



The Atmospheric Dynamics of the West African Monsoon Onset and its Ocean Counterpart

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Precipitation in the Sahel is produced by one rainy season during the northern summer monsoon over West Africa. The onset of these rains, linked to the northward migration of the Inter-Tropical Convergence Zone (ITCZ), is an important parameter for a large community of users like meteorologists, farmers, water resources managers... By using combined daily rainfall and OLR data on the period 1968-2002, we show that this migration is characterized by an abrupt latitudinal shift of the ITCZ in late June from a quasi-stationary location at 5N in May-June to another quasi-stationary location at 10N in July-August. A composite analysis based on NCEP reanalyses shows that this northward shift is associated with an enhanced Saharan heat low dynamics, increasing inland zonal moisture advection. By using TMI SST data over the 1998-2003 period, we investigate the SST changes around the monsoon onset. These changes show a meridional SST dipole over the Atlantic favourable to the northward shift of the ITCZ. We analyse this SST response in an oceanic general circulation model through a mixed layer heat budget by using the OPA/ORCA model of LODYC/IPSL forced by ERS-ECMWF based bulk formula over the 1992-2000 period. The analysis of the mechanisms of mixed layer temperature change around the onset shows a significant contribution of both atmospheric and oceanic forcings. Each physical process at play (e.g. upwelling, horizontal transport, latent heat flux, etc....) is discussed in terms of positive or negative feedbacks on the northward migration of the ITCZ.