

BOEMRE ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

Region: National

Planning Area(s): All

Title: Improving Wind Wave Forecasting and Hindcasting: Global to Regional Scales

Conducting Organization(s): U.S. Dept. of the Navy (M09PG00019)

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Cost Range: (in thousands) \$500

Period of Performance: FY 2009-2013

Description:

Background: Several of the U.S. Federal Agencies operate wind wave prediction models either in the forecast, hindcast, simulation or analyses for a variety of mission specific purposes ranging from protection of human life and safety, to design of engineered structures, to assessment of environmental conditions, etc. In general these prediction models consist of a series of science-based routines which contains the basic principles of air-sea interaction and wave evolution, a propagation routine that moves the wave energy across the ocean, and supporting infrastructure unique to the agency missions and prediction scenario. Much of the basic science contained in the physics core is more than a decade old. A group of federal agencies including the National Weather Service, the U.S. Army Corps of Engineers, the Office of Naval Research and the Bureau of Ocean Energy Management, Regulation and Enforcement believe that sufficient research has been accomplished in the last decade to allow a significant upgrade of the models. These new routines could be tested and shared amongst the Federal Agencies, who would then embed them within the mission-specific prediction systems and produce hindcast data. The partnership of four federal agencies is formed under NOPP program to carry out the missions.

Objectives: The goals are 1) new physics packages that perform demonstrably better across a range of environments and conditions than existing packages and 2) include a seamless transition from deep to shallow water (outside the surf zone) to be included in the source and sink terms for the community of wave modelers at the end of the study.

Methods: The goal of this NOPP solicitation is support the scientists from academia, private industry and government laboratories to work in partnership with the funding agency production centers to produce a new set of source and sink terms for the Federal models including many or all of the following: wind input, breaking, nonlinear wave-wave interaction, bottom friction, wave-mud interaction, and wave-current interaction.

Given the existence of operational codes, the additions to the partnership to be funded with the NOPP funds will join with personnel drawn from the operational groups (NOAA, Navy, Army) to build a new set of source terms representing advances in understanding of the source and sink terms. These will need to be constructed in a modular manner to be retrofitted into existing models, will need to reproduce classical wave growth studies, and will have to be tested within the operational systems.

Importance to BOEM: Wind wave prediction models either in the forecast, hindcast, simulation or analyses provide information to design of engineered structures, to assessment of environmental conditions, and to protect human life and safety in the nearshore region. The improved models will advance the knowledge and support the Sand and Gravel Program and the development of fast growing hydrokinetic energy conversion devices in the coastal ocean.

Current Status: The main expectation of this NOPP project is to provide a significant improvement to operational wind wave modeling, particularly at sponsoring agencies (NOAA, BOEM, USACE and the US Navy). Some of the results of this NOPP project are finding their way into operations at NCEP. Moreover, many upgrades are already available in various research version of WAVEWATCH III at the NOAA/EMC svn server. 30 years hindcast wind and waves data from current WWIII operational model have been performed and made available to all NOPP members and sponsoring agencies. The principal scientists meet twice annually to report and to compare the results. At the mid-term review meeting, the Principal Investigators decide to publish research results on wind-wave physics in a special issue of "Ocean Modeling". The papers have been submitted and currently in review processes. It schedules to publish in late 2012.

Publications: None

Affiliated Web Sites: None

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ESPIS: Environmental Studies Program Information System

All completed ESP studies can be found here:

<http://www.boem.gov/Environmental-Stewardship/Data-and-Information-Systems.aspx>