

Holistic analysis of the impact of heavy precipitation events and floods in a Mediterranean Region. The Spanish project HOPE

Maria-Carmen Llasat (2), Maria Cortés (1), Montserrat Llasat Botija (1), Joan Gilabert (1), Anna del Moral (1), Raul Marcos (1), Amelia Díaz (2), Tomeu Rigo (3), Marco Turco (4), Juan Pedro Martín-Vide (5), Jordi Cunillera (3), José Gibergans (6), and Pere Quintana-Seguí (7)

(1) University of Barcelona, Faculty of Physics, Department of Astronomy and Meteorology, Barcelona, Spain (carmell@am.ub.es), (2) Water Research Institute, University of Barcelona, Spain, (3) Meteorological Service of Catalonia, Barcelona, Spain, (4) Barcelona Supercomputing Center-Centro Nacional de Supercomputación (BSC-CNS), Spain., (5) Dept. of Civil and Environmental Engineering, UPC, Barcelona Tech, Spain, (6) Dept. of Mathematics, UPC, Barcelona Tech, Spain., (7) Ebro Observatory (University Ramon Llull-CSIC) Roquetes, Spain

On average, floods are the most important natural hazard in the world. Their mitigation and adaptation to the impact that climate change has on them is a priority in most government agendas. Recent reports from the IPCC (2012, 2014) still show significant uncertainty associated with the future development of precipitation extremes and floods. Uncertainty is still higher when we consider the interaction with society and the changes in vulnerability. As a consequence, there is now a call to treat flooding from a holistic perspective that integrates bottom-up (from impact and vulnerability) and top-down (from hazard) approaches in the same methodology. The objective of the Spanish Project HOPE (CGL2014-52571-R) is the integration of both approaches in order to improve the estimates of the present and future impacts of floods in the Eastern of the Iberian Peninsula and also for designing proposals for improving the resilience and adaptation strategies. In a first phase, the project has systematically collected hydrometeorological and socioeconomic information associated to floods recorded between 1981 and 2015 and any other important flood event recorded previously, in different areas of interest and pilot basins, and has identified the needs and priorities of the stakeholders. In this regard, the project continues the work already started, for some basins, within the HyMeX project (Llasat et al, 2013). Second, the bottom-up approach has provided a space-temporal analysis of the development of socio-economic indicators and thresholds of tolerance. This will also involve the selection of case studies to be analyzed in greater depth, including population response and the alerts chain. Third, the top-down perspective will focus on the statistical analysis of precipitation series in the selected watersheds, the establishment of distribution laws and the definition of precipitation and flow thresholds associated to different types of flood events and weather types. Future scenarios will be constructed using the results of the MEDCORDEX. They will be analysed from a meteorological and hydrological point of view on the case studies and then they will subsequently be integrated with the analysis of impacts and responsiveness. Finally, a strategy to integrate the two approaches will be developed so that the uncertainties and weaknesses of each of the methodologies are minimized by enhancing their strengths. Throughout the project, public participation tools will be developed to improve resilience.

This communication will be focused in the bottom-up approach. After the presentation of the database, two different approaches are shown. The first approach compares two flash flood events that affected the same region: the 25 September 1962 and the 10 June 2000. Both of them recorded more than 200 mm in less than 3 hours, but the first one produced, directly, 815 casualties and the second one, three. The second approach is focused on the changes experienced in the Metropolitan Area of Barcelona that can affect the flood risk, along the period 1950-2010. The FLOODUP mobile application is also showed. This work is developed in the framework of the Panta Rhei IAHS action, Flood Risk Change.