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An Ocean-atmosphere Simulation for Studying Air-sea Interactions

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During the past few years the Goddard Earth Observing System (GEOS) and Massachusetts Institute of Technology (MIT) modeling groups have produced, respectively, global atmosphere-only and ocean-only simulations with km-scale grid spacing. These simulations have proved invaluable for process studies and for the development of satellite and in-situ sampling strategies. Nevertheless, a key limitation of these "nature" simulations is the lack of interactivity between the ocean and the atmosphere, which limits their usefulness for studying air-sea interactions and for designing observing missions to study these interactions. To remove this limitation, we aim to couple the km-scale GEOS atmosphere simulation to the km-scale MIT ocean simulation.

As a preliminary step towards the km-over-km objective, we will present some results from a coupled GEOS-MIT simulation, whereby we have coupled a cubed-sphere-720 ($\sim$ 1/8°) configuration of the GEOS atmosphere to a lat-lon-cap-1080 ($\sim$ 1/12°) configuration of the MIT ocean. A particular focus will be put on air-sea interactions between Sea Surface Temperature (SST) and surface winds. We discuss observed and modeled high temporal variability ($\sim$days) SST-wind cycle and a mechanism for the cycle, which is driven by SST-wind feedback, is proposed.