

Variability and trends in air-sea fluxes and sea surface temperature in the CCSM4

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An examination of the realism of air-sea flux fields is a necessary part of any comprehensive assessment of coupled model skill because many of the large biases in individual component models can be traced to biases in the exchange of heat, freshwater, and momentum across the air-sea interface. Comparing with the Coordinated Ocean-ice Reference Experiments (CORE) dataset, we assess air-sea heat and freshwater fluxes in the Community Climate System Model Version 4 (CCSM4) in terms of variability and late 20th Century trends. We provide a baseline for assessment of flux variance in future CCSM versions and contribute a new metric for assessing the response of any model's planetary boundary layer scheme (PBL) to a warming SST trend. Within the CCSM4, we find that air temperature and specific humidity within the model PBL follows the sea surface conditions much more closely than is found in observations. Rather than sensible and latent heat fluxes acting as a negative feedback to SST warming, as is the case in the CORE data, the model's PBL allows for continued heating of the ocean's surface. This may have implications on the simulated atmospheric and oceanic heating trends.