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Influence of beech and spruce forests on soil water dynamics

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This study focuses on the description of soil water dynamics at four sites with different land cover types, namely beech forest, conifer forest, meadow and clipped grass. The analysis was based on soil tensiometer measurements from five consecutive vegetation seasons (comprising both wet and dry years). We investigated both column average pressure heads and also their vertical distribution. The soil water balance was studied by the HYDRUS-1D model. The highest pressure heads were observed at the grassland site, followed by the meadow site. The forested sites were generally reaching lower pressure head values, which was a result of higher evapotranspiration and different soil properties. The differences between the spruce forest (Picea abies (L.)) and beech forest (Fagus sylvatica L.) were evident namely in dry periods, when the beech site was experiencing lower pressure heads. Contrarily, the spruce site was drier (with recorded lower pressure heads) in wet periods and at the beginning of each season. Compared to the conifer forest, lower pressure heads were observed in beech forest, namely at the bottom of the inspected soil column (down to 100 cm). The inspection of the soil water balance revealed different rates of evapotranspiration and drainage at all sites. The evapotranspiration was highest in the beech canopy followed by spruce and both grass covered sites. The differences between spruce and beech forest were based namely on the water consumption efficiency and differences in interception rates, vertical distribution of the roots, and soil hydraulic properties.

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