



Observation of soil moisture variability in agricultural and grassland field soils using a wireless sensor network

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Soil moisture dynamics is a key factor of energy and matter exchange between land surface and atmosphere. Therefore long-term observation of temporal and spatial soil moisture variability is important in studying impacts of climate change on terrestrial ecosystems and their possible feedbacks to the atmosphere. Within the framework of the network of terrestrial environmental observatories TERENO we installed at the research farm Scheyern in soils of two fields (of ca. 5 ha size each) the SoilNet wireless sensor network (Biogena et al. 2010).

The SoilNet in Scheyern consists of 94 sensor units, 45 for the agricultural field site and 49 for the grassland site. Each sensor unit comprises 6 SPADE sensors, two sensors placed at the depths 10, 30 and 50 cm. The SPADE sensor (sceme.de GmbH, Horn-Bad Meinberg Germany) consists of a TDT sensor to estimate volumetric soil water content from soil electrical permittivity by sending an electromagnetic signal and measuring its propagation time, which depends on the soil dielectric properties and hence on soil water content. Additionally the SPADE sensor contains a temperature sensor (DS18B20).

First results obtained from the SoilNet measurements at both fields sites will be presented and discussed. The observed high temporal and spatial variability will be analysed and related to agricultural management and basic soil properties (bulk density, soil texture, organic matter content and soil hydraulic characteristics).