

Melting Ice, Rising Sea Level

Monitoring and Forecasting of the Coastal & Marine Environment

ICESat-2 Focus Session, 15-16 November, 2016

Co-hosted by

NASA Short-term Prediction Research and Transition Center

Background

In 2007, the National Research Council released the first Decadal Survey for Earth Science. The Decadal Survey provided consensus recommendations on research directions and activities of national importance for the next decade and identified development of applications of satellite data as a priority for all future space-borne missions. NASA's Applied Sciences division responded to this by identifying applications leads for all Tier 1 Decadal Survey missions, including the Ice, Cloud and land Elevation Satellite-2 (ICESat-2) mission. Since 2012, the ICESat-2 applications leads, working in concert with the ICESat-2 mission, have developed a program to improve understanding of how the global earth observations planned for ICESat-2 can be effectively used by different organizations within decision processes that lead to actions with direct societal benefits. **An initiative of the Applications Program, the *Melting Ice, Rising Sea Level: Monitoring and Forecasting of the Coastal & Marine Environment* meeting is designed with the intention of (1) providing an in-depth description of the land ice and ocean observations planned for ICESat-2 and (2) identifying applications and corresponding end-users that would benefit from the improvements in the forecasts that use these observations.**

Scheduled to launch no later than April 2018 (currently scheduled for October 2017), ICESat-2 will be one of the most spatially dense and fine precision instruments for global measurement of the earth's surface elevation. The space-borne light detection and ranging (LiDAR) mission will measure changes in ice sheet elevation, sea ice freeboard, and vegetation height. While not specifically designed to do so, the ICESat-2 mission is also developing products specific to the ocean, atmosphere, and inland water environments to maximize the value of data collected over all of the earth's surfaces. **The *Melting Ice, Rising Sea Level: Monitoring and Forecasting of the Coastal & Marine Environment* meeting will explore, specifically, the ICESat-2 ocean, land and sea ice products to gain insights into how these could inform operational requirements and activities relevant to coastal and marine forecasting.**

Co-hosting the meeting is the NASA Short-term Prediction Research and Transition Center (SPoRT). SPoRT focuses on transitioning unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale. SPoRT is also an Early Adopter for ICESat-2. The Early Adopter program is a key component of the pre-launch applications efforts for the ICESat-2 mission. Early Adopters are groups and individuals who have a direct or defined need for ICESat-2 data, and who have an interest in using products from the mission to inform key decisions. Through the program, early adopters investigate how ICESat-2 data could feed into their operational system or decision processes and provide the mission with valuable insights and feedback on how ICESat-2 can be used for decision support.

SPoRT is exploring the use of the ICESat-2 land ice and sea ice products to address two primary forecast challenges of the National Weather Service (NWS) in Alaska: spring flood potential and sea ice verification. The NWS needs accurate representation of land and sea ice depth and extent over currently unobserved areas of land and ocean. In both cases, ICESat-2's global observations have the potential of enhancing the situational awareness of modeled sea ice—critical in activities such as offshore oil and commercial fishing—and modeled frozen water available for spring thaw. **As a co-host of the *Melting Ice, Rising Sea Level: Monitoring and Forecasting of the Coastal & Marine Environment* meeting, SPoRT plays a key role in facilitating the dialogue needed to understand the weather user community needs and requirements with regards to new satellite remote sensing data and in expanding, through its partners, the overall community that the mission can reach in order to identify priority end uses of the data.**

Objectives

The two-day meeting, co-hosted by NASA SPoRT at Marshall Space Flight Center, is intended to bring together experts from the private sector, academe, government agencies, and international partners, to explore in detail the land and ocean data products planned for ICESat-2 with a focus on applications related to coastal and marine forecasting. The meeting will aim to provide a forum for discussions, exchange of information and ideas, on how ICESat-2 can be used to inform topographic features relevant to forecasting; be used with other datasets that would incorporate both ICESat-2 and National Weather Service products; and be scaled to address the specific data dependencies of current forecasting techniques. A hands-on data tutorial is also planned as part of the meeting. The mission has collected documentation, product readers, camera images, and pre-launch data files to demonstrate how the ICESat-2 data may function. The tutorial is expected to provide participants with a demonstration on how to access and use the pre-launch data for a particular case example.

The *Melting Ice, Rising Sea Level: Monitoring and Forecasting of the Coastal & Marine Environment* meeting continues the applications efforts aimed at expanding awareness of the ICESat-2 data products and of providing different user communities with the opportunity to provide direct feedback to the ICESat-2 mission scientists on opportunities for using and leveraging the use of the planned data products. During the meeting, the ICESat-2 scientists will provide an overview of the mission, including details on what the ocean and marine forecasting community can expect. The scientists will outline the mission's spatial coverage, the timeline for data product generation, and how the data products developed from the satellite observations work. The meeting will also include a discussion on the various initiatives of the ICESat-2 Applications Program, including the Early Adopter program. Research by ICESat-2 Early Adopters that have proposed to use the land ice or ocean products will also be presented.

Workshop Products & Deliverables

Prior to the meeting whitepapers on ocean and marine forecasting applications using the ICESat-2 land and ocean data products will be drafted for discussion during the meeting. Other pre-workshop material, such as seed questions, will be made available via email to all participants.