U.S. NAVAL RESEARCH LABORATORY

Sea Ice Prediction

AT A GLANCE

What is it?

NRL-developed sea ice prediction systems support Navy operations near and through the ice. This includes deterministic (out to 15 days) and ensemble (out to 45 days) prediction systems.

How does it work?

The sea ice model (CICE) is coupled to an ocean model and forced with an atmospheric model. The system assimilates satellite ice concentration observations to provide forecasts of expected ice conditions in both hemispheres.

The NRL research team develops these system to assimilate new data types such as ice thickness from CryoSat-2, SMOS, and Sentinel 3A/B. New features such as the incorporation of landfast ice provide a realistic depiction of polar ice conditions.

R&D Sponsor(s)

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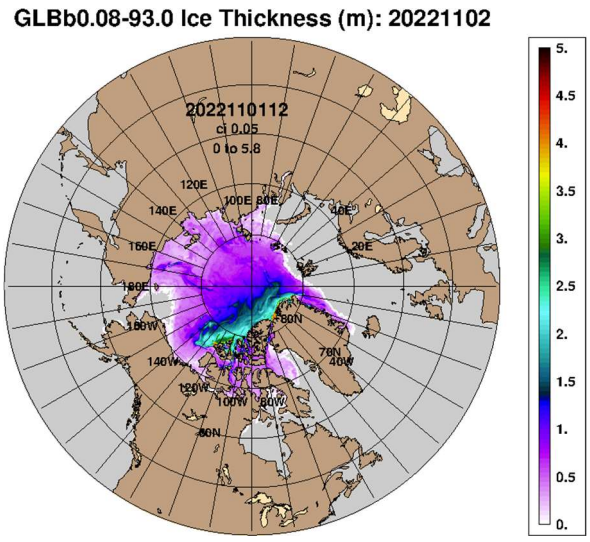

Sea ice prediction from the Navy's Global Ocean Forecast System (GOFS). The modeling system consists of the Community Ice Code (CICE) coupled to the Hybrid Coordinate Ocean Model (HYCOM) and forced with the NAVy Global Environmental Model (NAVGEM). The system assimilates satellite altimeter, sea surface temperature and sea ice concentration data. The system is run daily and produces 7-day forecasts of ice drift, ice thickness, ice concentration and lead opening rates. The graphic above depicts Arctic ice thickness (m) on November 2, 2022.

Sea Ice Prediction

Sea ice models are the sea ice component of coupled atmosphere-ice-ocean modelling systems used to provide forecast guidance on ice thickness, ice concentration, ice strength, and ice drift at horizontal resolutions ranging from 1-10 km. Sea ice models and available imagery are used by analysts at the U.S. National Ice Center (NIC) generate maritime safety of navigation products and to provide guidance to icebreakers which have the ability to transit through ice up to several meters thick. Sea ice models are used to support the biannual ICEX which occurs in the Beaufort Sea and the McMurdo Resupply in the Ross Sea (Antarctica) every February.