The U.S. Salinity Laboratory (USDA-ARS) guidelines for assessing multi-scale soil salinity with proximal and remote sensing

Elia Scudiero (1,2), Todd Skaggs (1), and Dennis Corwin (1)

(1) USDA-ARS, U.S. Salinity Laboratory, Riverside, California, USA, (2) University of California Riverside, Department of Environmental Sciences, Riverside, California, USA

Soil salinity is a major threat to sustainable agriculture, especially in arid and semi-arid regions. Updated and accurate inventories of salinity in agronomically and environmentally relevant ranges (i.e., <20 dS/m, when salinity is measured as electrical conductivity of the saturation extract, EC_e) are essential for producers and decision-makers to assure long term food production. Over the past three decades, scientists at the U.S. Salinity Laboratory (USDA-ARS) in Riverside, CA have developed proximal sensor (i.e., electrical resistivity and electromagnetic induction) and remote imagery (e.g., MODIS, Landsat, WorldView) methodologies for assessing soil salinity at multiple scales: field (0.5 ha to 1 km^2), landscape (1 to 10 km^2), and regional (10 to 10^5 km^2) scales. The purpose of this contribution is to provide an overview of these scale-dependent salinity assessment approaches. Guidelines, special considerations, and strengths and limitations of each scale-specific approach are presented for characterizing spatial and temporal variation in soil salinity. To support the discussion, we present a regional scale dataset comprising salinity surveys over 22 fields in California, USA. The dataset is used to provide practical examples of field-, landscape-, and regional-scale soil salinity assessment.