



Characterization of Soils and Tertiary-Quaternary Sediments by Electrical Resistivity Tomography in Terra Chá, Lugo, Spain

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Electrical Resistivity Tomography (ERT) is a very attractive tool to describe the spatial and temporal variability of soil properties without digging. The electrical resistivity is a function of a number of soil properties, including particle size distribution, mineralogy, porosity, water content, temperature, etc. The main advantage of ERT relies on the fact that it neither disturbs the structure nor the water dynamics of the soil. In our work, ERT was used as a non-invasive method for measuring 2-D ERT profiles at three different scales according to the distance between electrodes, to guarantee different sensitivity to horizontal and vertical heterogeneities investigation. The experiment was conducted in an experimental field devoted to grassland at Castro de Ribeiras de Lea, Lugo Province, Spain. The studied soil is an Umbric Fluvaquent (Fluvisol umbrico) developed from Quaternary sediments, highly heterogeneous in depth because of the contrasting texture of the successive soil horizons and geological strata. So the loamy top soil horizons are developed over coarse gravelly Quaternary sediments, which in turn are underlain with Tertiary clayey sediments. ERT measurements were taken using an ABEM 1000 equipment, with a Wenner array of 48 electrodes. Electrodes were spaced at 0.2, 0.5 and 5.0 m to record resistivity along transects of 8, 20 and 200 m, respectively, and successive increased depth. Measurements were repeated along time during dry and wet seasons to evaluate the effect of contrasting soil water content on resistivity. A mathematical inversion was performed to convert the volumetric apparent resistivity into interpreted resistivity data. Results were used for: 1) identifying soil horizon thickness, 2) characterizing the homogeneity of topsoil horizons and 3) assessing soil water penetration during the rewetting period from the soil surface to the Quaternary and Tertiary subsoil layers.

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