

ICESat-2 Applications Update

GSFC APPLIED SCIENCES WG MEETING
DECEMBER 6, 2017; NASA GSFC



ICESat-2 Objectives

1. Quantify **polar ice-sheet contributions** to current and recent sea-level change and the linkages to climate conditions
2. Quantify **regional signatures of ice-sheet changes** to assess mechanisms driving those changes and improve predictive ice sheet models; this includes quantifying the regional evolution of ice sheet change, such as how changes at outlet glacier termini propagate inward.
3. Estimate **sea-ice thickness** to examine ice/ocean/atmosphere exchanges of energy, mass and moisture.
4. Measure **vegetation canopy height** as a basis for estimating large-scale biomass and biomass change.

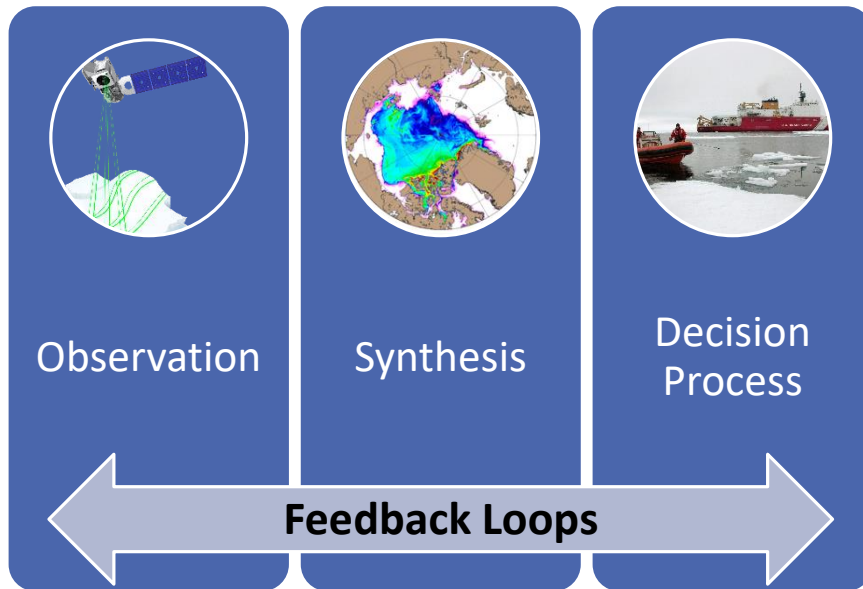
<https://icesat-2.gsfc.nasa.gov/science>

ICESat-2 is Scheduled to Launch September 12, 2018

Applications Team

Role in ICESat-2 Mission	Members	Affiliation
ICESat-2 Program Applications Coordinator	Sabrina Delgado Arias	Science Systems and Applications Inc (SSAI), NASA's Goddard Space Flight Center (GSFC)
ICESat-2 Deputy Program Applications (DPA) Lead	Vanessa Escobar	SSAI - GSFC
ICESat-2 Program Applications Lead	Molly Brown	University of Maryland
ICESat-2 SDT Member (Hydrology) & Science Team Applications Liaison	Mike Jasinski	SDT Member – Hydrology, GSFC
ICESat-2 Deputy Project Scientist	Tom Neumann	GSFC
ICESat-2 Science Team Leader	Lori Magruder	University of Texas
NASA Headquarters Program Applications Lead	Woody Turner	NASA Headquarters (HQ)

ICESat-2 Applications Goals



We define applications as innovative uses of mission data products in decision-making activities for societal benefit

- How can ICESat-2 be used effectively within analyses, forecasts, and models so as to improve decision processes needed to address practical societal needs?
- What is the scientific information flow for different applications starting from observation to end-use? Who is involved?
- How can the expected observations be leveraged or complemented with other data sources so as to lead to improved data products?

Meeting with USGS EROS and ISGS

Representatives: Inland Water

Applications and IWG-OCM Satellite-

Derived Bathymetry Mapping Task Team

Aug 17

ICESat-2 Joint Atmospheric Tutorial

May 31 - Jun 1

7th Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations [Applications Poster]

Jul 18 - Jul 20

NISAR Sea Ice Workshop [Applications Presentation]

Jun 23

Coastal Applications of ICESat-2 using Coincident Measurements Web Conference

Sep 19

Early Adopter Quarterly Call: Huilin Gao, Texas A&M

Jun 15

Early Adopter Quarterly Call: Rodrigo Paiva, Hydraulic Research Institute, UFRGS, Brazil
Sep 21

