Geophysical Research Abstracts
Vol. 17, EGU2015-11200, 2015
EGU General Assembly 2015

Assessment of soil electromagnetic parameters and their variation with soil water, salts: a comparison among EMI and TDR measuring methods

Nesrine Chaali (1), Antonio Coppola (2), Alessandro Comegna (1), and Giovanna Dragonetti (3)

(1) School of Agricultural Forestry Food and Environmental Sciences (SAFE), University of Basilicata, Potenza, Italy, (2) Department of European and Mediterranean Cultures-Architecture, Environment, Cultural Heritage (DiCEM), Hydraulics and Hydrology Division, University of Basilicata, Matera, Italy, (3) Mediterranean Agronomic Institute, Land and Water Division, IAMB, Bari, 70010, Italy

Numerous studies have analyzed the possibility of the extension of Electromagnetic Induction EMI calibration coefficients determined at field scale, to predict the depth distribution of bulk electrical conductivity ECb within unmonitored sites and/or times, in order to appraise the effect of salts dynamics on soils and plants. However, in the literature, it has been determined that the extension of those EMI calibration coefficients can be awkward since the calibration parameters are highly site-specific because of changes in water content, temperature, root development, soil physical properties, etc... So they can only be used in sites having similar characteristics in terms of EMI. Furthermore there is a difference in the observation windows of EMI sensors and of sensors (Time Domain Reflectometry TDR, Electrical Resistance Tomography ERT, ect...) used for measuring the ECb to be then used for the calibration and validation of the EMI. By consequence the actual variability of the soil salinity will be hidden due to the fact that data coming from EMI and other sensors have different variability patterns and structure, and are then influenced by different noises. The main objectives of this work were: 1) develop a practical and cost-effective technique that uses TDR data as ground-truth data for calibrating and validating of the EMI larger scale sensor, 2) using a Fourier transform FT analysis by applying a specific noise filter to the original data, to find the correlations between the TDR and the EMI data. An experiment was designed by irrigating three transects of green beans, 30 m long each, with three irrigation salinity inputs (1dSm-1, 3dSm-1, 6dSm-1). The irrigation volumes were estimated by measuring soil water content at different depths by using a Diviner 2000. During the experiment, the EM in both the vertical (EMV) and horizontal (EMH) configurations were regularly measured by a Geonics EM38 device. TDR probes were inserted vertically at the soil surface in 24 sites, each corresponding to the central point of an EM38 reading. EM38 and TDR probes were used to measure ECb along 24 m in the central line of each transect during the whole growth season. Soil samples were taken at 1 m distance along each transect for laboratory analyses. The FT analyses allowed separating the original EMI and TDR data signals from noise at different salinity levels, and thus finding better information about the existing correlation.