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3D imaging of soil apparent electrical conductivity from VERIS data using a 1D spatially constrained inversion algorithm

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Maps of apparent electrical conductivity of the soil are commonly used in precision agriculture to indirectly characterize some important properties like salinity, water, and clay content. Traditionally, these studies are made through an empirical relationship between apparent electrical conductivity and properties measured in soil samples collected at a few locations in the experimental area and at a few selected depths. Recently, some authors have used not the apparent conductivity values but the soil bulk conductivity (in 2D or 3D) calculated from measured apparent electrical conductivity through the application of an inversion method. All the published works used data collected with electromagnetic (EM) instruments.

We present a new software to invert the apparent electrical conductivity data collected with VERIS 3100 and 3150 (or the more recent version with three pairs of electrodes) using the 1D spatially constrained inversion method (1D SCI). The software allows the calculation of the distribution of the bulk electrical conductivity in the survey area till a depth of 1 m. The algorithm is applied to experimental data and correlations with clay and water content have been established using soil samples collected at some boreholes.

Keywords: Digital soil mapping; inversion modelling; VERIS; soil apparent electrical conductivity.