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How well do CMIP coupled models represent ocean surface wind?

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Wind stress, providing momentum flux between the ocean and atmosphere, is a critical element of ocean-atmosphere interaction. A good fidelity in representing ocean surface wind is thus crucial to the simulation of climate variability and change by coupled climate models. In this study, we evaluate the time mean and seasonal cycle of ocean surface winds from CMIP3 coupled models using the QuikSCAT-based scatterometer climatology of ocean winds (SCOW) (Risien and Chelton 2008, http://cioss.coas.oregonstate.edu/scow/). We focus on the time mean and seasonal variations of vector wind velocity, wind stress, and wind stress curl. The structure of the time mean and the phase and structure of the seasonal variations are described. The magnitude of the observed and CMIP simulated seasonal variations of these quantities are compared with the spread among different CMIP models. This is used as a measure of "signal-to-noise" ratio of CMIP models to represent the seasonal wind climatology. Common bias of CMIP wind relative to the SCOW climatology is identified. The causes for the model-data discrepancy are discussed in terms of potential limitations in model physics and effect of ocean currents on wind stress. An evaluation of CMIP5 models will be performed when they become available.