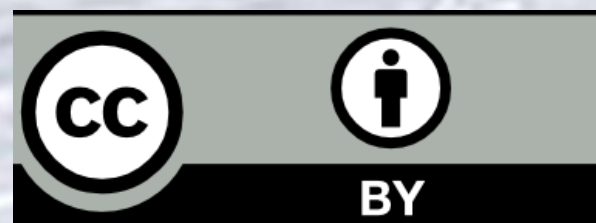ITS4.2/ESSI4.2
State of the Art in Earth Science Data Visualization

OpenAltimetry - Key Elements of Success in Visualizing NASA's Spaceborne LiDAR Data

EGU2020: Sharing Geoscience Online

ICESat-2, NASA's spaceborne laser altimeter, sends 10,000 laser pulses per second towards Earth, in 6 separate beams, and records individual photons reflected back to its telescope.

From these photon elevations, specialized ICESat-2 data products for land ice, sea ice, sea surface, vegetation and inland water are generated.

Altogether these products total nearly 1 TB per day, which poses data management and visualization challenges for potential users.
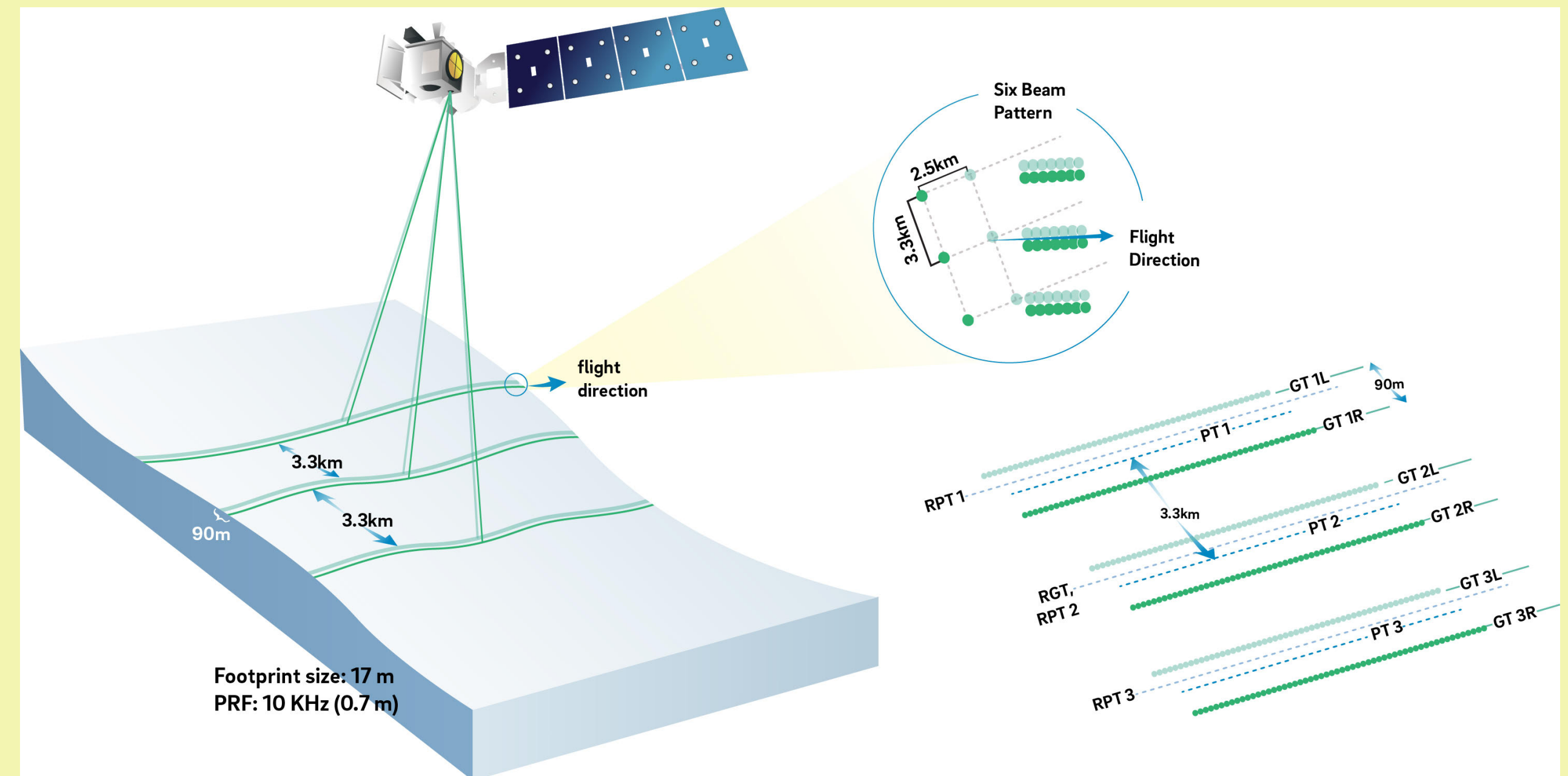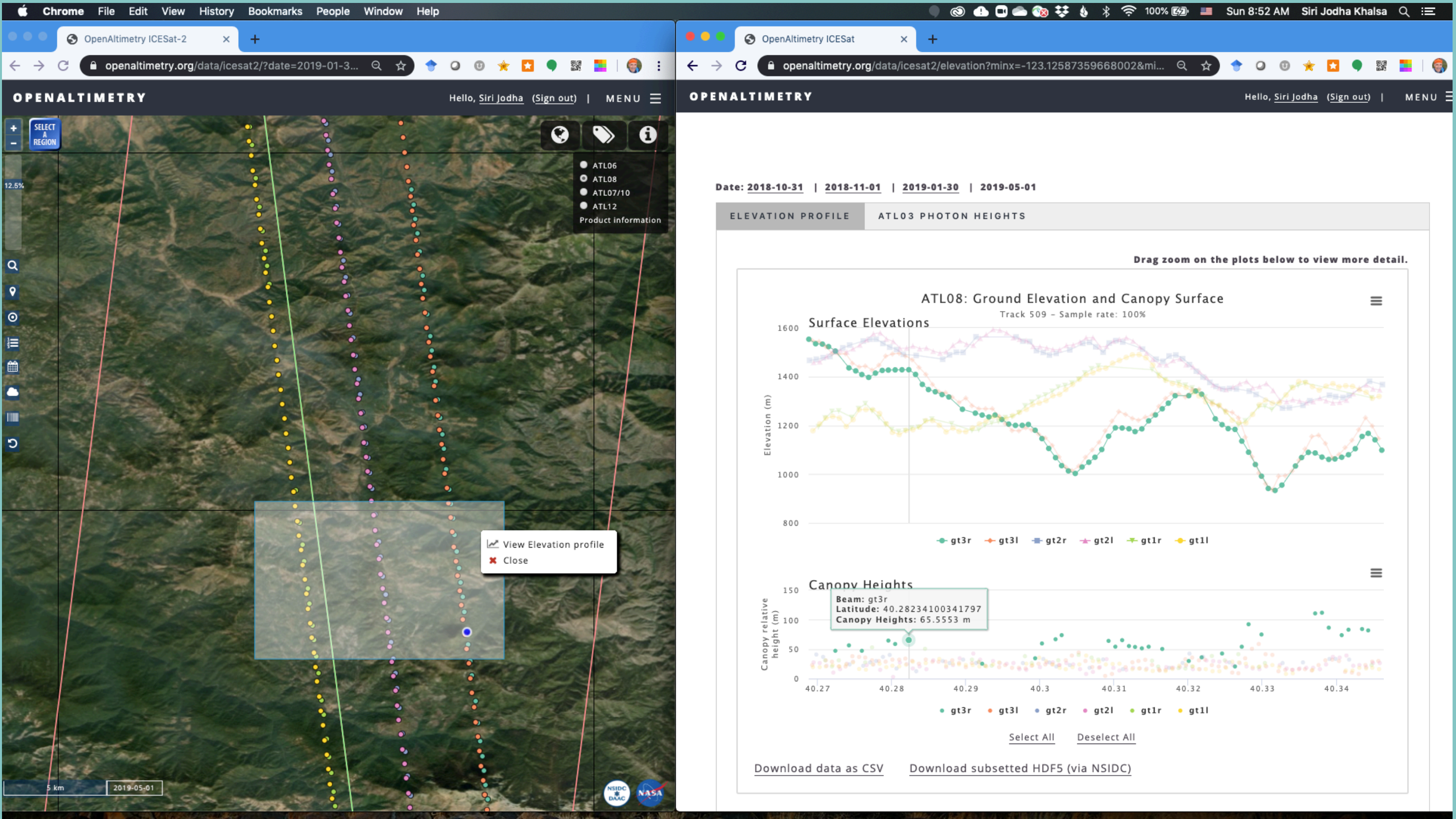
OpenAltimetry is a web-based cyberinfrastructure platform that allows users to locate, visualize, and download ICESat-2 photon clouds and surface elevation data for any location on Earth.

