[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-P03]Prediction and projection with anomaly coupling

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Keywords:Seasonal prediction, Climate projection, Anomaly coupling

Current state-of-the-art models exhibit large climatological errors in the tropical Atlantic. Such unfavourable errors degrade the skill of climate predictions and introduce uncertainty in climate projections. Here we investigate (1) seasonal predictions and (2) climate projections with a standard and an anomaly coupled configurations of the Norwegian Climate Prediction Model (NorCPM). Correcting momentum and SST fields exchanged between oceanic and atmospheric models significantly reduces the climatological errors in the anomaly-coupled version. The mechanisms for equatorial Atlantic variability are better represented, but the variability is reduced in strength. This enhances the ability of the model to assimilate ocean observations in this region. A set of seasonal predictions with both standard and anomaly-coupled models indicates that together this leads to a significant improvement in the skill in predicting the Atlantic Niño mode.

Regarding climate projection, the standard model shows a rather uniform warming of around 2.5 degrees Celsius over the equatorial Atlantic. In contrast, the corrected model shows greater warming in the east, reaching 3 degrees Celsius in the eastern equatorial Atlantic. These changes are reflected in quite

different rainfall response patterns. The standard model shows that climate change will lead to wetter conditions over central Africa and the western Atlantic, and drier conditions over eastern equatorial South America and the south equatorial Atlantic. The corrected model, in contrast, shows greater rainfall changes in the east and over central Africa, and less drying over South America. The underlying mechanisms will be discussed. This result illustrates the potential impact of mean state errors in future climate change in this region.