Can Electrical Resistivity Tomography offer us a dynamic view on what happens in the soil-plant continuum?

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Root water and nutrient uptake and its relation to environmental factors is one of the least understood components in the terrestrial water balance and is of high importance for water resources management, ecology and agriculture. As the processes in the soil-plant continuum are complex and inextricably intertwined, alternative, non-invasive measurement methods are necessary to unravel spatial and temporal dynamics of the system. Electrical resistivity tomography (ERT) has been proposed as a promising technique, since bulk resistivity maps and their temporal evolution may serve as a proxy for changes in soil moisture and pore water salinity, amongst others. However, the variables affecting the measured bulk electrical resistivity often change simultaneously in natural environments and not all influencing factors are yet well understood (e.g. influence of root biomass). Therefore, the method needs field-specific calibration. In addition to limitations due to signal-to-noise ratio and data inversion strategies, this implies that ERT still needs further development and research efforts for its use to characterize the soil-plant continuum.