



Pronounced differences between observed and CMIP5 simulated multidecadal climate variability in the twentieth century

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Identification and dynamical attribution of multidecadal climate undulations to either variations in external forcings or to internal sources is one of the most important topics of modern climate science, especially in conjunction with the issue of human induced global warming. Here we utilize ensembles of 20th century climate simulations to isolate forced signal and residual internal variability in a network of observed and modeled climate indices. The observed internal variability so estimated exhibits a pronounced multidecadal mode with a distinctive spatiotemporal signature, which is altogether absent in model simulations. This single mode, which has a pronounced variance over North Atlantic, but also in the rest of the Northern Hemisphere, explains a major fraction of model-data differences over the entire climate-index network considered; it may reflect either biases in the models' forced response or models' lack of requisite internal dynamics, or a combination of both. When viewed in the context of the previous work, these results argue for at least a hemispheric significance of the Atlantic Multidecadal Oscillation.