OceanPredict '19
GODAE OceanView Symposium | 6-10 May 2019 Halifax, Canada
Advancing the science and application of ocean predictions

Theme 6: User Applications and Societal Benefit

Session 1: OSC, Defence and OceanBestPractices (OBP)

Abstract ID: 3617678

Swimming across the Atlantic Ocean

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Herein I present my Atlantica project to swim from Dakar Senegal to Recife Brazil, over 3000 km and 4 months. I will attempt to become the first woman to swim across the Atlantic, supervised and recognized by the World Open Water Swimming Association (WOWSA). I describe the nature, strategy and logistics needed for this swim. Moreover I will outlay the need for precise Oceanographic and Atmospheric Environmental forecasts to make strategic and operational decisions during the swim. Discussion and engagement with oceanographers and meteorologists is vital in developing strategies for the swim as well as developing an in-situ observation monitoring strategy to verify forecasts.

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Abstract ID: 3772362

So you want to swim across the Atlantic?

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In early 2020, Heidi Levasseur will attempt to be the first person to swim across the entire Atlantic Ocean. In support of this endeavour, Environment and Climate Change Canada is participating in the determination of an optimal swimming route between Senegal and Brazil. Using available data, an optimal route using Dijkstra's algorithm is presented. This algorithm minimizes the number of days required to swim across the Atlantic using available ocean velocity data and swimming speed and duration. Sensitivity to uncertainties associated with the available data and swimming speed are discussed.

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Abstract ID: 3775291

Encoding & Disseminating Hydrodynamic Model Guidance in IHO S-100 Formats

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For over 10 years, the U.S. National Ocean Service (NOS) has operated a suite of Operational Forecast Systems (OFS), 4-D hydrodynamic forecast modeling systems which integrate near-real-time operational in-situ observations along with meteorological and basin-scale oceanographic analyses and forecast guidance to generate gridded nowcasts and forecast guidance of water currents, water levels, water temperatures, and salinity for U.S. coastal waters and the Great Lakes. NOS OFS run four times per day on NOAA's Weather and Climate Operational Supercomputer System (WCOSS) to generate timely forecast guidance of ocean & lake conditions for the next 48 to 72 hours, providing critical predictions that can be used for short-term planning of marine navigation, search and rescue missions, scientific research, or ecological forecast operations. While these products are regularly used by the operational and research communities, the native output produced by these forecast systems are difficult to use in the field due to their large file sizes and complex data structures which often require post-processing for effective analysis or visualization.

Recently, the International Hydrographic Organization (IHO) has made significant progress in maturing the S-100 Universal Hydrographic Data Model, a collection of related standards for encoding and disseminating digital products and services for use by the hydrographic, maritime, and GIS communities. Included in these standards are specifications for encoding Surface Currents (S-111) and Water Levels (S-104), two of the primary output variables from NOS OFS.

In an effort to increase the practical usability of these products and promote adoption of international standards, the NOS Office of Coast Survey (OCS) has begun to extract OFS forecast guidance from its native NetCDF output files, encode it into the S-111 format (and soon S-104 as well), and disseminate the output operationally. These S-111 and S-104 products, along with other S-100 encoded products, will eventually be used to support Precision Marine Navigation.

To accomplish this, OCS has developed a modular Python toolkit to automate the conversion and dissemination process while allowing for its future extension to support additional oceanographic forecast modeling systems. OCS plans to release this codebase under an open source license to foster potential use by and collaboration with other hydrographic offices around the world.

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Abstract ID: 3676547

Canadian Armed Forces Uses of Ocean Prediction Data

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Ocean Navigator is a geospatial web service which allows users, including the Canadian Armed Forces, to easily view, analyse and access scientific ocean data gathered from various ocean data sources in a modern and intuitive map display. Presently, the data from several ocean models is available on the website, and data is downloaded and used by an Acoustic Range Prediction application. Future plans for the service include integration of data from meteorological models to complete the environmental data domain of Met, Ocean and Ice.The addition of a Foundation domain (maps and charts) and Intelligence domain (e.g. marine and air traffic) will allow for the scientific combination of data to produce intelligence based derived products (decision aids) such as acoustic range prediction, freezing spray risk maps, etc. and the future development of planning tools such as ship optimal routing.

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Abstract ID: 3775637

The Ocean Best Practice System

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The utilization of Ocean Best Practices are vital to the ocean observing enterprise and the delivery of downstream services; well-tested methodologies generate quality, fitness-for-purpose and interoperable datasets that can be incorporated into models and information products The increasing diversity of practitioners and the needs to address a broad range of ocean issues makes the creation of common methods challenging and increasingly important. Getting access to such methods or "best practices" (BP), when they exist, can take considerable effort, particularly for those that have not been mentored by current experts. To help remedy this, a global Ocean Best Practices System (OBPS; www.oceanbestpractices.org) – supported by the Intergovernmental Oceanographic Commission (IOC of UNESCO) International Oceanographic Data and Information Exchange (OBPS Host) and Global Ocean Observing System (GOOS) – has recently become operational and is helping diverse ocean communities efficiently discover, access interlink and share common methods/best practices. Far more than a static archive, the OBPS uses document tagging (based on ocean vocabularies and ontologies) to detect the key context of submitted Best Practices, using the language embedded in the document itself to enable sophisticated natural language search, the linking of Best Practices in similar areas, and the linking of Ocean Best Practices to other communities, for example to those associated with the UN Sustainable Development Goals..

One of our OBPS objectives is to leverage these capabilities to support data assimilation methods, ground truthing of models and their connection to societal applications. In this presentation, we will focus on how the OBPS may support the use of observation data in predictions, and the handling of practices leading to applications with societal impact. In particular, we will discuss how the OBPS can manage multiple, continuously evolving practices and help clarify the circumstances in which methods may become "best practices". For example, we will discuss progress with GOOS to create "recommended practices" for Essential Ocean Variables. Lastly, we will look for opportunities to further evolve the OBPS to suit needs of the modeling community and solicit feedback and collaboration. The discussions at this meeting will be inputs for the OceanObs'19 Conference.

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