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Intraseasonal variability of the ocean – atmosphere coupling in the Gulf of Guinea during boreal spring and summer

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Statistical analyses of the satellite TMI Sea Surface Temperature (SST) and QuikSCAT surface winds in boreal spring and summer are performed to investigate the intraseasonal variability of air-sea interactions in the Gulf of Guinea. EOF decompositions show the existence of peaks around 15 days in their variance spectrum, and their lagged cross-correlation shows the signature of a negative feedback. Lagged linear regressions are performed onto an SST index of the equatorial cold tongue. A cold SST anomaly is forced after about one week by stronger-than-usual southeasterlies linked to the Santa Helena anticyclone, suggesting that the bi-weekly variability is connected to large-scale fluctuations in the South Atlantic. Between about 5°S – 5°N, the SST feedback mechanism described by Wallace, Mitchell and Deser (1989) in the eastern Pacific appears to strongly dominate near-surface atmosphere conditions. When the wind leads the SST, this mechanism explains the stronger monsoonal winds north of 2°N, which bring more humidity and rainfall toward the continent. When the SST leads the wind, it explains the reversal of anomalous winds within about one week and a large part of the bi-weekly variability. Importantly, there is no evidence of the SST influence on local winds through horizontal pressure gradient, as in Lindzen and Nigam (1987). At last, further investigations with an ocean model emphasize the role of horizontal advection in shaping the intraseasonal SST signals. Hence the time-evolution of the wind intraseasonal response to the SST is strongly tight to horizontal ocean dynamics.