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Floods evolution in Catalonia: trends and climatic factors

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The Mediterranean Coast of the Iberian Peninsula frequently experiences heavy rains and floods. In general, they are flash floods that affect torrential basins producing more or less damages, distinguishing between ordinary, extraordinary and catastrophic floods (Barrera et al., 2006). In turn, they may be caused by very heavy and short rainfalls, recording between 50 and 200 mm between one and three hours, or by episodes where it might accumulate over 500 mm between one and three days. The biggest problem is that such floods affect populated areas, in which the interaction between human activity (both in environment, land-use changes, vulnerability...) and flooding is very complex. In addition, some of the catchments are characterized by a non permanent regime, which prevents gauging data available.

In this context, and based on an early work on the evolution of floods in Catalonia since the 14th century (Llasat et al., 2005), the database has been updated and expanded to other Spanish basins. From there, we have analyzed the evolution of catastrophic and extraordinary floods. Anomalous periods have been also identified. To interpret the results in the light of climate variations, we have worked with the evolution of regional precipitation since 1898 (Barrera and Llasat, 2004), and in particular, with the Barcelona series (since 1780) and a derivate index that can be extrapolated to historical periods (Barrera-Escoda, 2008). For a better understanding of the meteorological factors possibly involved, 14 sea-level pressure European series available since 1780 have been used to analyze the main meteorological patterns. The study has been completed with the analysis of the evolution of the NAO estimated from proxy data (Luterbacher et al., 2002; Cook et al., 2002; Vinther et al., 2003 and Glueck y Stockon, 2001) and with the consideration of the periods characterized by major changes in solar activity.