

KOLLOQUIUM

Institut für Hydrologie, Albert-Ludwigs-Universität Freiburg



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Hörsaal Fahnenbergplatz (Rektoratsgebäude)

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Towards better understanding of soil moisture dynamics at the catchment scale

Hydrological analysis is often limited by the number of data available. Usually, discharge data and only little point information concerning soil moisture status are available which gives a good figure concerning temporal variability of runoff but do not provide insight into the spatial dynamics of soil moisture and water fluxes within the catchment. Due to this measurement constraints, our knowledge of short- and long-term dynamics of spatial soil water content (SWC) patterns at the small catchment scale has reached an impasse in recent years.

I will discuss new measurement techniques for monitoring soil moisture dynamics at the catchment scale and present results from the TERENO project. The wireless sensor network technique are used to continuously monitor three-dimensional SWC fields with high spatial and temporal resolution at the headwater catchment scale, i.e. to seasonal and event scale changes in SWC patterns. Cosmic-ray soil moisture probes utilise the fact that high-energy cosmic-ray neutrons are moderated (slowed to lower energies) as they most effective collide with terrestrial hydrogen atoms contained in water molecules to infer soil moisture with a larger footprint (~ 30 ha). L-band radiometry is one of the most promising approaches for remote soil-moisture retrieval at the larger scale since the impact of vegetation canopies and surface roughness is less distinct compared with passive measurements at higher frequencies and active remote sensing techniques (radar). A major challenge for the future will be the simultaneous use of different measurement technologies and the development of a framework that optimally combines the information contained in the observations with model predictions of soil moisture dynamics at various spatial scales.