Geophysical Research Abstracts, Vol. 8, 09432, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09432

Real time runoff forecasts in mountain basins using remote sensing data

T. Nagler, H. Rott, P. Malcher, and F. Müller

ENVEO IT GmbH, Technikerstr. 21a, A-6020 Innsbruck, AUSTRIA (email: thomas.nagler@enveo.at, fax: +43 512 50748 30)

Applications of satellite images from optical and SAR sensors for forecasting the daily runoff in alpine basins are presented. A modified version of the semi-distributed Snowmelt Runoff Model of Martinec and Rango is applied, which requires as input hydro-meteorological data from stations and numerical weather forecasting models, as well as spatially detailed snow information. Because of the large spatial variability of extent and depth of the snow pack in mountain regions, satellite based remote sensing methods are particularly suitable for providing snow cover information. For the use in the runoff model the snow information is spatially aggregated at the scale of hydrological response units. Temporal interpolation of snow information for days without satellite observations is carried out by means of a snow depletion model. For real time runoff forecasting data links were established to receive on-line data of meteorological stations and river gauges, and numerical weather forecasts. Snow cover input was derived from Terra MODIS and Envisat ASAR images, received via Internet with a typical time delay of one day. Real time forecasts of daily runoff for 1- to 7-day in advance were carried out in spring 2005 for several drainage basins in Ötztal and Zillertal, located in the Eastern Alps of Austria. The size of the watersheds ranges from 120 km^2 and 760 km^2 in area, the elevation from 800 m and 3700 m above sea level. The land cover is made up mainly by forests and meadows at elevations below 2000 m, and low alpine vegetation, bare surfaces and glaciers above. The forecasts were made available to the public or specific users at WWW pages. The retrospective validation revealed good agreement of the forecasts. The comparison of predicted and measured runoff for five day forecasts, for example, shows a Nash-Sutcliff coefficient of 0.9. Precipitation forecasts have been identified as the main error source for the runoff predictions.