Spatial patterns of soil water repellency: clues for sources of hydrophobic compounds?

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Certain organic compounds, derived from living organisms or their decaying parts, are generally accepted to induce soil water repellency. Water repellency may therefore be expected to increase with proximity to organisms releasing hydrophobic compounds or precursor substances. This hypothesis is tested here for Eucalyptus globulus trees, since eucalypt species are frequently associated with elevated repellency levels.

In a young, first-rotation plantation on coastal dune sands in central Portugal, repeat measurements of water repellency using the ´Molarity of an Ethanol Droplet´ (MED) test were carried out in situ between April 2001 and May 2002. On 25 dates, repellency was measured at initially 2 and later 3 distances on 2 sides of 8-11 randomly selected trees. At 15 of these dates, additional repellency measurements were performed within small grids aside 3 of the selected trees.

The postulated decrease in topsoil water repellency with increased distance to eucalypt tree stems was found to apply on several individual measurement dates as well as, more unexpectedly since repellency usually is a transient phenomenon, for the study period as a whole. The results confirm the general association of eucalypt trees with water repellency, and indicate that tree stem proximity is an important but not sufficient factor to explain repellency distribution in topsoil.

The presentation will further elaborate on how to explain the observed spatio-temporal patterns in water repellency by the different potential sources of hydrophobic substances, and discuss possible approaches to further the knowledge and understanding of the role of these potential sources under field conditions.