Geophysical Monitoring Tree Root Zones

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Understanding the extent and influence of tree root zones is very important to soil scientists and biologists studying a range of agricultural problems, such as salinity remediation. Unfortunately, most current methods of examination involve digging up the root system and kill the tree in the process. Thus, time-lapse studies are almost impossible. Information that we would like to know is how far do the roots extend to and how they influence soil moisture levels, and what are the effects of competition over time for water and nutrients. Geophysical methods are generally non-invasive and may provide a means to study tree systems over time. We have implemented with varying degrees of success self-potential, ground penetrating radar (GPR), resistivity and misse-a-la-masse methods. The research is still at a very early stage, but shows encouraging results. GPR and resistivity appear to show some promise in monitoring changes in moisture levels in the soil. Self-potentials due to the chemical/osmotic processes in the up-take of water and nutrients also shows promise, but noise from other sources and difficulties in interpretation limit the method. Misse-a-la-masse appears to uniquely solve the very difficult problem of mapping the extent of the root-zone of a particular tree, without having to resolve individual roots.