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Catastrophic floods in a climate change framework in the Southeastern Pyrenees: the case of June 2013

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The objective of this contribution is to analyse floods evolution in the Southeastern Pyrenees and to compare the catastrophic flood events of 1982 and 2013. The climate change framework is provided by the analysis of the flood trends in the Pyrenean regions of Catalonia, the results showed in the Third Report of Climate Change in Catalonia and the report of the Pyrenees Climate Change Observatory. With this aim it builds upon the INUNGAMA database, the PRESSGAMA database and damage data provided by the CCS. To do the analysis of specific cases, we have also used daily precipitation data provided by rain gauge networks as well as the SAFRAN reanalysis, meteorological radar data and post-event surveys.

After doing a data quality checking, precipitation and flood trends have been obtained, and the precipitation thresholds associated to floods (mainly flash floods) have been analyzed. The study has been complemented with the database on economic damages and casualties. In order to analyze some specific events with a detailed information, we have looked for the most catastrophic flood events in the last 30 years: the cases of November 1982 and June 2013. The Val d'Aran received a 35% of the total mainly as a consequence of the 2013 floods that has been the more expensive event in the last 20 years. The flood event recorded between the 6 and 8 November 1982 has been the most extended one in the Pyrenean region in the last 60 years, with daily precipitation values above 400 mm.

Results show that between 1981 and 2015, 77 flood events have affected the Catalan Pyrenean counties. More than 100 deaths and damages above 65 M€ (1996-2015) have been produced. Although catastrophic flood events in this region can be produced by daily rainfalls near 100 mm, the median is near 200 mm in the Southern part, and 250 mm in the Northern one. Median values for extraordinary events are near 110 mm and 90 mm for the ordinary ones. Flood events in Catalonia shows a positive trend (0.79 flood events/decade) that is mainly associated to the increase of ordinary floods that seems more related with anthropic factors that natural ones. Seasonal analysis points to associate this increase to summer events. In effect, when the analysis is concentrated in the Pyrenean region a positive trend (0.4 flood events/decade) is found, being specifically relevant in the JAS season. Precipitation trends are generally non-significant and do not show any regional pattern. While the November event was produced by extended heavy precipitations, the June event was a mixture between precipitation and the fusion of snow accumulated in the previous months. The SAFRAN analysis shows that the cumulated rainfall above 50 mm, in the first event, mainly affected the NE of the Iberian Peninsula, while in the second one it was extended from the Central Pyrenees until the north coast.

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