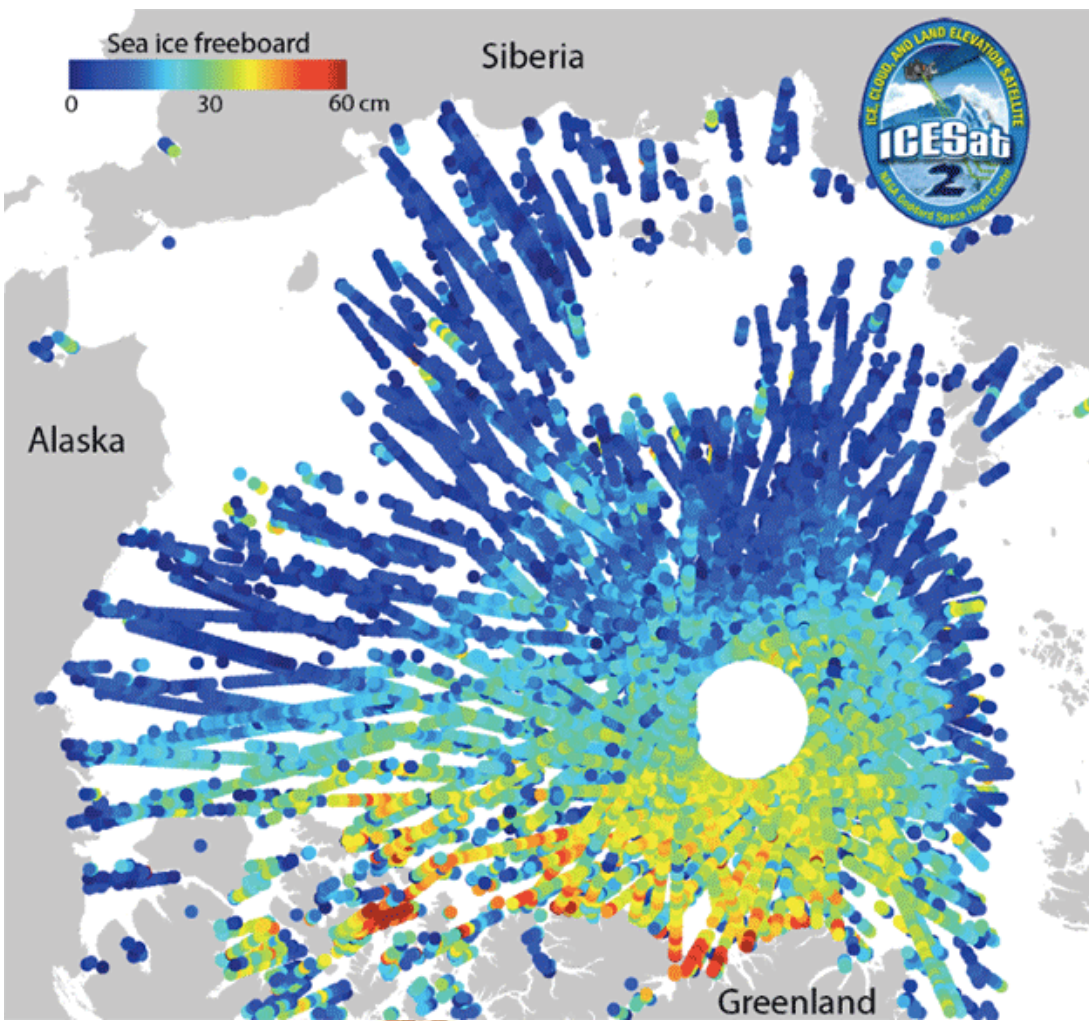




Overview of ICESat-2 Applications

Molly E Brown, University of Maryland

Aimee Neeley, Mission Applications Lead, SSAI NASA

Sabrina Delgado Arias, Science Systems and Applications, NASA Goddard Space Flight Center

Tom Neumann, NASA

What is an application?

Applications are defined as *innovative uses of mission data products in decision-making activities for societal benefit.*

The ICESat-2 Mission Applications program works to bring our data products into areas where they can help inform policy or decisions that benefit the public.

Our "End Users" are individuals and groups from private sector organizations, industry associations, universities and government agencies who make these decisions.

For example, ICESat-2 measurements of reservoir height can indicate the potential for flooding or drought, which local governments could use to regulate water usage.

ICESat-2 Applications in Senior Review – 10 years!

- The data has been a game changer for **mapping coastal bathymetry**, which is critical for monitoring coral reefs, managing our coasts and even determining the exposure of world heritage sites to storms, tidal surges and increasing sea level.
- ICESat-2 data provides information on **shoreline features for nautical charts** from space that otherwise requires costly and lengthy hydrographic field work.
- Combining ICESat-2 data with other datasets (GEDI, Sentinel/Landsat) maximizes the information for assessing burn severity, as well as mapping and **monitoring forest biomass and carbon stocks** in forests globally.

An assessment of our applications community and interviews we recently conducted provided us with insight data product uses and identify thematic areas that may benefit from ICESat-2 measurements.

"Most of the commerce for the United States comes in through shipping, 90%, and those ships are required to use the nautical charts. So they're updated maybe every 30 days and sometimes faster if there's been change detected in a specific area. So, the data is definitely valuable to us in many different ways."

