**PROMOTING PRACTICAL APPLICATIONS OF HIGH-RESOLUTION ALTIMETRY MEASUREMENTS**

**Surface Water and Ocean Topography Mission***

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**Abstract**

NASA’s Applied Sciences Program is supporting a formal effort to optimize the value of upcoming NASA Earth missions to a broad user community and to society at large. The objective of the proposed Surface Water and Ocean Topography (SWOT) Applications program would be to pave the way for operational use of SWOT data products soon after the mission would launch in 2020. A wide range of existing and potential oceanography applications utilizing current altimetry data products from the Jason series and other missions would be enhanced with the introduction of high-spatial-resolution data anticipated to be gained from the proposed SWOT mission. With time series of surface water measurements anticipated to be provided by SWOT, a broad range of both ocean applications may inform coastal managers and marine operators on offshore conditions and currents relevant to their regions.

Several studies proposed to highlight the applications potential of the SWOT* mission for a broad range of users. These include 1) the development of a flood forecasting toolbox, 2) the use of remote sensing measurements to improve the understanding, monitoring and management of estuaries and deltas, and 3) the use of simulated SWOT data to assess the quality and potential value of anticipated SWOT measurements to both oceanography and hydrology applications.

Planned strategies to enhance science and practical applications of anticipated SWOT data include methods of engaging with the science community, operational users and mission planners, and the establishment of an Early Adopters Program.

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**SWOT* Science Goals**

Hydrology: First global inventory of fresh water storage and discharge on land.
Oceanography: First global determination of the ocean circulation, kinetic energy and dissipation at mesoscales and submesoscale processes.

**Science Questions Addressed by SWOT**

Hydrology: What is the spatial and temporal variability in the world’s terrestrial surface water storage and how can we predict these variations more accurately?
Oceanography: What is the small-scale (10-100 km) variability of ocean surface topography that determines the velocity of ocean currents, especially the effects of ocean current velocity on the transfers of heat, carbon dioxide and nutrients between the upper and deep ocean?

**Monitoring and Managing Estuaries and Deltas**

This proposed project will engage end users in both oceanography and hydrology application areas to demonstrate the potential use of SWOT* data to enable improved decision-making. Simulated SWOT measurements over the San Francisco Bay Estuary and the Sacramento River will be used to assess the quality and potential value added by SWOT measurements to both oceanography and hydrology applications. The simulated SWOT data will be used to develop application-oriented data sets and value-added products to engage potential end users. (Y. Chao, E. Beigley, D. Moller)

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**AirSWOT Applications Demonstration**

Multiscale data assimilation from 3DVAR uses SST from multiple satellites, SSH from HF radars, vertical profiles of T/S from three Spray gliders, Argo floats, and ships, and produces 3 km resolution coastal ocean temperature maps. Nowcast data has been provided every 6 hours from September 2015 to present, and data 72-hour forecasts are produced from 03 UTC. Images: Left: Observations; satellite SST in color, HF radar surface current in vectors. Right: 3DVAR reanalysis grid model with variable resolutions from 10 km near the Golden Gate Bridge to 10M up in the meso-

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**Flood Forecasting Toolbox**

A graphical user interface (GUI) “toolbox” is being developed that will make satellite altimetry data far more accessible and interpretable to a wide range of end users. The toolbox will use altimetry data from the OSTM/Jason-3 satellite to allow the convenient extraction of river heights from the data, and will be usable for other data sets (such as SWOT) in the future. It will have the capability for expanded use in diverse geographic regions for users and stakeholders engaged in water resources management, and will have potential value as a test bed for data from the AirSWOT instrument. The toolbox will be made available to stakeholders such as water supply managers, NGOs, water resources and planning agencies, crop modelers, ecological forecasters, the climate adaptation community, and land management agencies. An immediate application of the toolbox during the project duration will be made by the Flood Management Division of the Institute of Water Modeling-Bangladesh for extending the flood forecast lead-time to 5+ days using Jason-2 data. (F. Hossain, H. Lee)

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For more information: swot.gis.nasa.gov

*Proposed Mission - Pre-decisional - for Planning and Discussion Purposes Only

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