Geophysical Research Abstracts
Vol. 20, EGU2018-18759, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Quantitative mapping of soil salinity in 3-d using a DUALEM-21S and EM4Soil inversion software

Triven Koganti and John Triantafilis
UNSW Sydney, School of BEES, KENSINGTON, Australia (j.triantafilis@unsw.edu.au)

To generate baseline data for the purpose of monitoring the efficacy of remediation of a degraded landscape, we demonstrate a method for 3-dimensional (3-D) mapping of electrical conductivity of saturated soil paste extract (ECe) across a study field in central Haryana, India. This is achieved by establishing a linear relationship (LR) between calculated true electrical conductivity (sigma) and laboratory measured ECe at various depths (0-0.3, 0.3-0.6, 0.6-0.9 and 0.9-1.2 m). We estimate sigma by inverting DUALEM-21S apparent electrical conductivity (ECa) data using a quasi-three-dimensional inversion algorithm (EM4Soil-V302). The best LR (ECe = -11.814 + 0.043 $\times$ σ) was achieved using full solution (FS), S1 inversion algorithm and a damping factor (λ) of 0.6 which had a large coefficient of determination (R2 = 0.84). A cross-validation technique was used to validate the model and given the high accuracy (RMSE = 8.31 dS m-1), small bias (mean error [ME] = -0.0628 dS m-1), large R2 = 0.82 and Lin's concordance (0.93), between measured and predicted ECe, we were well able to predict the ECe distribution at all the four depths. However, the predictions made in the topsoil (0-0.3 m) at a few locations were poor due to limited data availability in areas where ECa changed rapidly. In this regard, improvements in prediction can be achieved by collection of ECa in more closely spaced transects, particularly in areas where ECa varies over short spatial scales. Also, equivalent results can be achieved using smaller combinations of ECa data (i.e. DAULEM-1S, DUALEM-2S) although with some loss in precision, bias and concordance.