Dr. Neil Weston, Office of Coast Survey, NOS, NOAA

Recruiting New Applied Users

- Each Science Team member has their own science, geographic focus and objectives
- Consider potential users of your science and data that could become an applied user
- AUs should be able to articulate how the data is affecting a decision, either that they make or that their customers, clients or stakeholders make
- Some examples of institutions that potentially recruited:
 - Coastal zone management might be used by the California Coastal Commission and their use of lidar data for decision making
 - Above ground biomass data from ICESat-2 and models for VERRA voluntary carbon credit verification of carbon projects
 - Iceberg and sea ice thickness tracking for ship navigation and safety in northern waters

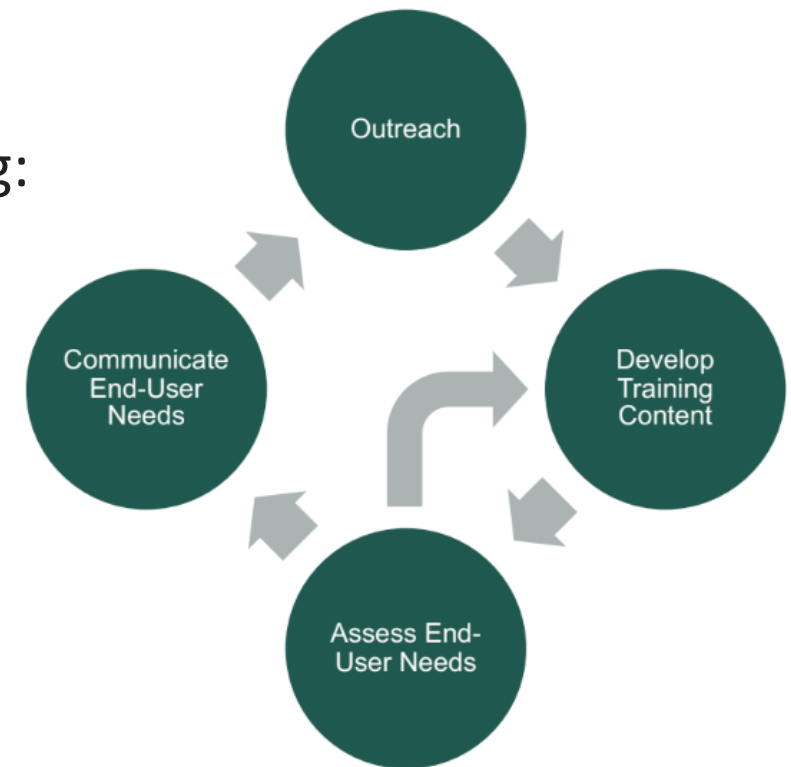
Benefits of being an Applied User

Participation is entirely voluntary, with no funding for either the AU institution or for their advisors

- **Get support from a Science Definition Team (SDT) or Project Science Office (PSO) member**
- **Participate in quarterly webinars:** the Applications team will host a quarterly webinar for Applied Users to share updates on the mission status, provide support and information on the data products, gather feedback, share schedules and timelines, and answer questions.
- **Be in the know about ICESat-2:** As an AU, you will be among the first to know about any new features of the science data products and to receive updates on the mission and ICESat-2 field campaigns.
- **Get access to calibration and validation (cal/val) data:** AU will be granted access to cal/val data from ICESat-2 field campaigns, modeling and synergistic studies
- **Reference lessons learned:** AU will have the opportunity to interact and exchange lessons learned with other AUs and EAs during quarterly webinars and at the various applications events.

Strategies to extend ICESat-2 to new communities

- The Applied Remote Sensing Training (ARSET) program empowers the global community through remote sensing training. Participants learn how to use NASA Earth data and models for environmental management and decision support through online and in person training.
- Training as part of the outreach and applications cycle
- ICESat-2 will work in the coming year to design a training:
 - What is lidar?
 - How to access ICESat-2 data
 - Data structure and acquisition strategy
 - Application stories and code to replicate examples
 - Thematic labs focused on topic areas



ICESat-2 Research Activities

Previous Research

- M.E. Brown, S. Delgado Arias, M. Chesnes (2022) Literature Review shows that Engagement of Stakeholders Accelerates Applications of ICESat-2 data when compared to ICESat. Remote Sensing Applications: Society and Environment doi: 10.1016/j.rsase.2022.100874
- M.E. Brown, Sabrina Delgado Arias, Thomas Neumann, Michael Jasinski, Pamela Posey, Greg Babonis, Nancy Glenn, Charon Birkett, Vanessa Escobar, Thorsten Markus (2016) Applications for ICESat-2 Data from NASA's Early Adopter Program. IEEE Geoscience and Remote Sensing Magazine 4(4) 24-37.
Doi:10.1109/MGRS.2016.2560759

New Research Efforts

- Impact assessment using the Impact Assessment Framework of Ari et al 2020, which focuses on generating data to assess how ICESat-2 data is
 - How ICESat-2 data is **disseminated**,
 - Community **awareness** of the data
 - **Understanding the action** that has been generated from the data
 - How the data has **affected change** and
 - How science from ICESat-2 is **shaping the future**.
- With Aimee Neeley and Siobhan Light

Recent and Upcoming Events

Presentation	Location	Time	Team Member
Hyperwall Presentation	Ecological Society of America, August 6-11, 2023	August 7, 2023	SDA
ICESat-2 Applications Presentation for Science Team	ICESat-2 Science Team Telecon	September 14, 2023	SDA
2023 Mission Applications Lead – 1 st In person Meeting	Lancaster, PA	September 27-28, 2023	SDA
ICESat-2 Science Team Meeting	La Jolla, California	October 2-4, 2023	Tom, Molly (remote)
Space & Sustainability Colloquium – ICESat-2 & CMS	Guadalajara, Jalisco, México; https://ciudadcreativadigital.mx/	November 15-16, 2023	Sabrina, Molly remote
AGU Fall Meeting 2023 talk on applications and data	San Francisco, CA	December 11-15, 2023	Tom, Molly
AMS 2023	Baltimore, MD	28 January–1 February 2024	Molly
ARSET Training for ICESat-2	Remote	TBD	Aimee

Thank you!

Feel free to email me! mbrown52@umd.edu