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Detection and attribution of summer 2015's European heatwave using analogues of circulation

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Summer 2015 has been the second hottest summer in Europe after 2003. Many temperature records were broken. In particular, July 2015 was the warmest July since the beginning of measurements in the Western Mediterranean region, with monthly anomalies up to 4°C in Spain, France and Italy. We focus on this specific region and month, using the NCEP reanalysis data.
The goal of this study is to provide a detection/attribution statement on this extreme temperature event, by investigating its connection with the atmospheric circulation. We base our analysis on analogues of circulation.
Analogues are days which have similar atmospheric circulations to the days of interest. Circulation analogues can be obtained in different ways, depending on the variable used (Z500 or SLP), the domain and the reference period on which we compute them. This study explores the sensitivity of the analogues to those choices. We then compare optimal analogues to reconstruct the temperatures of July 2015.
This analysis helps disentangling the role of dynamical and thermodynamical processes, including Mediterranean SST and relative humidity. We then discuss how climate change modifies the probability of occurrence of such an event, conditional to the atmospheric circulation.