

Equatorial Atlantic interannual variability in a CGCM

*Shunya Koseki¹, Noel S Keenlyside¹

1. Geophysical Institute, University of Bergen

We have investigated the CGCM-simulated equatorial Atlantic interannual variability in sea surface temperature (SST) focusing on its dynamical and thermodynamical processes. We compare an anomaly-coupled model, with its mean state corrected to observations by prescribing the observed air-sea flux correction of climatology to a standard model with large biases in the tropical Atlantic. A benchmark simulation of the CGCM (without the anomaly coupling) overestimates the equatorial SST variability from summer to early winter and the area of high variability extends more westward compared to the observations. The Bjerknes Feedback is held in the standard simulation as observed, but the coupling between zonal wind and Atlantic SST anomalies and its seasonality is poorly represented. While the anomaly coupling somewhat underestimates the amplitude of SST interannual variability with respect to the observations, there are some improvements in seasonality and location of the SST variability. The Bjerknes Feedback loop is also ameliorated, in particular, the communication between zonal wind stress and SST anomalies shows a better seasonal march in the western basin. Additionally, the thermodynamical process for the SST variability is also well reproduced with the anomaly coupling. Lag-composite analysis elucidates that the anomaly coupling leads to a more realistic evolution in the Atlantic modes and better symmetry between the SST warm and cold SST anomalies. On the other hand, both experiments without and with the anomaly coupling fail to simulate the South Atlantic Anticyclone variability in February to April, which possibly triggers and enhances the equatorial Atlantic SST anomalies. We conclude that the anomaly coupling can improve the equatorial mechanism for the SST variability. Such improvement of the processes responsible for the variability should influence the skill of seasonal prediction.

Keywords: Equatorial Atlantic Ocean, Interannual variability, CGCM