COMBINED USE OF MODELS, SATELLITE OBSERVATIONS, AND GROUND-DATA TO SUPPORT WATER MANAGEMENT IN THE VOLTA BASIN, WEST AFRICA

N. van de Giesen (1), W. Andah (2), M.Andreini (3,1), D. Burose (5,1), J. Friesen (1), M. Hafeez (1), H. Kunstmann(4), J. Liebe (1), A. Marx (4), A. Moene (5)

(1) Center for Development Research (ZEF), Bonn University, (2) Water Research Institute, Ghana, (3) International Water Management Institute, Ghana, (4) IMK-IFU, Garmisch-Partenkirchen (5) Meteorology, Wageningen University. (Contact: nick@uni-bonn.de)

In West Africa, collection of hydrological data tends to be difficult due to the limited availability of resources for scientific monitoring. Remote sensing has the potential to fill gaps in our observation networks but has inherent limits as to what variables can be measured. Similarly, model development is hampered by gaps in historical time series and by the lack of hydrological process knowledge for this specific region. The GLOWA Volta Project (GVP), a large interdisciplinary research effort sponsored by the German government, studies the impact of global change on water availability and demand in the Volta Basin. The Volta drains 400,000 km2 of the West African savanna, mainly in Ghana and Burkina Faso. By combining remotely sensed data with models and ground observations, the GVP seeks to develop a monitoring system that feeds into a basin-covering Decision Support System (DSS). Here, this combined approach is presented through the example of evapotranspiration. Other presentations will focus on rainfall and surface runoff.

Over 90 percent of the rainfall in the Volta Basin returns to the atmosphere as evapotranspiration. It is, therefore, extremely important for decision makers to know which parts of the basin use most of the water, how evapotranspiration is linked to different land covers, and to what extent this water is used productively. Different approaches exist to estimate evapotranspiration over space from satellite images and models. Al-

gorithms, such as SEBS and SEBAL, are relatively successful and are based on the assumption that at hot/dry pixels, all energy flux into the atmosphere is sensible heat and at cool/wet pixels all is latent heat. The algorithms subsequently interpolate flux between these extremes. In the Volta Basin, GVP measures sensible heat flux on the ground with scintillometers at three points along a North (dry) to South (wet) gradient of 1000 km. These direct measurements anchor the satellite based interpolations schemes. The meteorological MM5 model provides daily hindcasts for the region in an operational mode since October 2000. Recently, MM5 has been coupled to the hydrological WaSim model. Both models produce spatially distributed evapotranspiration estimates. Here, first comparison of satellite observations, ground-based flux measurements, and model outputs is presented together with assimilation results.