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Application of SnowModel in a large, semiarid watershed in Inner Mongolia

F.K. Barthold (1), Mazurkiewicz, A. (2), J. Wu (1,3), L. Breuer (1), K.B. Vaché (1), H.G. Frede (1)

(1) Institute for Landscape Ecology and Resources Management, Justus-Liebig-University of Giessen, Germany, (2) Water and Operations Group, Hetch Hetchy Water and Power, City of San Francisco, USA, (3) Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Science, Lanzhou, China
(frauke.barthold@umwelt.uni-giessen.de / Phone: +49-641-9937394)

Streamflow generation processes in the Inner Mongolian grassland steppe are poorly understood. Long-term discharge data and a lumped perceptual model of the Xilin river catchment suggest that snowmelt is an important water source on an annual timescale. Since the basin is poorly gauged, and inaccessible during the winter months, one approach to learn about snowmelt processes and their contribution to stream flow is to simulate snow accumulation, blowing snow redistribution, sublimation, and melt. In this study we use climatic, topographic and land use data for application of the SnowModel by Liston and Elder (2006, J. Hydromet., 7 (6), 1259-1276) in order to predict the snowmelt contribution to stream discharge. SnowModel is a spatially distributed snow-evolution model specifically designed for applicability over a wide range of landscapes, climates and conditions. Since it was originally developed and tested for non-forested conditions, and accounts for snow distribution by wind, SnowModel provides a suite of model algorithms which should capture the snowmelt dynamics dominating the runoff response in the grassland ecosystem of the Xilin river catchment.