Long term soil moisture measurements at two ecosystems in north-eastern Germany

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Soil moisture plays a crucial role in physical interaction between land-surfaces and the atmosphere at almost all temporal and spatial scales. Partitioning of available energy at the ground surface into sensible and latent heat is largely controlled by the near-surface soil water content, thus representing a link between water and energy cycles. This makes an accurate description of soil moisture important for numerical climate, and weather prediction modelling as well as for local ecosystem models. Validation of incorporated SVAT (soil-atmosphere-transfer) schemes relies mainly on in-situ measurements from different soils and vegetation covers, which are also required as ground-truth for remote sensing techniques. Often available data sets have shortcomings for special validation purposes, e.g. lack of complementary atmospheric measurements, missing information on spatial representativeness, or insufficient temporal resolution. Here soil moisture data sets are presented from a grass and a pine forest site in north-eastern Germany, which are part of a comprehensive atmospheric monitoring program at the Meteorological Observatory Lindenberg (Richard-Aßmann-Observatory) of the German Meteorological Service (Deutscher Wetterdienst, DWD), providing information about surface exchange processes and the physical structure of the boundary layer and the troposphere. Since 1998 soil moisture is measured by TDR probes continuously at discrete levels down to 1 m depth. Long term comparisons will be presented to gravimetrically determined soil water content as well as to results of an additional probing system on the basis of capacity measurements (Lumbricus, METEOLABOR Switzerland) which provides high resolution soil moisture profiles. For the grass site several years of parallel TDR measurements by three systems allowed to estimate small scale soil moisture variability, which was found to increase with depth and to have a maximum during dry summer periods. Seasonal differences in the soil water content of the two ecosystems, typical for the northern part of central Europe are also discussed.