

An Atmospheric Bridge Between the Subpolar and Tropical Atlantic Regions: A Perplexing Asymmetric Teleconnection

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The largest sea surface temperature (SST) anomalies associated with Atlantic Multidecadal Variability (AMV) occur over the Atlantic subpolar gyre, yet it is the tropical Atlantic from where the global impacts of AMV originate. Processes that communicate SST change from the subpolar Atlantic gyre to the tropical North Atlantic thus comprise a crucial mechanism of AMV. Here we use idealized model experiments to show that such communication is accomplished by an “atmospheric bridge.” Our results demonstrate an unexpected asymmetry: the atmosphere is effective in communicating cold subpolar SSTs to the north tropical Atlantic, via an immediate extratropical atmospheric circulation change that invokes slower wind-driven evaporative cooling along the Eastern Atlantic Basin and into the tropics. Warm subpolar SST anomalies do not elicit a robust tropical Atlantic response. Our results highlight a key dynamical feature of AMV for which warm and cold phases are not opposites.