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# Integration of Atmospheric Sciences and Hydrology for the Development of Decision Support Systems in Sustainable Water Management

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Sustainable decisions in water resources management require scientifically sound information on water availability. In areas with weak infrastructure and in particular in developing countries, lack of reliable data remains a main obstacle for this effort. Usually, no dense networks of meteorological, discharge and piezometric data recording exist. This, however, is a basic prerequisite for reliable water resources estimation and successful water management planning. To support sustainable water management in the Volta Basin of West Africa, we developed a set of tools that facilitates the retrieval of hydrological information for decision makers in this extremely data poor region. A combination of atmospheric and distributed hydrological models, remote sensing and meteorological/hydrological monitoring is applied to quantify the water balance of the Volta Basin (West Africa) at different scales.

Within the framework of the GLOWA-Volta project, an operational, model based water balance monitoring system for the White Volta is developed by applying continuous coupled meteorology-hydrology simulations and automatic satellite transmitted discharge measurements. Gridded land use and land surface information is obtained from satellite image interpretation and assimilated together with hydro-geological information into atmospheric and hydrologic models. An operational scheme for numerical weather prediction (allowing 5 days precipitation and temperature forecast) is developed and a daily update can be accessed on the WWW. The correct estimation of the onset of the rainy season, which is of crucial importance for farmers, is investigated

by statistical techniques. The impact of climate change on water availability in the entire Volta Basin is assessed via high resolution coupled regional climate-hydrology simulations and dynamic downscaling of ECHAM4 climate scenarios.

Examples of the developed tools are presented and the limits and potentials of the methodologies are discussed.