



Tree species specific soil moisture patterns and dynamics through the seasons

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Soil moisture patterns in the landscape are largely controlled by soil types (pore size distributions) and landscape position. But how strong is the influence of vegetation on patterns within a single soil type? While we would envision a clear difference in soil moisture patterns and responses between for example bare soil, a pasture and a forest, our conceptual images start to become less clear when we move on to different forest stands. Do different tree species cause different moisture patterns to emerge? Could it be possible to identify the dominant tree species of a site by classifying its soil moisture pattern? To investigate this question we analyzed data from 15 sensor clusters in the lowlands of north-eastern Germany (within the TERENO observatory) which were instrumented with soil moisture sensors (5 profiles per site), tensiometers, sap flow sensors, throughfall and stemflow gages. Data has been collected at these sites since May 2014. While the summer data has already been analyzed, the analysis of the winter data and thus the possible seasonal shifts in patterns will be carried out in the coming months. Throughout the last summer we found different dynamics of soil moisture patterns under pine trees compared to beech trees. While the soils under beech trees were more often relatively wet and more often relatively dry, the soils under pine trees showed less variability and more often average soil moisture. These differences are most likely due to differences in both throughfall patterns as well as root water uptake. Further analysis includes the use of throughfall and stemflow data as well as stable water isotope samples that were taken at different depths in the soil, in the groundwater and from the sapwood. The manifestation of tree species differences in soil moisture patterns and dynamics is likely to have implications for groundwater recharge, transit times and hydrologic partitioning.