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Inversion of EM38 data measured in different heights using a-priori information for stabilization

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Within the frame of the iSOIL project apparent conductivity measurements using the EM38DD (Geonics) have been conducted on different soil types. The EM38DD is mounted in different heights on a metal-free sled and pulled behind a tractor with an inline sampling distance of 20cm and a profile offset of 1m. The apparent conductivities have been inverted into real conductivities over the whole measured area. In order to improve the equation system and to avoid singular matrices 4 measurements (vertical and horizontal mode in two different heights) at one location are used to determine the conductivities of two layers and the depth of the interface between the layers. The inversion is stabilized by weighted a-priori information for both conductivities and depth and by the inclusion of neighboring points. Depth information is gained from GPR measurements over the same area that have been done in one survey together with the EM38DD measurements.
The inversion results are compared to results of 1D and 2D electrical resistivity imaging using optimized and Schlumberger configurations. Principal Component Analysis is used to compare modeled and measured data and correlation coefficients between them are calculated to evaluate the reliability of the inversion.

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