



## **Establishing a hydrometeorological field observatory in the Sudan Savanna of West Africa: Concept, Outcomes and Challenges**

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Large-scale experimental sites for studying Critical Zone processes are relatively rare for savannas. However, they are essential for a better understanding of environmental changes and their impacts on ecosystem functioning and services. This study gives an overview of a novel field observatory which was established for mesoscale watersheds in the Sudan Savanna near the border of Burkina Faso and Ghana as part of the WASCAL (West African Science Service Centre on Climate Change and Adapted Land Use) programme. The study area is characterized by severe land cover changes due to a strongly increasing demand of agricultural land. The observatory is designed for long-term measurements of selected eco-hydrological processes in fine temporal resolution focusing on land-atmosphere exchange processes. It consists of a network of automatic weather stations, agro-meteorological stations, eddy covariance towers and various hydrological measurement devices, which are complemented by long-term historical measurements from national meteorological and hydrological networks. A unique component of the observatory is a micrometeorological experiment using the eddy covariance towers which is conducted since the initiation of the observatory in 2013. The experiment was implemented at three contrasting sites with different vegetation cover and contrasting land use practices (pristine savanna, mixture of cropland, degraded grassland) to investigate the impact of land use changes on water, energy, and CO<sub>2</sub> fluxes. Moreover, the datasets of the new observatory are the basis of various field, data analysis and modelling studies conducted by other disciplines (i.e. agriculture, biology, ecology, remote sensing) in this region and are made available via a new database, the WASCAL Data Discovery Portal. The new large-scale field experiment also forms an excellent platform for future field campaigns and long-term experimental sites and can be used as foundation for an observatory that addresses key processes and components of the Critical Zone. In this presentation we give a detailed overview about the new field observatory with its different components and its advantages and drawbacks in comparison to other large-scale experimental sites for savanna ecosystems (e.g. AMMA catch observatory). In addition, recent outcomes from the long-term micrometeorological field experiment are shown. Finally, the current challenges and future perspectives are addressed for operating this type of observatory in this region.