Accepted two new Early Adopters
Sep 29



<https://icesat-2.gsfc.nasa.gov/applications>

Applications Activities since April-Oct 2017

Joint Atmospheric Tutorial

- May 31-June 1, 2017
- Discovery Learning Bechtel Collaboratory, University of Colorado Boulder
- Hosted by **Ute Herzfeld** and Applications Team
- 47 participants – 19 in person and 28 via remote access.
- SDT Members in attendance: **Steve Palm** and **Yuekui Yang**

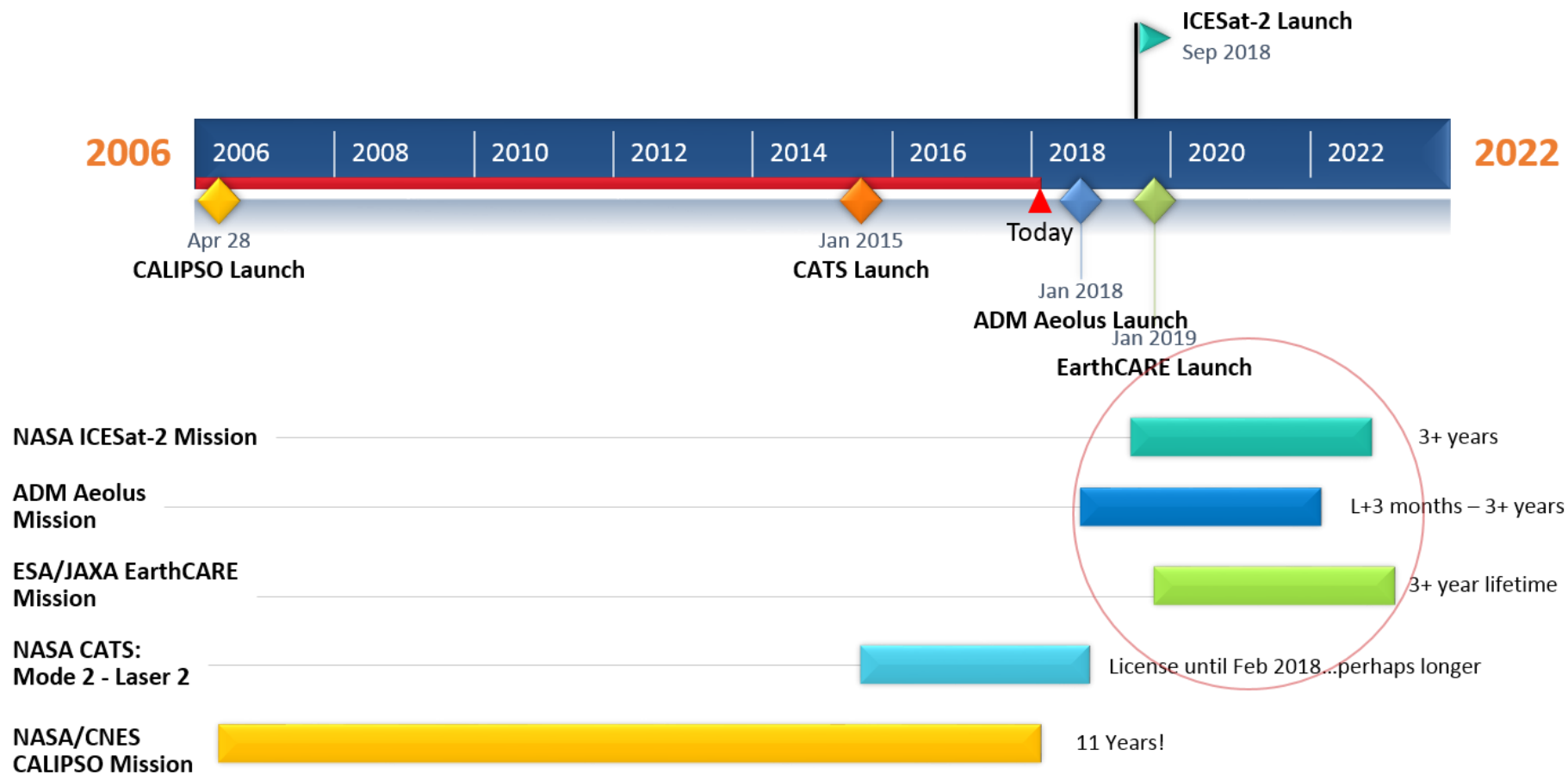
Goals:

- Increase participants' familiarity with ICESat-2 **mission objectives and atmospheric data product functionalities**
- Encourage exploratory discussion on potential for future **joint-product development**
- Identify opportunities to **leverage the planned data with information from other satellite instruments** to maximize their utility for the applied and operational atmospheric science communities

Collaboration between ICESat-2 mission and representatives of the:

- Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (**CALIPSO**) mission
- Cloud-Aerosol Transport System (**CATS**) instrument
- Earth Clouds, Aerosols and Radiation Explorer (**EarthCARE**) mission; and
- Atmospheric Dynamics Mission–Aeolus (**ADM-Aeolus**) satellite.

