

Testing the role of the ocean in AMV using a new CESM Large Ensemble with a slab ocean model (LENS-SOM)

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Previous studies using CMIP5 models have shown that historical forcing can explain the timing of shifts in the Atlantic Multidecadal Variability (AMV), but almost all models underestimate the magnitude of the observed AMV. Here we test the role of interactive ocean processes in the simulation of the AMV using a Large Ensemble approach with CESM in which the ocean model is replaced by a slab ocean (LENS-SOM). We find that the magnitude of AMV is larger in the LENS-SOM than in the fully coupled LENS throughout the North Atlantic. Thus the net effect of ocean processes is to damp SST in both the high latitudes and tropics in this model. We hypothesize that vertical mixing is the dominant mechanism responsible for the difference in variance between the two model configurations, and test this idea with an intermediate configuration of CESM in which the full ocean model is replaced with a 1-d version of POP.