Geophysical Research Abstracts, Vol. 7, 04627, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04627

A methodology for modelling the spatially distributed seasonal water balance in the Danube River basin

H. Kling, H.P. Nachtnebel, J. Fürst

Institute of Water Management, Hydrology and Hydraulic Engineering, BOKU, Vienna, Austria (harald.kling@boku.ac.at)

A methodology was developed for spatially distributed water balance modelling in the Danube River basin. The methodology was developed within the project "Water balance of the Danube River basin" which was executed in the framework of the UNESCO IHP programme and funded by the Austrian Academy of Sciences. Considering the limited availability of data in the various Danubian countries, it was necessary to develop a water balance model which requires only monthly data of precipitation and temperature in order to achieve consistent results for the whole basin. Observed monthly runoff data is used to calibrate the model. The model uses a conceptual, spatially distributed approach, similar to the HBV model, with a spatial resolution of a 1x1 km grid and a temporal resolution of monthly time-steps. The model uses spatially distributed input of precipitation and temperature. Temperature is regionalized with elevation with a three layer regression model in order to consider large scale temperature inversions. Precipitation data are processed by a Slovakian institution to provide consistent spatially distributed precipitation inputs for the whole Danube basin. A method was developed to adjust the precipitation inputs within reasonable limits. The adjustment is based on a comparison of precipitation, observed runoff-depth and potential evapotranspiration. Such an adjustment of precipitation is important for mountainous regions where the spatial distribution of precipitation includes a lot of uncertainty. To estimate parameters of the water balance model spatial datasets like the DEM Hydro1k or the USGS land-cover dataset are available. The parameters are calibrated with a regional calibration procedure in order to ensure homogeneous spatial distributions of parameters and consequently also of water balance components. The water balance model was applied for the whole of Austria (84000 km^2) for a 30 year period (1961 to 1990) and performed well in both mountainous and low-land regions. The

output of the model is the basis for seasonal maps of the water balance components precipitation, runoff-depth, actual evapotranspiration and storage change. As a result of the methodology the water balance equation is fulfilled in any selected sub-area.