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Providing Real-time Sea Ice Modeling Support to the U.S. Coast Guard

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The Naval Research Laboratory (NRL) supported the U.S. Coast Guard Research Development Center (RDC) through a demonstration project during the summer and autumn of 2015. Specifically, a modeling system composed of a mesoscale atmospheric model, regional sea ice model, and regional wave model were loosely coupled to provide real-time 72-hr forecasts of environmental conditions for the Beaufort/Chukchi Seas. The system components included a 2-km regional Community Ice CodE (CICE) sea ice model, 15-km Coupled Ocean Atmosphere Mesoscale Prediction System (COAMPS) atmospheric model, and a 5-km regional WAVEWATCH III wave model. The wave model utilized modeled sea ice concentration fields to incorporate the effects of sea ice on waves. The other modeling components assimilated atmosphere, ocean, and ice observations available from satellite and in situ sources. The modeling system generated daily 72-hr forecasts of synoptic weather (including visibility), ice drift, ice thickness, ice concentration and ice strength for missions within the economic exclusion zone off the coast of Alaska and a transit to the North Pole in support of the National Science Foundation GEOTRACES cruise. Model forecasts graphics were shared on a common web page with selected graphical products made available via ftp for bandwidth limited users. Model ice thickness and ice drift show very good agreement compared with Cold Regions Research and Engineering Laboratory (CRREL) Ice Mass Balance buoys. This demonstration served as a precursor to a fully coupled atmosphere-ocean-wave-ice modeling system under development. National Ice Center (NIC) analysts used these model data products (CICE and COAMPS) along with other existing model and satellite data to produce the predicted 48-hr position of the ice edge. The NIC served as a liaison with the RDC and NRL to provide feedback on the model predictions. This evaluation provides a baseline analysis of the current models for future comparison studies with the fully coupled modeling system.