Geophysical Research Abstracts
Vol. 20, EGU2018-2973, 2018
EGU General Assembly 2018

Winter hydrology and soil erosion at catchment scale in Norway

Torsten Starkloff
NIBIO, Miljø og naturressurser, Ås, Norway (torsten.starkloff@nibio.no)

In regions with a Nordic climate, soil erosion rates in winter and early spring can exceed those occurring during other seasons of the year. In this context, this study was initiated to improve our understanding of the interaction between agricultural soils and occurring winter conditions. A holistic approach, combining field investigations, X-ray imaging and spatial distributed modelling was applied in order to better understand how hydrological processes in a catchment are influenced by snow, ice, and freeze-thaw cycles of soils, leading to runoff and soil erosion in winter and spring conditions.

Detailed spatially and temporally distributed measurements and observations in a small catchment in Norway were executed during three consecutive winter periods. During the winter periods of 2013-2014, 2014-2015 and 2015-2016, surface runoff, soil water content, soil temperature, and snow cover properties were measured. In addition, numerous soil samples were taken to determine the soil hydraulic characteristics of the investigated soils and to quantify the changes in their macropore networks due to freeze-thaw events, using X-ray imaging.

With the collected data and deduced process understanding, it was possible to model (using UEBGrid and SHAW) and quantify the spatial and temporal development of snow packs. Furthermore, the field observations revealed how the interaction of tillage, state of the soils and snow cover at a certain time can lead to none or extensive surface runoff and soil erosion.

Integrating acquired data, observations and process knowledge facilitated advances in simulating (using LISEM) and quantifying surface runoff and soil erosion rates across the catchment under investigation.