Title: 'The Atlantic Multidecadal Variability: Mechanism, Predictability, and Associated Impact on Hurricane Activity'

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Abstract: This presentation will discuss the key features associated with the Atlantic Multidecadal Variability (AMV) in both observations and a fully coupled climate model that could be used to distinguish the AMV mechanism: e.g. decadal persistence of monthly mean subpolar North Atlantic (NA) sea surface temperature (SST) and salinity (SSS) anomalies, and high coherence among subpolar NA SST/SSS and with the Atlantic Meridional Overturning Circulation (AMOC) fingerprint at low frequency. These key AMV features cannot be explained by the slab ocean model results or red noise process.

This presentation will also show that the correlation/regression between net surface heat flux and SST anomalies at low frequency are key indicators for the relative importance of oceanic vs. atmospheric forcing to SST anomalies, and the oceanic forcing has a dominant role for the low frequency subpolar NA SST anomalies associated with the AMV. The oceanic forcing is closely linked to AMOC variability, which is certainly not a white noise but a signal with enhanced low frequency variability and thus a major source for the decadal persistence in Subpolar NA SST/SSS associated with the AMV. The slow southward propagation of AMOC anomalies is crucial for the evolution and the enhanced decadal predictability of subpolar NA ocean temperature anomalies. The decadal persistence of Subpolar NA SST anomalies associated with the AMV will lead to much higher decadal prediction skill than that obtained from the slab ocean models or the fitted red noise model, so that successful decadal predictions in subpolar North Atlantic can be achieved by initializing observed ocean states in fully coupled models. The observed Atlantic major hurricane frequency exhibited pronounced multidecadal variability during the 20th century. However, the cause of this variability is still not well understood. The presentation will show that observations since the middle of the 20th century and coupled model simulation results provide new evidence for the important role of AMOC in the AMV and the multidecadal variability of Atlantic major hurricane frequency.