2000-05

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Selected results from the first decade of model spin-up are presented along with comments on the development of a high-resolution, eddy-permitting, coupled ice-ocean model, plans for future model improvements and anticipated results.

The model is configured on a rotated spherical coordinate grid, with 45 vertical levels and an effective horizontal resolution of 9 km or 1/12°. The model domain extends from 35° N in the Pacific Ocean, across the North Pole, to roughly 40° N in the Atlantic Ocean. Model bathymetry is derived primarily from the recently released International Bathymetric Chart of the Arctic Ocean (IBCAO, Jakobsson *et al.*, 2000), and the National Geophysical Data Center ETOPO5 database. Vertical layer thickness varies from five meters to 300 meters with twenty layers in the first 500 meters. The high resolution will improve simulation of eddies, surface, intermediate and deep currents, Arctic Ocean inflow and outflow, and important shelf processes such as water mass modification and halocline maintenance.

The ocean model is based on the Los Alamos National Laboratory Parallel Ocean Program, with a free surface formulation (Dukowicz and Smith, 1994), prescribed river runoff and passive and active tracer capability. In its final form, the dynamic-thermodynamic, energy conserving (Bitz *et al.*, 2000) sea-ice model will include elastic-viscous-plastic rheology (Hunke and Dukowicz, 1997), multiple thickness categories, multiple levels, brine pocket parameterization, a snow layer, and the assimilation of observed sea-ice motion and concentration.

Started from rest using merged Environmental Working Group (EWG)-Levitus ocean climatology, the model is forced with realistic daily varying atmospheric data from European Centre for Medium-Range Weather Forecasts (ECMWF) reanalyses. The ocean surface and vertical domain boundaries are restored monthly to the merged climatology. To allow interannual variability, Bering Strait flow is not prescribed and an artificial, 160 km-wide, 500 m-deep channel was created through North America to balance Pacific Ocean inflow to the Arctic Ocean. Realistic steric height differences have

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developed between the Pacific and the Arctic oceans and an average Bering Strait through-flow is approaching observed values.

Vigorous eddy fields, strong boundary and topographically steered currents, significant seasonal ice growth and decay, and complex ice structure and dynamics are already evident in the output. The ability to simulate inter-basin exchanges, thermohaline and wind driven circulation, regional and shelf processes, and Arctic Ocean inflow and outflow at an unprecedented resolution should prove exceptionally useful in climate change related studies.

A forecast version of the coupled model will transition to operational use as the U. S. Navy's Polar Ice Prediction System (PIPS) upgrade, to PIPS 3.0. PIPS 3.0 will run on a distributed, shared memory computer at the Fleet Numerical Meteorology and Oceanography Center in Monterey, California with output provided to the National Ice Center in Suitland, Maryland. It is anticipated the improved ice-ocean model will provide more accurate forecasts in the marginal ice zone, improved ice convergence-divergence and lead orientation forecasts and better predictions of upper-ocean stratification.

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