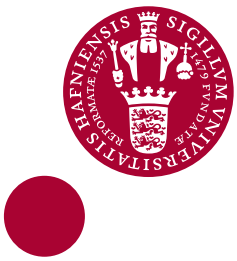

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Body: The exchange of water and energy between the land surface and the atmosphere is controlled by the amount of water stored in the subsurface (mainly the moisture in the root zone) and the pools above-ground (snow, biomass-water, water retained in surface layers, interception etc.). Therefore measures of the water storage pools within this zone are critical for the prediction of evapotranspiration and groundwater recharge. Soil moisture constitutes in most cases the largest pool of water. The scale of soil moisture measurements are due to considerable spatial and temporal variability important to consider. At present soil moisture within the Ahlergaarde subcatchment (1055 km2) of the Skjern River watershed (2500 km2) (HOBE Danish Hydrologic Observatory) are collected at point scale using Decagon ECH2O 5TE capacitance sensors (30 stations with sensors installed in three depths) and at larger scale (44*44 km) by satellite retrievals (SMOS). However, calibration and validation of a hydrological model with a regular grid of e.g. 500-1000 meter requires measurements at a corresponding scale. Up-scaling of point measurements are possible but inflicted with uncertainties as a substantial amount of points has to be sensed to represent the heterogeneity of the area.

A cosmic-ray neutron probe continuously detects the average amount of water (soil moisture, water in the biomass, water in the litter layer, snow and intercepted water) over a circle with a radius of approximately 300 m and depths of 10-70 cm. Several of studies have documented that the cosmic-ray neutron probe provides reliable estimates of soil moisture.

Lately, more attention has been given to use the probe for measuring other variables than soil moisture. At sites with extensive or considerable annual variation in vegetation cover, the signal is affected by the change in the biomass-water content of a cropped field (from sprout to harvest) as well as the interception and the wetting/drying of the litter layer and the moss layer of a forested site.

In the beginning of 2013 five cosmic-ray neutron probes were installed in the Ahlergaarde catchment at sites representing the two major land uses (agriculture (61 %) and forest (17 %)). The standard installation procedure is to place the probes at 1.5 m above the ground. Here, probes detecting neutron intensity at different energies (0.025 eV and 0.5 – 106 eV) were installed at different heights above the surface. Probes at surface level were used for the detection of soil moisture, whereas the difference in the count rates at the different energy levels and heights above the surface were used to investigate the biomass-water and the intercepted water fluxes. In this study continuous measurements of intermediate scale soil moisture were carried out at the two sites, and the potential of using the cosmic-ray neutron method to determine the water content of the biomass and the interception storage were tested.