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Comparative analysis of different databases for study of the intra-annual variability of the Western Mediterranean Oscillation (WeMO)

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Previous studies have shown that the Western Mediterranean Oscillation index (WeMOi) presents a statistically significant relationship with the pluviometric totals of the eastern façade of the Iberian Peninsula. Use of the WeMOi at daily resolution has proven to constitute a useful tool for helping to predict torrential rainfall episodes in the east of the peninsula. The present research attempts to compare different data sources in order to calculate the WeMOi and to determine the most suitable database for studying the intra-annual variability in the occurrence of torrential episodes on the Mediterranean façade of the Iberian Peninsula. In order to calculate the WeMOi data on atmospheric pressure are required for two points of the WeMO dipole: San Fernando (SW Spain) and Padua (NE Italy). The different data sources we compare to construct the dipole involve the historical instrumental series and the data for 5 reanalyses at different horizontal resolutions (ERA-Interim, ERA-40, 20CR, MERRA2 and NCEP/NCAR). To evaluate and compare them we constructed several calendars, one for each database, based upon the daily averages of the WeMOi averaged for 10-day periods. These calendars enable study of the intra-annual variability of the index and allow us to delimit the most favourable time of year for the occurrence of torrential episodes. To construct the calendars we considered a study period comprising 67 years (1950-2016). The main result of our study indicates that the instrumental data and the data from the ERA-Interim reanalysis constitute the most suitable databases for studying the intra-annual variability of the WeMOi and for its application to the occurrence of torrential episodes.