[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-OS Ocean Sciences & Ocean Environment

[A-OS10]Atlantic climate variability, and its global impacts and predictability

convener:Ingo Richter(JAMSTEC Japan Agency for Marine-Earth Science and Technology), Noel S Keenlyside (Geophysical Institute Bergen), Carlos R Mechoso (共同), Yoshimitsu Chikamoto(Utah State University)

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The Atlantic Ocean is subject to pronounced climate variations that occur on a wide range of time scales and can be globally connected to variations in other oceans and over continents. Atlantic multi-decadal variability (AMV) associated with the Atlantic meridional overturning circulation (AMOC) has long been known to have global impacts. In particular, AMV has been linked to changes in the Indian, Asian and South American summer monsoons, and also to changes in the Pacific associated with the "global hiatus". Interannual variability in the equatorial and subtropical Atlantic has also been shown to influence global climate, including over Asia. The freshening of the North Atlantic by melting of the Greenland ice cap is expected to influence all ocean basins via atmospheric bridges. Likewise, misrepresentation of the AMOC in climate models has been associated with model biases in the entire Northern Hemisphere. This session seeks observational, modeling, and theoretical studies on the mechanisms that determine the Atlantic mean climate and variability, as well as the predictability and global impacts of such variability. We also seek studies that evaluate climate model performance in the region. Topics include atmosphere-ocean-cloud interactions in the tropical Atlantic and their remote impacts; relationships between tropical and mid/high latitude variability; air-sea interaction along the Gulf Stream and its influence on cyclones and storm track evolution; variability in the Benguela upwelling region; influence of Agulhas leakage on the South Atlantic; coupled climate models biases in the region and their impacts; AMOC and long-term climate change.

[AOS10-P02]Extratropical influences on equatorial Atlantic variability

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Prediction of equatorial Atlantic variability remains a challenge for current prediction systems and many dynamical models struggle to beat simple persistence forecasts. Since the simulation of tropical Atlantic variability in general circulation models (GCMs) is plagued by severe biases in sea-surface temperatures (SST) and other fields it has long been assumed that these biases are the reason for poor prediction skill in the basin. Here we suggest that internal atmospheric variability and its linkage to the extratropics constitutes another important cause for low prediction skill in the equatorial Atlantic.

To evaluate the role of internal atmospheric variability three experiments with the SINTEX-F GCM are performed using strong SST restoring. In the control experiment global SSTs are restored to observations for the period 1982-2014. The second experiment is similar to the control experiment but, in the tropical Atlantic (30S-30N), restores SSTs to the observed monthly climatology. In the third experiment SSTs are restored to observed climatology everywhere.

Composites of westerly wind events in the control experiment show a southward shift of the intertropical convergence zone (ITCZ) and accompanying northwesterly surface wind anomalies. They

also show pronounced sea-level pressure anomalies away from the equator that resemble those associated with the positive phase of the Arctic Oscillation, including high pressure over the subtropical and northern Atlantic and low pressure over the Arctic. These patterns are reproduced remarkably well in the experiment with climatological tropical Atlantic SST and even in the experiment with climatological SST everywhere. The results suggest that westerly wind events in the equatorial Atlantic are part of large-scale atmospheric variability patterns that do not rely on SST anomalies. Coupled feedbacks in the equatorial region are necessary, however, to reproduce the observed strength of wind events. The role of midlatitude influences in other basins will be discussed.