Observed and simulated (CMIP5/CMIP6) winter evolution of North Atlantic atmosphere-ocean linkages

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Observations show strong multi-decadal variability of atmospheric circulation in the North Atlantic Oscillation (NAO), particularly in late winter. This late-winter low-frequency atmospheric variability appears to be too weak in the majority of climate models across a range of indices of North Atlantic (NA) large-scale atmospheric circulation, particularly for the NAO in March. One possible explanation is too-weak late-winter linkages between Atlantic multi-decadal variability (AMV) and atmospheric circulation.

Here, an analysis of the winter evolution of multiple indices of NA mid-latitude atmospheric circulation will be presented based on both re-analysis data and historical simulations of coupled climate models (CMIP5 and CMIP6). The atmospheric indices assessed will include the NAO, speed and latitude of the NA eddy driven jet.

Early results from an assessment of 34 CMIP6 models shows no a clear change from CMIP5 in terms of the representation of low-frequency late-winter atmospheric variability. To diagnose in more detail possible origins of differences between observed and simulated variability, a detailed evaluation of early- to late-winter evolution in variability of the above indices will be presented incorporating the following questions:

- Are there significant differences in the relative strength of linkages to tropical and extra-tropical SST variability across the different atmospheric indices?

- Is the observed late-winter maximum in correlations between NA atmospheric indices and North Atlantic SSTs still apparent at sub-decadal timescales?