On the predictability of tropical Atlantic surface winds

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The potential predictability of tropical Atlantic surface winds is examined in a set of AMIP-like experiments with the SINTEX-F coupled general circulation model (GCM). In the control experiment, sea-surface temperatures (SSTs) are strongly restored to observed values for the period 1982-2014. In the sensitivity tests, SSTs are restored to climatological rather than observed values in selected regions including the global oceans, the equatorial Atlantic (5S-5N), the southeastern tropical Atlantic (10W-20E, 20-10S), the northern tropical Atlantic (90W-20E, 5-15N), and the equatorial Pacific (10S-10N).
Observed surface zonal wind variability over the western equatorial Atlantic displays pronounced seasonality with a distinct peak in April. The SINTEX-F control simulation is able to reproduce this seasonality though the peak is delayed by one month relative to observations. The sensitivity tests suggest that, during May and June, about 80% of this variability is due to local and remote SST anomalies, while internal atmospheric processes contribute 20%. The contribution from internal variability is substantially larger in other months. Equatorial Atlantic SSTs control about 75% of the equatorial surface wind variability in June but only about 20% in boreal spring. Likewise, remote influences associated with equatorial Pacific SST anomalies contribute about 20% of equatorial Atlantic surface wind variability in spring.
The results suggest that a large portion of equatorial Atlantic wind variability in boreal spring is due to internal atmospheric processes and therefore not predictable. This may also limit the predictability of equatorial Atlantic SST variability.

Keywords: tropical Atlantic, predictability, seasonal prediction, interannual variability

