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## **Effect of different tree species on soil moisture and temperature. Early-stage view of continuous forest soil regime monitoring.**

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Due to the spatial heterogeneity, root presence and other specific properties, measurement of forest soil hydraulic properties is difficult. Forests are generally hydrologically important systems that can mitigate negative climate change impact, and specifically, forest soil represents crucial water reservoir. A common forest management strategy is to plant monocultural stands of trees. Due to the differences in trees characteristics, e.g., root system, litter and leaf area, the development of soil undergoes specific changes according to the planted species. The main aim of this study is to investigate the connection between the tree species and hydro-physical properties of forest soil with focus on long term soil moisture and temperature regime monitoring. This research brings an early-stage view to data obtained from May 2021 up to nowadays.

A set of 55 TDT (time domain transmission) soil moisture and temperature sensors were installed into three nearby locations. In each of those a monoculture stand of beech (*Fagus sylvatica*), spruce (*Picea Abies*), and larch (*Larix Decidua*) are planted. Half of the sensors are used for measuring the mineral soil moisture in depth of -15 to -29 cm below soil surface and point temperature of -23, -15, +5 cm relative to the surface, the rest is used for measuring the topsoil moisture from the surface to the depth of -14 cm and point temperatures in levels of -8, 0 and +15 cm.

Results shows distinct differences in soil moisture among tested tree species. After longer period without precipitation (period of soil-water loss), the highest differences in volumetric water content (VWC) were observed. After one-month period without rain in early summer, mean values of VWC for topsoil were 35% for beech, 28% for larch, and 21% for spruce. Overall, the beech stands showed the highest ability to maintain soil water after periods of soil water loss and therefore, potentially exhibited the strongest resistance towards soil drought. By contrast, spruce tends to lose water relatively fast which can be problematic especially in events of long-term drought. For the surface temperature during vegetation season, the highest values were observed in larch stands followed by spruce and the lowest in beech. These findings probably corresponding to different solar radiation permeability of tree canopies. The observed effects of tree species on soil moisture and temperature should be considered for hydrological modelling, future forest planning, and water management improvement of forest soil.