



Design and deployment of a multi-platform soil moisture monitoring network

Felix Thomas¹, Friedrich Boeing², Julian Schlaak², Solveig Landmark¹, Rebekka Lange⁵, Daniel Altdorff¹, Jan Bumberger⁵, Andreas Marx², Peter Dietrich¹, Falk Böttcher³, Rainer Petzold⁴, Kerstin Jäkel⁶, and Martin Schrön¹

¹Helmholtz Centre for Environmental Research, Monitoring and Exploration Technologies, Germany (felix.thomas@ufz.de)

²Helmholtz Centre for Environmental Research, Computational Hydrosystems, Leipzig, Germany

³German Weather Service, Department Agrometeorology, Branch office Leipzig, Leipzig, Germany

⁴Public Enterprise Sachsenforst, Unit Site Survey, Soil Monitoring and Laboratory, Pirna, Germany

⁵Helmholtz Centre for Environmental Research, Research Data Management, Leipzig, Germany

⁶Saxon State Office for Environment, Agriculture and Geology, Nossen, Germany

The MOWAX project investigates monitoring- and modelling concepts as a basis for the assessment of the water budget in Saxony. It operates a dense, multi-platform soil moisture observation network in collaboration with the German Weather Service (DWD), Sachsenforst, TU Dresden and regional authorities.

The network was designed to represent the dominant landscape properties influencing the water budget in Saxony, including land use, natural areas, soil types, and climatic conditions. It combines up to 10 area-representative Cosmic Ray Neutron Sensing (CRNS) stations and novel mobile platforms, namely Rail-CRNS (continuous measurements from sensors on trains). We describe our standardized sensor deployment and calibration protocols, automated quality control procedures, and methods for integrating our observations into the modelling framework using the new UFZ timeseries infrastructure. After more than one year of effort, we report on advancements and experiences in pursuing our goals. Based on our strong collaboration with existing observatories and data management infrastructures we are maximizing the utility of ongoing CRNS data for our purposes by establishing a new sensor network.

One of the primary objectives is to enhance and validate the mesoscale Hydrologic Model (mHM) for Saxony by providing continuous, quality-controlled soil moisture time series. Further, we aim to provide a near-real-time visualization of our observations and model outputs and deliver a valuable data basis that can be used by authorities to support management decisions and urgent actions.

MOWAX is funded by the European Regional Development Fund (EFRE) and by tax revenue on the basis of the budget approved by the Saxon state parliament (funding code 100702604).