Geophysical Research Abstracts, Vol. 8, 03076, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03076

The Polar Ice Prediction System - a decade of U.S. Navy ice forecasting capability

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Ice forecasting systems, developed by the Naval Research Laboratory (NRL), have been predicting conditions in the Arctic for operational use by the U.S. Navy since the late 1980's. The Polar Ice Prediction System (PIPS 2.0) was implemented operationally at the Fleet Numerical Meteorology and Oceanography Center (FNMOC) in 1996. PIPS 2.0 is a forecast system that consists of the Hibler ice model coupled to the Bryan and Cox ocean model. PIPS 2.0 forecasts conditions in all sea-ice covered areas in the northern hemisphere (down to 30 degrees North in latitude). The horizontal grid resolution of the model is 0.28 degrees with 15 vertical levels. PIPS 2.0 model forecasts and research simulations have been generated for the period from 1992 to the present; more than a decade of results.

Since 2002, NRL has been developing and validating a new ice forecasting capability called PIPS 3.0. PIPS 3.0 will cover the same area as PIPS 2.0 but with higher resolution (9 km). The PIPS 3.0 system will use the Los Alamos ice model, CICE, containing improved methods for model thermodynamics, physics parameterizations, energy-based ridging and has the ability to predict multi-category ice thickness. The CICE model is presently being coupled to the Navy's operational global ocean model, the global Navy Coastal Ocean Model (NCOM) and to the next generation global ocean model, HYCOM. The ice-only part of PIPS 3.0 was tested first to evaluate its sensitivity to the Navy Operational Global Atmospheric System (NOGAPS) atmospheric forcing from 1999-2003. In addition, results from the coupled CICE/NCOM model will be shown.