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Combined extreme climate indices related to atmospheric circulation over the Mediterranean region.

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The Mediterranean is a vulnerable area to the upcoming climatic change, due to that the air temperature is projected to rise while the precipitation is likely to decrease in mid-latitude dry regions over the 21st century, according to the latest report of IPCC. Consequently, the potential climate change will significantly affect the densely populated coastal areas and the Mediterranean ecosystems.
The objective of this study is to assess and quantify the impact of the atmospheric circulation on the four combined extreme climate indices over the Mediterranean region, during the period 1950-2017. These combined extreme climate indices concern Cold/Dry (CD), Cold/Wet (CW), Warm/Dry (WD) and Warm/Wet (WW) days and they are defined by the exceedances of the joint modes of air temperature and precipitation using the 25th and 75th percentile levels in order to capture a larger number of events. Moreover, the influence of the atmospheric circulation is examined by means of the following well-known atmospheric teleconnection patterns in the wider region of Europe: the North Atlantic Oscillation (NAO), the North Sea Caspian Pattern (NCP) and the Eastern Mediterranean Pattern (EMP).
The climatological datasets used concern the high resolution gridded daily mean temperature and precipitation datasets covering the period January 1, 1950 - December 31, 2017, based on the E-OBS dataset (0.25° x 0.25°; v.17.0) from the European Climate Assessment & Dataset (ECA&D) and all the calculations have been assessed by using R-project.
The findings revealed significant patterns between the examined combined extreme climate indices and the atmospheric circulation over the Mediterranean region, during the examined period (1950-2017). This could be of high importance for better understanding and interpreting the observed variability of extreme climate in the Mediterranean.