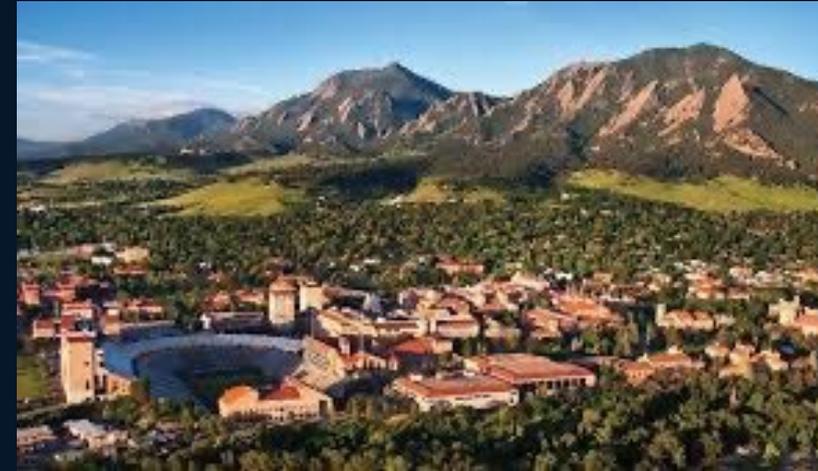
A central graphic shows a 3D Earth globe with a white polar ice cap. Two satellite icons, one on the left and one on the right, are connected to the globe by dashed lines representing orbital paths. The background is a dark blue world map.

30 YEARS OF SATELLITE AND AIRBORNE ALTIMETRY DATA AT NSIDC DAAC

Amanda Leon, Lisa Kaser, Walt Meier, and Amy Steiker
NASA NSIDC DAAC

The NASA snow and ice Distributed Active Archive Center (DAAC) is located at the National Snow and Ice Data Center (NSIDC).

NSIDC is a part of the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder.



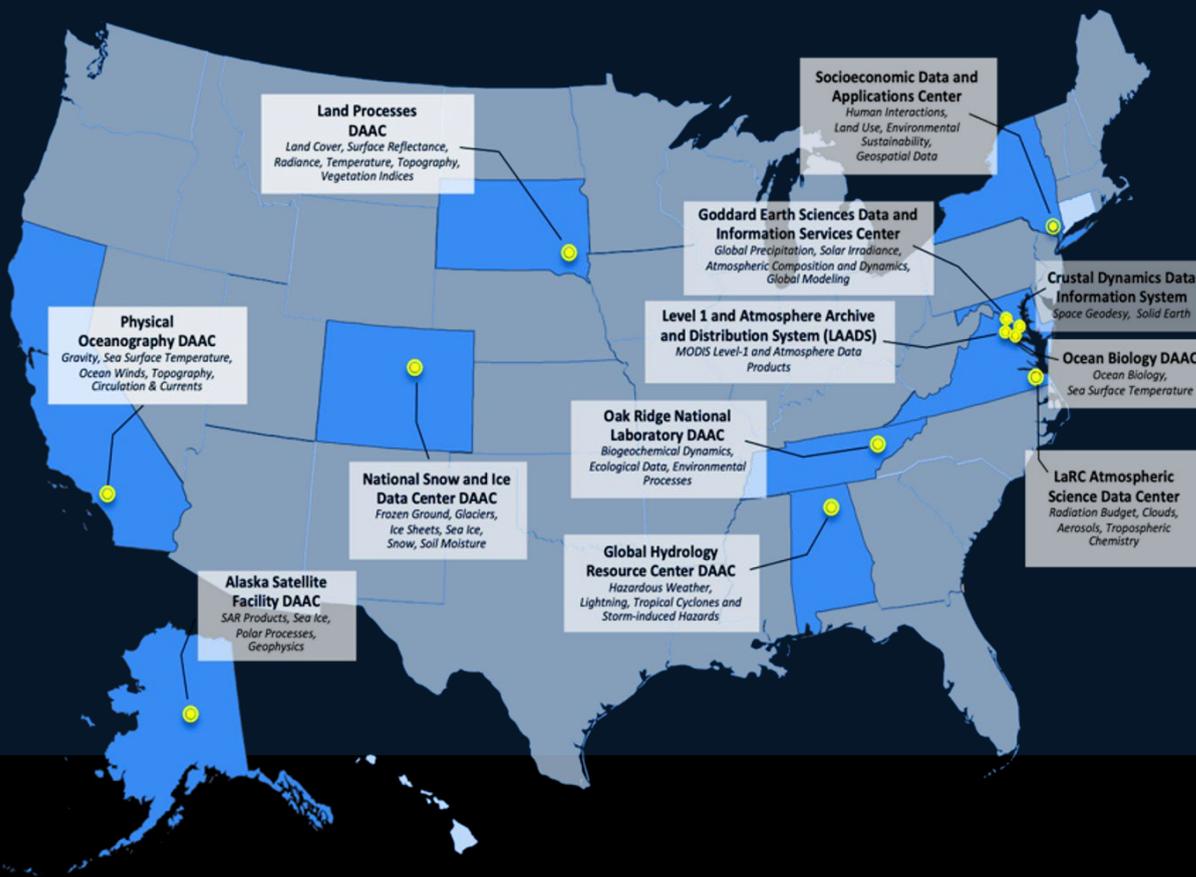
NSIDC DAAC is one of 12 NASA DAACs serving as key data infrastructure for NASA Earth science.

