

# **Using electrical resistivity tomography and water injection test estimated the unsaturated hydraulic parameter in topsoil**

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## **Abstract**

Improved understanding of unsaturated flow and identifying hydraulic parameter we using electrical resistivity tomography to estimate it. Recent research has shown that ERT surveys as non-invasive and cost-effective method are a promising alternative to traditional techniques for unsaturated zone characterization. The study site is located at the state of Campanhia das Lezirias-Samorra Correa, near east of Lisbon. The site is characterized by a deep Arenosol soil with sand. We used water injection test with a drip to let the resistivity of the site with time varied. We used the three different time-lapse inversion methods: independent data inversions, difference inversion, and simultaneous space-time inversion, to obtain the resistivity data. Then we removed the temperature effectively. The resistivity and saturation relationship is Archie's law. Afterward, using in-situ approach resistivity variation models were converted to water content images. We used the water moment analysis that 2D spatial analysis to divided the three parts, the mass of the system, location of the center of mass and the mass spread. After the moment analysis of water movement image inferred from the ERT method with unsaturated flow simulation predicted from a numerical solution of Richard's equation, the range of saturated hydraulic conductivity is estimated to be in 0.5-0.7(cm/min).

## **Reference:**

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Hayley, K., L. R. Bentley, M. Gharibi, and M. Nightingale (2007), Low temperature dependence of electrical resistivity: Implications for near surface geophysical monitoring, *Geophysical Research Letters*, 34(18).