



Role of air-sea interactions in the onset of coastal rainfall in the Gulf of Guinea

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It has been clearly established that the Gulf of Guinea has a significant influence on the onset of the West African monsoon. In particular, a link has been observed between the equatorial upwelling and the onset of the rainfall season on the coastal region. The development of this upwelling generates a sea surface temperature (SST) gradient between the equator and 1°N, which seems to enhance the local convective activity. As a result, this SST front appears to be a key zone for air-sea interactions in the eastern equatorial Atlantic. A study of this region is needed in order to understand its impact on the humidity transport towards the African coast.

The satellite measurements and ECMWF ERA-Interim reanalyses are used to describe the atmosphere and the sea surface in the Gulf of Guinea during boreal spring from 2000 to 2009. The study domain ranges from 10°W to 6°E in longitude, and 8°S to 8°N in latitude to be able to link the atmospheric events above the ocean to rainfall on the coast. Composites are computed to analyse the temporal and spatial variations of SST, wind speed and humidity in surface, as well as in altitude. A clear transition in temperature and humidity is observed when the wind strengthens between the equator and 5°N at the end of May.

In the same way, linear regressions are performed to investigate the horizontal and vertical processes, which enhance convective activity and precipitation on the coast. Results seem to suggest a link between the coastal rainfall, and the wind bursts induced by the Santa Helena anticyclone, the wind strengthening crossing the SST front and the humidity increase within the entire atmospheric column at the north of the equator.