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C20C - Climate of the 20th Century: Are SST forced AGCM simulations misleading?

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It is well known that atmospheric general circulation models forced by the observed 20th century time evolving SST do not reproduce some of the observed teleconnections in the Tropical Pacific/Indian Ocean region. There have been several studies in a perfect model framework indicating that this lack of agreement may not be due merely to model biases, but is rather the manifestation of a fundamental inconsistency in the experimental design. We examine this issue in a series of experiments with CCSM3 CGCM and its AGCM component, CAM3. A century length 1990 control simulation and an 1870-2000 simulation from CMIP4/AR4 provide the target data. Ensembles of AGCM ensembles are made, forced by the SST and the associated external forcing from the CGCM simulations. Our tests for consistency include lag regression analyses, as in the earlier studies. Additionally, the atmospheric weather noise of each target simulations is inferred, and a new consistency test, that the weather noise should not be predictable from prior SST anomalies, is applied. Our results to date do not indicate fundamental inconsistencies from either set of tests.