Geophysical Research Abstracts
Vol. 19, EGU2017-8913, 2017
EGU General Assembly 2017

Role of Air-Sea-Land Interactions in the Tropical Atlantic Seasonal Cycle

Lander R. Crespo (1,2), Noel Keenlyside (1,2), Shunya Koseki (1,2)

(1) University of Bergen, Geophysical Institute, Norway (lander.crespo@gfi.uib.no), (2) Bjerknes Centre for Climate Research, Bergen, Norway

The state-of the art models poorly represent the seasonal cycle in the tropical Atlantic, to a large extent due to the lack of understanding of the ocean-atmosphere and land-atmosphere couplings. In this study, we investigate the role of equatorial SST and land surface processes in driving the seasonal cycle of the atmosphere in the tropical Atlantic basin. We run two sensitivity experiments for the historical period 1982-2013 using the atmospheric general circulation model CAM4 in the 1.25°x0.9° resolution configuration forced with an observed climatological SST and a time-independent SST, to understand the impact of the seasonal cycle of the SST in the atmosphere. Comparing the two runs for surface winds and precipitation shows the relevance of the seasonal cycle of the SST in driving the atmosphere. In addition, we use a Maximum Covariance Analysis (MCA) statistical technique to isolate and quantify the separate contributions of ocean- and land-processes to the variability of the atmosphere. The leading modes show that the land is the main driver of the monsoonal precipitation over west Africa, but the ocean variability also plays a role contributing to the northward shift of the ITCZ. The covariability patterns also show that the SST seasonal variability controls the low-level wind circulation over equatorial western Atlantic with less than 10% of the variance explained without the seasonal cycle in the SST. Our results suggest that the land-processes play a major role during the monsoonal season but the ocean-processes also play a significant role in determining the seasonal cycle of the atmosphere in the eastern tropical Atlantic; for instance, explaining around 30% of the variance of the precipitation.