Objective and subjective Calibration of an atmospheric/hydrological Model System for the Odra Watershed

H.-T. Mengelkamp, H. Messal and J. Pestel

GKSS Research Center Geesthacht GmbH

Institute for Coastal Research

Max-Planck-Str. 1

D-21502 Geesthacht, Germany

mengelkamp@gkss.de

The exchange processes between the earth surface and the atmosphere are differently described in atmospheric and hydrological models. Most of the atmospheric land-surface schemes treat the canopy and root zone in great detail and explicitly calculate all components of the surface energy and water balance. Soil and vegetation characteristics are commonly defined by setting parameters from look-up tables. Hydrological models focus on the horizontal water transport and describe the interaction between surface water and groundwater in great detail but treat the surface-atmosphere interaction in a simplistic way. Commonly, hydrological models are calibrated against observed streamflow data.

A coupled atmospheric/hydrological model system for the Odra watershed is presented. Runoff generation processes are implemented into a sophisticated atmospheric land-surface model which is coupled to a horizontal routing scheme. The horizontal water transport inside a model grid cell is described by a unit hydrograph approach and the transport along the river channel system through a kinematic wave. Parameters objectively calibrated for the period 1992 – 1994 control the evaporation, runoff generation, and the horizontal water transport. The validation period from 1995 to 1999 includes a major flooding event in 1997. Firstly, the model failed for the flooding event, but after subjectively adapting some parameters for the horizontal as well as the vertical water transport the flood wave could be simulated through the whole river channel system with reasonable accuracy.

Two test cases are considered. Firstly atmospheric variables from the mesoscale model MM5 are used to run the land-surface/routing scheme system, and secondly, runoff from MM5 is directly used as input to the routing scheme.