The DAACs' purpose is to **preserve** NASA Earth science data and to make it **discoverable, accessible, and usable**.



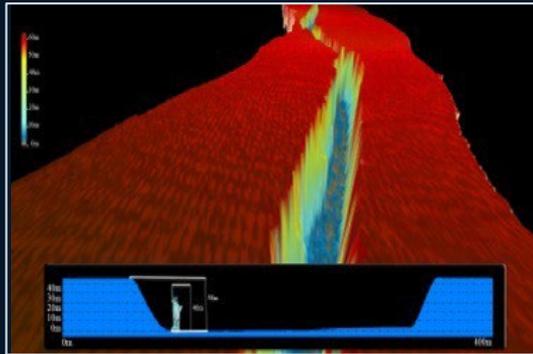
The Earth Science Data and Information System (ESDIS) manages the 12 DAACs.

ESDIS is a project of the NASA Earth Science Data Systems (ESDS) program.



30 years of data from NASA altimetry missions

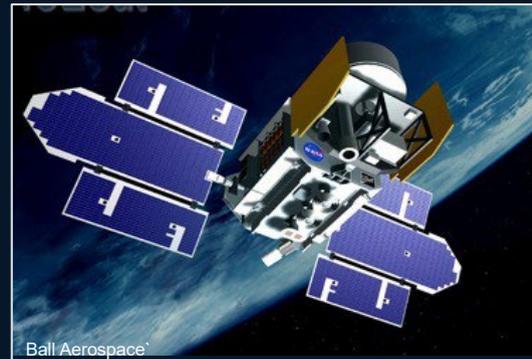
Pre-IceBridge Campaigns



- Airborne Topographic Mapper (ATM)
- Elevation change studies, Greenland mass balance assessments, and calibration/validation of satellite altimeters.

1993 - 2008

ICESat



- Geoscience Laser Altimeter System (GLAS)
- Measure ice sheet elevation and changes in elevation through time.

2003 - 2010

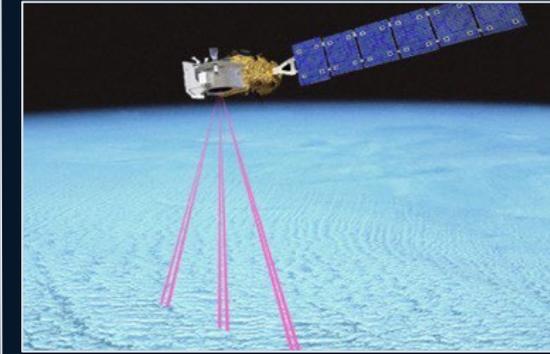
Operation IceBridge



- Airborne Topographic Mapper (ATM)
- Land, Vegetation, and Ice Sensor (LVIS)
- Airborne remote sensing measurements of Arctic and Antarctic land and sea ice from multiple instruments

2009 - 2019

ICESat-2



- Advanced Topographic Laser Altimeter System (ATLAS)
- Measure and investigate ice sheet and glacier melt, sea ice thickness, inland water, and vegetation height worldwide.

