Geophysical Research Abstracts, Vol. 9, 08129, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08129

Improvement of remotely sensed snow cover monitoring in semi-arid High Atlas mountains and its assimilation in a distributed hydrological model

Duchemin B. (1), Leroux J. (1), **Boulet G.** (1), Maisongrande P. (1), Boudhar A. (2), Hanich L. (1), Chaponnière A. (1), Chehbouni A.G. (2)

(1) CESBIO, 18 Av. Edouard Belin, bpi 2801, 31401 Toulouse cedex 9 (2) CESBIO, 18 Av. Edouar Belin BPI 280 Toulouse cedex 4, France

The sustainable management of water resources worldwide is one of the most important challenges of the 21st century. In the Tensift-Haouz plain, located in central Morocco and characterized by a semi-arid climate, 85% of available water is used for agriculture. Precipitation, which is concentrated over the High-Atlas mountain range, falls in a significant proportion as snow leading to storage until the snowmelt period and a significant contribution to baseflow in the summer. The monitoring of snow cover is consequently fundamental to quantify the water equivalent volume in space and time.

Remote sensing data through space-borne optical sensors are particularly adapted to wide mountain regions with few ground stations and a strong spatio-temporal variability of the snowpack. In this context, we developed a method to monitor the proportion of snowy areas using in conjunction a data set of high resolution images (SPOT and Landsat) and time series of daily low-resolution images. The performance of various snow indices derived from both MODIS and VEGETATION blue and short-wave infrared bands are compared at different spatial scales. A new snow index normalised for both soil and directional effects results in errors of about 4% when degrading the spatial resolution to 9km.

This method was used to monitor the dynamics of areas covered by snow for two successive which display high contrast in the distribution and amount of precipitation. Finally, the time courses of the snow cover at different elevation were integrated into the hydrological Snowmelt Runoff Model (SRM) to simulate the streamflow of one of

the main High-Atlas watershed. Some parameterisations of the model were adapted to this area where the snowpack shows a strong variability in space and time. Finally, the study also allowed to quantify the gain of using remote sensing estimates of snowy areas in the hydrological response of this semi-arid catchment.