



Links between West African monsoon variability and summer anomalies in the western Mediterranean

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During the boreal summer, shifts of the West African monsoon (WAM) are partly related to the anomalous warming of the sea surface in the Guinea Gulf. Fluctuations of the WAM produce significant changes of the regional atmospheric circulation which affects rainfall, moisture, temperature and wind, as far north as the central part of the Sahara desert. The monsoon teleconnects the Guinean coastal region and the Sahel through the combination of different mechanisms and processes like: evaporation, atmospheric moisture content and its convergence with release of latent heat; as well as land/sea temperature gradient, latitudinal shift of the inter-tropical convergence zone, modified flux convergence, anomalous rising/subsidence patterns.

Through statistical analysis of global NCEP/NCAR reanalysis and GPCP rainfall data, we find a good correlation between the WAM intensity and summer air temperature in the Mediterranean region. A strong WAM intensifies the Hadley meridional circulation, with a strengthening of the north Atlantic anticyclone and a blocking of the westerly flow in the Mediterranean. A deeper inland penetrating WAM produces a northern shift of the Libyan high, with subsidence and anticyclonic flow affecting mainly the West Mediterranean. A positive feedback comes from the East Mediterranean high which is the result of the effects of the Asian monsoon: the north easterly flow Etesian crosses the Sahara desert therefore intensifying the intertropical front and favouring the monsoonal precipitation.