



Investigation of coastal areas in Northern Germany using airborne geophysical surveys

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Since 2000, the German Federal Institute for Geosciences and Natural Resources (BGR) carried out several airborne geophysical surveys in Northern Germany to investigate the coastal areas of the North Sea and some of the North and East Frisian Islands. Several of those surveys were conducted in cooperation with the Leibniz Institute for Applied Geophysics (LIAG). Two helicopter-borne geophysical systems were used, namely the BGR system, which collects simultaneously frequency-domain electromagnetic, magnetic and radiometric data, and the SkyTEM system, a time-domain electromagnetic system developed by the University of Aarhus.

Airborne geophysical surveys enable to investigate huge areas almost completely with high lateral resolution in a relatively short time at economic cost. In general, the results can support geological and hydrogeological mapping. Of particular importance are the airborne electromagnetic results, as the surveyed parameter - the electrical conductivity - depends on both lithology and groundwater status. Therefore, they can reveal buried valleys and the distribution of sandy and clayey sediments as well as salinization zones and fresh-water occurrences. The often simultaneously recorded magnetic and radiometric data support the electromagnetic results. Lateral changes of Quaternary and Tertiary sediments (shallow source - several tens of metres) as well as evidences of the North German Basin (deep source - several kilometres) are revealed by the magnetic results. The radiometric data indicate the various mineral compositions of the soil sediments.

This BGR/LIAG project aims to build up a geophysics data base (<http://geophysics-database.de/>) which contains all airborne geophysical data sets. However, the more significant effort is to create a reference data set as basis for monitoring climate or man-made induced changes of the salt-water/fresh-water interface at the German North Sea coast. The significance of problems for groundwater extraction and treatment caused by groundwater salinization is more and more increasing and particularly coastal areas are affected by a latent risk for the sustainable usage of aquifers.