

## Off-equatorial influences on equatorial Atlantic variability

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Interannual-to-decadal variability in the tropical Atlantic is dominated by two modes of variability. The zonal mode governs in the equatorial Atlantic and is thought to rely on dynamics akin to El Niño-Southern Oscillation (ENSO). The meridional mode, on the other hand, involves sea-surface temperature (SST) anomalies in the northern and southern tropical Atlantic centered at 15°N and 15°S, respectively.

In the present study we use the NCEP reanalysis, OFES hindcast, and CSIRO Mk 3.5 coupled GCM to reexamine the dynamics governing the zonal mode. We find that equatorial wind stress forcing and ENSO-like dynamics can explain some of the observed warm events but not all of them. In particular there are warm events that occur despite easterly surface wind anomalies in the preceding months. This is due to sub-surface warm waters being advected from approximately 5°N toward the equator. The sub-surface warming is ultimately related to SST anomalies in the northern tropical Atlantic, which induce wind stress curl anomalies that force downwelling just north of the equator. This suggests a mechanism by which off-equatorial ocean conditions can influence the zonal mode of variability and poses an additional challenge to skillful predictions in the region.

Keywords: tropical Atlantic, equatorial Atlantic, zonal mode, meridional mode, meridional advection