Geophysical Research Abstracts
Vol. 21, EGU2019-16839, 2019
EGU General Assembly 2019

A new identification and classification of heavy precipitation events in the Western Mediterranean region

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The Western Mediterranean Region (WMR) is characterized by a high frequency in the occurrence of torrential rainfall episodes and floods that cause severe damages, with a very high social and economic impact. Several particularities make this region prone to extreme rains; the mild sea waters or its orography are some examples. Most cases occur in autumn, when the combination of a still warm sea surface temperature (after a peak in late summer), and a southward displacement of the jet stream (which usually favors the appearance of Atlantic lows or cut-off-lows affecting the WMR), make this season the most favourable for the development of these adverse episodes.

Here, we developed a new WMR extreme precipitation events database for the period 1980-2015. The events' detection is based on the MESCAN precipitation analysis dataset (recently available in the ECMWF MARS archive at 5.5 km) and the HYMEX flood database. Then, by applying the k-means method of cluster analysis, the identified episodes are classified into different groups based on the synoptic pattern of each event. The procedure yields a dataset consisting of the main episodes, their associated floods (if any) and the referral atmospheric circulation pattern associated with each event.

In the future, this archive could be useful in many other different studies of WMR torrential rains. For example, we plan to use this database for the study of moisture sources, trying to associate some recurrent sources to each event cluster created.