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Impact of the Mediterranean Sea Surface Temperatures from a Weather Regimes Classification Approach

Irene Polo (1), Albin Ullmann (2), Pascal Roucou (2), and Bernard Fontaine (2)

(1) Facultad CC Físicas, UCM, Geophysics and meteorology, Madrid, Spain (ipolo@fis.ucm.es), (2) Centre de Recherches de Climatologie, UMR 5210 CNRS, 6 Bd Gabriel, Bât. Gabriel, Université de Bourgogne, 21000 Dijon, France.

Weather Regimes (WR) have been defined over the Euro-Mediterranean region [60W-60E; 15N-70N] from May to October season using the daily Sea Level Pressure, 700 hPa geopotential height and specific humidity from ERA-interim dataset over the period 1989-2008. Computations are based on a neural network classification technique referred to as Self Organizing Maps and the WR produced can be used by the community for comparison with other periods, projection onto model outputs, seasonal prediction, or teleconnection studies.
This work particularly examines the relationship between Mediterranean Sea Surface Temperatures and West African rainfall through the WR classification. Our results suggest that changes in particular WR frequencies associated with anomalous Mediterranean SST can account for part of interannual rainfall variability.
Thus during anomalous wet (dry) years in West Africa, both higher frequencies of occurrence of WR related to negative (positive) summer NAO-like pattern and less frequent WR related to positive (negative) summer NAO-like pattern are attested in July and August (hereafter SN- and SN+). This is associated with a zonal symmetric pattern, consistent along the middle troposphere, i.e. a low pressure anomaly centered over 50N-20W and Eurasia (Greenland) and a high pressure anomaly centered over Iceland (central Europe) for SN- (SN+) WR. Another striking characteristic of SN- (SN+) WR is southeastward (southwestward) surface anomalous winds flowing from (to) the Atlantic ocean at 20N and therefore able to enhance (weaken) wet convection. Sea Surface Temperature associated with SN- WR shows a warming of the Mediterranean in July and the opposite with SN+ WR in August, suggesting that temperature anomalies could be a precursor in the change of frequency of SN- and SN+ WR and therefore impacts on WA rainfall.