EGU21-6465
https://doi.org/10.5194/egusphere-egu21-6465
EGU General Assembly 2021

Monitoring changes in salinity and sodicity in a tile-drained field in the B-XII irrigation district (SW Spain) using electromagnetic induction sensing and inversion.

José Luis Gómez Flores[1], Mario Ramos Rodriguez[1], Alfonso González Jiménez[1], Mohammad Farzamian[2], Juan Francisco Herencia Galán[3], Benito Salvatierra Bellido[4], Pedro Cermeño Sacristán[3], and Karl Vanderlinden[1]

[1]IFAPA Centro Alameda del Obispo, Córdoba, Spain
[2]Instituto Nacional de Investigação Agrária e Veterinária, Oeiras, Portugal
[3]IFAPA Centro Las Torres, Alcalá del Río (Seville), Spain
[4]IFAPA Centro Rancho de la Merced, Jeréz de la Frontera, Spain

Continuous monitoring of soil salinity/sodicity is of prime importance in environments such as the B-XII irrigation district (SW Spain) where a shallow saline water table and intensive irrigated agriculture create a fragile equilibrium between salt accumulation and leaching in the topsoil. We evaluate to which extend electromagnetic induction (EMI) sensing and inversion with limited calibration can be used to accomplish such monitoring purposes, given that widespread soil sampling and laboratory analyses are prohibitive for economic and technical reasons.

Detailed EMI surveys were performed in 2017 and 2020 in a 4-ha tile-drained field with a heavy clay soil. Soil samples were taken at different locations and depths along a transect and analyzed for salinity/sodicity-related parameters. Inversion of the EMI signals along the investigated transect yielded consistent conductivity images for both years and showed a strong relation (R^2<0.95) with saturated paste extract conductivity. The observed spatial conductivity patterns persisted from 2017 to 2020, although the obtained absolute values of the salinity/sodicity parameters changed slightly. This indicates that salinity hotspots persist in time and are mainly associated with wet locations, where salt movement towards the topsoil is promoted, possibly as a result of deficiencies in the performance of the drainage system.

Our results show that inversion of EMI signals offers a powerful means for accurately monitoring spatial and temporal changing salinity/sodicity under the specific conditions of the B-XII irrigation district.

Acknowledgement

This work is funded by the Spanish State Agency for Research through grant PID2019-104136RR-C21 and by IFAPA/FEDER through grant AVA2019.018.