

Large scale atmospheric drivers for heat waves in the Mediterranean Basin

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West African Heat Low (WAHL) is one of the prominent dynamical components of the West African Monsoon (WAM) system playing a key role in the summer atmospheric circulation over Mediterranean as well. It is characterized by a semi-permanent low pressure system generated and maintained by surface heating over the western part of Saharan desert in summer, and a divergent flux pattern above the atmospheric boundary level. In this study we analyse the formation and occurrence of heat waves in the Mediterranean Basin connected to the WAHL regimes in combination with the subtropical anticyclone regimes over North Atlantic basin (the “Azore High”).

In this work, heat waves are defined when more than 6 consecutive days with a daily temperature above 90th percentile corresponding threshold are observed. We use 1971-2000 as reference period for thresholds calculation, based on two datasets: a) the European Climate Assessment & Dataset (ECAD/E-OBS) data; b) the Berkeley-Earth Project data; the analysis period covers March-September from 1951 to 2015 and 1951 to 2011 respectively. The WAHL index is calculated following the method proposed by Chauvin et al. (2010) and based on NCAR/NCEP Re-analysis dataset, while the Azore High pressure system regimes variability are computed as in Davis et al. (1997). We show that a statistical relationship between heat waves in Western and Central Mediterranean Basin and WAHL mechanism exists, being the latter a prominent causal factor. The relationships and causal connections between WAHL and Azores High atmospheric systems are also analysed to highlight potential implications for heat waves outlooks and early warning systems.