Geophysical Research Abstracts
Vol. 20, EGU2018-16819-5, 2018
EGU General Assembly 2018

Inferring soil's dynamic parameters using Electromagnetic instrument and time-lapse inversion algorithm

Mohammad Farzamian (1), Fernando A. Monteiro Santos (1), Maria Catarina Paz (1), Maria C. Gonçalves (2), Angelo Basil (3), Fethi Bouksila (4), Tarek Salim (5), Ana M. Paz (2), Nádia Castanheira (2), Antonio Coppola (6), Yaser Hamed (5), Roberto De mascellis (3), Giovanna Dragonetti (7), and Ben Slimane A (4)

(1) Universidade de Lisboa, IDL, Campo Grande ed. C8, 1749- 016 Lisbon, Portugal, (2) INIAV, Instituto Nacional de Investigação Agrária e Veterinária, Oeiras, Portugal, (3) Institute for Mediterranean Agricultural and Forestry Systems, Italian National Council of Research, Ercolano (NA), IT, (4) National Research Institute for Rural Engineering, Water and Forests (INRGREF), Box 10, 2080 Ariana, Tunisia., (5) Civil Engineering Department, Faculty of Engineering, Port Said University, Port Said, Egypt., (6) School of Agricultural, Forestry, Food and Environmental Sciences, University of Basilicata, Potenza, IT, (7) Land and Water Division, Mediterranean Agronomic Institute - International Centre for Advanced Mediterranean Agronomic Studies, Bari, IT

Recent research shows how soil information can be generated quickly and cheaply, by using a state-of-the-art electromagnetic (EM) instrument and the inversion method to generate high-resolution EM conductivity images (EMCI). EM instruments have the advantages of being faster, less expensive, and also to collect data easier than the common Electrical Resistivity Tomography (ERT) method, which makes EM adequate to cover a larger area in regional studies. However, the capability of the technique is limited in mapping soil dynamic parameters (i.e. water content, salinity) due to the lack of a time-lapse inversion algorithm.

While several time-lapse inversion algorithms have been developed for modeling of time-lapse ERT data in order to reduce the inversion artefact, no attempt has been made to implement a time-lapse inversion algorithm to invert the EM data. Developing a time-lapse inversion algorithm for EM data is, therefore, a determined step forward for application of EM instruments in characterization of the soil's dynamic parameters where a multiple datasets is required.

We developed a time-lapse inversion algorithm where a spatiotemporal objective function is minimized and we evaluated the algorithm by performing several synthetic tests. The developed program will be applied to the field data collected in the scope of the SALTFREE project to image spatiotemporal variability of soil salinity. The project consortium is formed by five partners from four countries around the Mediterranean - Egypt, Italy, Portugal, and Tunisia in the scope of ARIMNET2 program and aims to develop a framework for the evaluation of the salinization risk in the management scale.

Acknowledgements
This work was developed in the scope of SALTFREE project (ARIMNET2/0005/2015 SALTFREE). Publication is supported by the project FCTUID/GEO/50019/2013–Instituto Dom Luiz