Geophysical Research Abstracts, Vol. 8, 04889, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04889

Sensitivity of simulated snow water equivalent and snowmelt runoff to spatial forest representation

M. Stähli (1), D. Gustafsson (2), M. Hardmeier (1), P. Schleppi (1)

(1) Swiss Federal Research Institute WSL, Birmensdorf, Switzerland, (2) KTH, Stockholm, Sweden

(manfred.staehli@wsl.ch / Phone: +41-44 739 2472)

In semi-forested subalpine areas, where a considerable fraction of annual precipitation falls as snow, the representation of forest in numerical hydro-meteorological models is crucial. Forest not only intercepts a part of the snow by its canopy, it also modifies the timing of snowmelt and runoff compared to open areas due to an altered radiation balance below the canopy. Distributed hydro-meteorological models typically have to work with simple spatial information on forest extent and canopy density, although the nature of subalpine forests is very heterogeneous. With this presentation we address the question of how much uncertainty that is introduced in the simulation of snow water equivalent (SWE) and catchment runoff by using simplified forest input fields.

Simulations with a distributed hydro-meteorological model (Alpine3D) are presented for three subalpine catchments of approximately 1 km^2 area located in central Switzerland. The model performance of three winter seasons was evaluated in terms of Taylor-plots, a comprehensive method combining multiple aspects of model performance with regard to several validation variables into one diagram. We found that a detailed forest map derived from a Landsat TM-scene and ground-based hemispherical photographs significantly improved SWE- and snowmelt runoff simulation compared to a traditional forest extent map based on the Swiss Inventory of Spatial Statistics. Disregarding the forest at all in the simulation resulted in an overestimation of accumulated snowmelt runoff by 10 to 15%.