



## Application of the Electrical Resistivity Tomography to the stone content estimation

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Electrical Resistivity of the soil is regarded as a proxy for many soil properties as structure, moisture content or bedrock depth. The stone content is important for the trees as a large number of stones in the soil restrict the volume of soil that is available for roots to uptake water and nutrients. The potential of ERT for estimating the stone content is evaluated by regarding the stony soil as a two-exponent mixture with stones, which are less conductive, suspend in a conductive matrix. The resistivity of the two components was obtained separately by 2-electrode and 4-electrode methods. On the basis of the resistivity of the soils and the stones, the stone size effect on the effective resistivity was addressed using numerical modeling by Windows based resistivity modeling program RES2DINV and RES3DINV. The effective resistivity at different stone content was calculated by inverting the simulated potential which reproduces a linear panel experiment. The results demonstrate that stone size effect is not very significant.

Field measurements were carried out at Mt-Ventoux and l'Issole, located in south of France in the Provence Region. The sites stand in Karstic terrain with soils having high and variable stone content and lying on a bed rock which can be found very close to the surface. Pits were dug and their stone content (volumetric fraction) was estimated. There is an apparent relation between the effective resistivity values extracted from the ERT inversion results and the stone content, the tendency are in good agreement with theoretical results. However, exceptions are found with relatively higher stone content and lower ER value, it can be explained by 3D effect from soil characteristics surrounding the pit. An error assessment in stone content is given according to the resistivity contrast between phases (stones and soil) and the variability in electric resistivity within each phase.