Mineralisation in the Potash Mining District of The Werra River, GER, Near Surface 2010– 16th European Meeting of Environmental and Engineering Geophysics. Zurich, Switzerland.

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