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## Monitoring soil status in an irrigated saline reclaimed marsh area in SW Spain using multi-receiver electromagnetic induction sensing and inversion

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Multi-receiver electromagnetic induction (EMI) shows increasing potential for effective depth-specific monitoring of shallow soil properties as EMI sensors become available that provide simultaneous apparent electrical conductivity (ECa) measurements for small depths of exploration (DOE). Inversion of such ECa data results in more detailed soil profile EC estimates that can provide a complete understanding the soil hydrology and chemistry near the surface (<1 m depth). We demonstrated this by monitoring the soil status weekly at eight measurement locations in an irrigated cotton field in a saline reclaimed and tile-drained marsh area in SW Spain using a multi-receiver EMI instrument that provided ECa for 12 different DOEs. Soil water content and water table depth and conductivity were monitored at the eight locations. Inversion of the ECa data at the eight locations yielded characteristic EC profiles that depended on soil water content, irrigation and salt leaching, and water table depth. A depth-specific correlation analysis of the EC profiles and their first derivative elucidated the depths where the correlations were strongest and for which the best estimates of water content and water table depth and salinity could be obtained. The established relationships were then used to estimate these properties along two transects that contained each four of the monitoring locations. This approach allowed the detection of areas where a shallow water table emerged during the irrigation season which led to topsoil and crop salinization and can therefore assist decision-making in soil, water and crop management in this area.

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