2018 - Present

1990

2000

2010

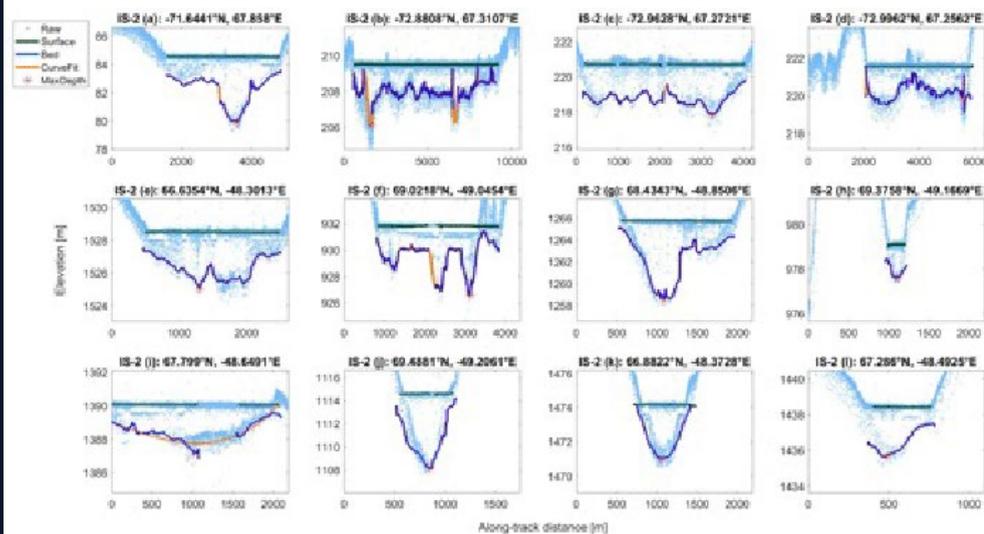
2020

2030

Advances in science resulting from cross-mission altimetry data, including ESA's CryoSat

Using ICESat-2 and Operation IceBridge altimetry for supraglacial lake depth retrievals

Zachary Fair, Mark Flanner, Kelly M. Brunt, Helen Amanda Fricker, and Alex Gardner



How to cite. Fair, Z., Flanner, M., Brunt, K. M., Fricker, H. A., and Gardner, A.: Using ICESat-2 and Operation IceBridge altimetry for supraglacial lake depth retrievals, *The Cryosphere*, 14, 4253–4263, <https://doi.org/10.5194/tc-14-4253-2020>, 2020.

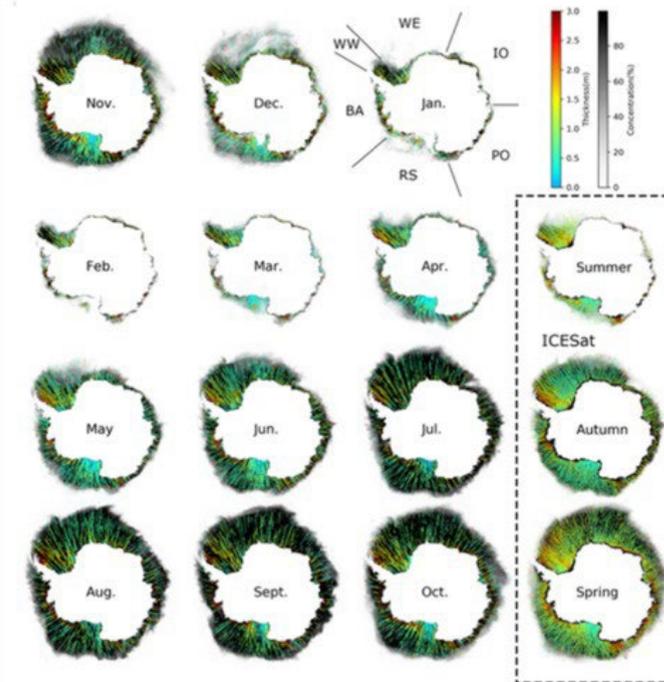
Understanding biases in ICESat-2 data due to subsurface scattering using Airborne Topographic Mapper waveform data

Benjamin Smith, Michael Studinger, Tyler Sutterley, Zachary Fair, and Thomas Neumann

How to cite. Smith, B., Studinger, M., Sutterley, T., Fair, Z., and Neumann, T.: Understanding biases in ICESat-2 data due to subsurface scattering using Airborne Topographic Mapper waveform data, *The Cryosphere Discuss.* [preprint], <https://doi.org/10.5194/tc-2023-147>, in review, 2023.

