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Soil water repellency in Pinus sp. plantations affected by forest fires in Temperate climatic conditions.

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Abstract

Earth science research is moving towards holistic investigations that show the interaction of different spheres involved in the biogeochemical cycles (Atekwana and Slater, 2009). Scientific research is more efficient at the frontier of the scientific disciplines where little research has been done. This is a very fruitful strategy to advance scientific knowledge, as different scientific backgrounds join and generate new knowledge. This STSM is based on this idea. Soil water repellency involves water, minerals, life, and air spheres (Doerr et al., 2000), and has been found in various climatic and pedological regions of the world. For example, Walden et al., (2015) found an increase in soil water repellency in the reforestation of Eucalyptus. Kobayashi and Shimizu (2007) found high values of water repellency in Japanese cypress resulting in a shortage in soil water storage. Miyata et al., (2007) registered an increase in runoff due to the high-water repellency in the same experimental area. Ma et al., (2017) found water-repellent soils in China, and Hrabovsky et al., (2020) in The Little Carpathians in Europe. During the last two decades, it has been confirmed that soil water repellency is a global soil property of the Earth System and that it is not anymore, an issue restricted to the forest fire-affected land (DeBano et al., 2000) or the citrus plantations on sandy soils (Jamison, 1947), that have been the two-pioneer research on soil water repellency in the world.
Soil water repellency is edaphic property enhanced by soil organic matter and organic products such as oils and waxes. Fire disturbs the degree and spatial distribution of soil water repellency. This is especially relevant in soils covered with species rich in resins, oils, and waxes such as the Pinus sp. The objective of this research is to determine the degree and distribution of soil water repellency in Pinus sp. plantations in temperate climatic conditions. The information collected will shed light on the importance of forest fire on soil hydrology and how a fire will reallocate the water-repellent layers. A spatial

distribution assessment of the water repellency at different depths will contribute to understanding the role of fire as a critical factor in the changes in soil hydrology.

Keywords: Fire, Repellency, Soil, Water, The Netherlands, WDPTR

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