Low Frequency Variability in the North Atlantic-Arctic Sector

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This presentation will be focused on the low frequency variability in the North Atlantic Sector and Arctic. The Atlantic Multidecadal Variability (AMV) has been shown to have many important global and regional scale climate impacts. However, the mechanism causing the AMV is still highly debated. For example, stochastic atmospheric forcing or anthropogenic aerosols has been proposed as the key driver of the AMV. In this presentation, I will review the recent debate on the AMV mechanisms and discuss various evidence showing that ocean dynamics has played a central role in the AMV. The AMOC fingerprints and mechanisms for decadal predictability in the North Atlantic sector will also be discussed. Identifying the leading mechanism for the AMV is crucial for understanding and predicting the AMV related climate impacts.

The presentation will also highlight the impact of AMOC and associated Atlantic heat transport on the low frequency variability of both winter and summer Arctic sea ice extent (SIE). Recent analysis using long control simulations from three coupled models shows that the response of Arctic sea ice thickness to the Atlantic heat transport into the Arctic is stronger in models that have thicker climatological Arctic sea ice. Comparison of observations with CMIP5 external forced response and control simulations from coupled models suggests that the enhanced Atlantic heat transport across the Barents Sea Opening associated with internal variability has played a leading role in the observed decline in winter Barents Sea SIE over the satellite period.