Deriving Antarctic Sea-Ice Thickness From Satellite Altimetry and Estimating Consistency for NASA's ICESat/ICESat-2 Missions

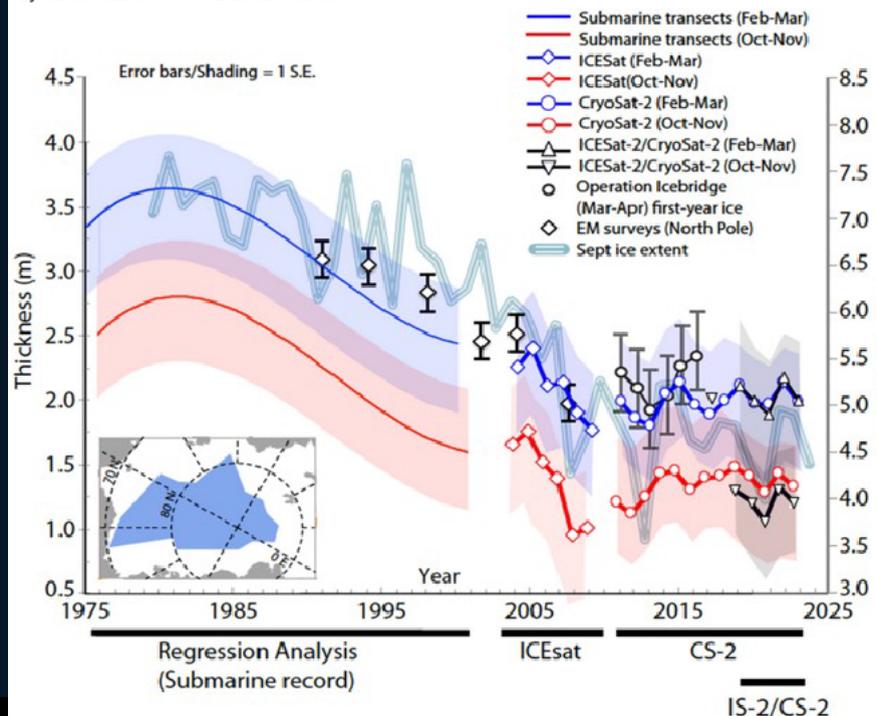
Yue Xu, Huan Li, Baojian Liu, Hongjie Xie, Burcu Ozsoy-Cicek



Xu, Y., Li, H., Liu, B., Xie, H., & Ozsoy-Cicek, B. (2021). Deriving Antarctic sea-ice thickness from satellite altimetry and estimating consistency for NASA's ICESat/ICESat-2 missions. *Geophysical Research Letters*, 48, e2021GL093425. <https://doi.org/10.1029/2021GL093425>

Two Decades of Arctic Sea-Ice Thickness from Satellite Altimeters: Retrieval Approaches and Record of Changes (2003–2023)

by Sahra Kacimi and Ron Kwok



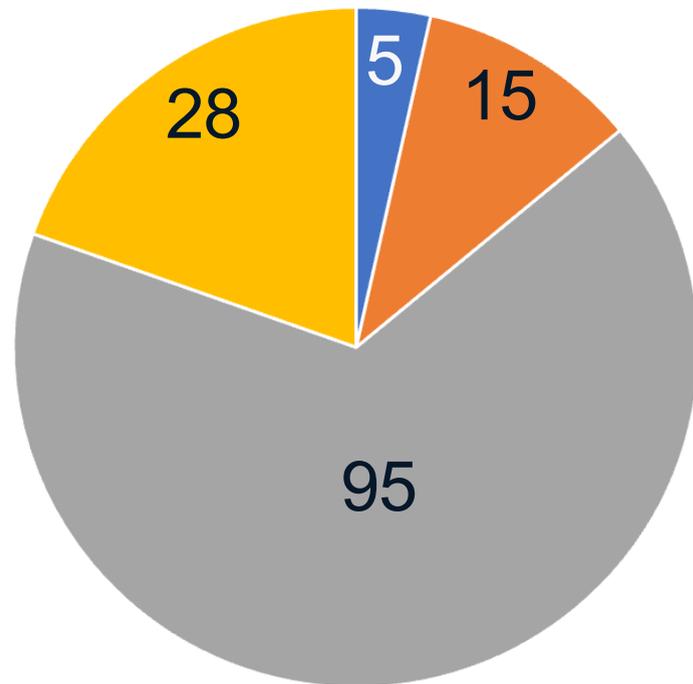
Kacimi, S.; Kwok, R. Two Decades of Arctic Sea-Ice Thickness from Satellite Altimeters: Retrieval Approaches and Record of Changes (2003–2023). *Remote Sens.* 2024, 16, 2983. <https://doi.org/10.3390/rs16162983>



