



Mobile geophysical study of peat deposits in Fuhrberger Field, Germany

T. Wunderlich, H. Petersen, S.A. al Hagrey, and W. Rabbel

Christian-Albrechts-University Kiel, Geosciences, Geophysics, Germany (tinaw@geophysik.uni-kiel.de)

In the water protection area of Fuhrberger Field, north of Hanover, geophysical techniques were applied to study the stakeholder problem of the source detection for nitrate accumulations in the ground water. We used our mobile multisensor platform to conduct measurements using Ground Penetrating Radar (GPR, 200 MHz antenna) and Electromagnetic Induction (EMI, EM31). This aims to study the subsurface occurrences of peat deposits (surplus of organic carbon) supposed to be a source of nitrate emissions due to the aeration and the drawdown of groundwater levels (e.g. by pumping, drainage etc.).

Resulting EMI and GPR signals show high data quality. Measured apparent electrical conductivity shows very low values (<10 mS/m) due to the mainly sandy subsurface. For this medium, both methods are expected to penetrate down to 3-5 m depth. GPR radargrams, time slices of GPR reflection energy and EMI apparent electrical conductivities are plotted on aerial photographs and compared to each other's and with vegetation intensity. We could separate areas characterized by low reflection energy and high conductivity, and vice versa. Briefly, organic rich sediments such as peats are assumed to have a relative high conductivity and thus low GPR reflectivity. Some areas of local conductivity increase correspond to a deep reflection interface (as seen in the radargrams), which even vanishes due to the high attenuation caused by the high conductivity. This implies that the upper layer is more conductive than the lower layer. Several local areas with these characteristics are found at the study sites. We recommend shallow drillings at representative points to deliver the necessary confirmation with ground truth information.

Acknowledgments:

iSOIL (Interactions between soil related sciences – Linking geophysics, soil science and digital soil mapping) is a Collaborative Project (Grant Agreement number 211386) co-funded by the Research DG of the European Commission within the RTD activities of the FP7 Thematic Priority Environment.