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Operational Utilization of High Resolution Ocean Surface Wind Vectors (25km or better) in the Marine Forecasting Environment

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Long-term goals

The work proposed here seeks to exploit currently and soon to be available satellite ocean surface vector wind data in the operational weather forecasting environment. This work will build upon an ongoing effort to quantify the impacts of QuikSCAT ocean vector wind data in the operational short-term warnings and forecasts issued by the NWS Marine Prediction Center (MPC), and extends the effort to

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include the NWS Tropical Prediction Center and OCENS, Inc, a small company specializing in ocean and weather monitoring tools and services for the commercial and recreational marine users.

Objectives

This effort aims to operationally generate and distribute a gridded wind vector analysis and forecast product out of the MPC and TPC to end user participants (US Coast Guard and OCENS Inc.) who will provide feedback on the product impacts and utility. The National Environmental Satellite, Data and Information Service (NESDIS) will generate and provide a gridded wind field product utilizing all available satellite remote sensing data to the MPC and the TPC. These gridded wind field products will cover the areas of responsibility (AORs) for MPC and TPC, and will serve as the basis for the gridded wind vector analysis and forecast products generated by MPC and TPC. We also seek to investigate improvements to the currently available standard wind vector product that will yield positive impacts in its operational utilization. In particular, ambiguity removal processing and quality flagging improvements in adverse weather conditions will be studied along with the potential of retrieving higher resolution (< 25km) wind vector products. When data becomes available from the ADEOS-II satellite, launched in December 2002, we will investigate the utility of having a colocated radiometer with the scatterometer in flagging and potentially correcting rain contaminated data. Additionally, the launch of WindSat in January 2003 will represent the first polarimetric radiometer in space designed for retrieval of the ocean surface wind vector. After WindSat's calibration/validation period, the ocean vector wind data retrieved from it will be compared and integrated with the scatterometer wind vector products. Attempts will also be made to improve the spatial resolution of WindSat products where it is feasible.

Approach and work plan

The work proposed here involves exploring the benefits to operational weather forecasting of high-resolution ocean surface wind vector data through an end-to-end operational demonstration project. Existing vector wind products will be utilized, and potential new products will be investigated from current and future satellite sensors. The observations themselves will be gridded by ORA and used by forecasters at the Marine Prediction Center and the Tropical Prediction Center to regularly issue a gridded high-resolution wind analysis product over their areas of responsibilities (AORs). These gridded products will be provided operationally to the US Coast Guard for use in their Search And Rescue (SAR) mission, and to OCENS, a commercial company specializing in weather, earth and ocean monitoring services (www.ocens.com). Both the Coast Guard and OCENS will provide feedback on the utility of these data.

Specifically,

 -Investigate the potential of higher resolution, less than 25km, wind products from QuikSCAT.

 -Evaluation of benefits for having a coincident passive sensor with a scatterometer (AMSR and SeaWinds on

        ADEOSII) in wind retrieval performance and   its use as a quality control to maximize impacts in data   assimilation. Implement in near real-time if data availability permits.

-Evaluation of ocean vector wind data from WindSat and integration into operational ocean surface wind vector   product stream.

- Investigate the potential of higher resolution, less than 30km, wind products from WindSat.

-Gridded high resolution surface wind fields over MPC AORs...edited and quality

controlled by MPC forecasters as a routine product.

-Operational delivery of gridded winds by MPC to the US Coast Guard for their

Search and Rescue (SAR) mission with feedback of utility.

-Operational delivery of gridded winds by MPC to commercial ship routing company(s) with feedback of utility.

To accomplish these objectives we propose a National partnership among the following organizations. These organizations have demonstrated experience in remote sensing of the ocean surface wind vector, near real-time processing and distribution of this data, application and utilization of these data in the operational environment.

-NOAA/NESDIS/Office of Research and Application - Paul Chang

-NOAA/NWS/NCEP/Marine Prediction Center - Joseph Sienkiewicz

-NOAA/NWS/NCEP/Tropical Prediction Center - Richard Knabb

-Brigham Young University - David G. Long

-US Coast Guard

-Navy/Naval Research Laboratory - Peter Gaiser

-OCENS, Inc. - Mark Freeberg

The effort proposed here will develop an end-to-end process for the operational utilization of satellite observations, and will address the end-to-end utilization of remote-sensed ocean vector wind data. Ocean vector wind data is currently in available from NASA's QuikSCAT mission and will also be available from future satellite sensors such as WindSat, SeaWinds on ADEOSII, ASCAT on METOP, and CMIS on NPOESS.

Work Completed

Funding for this effort was obtained January 2003

Results

This effort is just getting started.

Impact and Applications

National Security

Any improvements in short-term warnings and forecasting in the marine environment would certainly benefit any Naval operations and thus National Security or Homeland Defense.

Economic Development

Commercial interests in remotely-sensed ocean surface wind vector data would seem likely and should become apparent through the activities of OCENS, Inc. in this project.

Quality of Life

Any improvements in short-term warnings and forecasts will benefit commercial and private interests in the marine environment.

Transitions

Since this project is just starting, it is too early to comment on any transitions.