~5,000 unique users of NASA altimetry data at NSIDC DAAC in FY2024

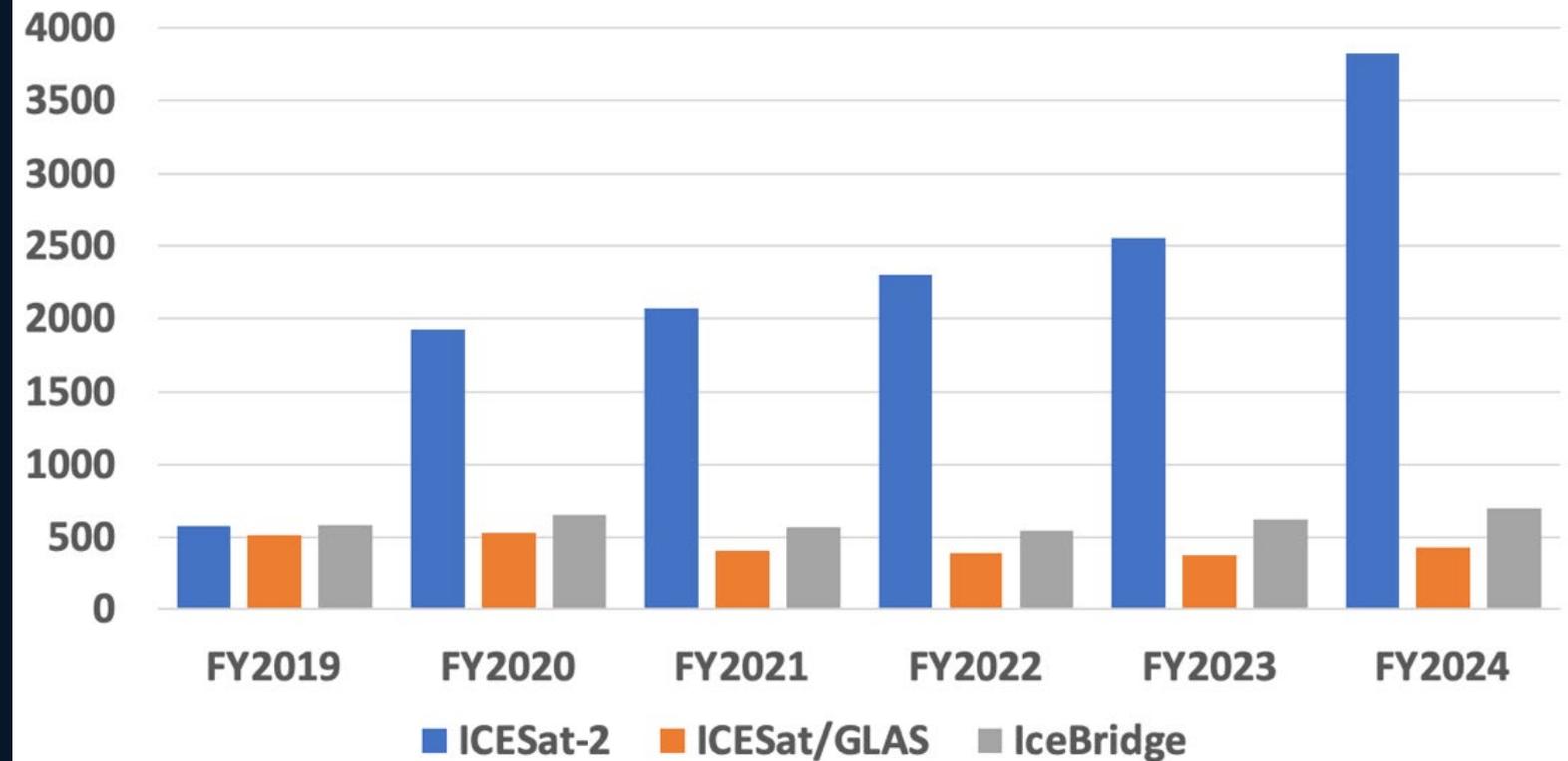
143 Total Datasets

Number of Datasets per Mission



■ Pre-IceBridge ■ ICESat/GLAS ■ IceBridge ■ ICESat-2

Unique Data Users Per Mission Per Year



Fiscal Year (FY): October - September

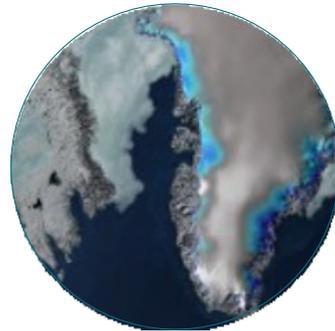
Pre-IceBridge metrics included in IceBridge



The NSIDC DAAC's role is to support and enable science with the 30 years of altimetry data.



