Geophysical Research Abstracts
Vol. 12, EGU2010-15005, 2010
EGU General Assembly 2010

Extreme flow regime in a mountainous Mediterranean basin and climate change estimated influence

Agustín Millares (1), Cristina Aguilar (2), Isabel M. Moreno (1), Javier Herrero (1), María J. Polo (2), and Miguel A. Losada (1)

(1) University of Granada, Av. del Mediterráneo s/n, 18006, Granada, Spain; email: mivalag@ugr.es, (2) University of Córdoba

Snow processes play a relevant role in the fluvial regime in Mediterranean mountainous basins, where snowmelt dynamics usually exhibits a multi-cycle behavior throughout the year due to the strong variability of seasonal and weekly daily meteorological conditions. In such climates, many rivers flow during the summer due to the water storage in the snow cover until late spring; while severe flood events occur when heavy rainfall and strong snowmelt flow interact, extreme storms in winter may result in lower peak flow values when the atmospheric conditions favor snow formation and maintenance. Thus, the fluvial regime in these basins is subject to an additional source of variability which accounts for the previous seasonal history of snowfall and snowmelt events, and their characteristics. The Guadalfeo River basin is located in Southern Spain and its Northern limit is the Sierra Nevada (3478 m). The fluvial dynamics is bound to the intermittent persistence of snow throughout the year, and its annual extreme flow regime is very sensitive to the variability of snow processes. This study quantifies the influence of the snow dynamics in the Guadalfeo River on the annual extreme flow regime, and estimates of the effects of the most probable scenarios of climate change within different time scales. For this purpose, physically-based modeling of hydrological processes in the basin has been developed, and different scenarios from the ICCP studies have been performed as forcing meteorological sequences of the basin. The results show a strong current influence of the snow dynamics, and modified extreme flow values for peak flows as well as for baseflow and subsurface flow from the decrease in snowmelt through the fractured materials of the basin.