It is unlikely that **CALIPSO** or **CATS** will be in operation while ICESat-2 is collecting data, although it is not impossible. **ADM-AEOLUS** and **EarthCARE**, on the other hand, are scheduled to launch in 2018 and 2019, respectively, and should be operating at the same time as ICESat-2.



Joint Atmospheric Tutorial (cont.)

- **Report:**

<https://goo.gl/i6crfM>

- **Article in The Earth Observer**

<https://goo.gl/7ggZZV>

Applications Discussed

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- **Air Quality Prediction (ICESat-2 & CALIPSO)**

Example: ICESat-2 vertical profiles could build upon current work with CALIPSO data to assess air quality above the ground, to **help track the vertical movement of smoke in plumes emitted by fires.**

- **Weather Forecasting and Climate Monitoring**

Example: Prospect of using ICESat-2 to **fill CALIOP polar data information gap**

- **Monitoring Wildfires**

Example: Monitor smoke aerosols (distinguish smoke aerosols from clouds, observe vertical characteristics of pyroCb smoke plume, track smoke transport, and more).

- **Traffic Hazard Warning**

Example: assess hazardous conditions for traffic (both air and ground traffic) due to blowing snow (EA Research – Ute Herzfeld)

https://icesat-2.gsfc.nasa.gov/get_involved

ICESat-2 Early Adopters



Hongjie Xie

University of Texas at San Antonio

Applied Research Topic:

Developing effective algorithms for ICESat-2 for improving observations and forecasting of freeboard, ice thickness, and leads in NOAA operational ice charts for southern oceans

[Read more](#)

ICESat-2 hosts 21 Early Adopters:

- Program started on August 2013 during Phase C
- EA selection is via a biannual approval process; as of January 2016, started accepting proposal submission and reviewing proposals on a rolling basis.
- Early Adopters have access to pre-launch airborne data via the ICESat-2 website (MABEL, SIMPL, MATLAS, SPL Prototype). The Multiple Altimeter Beam Experimental Lidar, or MABEL, is the test-bed instrument for ICESat-2.

https://icesat-2.gsfc.nasa.gov/early_adopters

EA Low-latency Requirements

- Over the past several workshops, we have had several requests for the ICESat-2 project to consider generating and producing low-latency along-track data products.
 - Feedback from Early Adopters reported to SDT members in October 2017.
- July 2017: Begun collecting precision and accuracy requirements for these products from Early Adopters to help, to the extent possible, determine if ICESat-2 can potentially meet their needs.
 - Questions asked:
 - What **parameters** are you most interested in (e.g. "inland water body height")?
 - What **precision** is needed (e.g. "no requirement, just need to know what the 1-sigma precision uncertainty is")?
 - What **accuracy** is needed (e.g. "10 cm in nominal along-track heights")?
 - Currently collaborating with members of the U.S. Arctic Observing Network Sea Ice Forecasting Team to develop a consistent set of technology neutral requirements for sea ice thickness observations from the standpoint of forecasting services (Lead: Sandy Starkweather)

Upcoming Activities



Thank you!

Questions? Nominations to the Early Adopter Program?

Email: Sabrina Delgado Arias
sabrina.delgadoarias@nasa.gov

2017 AGU Fall Meeting Applications Town Hall

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- Monday, 11 December 2017, 12:30-13:30
- New Orleans Ernest N. Morial Convention Center, 252-254
- Preparing for Launch: 2018

Virtual Early Adopter Roundtables

- Fall-Winter 2017-2018; 1-1.5 hour virtual meetings
- Roundtable for Early Adopters (EAs), SDT partners, and invited experts to discuss knowledge, practice and strategies on how to use the planned ICESat-2 data
- Engages all EAs developing similar applications
- Opportunity to involve new/less outspoken EAs that may still be relatively unfamiliar with data products
- Inquisitive discussion led primarily by SDT members
- Development of EA Applications Readiness Levels

End-user led Working Group Meetings