Data
producer and
user support



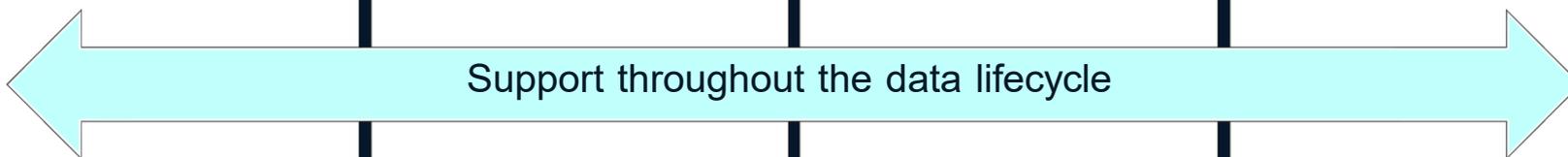
Science-
focused data
and metadata
curation



Capabilities to
enable data
use and
science



Data
preservation
and open
access



Support throughout the data lifecycle



The NSIDC DAAC's role is to support and enable science with the 30 years of a data.

Support creating FAIR data



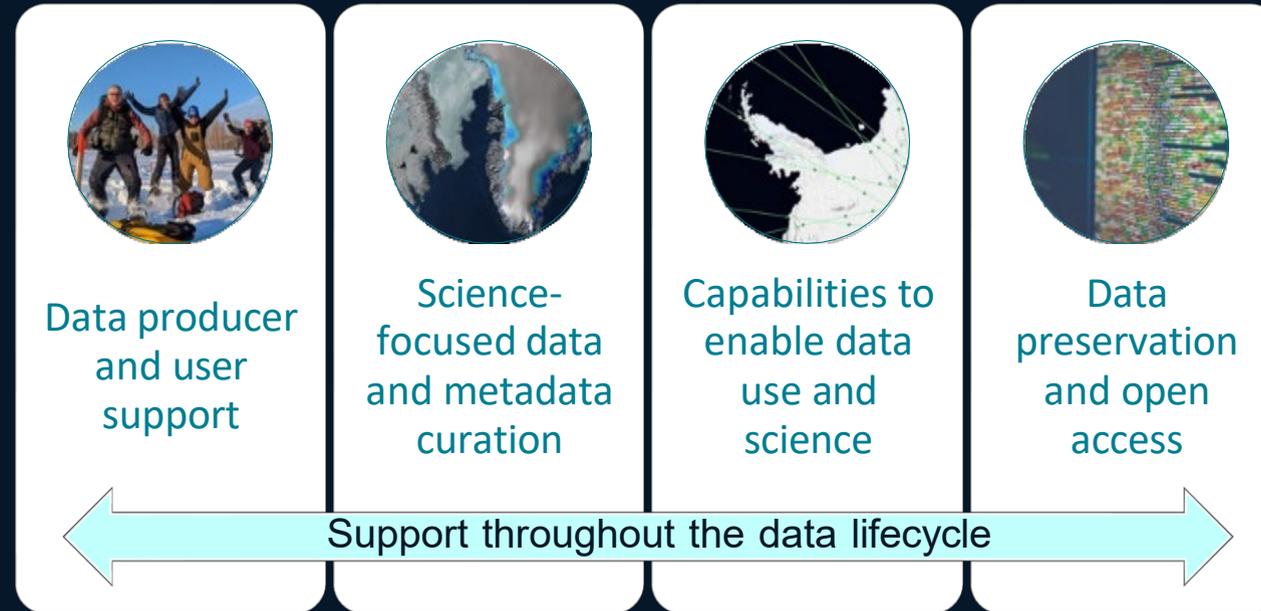
As a condition of using these data, you must cite the use of this data set.

10.5067/ATLAS/ATL08.005 **Data citations and DOIs**

Select a Citation Style
APA

Neuenschwander, A. L., K. L. Pitts, B. P. Jelley, J. Robbins, B. Klotz, S. C. Popescu, R. F. Nelson, D. Harding, D. Pederson, and R. Sheridan. (2021). ATLAS/ICESat-2 L3A Land and Vegetation Height, Version 5 [Data Set]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/ATLAS/ATL08.005>. Date Accessed 04-21-2023.

