Geophysical Research Abstracts
Vol. 19, EGU2017-18413, 2017
EGU General Assembly 2017

The role of North Atlantic in modulating Mediterranean teleconnection with the Sahel

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Sea surface temperature (SST) is the key variable when addressing Sahelian rainfall variability, in turn playing a crucial role in predictability. In this way, the multidecadal variability in the North Atlantic has been shown to strongly influence the West African Monsoon. On the one hand, interhemispheric SST gradients determine the location of the rain belt within West Africa. On the other hand, the anthropogenic-related warming component in the Mediterranean Sea has been linked to the recovery trend of rainfall in the Sahel after the severe drought experienced from the early 1970s to the 1990s. Moreover, at interannual timescales, the teleconnections from several oceanic regions well-known for impacting the Sahel seems to be non-stationary on time. In this context, beyond the tropical ocean basins, the Mediterranean is playing an outstanding role. The impact of a warm Mediterranean on the Sahel is explained in terms of enhanced low-level moisture transport across the Sahara to the south, feeding converge in the Sahel with the associated increase in rainfall. Starting from an observational analysis, we conduct a set of sensitivity experiments to show how the teleconnection between the Mediteranean and the Sahel is enhanced under a warming scenario in the North Atlantic. In this framework we propose a mechanism by which a warm North Atlantic SST background in turn causes a strengthening of the Saharan heat low due to the combination of low-level moisture inflow from both the subtropical North Atlantic and the Mediterranean. Under these conditions, rainfall in the Sahel is increased from the improved flux convergence.