Geophysical Research Abstracts
Vol. 16, EGU2014-5329-1, 2014
EGU General Assembly 2014

Seasonal snowmelt modelling for the Sieber catchment (Harz Mountains, Germany) by means of WRF-downscaled analysis data including different process parameterizations for microphysics and snowmelt

Kristian Förster (1,2), Günter Meon (1), and Ulrich Strasser (2)

(1) Department of Hydrology, Water Management and Water Protection, Leichtweiss Institute for Hydraulic Engineering and Water Resources, University of Braunschweig, Germany, (2) Institute of Geography, University of Innsbruck, Austria (Kristian.Foerster@uibk.ac.at)

Physically based snowmelt modelling at the catchment scale requires adequate strategies to derive basin scale meteorological data fields. These meteorological data fields must fulfil two major requirements for distributed hydrological modelling with a focus on snowmelt and flood prediction: (i) high spatial and temporal resolution, and (ii) all surface variables including precipitation, temperature, humidity, wind speed, and radiation have to be physically consistent in space and time. Local atmospheric models using atmospheric (re-) analysis data meet these prerequisites. We use the Weather Research and Forecast Model (WRF) and NCEP analysis data to derive hourly meteorological data fields of surface meteorological variables with a spatial resolution of 1.1 km for the Sieber catchment (44 km^2) in the Harz Mountains, Germany. At first, the performance of several model runs including three different downscaling approaches and four different microphysics parameterizations is evaluated for the winter season 2005/06 using observations from the station network. Then we carry out the hydrological simulations with the hydrological modelling system PANTA RHEI including four independent snowmelt parameterizations. The passively coupled modelling system consisting of WRF and PANTA RHEI performed well ($r > 0.8$) which holds also for an independent validation period. In conclusion it can be stated that local atmospheric models are suitable tools to provide boundary conditions respectively meteorological data fields for snowmelt modelling at the catchment scale. The presented approach can also be useful for water management in ungauged basins.