COPY DATA CITATION



User Support

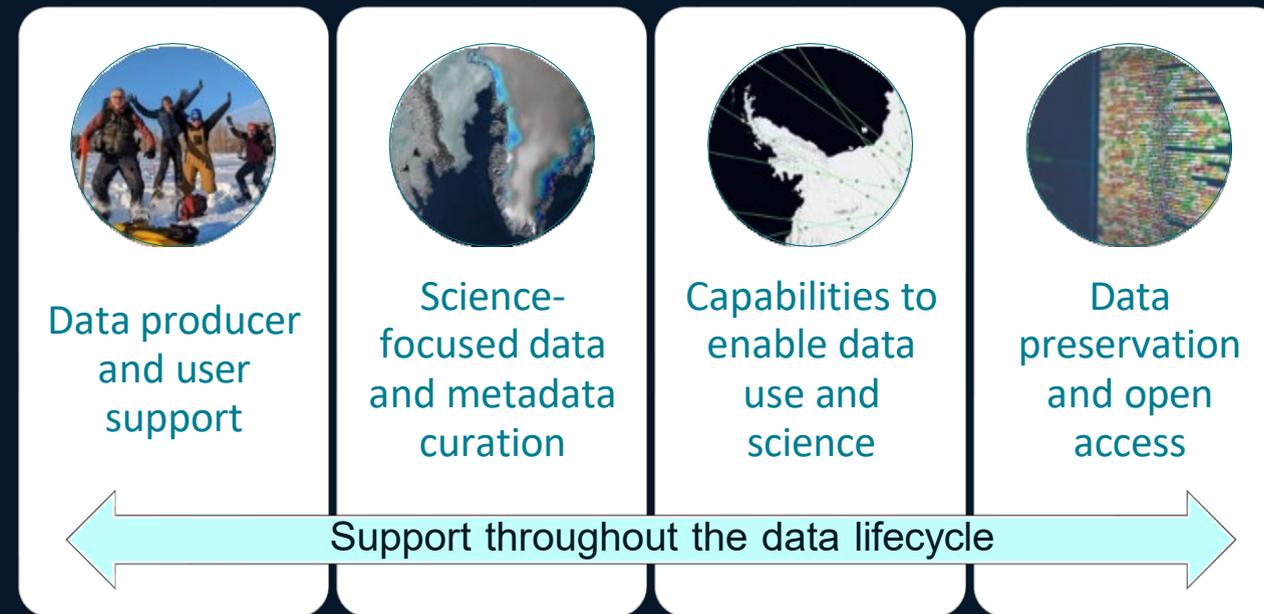


NSIDC DAAC Tutorials

- Monday 18:00-19:30
- Thursday 17:00-18:00



The NSIDC DAAC's role is to support and enable science with the 30 years of a data.



Home > Data > IceBridge

Operation IceBridge

NASA's Operation IceBridge Aircraft Missions

Mission Pages

Overview

This NSIDC DAAC collection includes products derived from NASA's Operation IceBridge: the largest airborne survey of polar regions in history. Data products describe annual changes in ice surface elevation, topography of bedrock under ice sheets, glacier and ice shelf grounding lines, snow and ice thickness, sea ice distribution, sea ice freeboard, ice temperature, and meteorological observations.

The Operation IceBridge mission was designed to bridge the gap in polar observations between the ICESat satellite mission, which ended in 2010, and the ICESat-2 satellite mission, which launched in 2018. Operation IceBridge flew more than 1,000 aircraft surveys from 2009 to 2020. The flights provided annual mapping of coastal Greenland, coastal Antarctica, the Antarctic Peninsula, interior Antarctica, the southeast Alaskan glaciers, and Antarctic and Arctic sea ice.

The mission used a highly specialized fleet of research aircraft outfitted with a suite of instruments including radar sounders, gravimeters, magnetometers, mapping cameras, among other instruments. By mapping hundreds of miles of ice sheet and glacier grounding lines in Antarctica and Greenland, Operation IceBridge provides data to better understand potential ice sheet instability and retreat. By revealing the topography of the underlying bedrock, Operation IceBridge data shed light on the complex interactions between ice and the land beneath. The aircraft missions also documented seasonal growth and melt of sea ice, including tracking interannual variations in sea ice extent and thickness.

After NASA's ICESat-2 satellite launched on September 15, 2018, Operation IceBridge continued aircraft missions for another 14 months, validating the new satellite's measurements. Operation

Documentation

Help Articles

Data Tools

Data

Announcements

Pre-IceBridge Data

Related Data

Data

Support

Data & Tools: Lists of available datasets and tools/services

Home > Data > ATLAS/ICESat-2 L3A Land and Vegetation Height, Version 5

ATLAS/ICESat-2 L3A Land and Vegetation Height, Version 5 (ATL08)

DATA SET: ATL08

Dataset Pages

USER GUIDE CITATION SUBSCRIBE SERVICE

This is the most recent version of these data. [Version Summary](#)

Overview

This data set (ATL08) contains along-track heights above the WGS84 ellipsoid (TRF2014 reference frame) for the ground and canopy surfaces. The canopy and ground surfaces are processed in fixed 100 m data segments, which typically contain more than 100 signal photons. The data were acquired by the Advanced Topographic Laser Altimeter System (ATLAS) instrument on board the ice, Cloud and land Elevation Satellite-2 (ICESat-2) observatory.

