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1 Water balance simulations in a poorly gauged basin using different meteorological and land surface data sources

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Scientifically sound decisions in sustainable water management are usually based on hydrological modelling which can only be accomplished by meteorological driving information. Especially in regions with weak infrastructure this task is hampered by the fact that only little hydro-meteorological information is available in sufficient spatial and temporal resolution. The spatial interpolations of coarse-resolution meteorological point observations are afflicted with uncertainties, particularly in case of discontinuous variables like precipitation, which are passed into the hydrological simulations.

Within the framework of the GLOWA-Volta project (http://www.glowa-volta.de) we investigated two approaches to provide and analyse the required meteorological fields driving the distributed hydrological model. First, joint meteorological-hydrological simulations were performed using the mesoscale meteorological model MM5 to dynamically downscale global atmospheric fields and pass the required variables to the hydrological model. Second, different spatial interpolation techniques were applied for the calculation of areal precipitation. The results are compared and analyzed including estimation errors. For both approaches the results of the hydrological simulations driven by these meteorological fields are investigated to estimate the propagating effect on water balance estimations.

Beside of missing meteorological driving data, also gridded information on land surface properties usually is difficult to obtain, albeit it is an essential input for distributed hydrological models (albedo, LAI, etc.). This information is usually taken from tables depending on land use. Satellite remote sensing provides worldwide spatially detailed information on land surface properties which is especially for large and difficult accessible regions a very important source of information. The differences between a) satellite derived land surface data and b) tabular data driven hydrological model results will be shown.

Research area is the White Volta catchment (100 000 km^2) in the semi-arid environment in West Africa for which basin-wide water balance estimations are a basic requirement for sustainable water management decisions.