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Impact of soil wetness on plant litter decomposition using low-cost soil moisture sensors and off-the-shelf tea bags

Angelika Xaver^{1,2}, Taru Sandén², Heide Spiegel², Luca Zappa¹, Gerhard Rab³, Drew Hemment⁴, and Wouter Dorigo¹

¹TU Wien, Research Group Climate and Environmental Remote Sensing, Department of Geodesy and Geoinformation, Vienna, Austria (angelika.xaver@geo.tuwien.ac.at)

²Austrian Agency for Health and Food Safety (AGES), Department for Soil Health and Plant Nutrition, Vienna, Austria

³TU Wien, Centre of Water Resource Systems, Vienna, Austria

⁴University of Edinburgh, Edinburgh Futures Institute and Edinburgh College of Art, Edinburgh, United Kingdom

Soil organic matter plays a key role within the nutrient cycle, serves as an agent to improve soil structure, and is also known to impact concentrations of greenhouse gases and stabilize soil pollutants. Thus, the soil organic matter content and its potential losses through decomposition are of high interest, especially in the light of a changing climate. As the decomposition process is significantly influenced by climatic conditions, it is important to understand the relationship between decomposition and environmental variables. Previous studies primarily focused on determining the influence of air temperature and precipitation on litter decomposition, but the impact of soil moisture has hardly been investigated.

In this study, we evaluate the relationship between plant litter decomposition, using commercial tea bags (Green and Rooibos tea) as standardized plant litter, and soil moisture, observed with low-cost sensors used within the European citizen science project GROW Observatory (GROW; <https://growobservatory.org/>). The low-cost soil moisture sensors were placed alongside the tea bags at eight different locations, covering four different land cover types, within the Hydrological Open Air Laboratory (HOAL), a small agricultural catchment in Petzenkirchen, Austria. Data has been collected for two years providing decomposition rates (k) and stabilization factors (S) for the four different seasons of both years. Apart from soil moisture, we investigate air and soil temperature, precipitation and soil parameters as drivers for litter decomposition.

We will show preliminary results on the relationship between decomposition and different environmental variables, in particular soil moisture, throughout all seasons and various land cover classes.

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