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West African monsoon teleconnection with ENSO: the response of a coupled AOGCM to various sensitivity experiments

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The West African monsoon teleconnection with El Niño and the Southern Oscillation (ENSO) is scrutinized both in the available reanalysis products and in a set of coupled simulations with the Météo-France CNRM-CM3 Atmosphere-Ocean General Circulation Model (AOGCM).

A new approach is used to reproduce the observed variability in coupled simulations. The method is based on the use of a reanalyzed wind-stress to drive the ocean, while keeping all other fluxes fully coupled. It is shown that forcing the wind-stress is enough to reproduce the observed 1960-2001 ENSO timing, so that it enables year-to-year comparisons between coupled simulations and observations.

In this presentation, we analyze the teleconnection between Sahelian rainfall and equatorial Pacific SSTs using composites. It is shown that for the 1951-2002 period, Sahelian droughts generally occur during the onset (rather than the decay) of ENSO events. Thus, the teleconnection cannot happen via the “atmospheric bridge” that impacts northern tropical Atlantic SSTs (and the marine ITCZ above) a few months after the ENSO peak. On the contrary, in our coupled model the ENSO teleconnection is quite strong and happens mainly during the decay of ENSO events. It involves a warming of the whole tropical troposphere during the mature phase of the ENSO, leading to an unrealistic warming of all the tropical oceans in the summer following the ENSO peak. It is shown that our wind-stress forcing method improves some aspects of the modeled ENSO teleconnection, but due to some delay in the onset of ENSO events, the teleconnection still happens during the decay phase.