



Rainfall-Runoff modeling in a semi-arid catchment with presence of snow. The Rheraya wadi case study (Marrakech, Morocco)

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The Haouz basin, located in the Central Morocco, is composed of two parts: the Haouz plain which contains the Marrakech city in the north and the High-Atlas mountains culminating at 4165 m in the South. The High-Atlas receives more important precipitation either as rain or snow falls and encompasses the drainage basins of several intermittent streamflows (wadis) that cross the plain from south to north. This study aims to modeling the runoff of one of those wadis, the Rheraya, taking into account the snow component. For this purpose, the GR4J conceptual and global model was applied over the period 1989-2009, coupling it with the CemaNeige module for semi-distributed snow dynamics. This work allows for an improved characterization of the hydrologic regime of this watershed.

Results of the hydrologic conceptual modeling allow assessing the role of the snow melt in the hydrological functioning of the Rheraya wadi (225 km², elevations ranging between 1030 and 4165 m.a.s.l.). The daily snow coverage simulated by CemaNeige is in good agreement with that extracted from the MODIS snow product in the period 2000-2009 (R² = 0.64). In addition, the simulated daily snow water equivalent (SWE) is consistent with that measured at a weather station (2004-2006, R² = 0.81). Finally, the runoff simulation reproduces quite well the strong seasonal and inter-annual variability. However, the low Nash value obtained as compared to standards (0.45), can be link to the low quality of runoff measurements (unstable riverbed).