

On the Usefulness of the Atlantic Multidecadal Oscillation Index for Identifying Origins of North Atlantic Sea Surface Temperature Variability

*Jing Sun^{1,2}, Mojib Latif^{1,3}, Wonsun Park¹, Taewook Park^{1,4}

1. GEOMAR Helmholtz Centre for Ocean Research Kiel, 2. Ocean University of China, 3. University of Kiel, 4. Korea Polar Research Institute

We provide, on the basis of observations and climate models, an interpretation of the Atlantic Multidecadal Oscillation (AMO) index which is widely used in studies addressing sea surface temperature (SST) variability over the North Atlantic (NA). In particular, the AMO index is often used as an index of the Atlantic Meridional Overturning Circulation (AMOC). The AMO index, defined here as the anomalous North Atlantic SST averaged over 0° - 60° N, accounts for significant SST variability over the tropical and subpolar NA. Climate models analyzed in this study suggest that the AMOC only accounts for significant SST variability over the subpolar NA. In these models, a low-pass filtered AMO index also is associated with SST variability only over the subpolar NA and tracks well multidecadal AMOC variability. SST variability over the tropical NA has previously been suggested to be largely governed by local surface wind variability, which can be amplified the wind-evaporation-SST feedback, and remote forcing by El Niño/Southern Oscillation, the leading mode of interannual variability over the tropical Pacific. The AMO index lumps together SST variability associated with different physical mechanisms, which limits the usefulness of the index to understand the origins of NA SST variability. Our results may help to reconcile seemingly competing results about the role of ocean dynamics in NA SST variability.

Keywords: Atlantic Multidecadal Oscillation/Variability, Atlantic Meridional Overturning Circulation, North Atlantic sea surface temperature

