



## **Distributed modeling of snow cover mass and energy balance in the Rheraya watershed (High Atlas, Morocco)**

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The mountains of the High Moroccan Atlas represent an important source of water for the neighboring arid plains. Despite the importance of snow in the regional water balance, few studies were devoted to the modeling of the snow cover at the watershed scale. This type of modeling is necessary to characterize the contribution of snowmelt to water balance and understanding its sensitivity to natural and human-induced climate fluctuations.

In this study, we applied a spatially-distributed model of the snowpack evolution (SnowModel, Liston & Elder 2006) on the Rheraya watershed (225 km<sup>2</sup>) in the High Atlas in order to simulate the mass and energy balance of the snow cover and the evolution of snow depth over a full season (2008-2009). The model was forced by 6 meteorological stations.

The model was evaluated locally at the Oukaïmeden meteorological station (3230 m asl) where snow depth is recorded continuously. To evaluate the model at the watershed scale we used the daily MODIS snow cover products and a series of 15 cloud-free optical images acquired by the FORMOSAT-2 satellite at 8-m resolution from February to June 2009.

The results showed that the model is able to simulate the snow depth in the Oukaïmeden station for the 2008-2009 season, and also to simulate the spatial and temporal variation of the snow cover area in the watershed Rheraya. Based on the model output we examine the importance of the snow sublimation on the water balance at the watershed scale.