Parameter(s): CANOPY HEIGHT | TERRAIN ELEVATION

Platform(s): ICESat-2

Sensor(s): ATLAS

Data Format(s): HDF5

Temporal Coverage: 14 October 2018 to present

Temporal Resolution: 91 day

Spatial Resolution: Varies

Spatial Reference System(s): WGS 84 (EPSG:4326)

Spatial Coverage: N: 90 S: -90 E: 180 W: -180

Documentation

Data Access & Tools

Documentation

Help Articles

Support

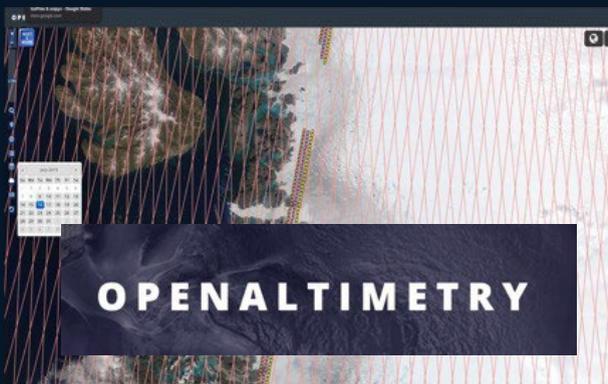
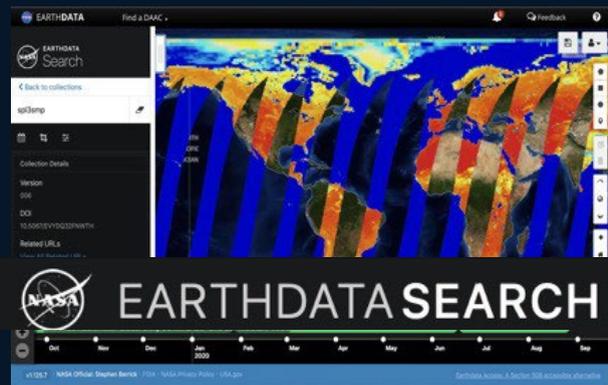
User Guide: Comprehensive product documentation on file structure, variable info, data acquisition, etc.

Subscribe: Sign up to receive dataset updates via email



NASA ESDIS, NSIDC DAAC, and the community provide a range of cross-mission discovery and access methods.

Web



Code

Customized Programmatic Data Access Service →

[Get Data](#) [Customize](#)

Programmatically request selected data products through our API. Specify parameters you need from big data sets. Apply spatial and temporal reprojection.

[Programmatic Data Access Guide](#)



earthaccess

A Python Library for NASA Earthdata



 Community developed

Direct

NASA Earthdata Cloud (AWS S3) →

[Get Data](#)



Access data directly from the NASA Earthdata Cloud via Amazon web Services Simple Storage Service (S3). This access option is only available when working within the us-west-2 region and requires S3 credentials.

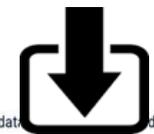
[NASA Earthdata Cloud Data Access Guide](#)
[AWS S3 Credentials](#)

Amazon S3

Type: Service [View Metadata](#)

HTTPS File System →

[Get Data](#)



Quickly download a few files using a web browser, or access data directly using a command-line utility like WGET.

[Programmatic Data Access Guide](#)

Download

Type: Service Last updated: October 2020 [View Metadata](#)

<https://nsidc.org/data/icesat-2/tools>



Opportunities to further connect NASA and ESA altimetry data



- Provides the ability to **search for**, and **download** or **stream** all NASA Earth science data with just a few lines of code.
- Future: Adding support for SpatioTemporal Asset Catalogs (STAC), enabling integration with additional data providers, such as ESA.

- NSIDC DAAC will steward a NASA archive of CRISTAL snow and ice datasets
- Future: Expansion of ESDIS and NSIDC DAAC tools and services for CRISTAL data



Questions? Feedback?
We'd love to hear from you!

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NSIDC DAAC Manager
Amanda.Leon@Colorado.edu

NSIDC DAAC User Support
nsidc@nsidc.org



NSIDC DAAC Website

