Geophysical Research Abstracts
Vol. 15, EGU2013-10110, 2013
EGU General Assembly 2013

Changing flood magnitude and frequency in snow-melt dominated catchments: the case of the Bucegi Mountains, in the Romanian Carpathian region

Elena-Ruth Perju (1,2), Daniela Balin (1), Stuart Lane (1), and Liliana Zaharia (2)

(1) IGD-Alpine Environments, Université de Lausanne, Lausanne, Switzerland (elena-ruth.perju@unil.ch), (2) Faculty of Geography, University of Bucharest, Romania

Flooding in mountain environments is an issue of particular concern given the impacts of possible climatic changes and especially where those environments are occupied and/or used for activities like tourism. Central to understanding the flood risk in such environments is the analysis of historical data coupled with predictive modelling to understand possible changes in the hazard dimension of flood risk. Here we focus upon a little studied but important part of Eastern Europe, the Valea Cerbului, a mountainous basin, located on the eastern slope of Bucegi Mountains in the Romanian Carpathians. This study has two components. In the first, analysis of monthly and annual maximum discharges from 1961 to 2010, (daily and hourly discharges during the analyzed floods) from Buşteni hydrometric station on the Valea Cerbului river showed that rather than extreme flood events being distributed randomly in time, they tend to be clustered and not simply related to extreme rainfall events, but extreme rainfall events superimposed upon snow cover, which substantially increases the surface runoff potential. This clustering occurs inevitably at the seasonal scale (the annual maximum discharges have a maximum frequency from June to August: 19,2% of cases in June, 19,2% of cases in July, 23,1% in August, for the period 1961-2010) but also in terms of series of years when there is an elevated frequency of significant snow accumulation remaining in the basin at the time at which the probability of extreme, convective rainfall events starts to increase. In the second part of the study, we have considered how these processes might change given possible climate warming. Using a distributed, physically-based hydrological model (WaSIM-ETH) we show that under climate futures, a decrease in solid precipitation in the Winter plus the earlier onset of spring snowmelt has two important flood effects. First, it reduces the probability of a deep snow cover in the summer months, and hence the size of the maximum annual flood. Second, the floods start to occur earlier in the year, more commonly in late spring rather than summer. This kind of shift is important as it implies a need to change the way in which floods are managed to be more sensitive to extreme events in periods of the year where floods, hitherto, have been relatively rare.