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Measurement of water content at different scales and geostatistical analysis

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Accurate measurement of the spatial patterns of water content is an important aspect of most vados zone studies, e.g. ground truthing for remote sensing data-sets, the identification of near surface flow processes, or as initial condition for a hydrological modelling. Water content can be determined, either measuring the temporal dynamics with permanently installed equipment or by high spatial resolution snapshots at the field scale during field campaigns. In the upper Weisseritz in Saxony, Germany, at selected hillslopes with different microtopography and land use the water content was measured with both methods. The study area is characterised by gentle slopes with a rural land use. The soils are dominated by cambisoils. The snapshots were surveyed with soil moisture probes as well as with ground penetrating radar. Continuous measurements were carried out with two Spatial TDR clusters (STDR) with a high spatio-temporal resolution. STDR encompasses three components: (1) a sampling three-rod-TDR, (2) an appropriate wave-guide and (3) an algorithm to reconstruct the water content profile along the wave-guide. By connecting up to 40 STDR sensors via a multiplexer, the representative soil moisture patterns may be observed at a scale of up to 900 m2 and at a time resolution of 10 min, which allows for the determination of the geostatistical properties of soil moisture at the field scale. A high spatial variability of water content was measured with all measurement techniques. To explain the spatial patterns auxiliary information such as the soil type and elevation

has to be included into the analysis process. It is expected that the geostatistical interpretation of water content estimated by the different measurement techniques could be improve the ground truthing process of remote sensing data-sets.