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Coupled ocean-atmosphere modeling on horizontally icosahedral and vertically hybrid-isentropic/isopycnic grids.

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Current efforts to close the gap between weather prediction and climate models have led to the construction of a coupled ocean-atmosphere system consisting of two high-resolution component models, operating on matching icosahedral grids and utilizing adaptive, near-isentropic/isopycnic vertical coordinates.

The two components models, FIM and HYCOM (the latter converted to an icosahedral mesh for this purpose), have been tested extensively in twice-daily global medium-range weather prediction (http://fim.noaa.gov) and in real-time ocean data assimilation (http://hycom.org), respectively. The use of matching horizontal grids, currently at resolutions of 15km, 30km and 60km, avoids coastline ambiguities and interpolation errors at the air-sea interface.

The intended purpose of the coupled model being subseasonal-to-seasonal prediction, our focus is on mid-term precipitation biases and the statistical steadiness of the atmospheric circulation (blocking frequency, Rossby wave breaking, meridional heat transport, etc.), as well as on possible causes of ocean model drift.

An attempt is made to isolate the weather model's role in modifying water mass properties and ocean circulations (including meridional overturning) by comparing coupled model results to ocean-only experiments forced by observed atmospheric boundary conditions. A multi-decadal run at 60km resolution is used to illustrate ENSO variability in the coupled system.