Source data resides at the National Snow and Ice Data Center, from which OpenAltimetry ingests subsets.
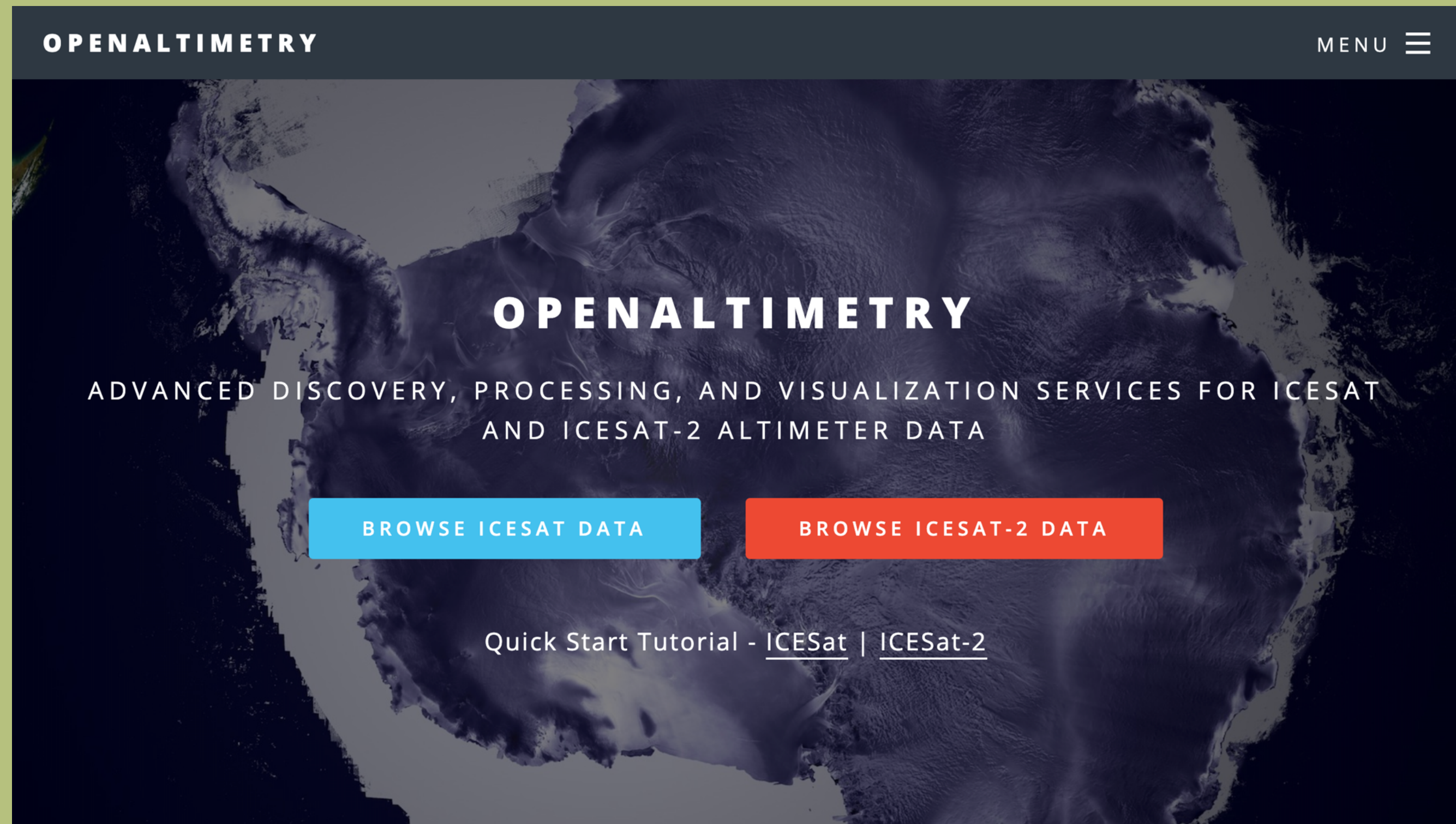
Users interact with a map-based interface to select an area of interest to inspect the data in. The plots can be queried interactively and the data behind them directly downloaded. Users also have the option of requesting a subset for their area of interest of the full dataset from its source NSIDC.

Users can view the photons returned from the surfaces (land, vegetation, water, ice) where each laser pulse intersected the surface.

At the right the blue dots are photons reflected off trees and the land surface.

OpenAltimetry has a suite of APIs supporting data access from external applications such as cloud-based Jupyter notebooks.

Here is an example of an interactive visualization of photon elevations in a notebook linked from OpenAltimetry.
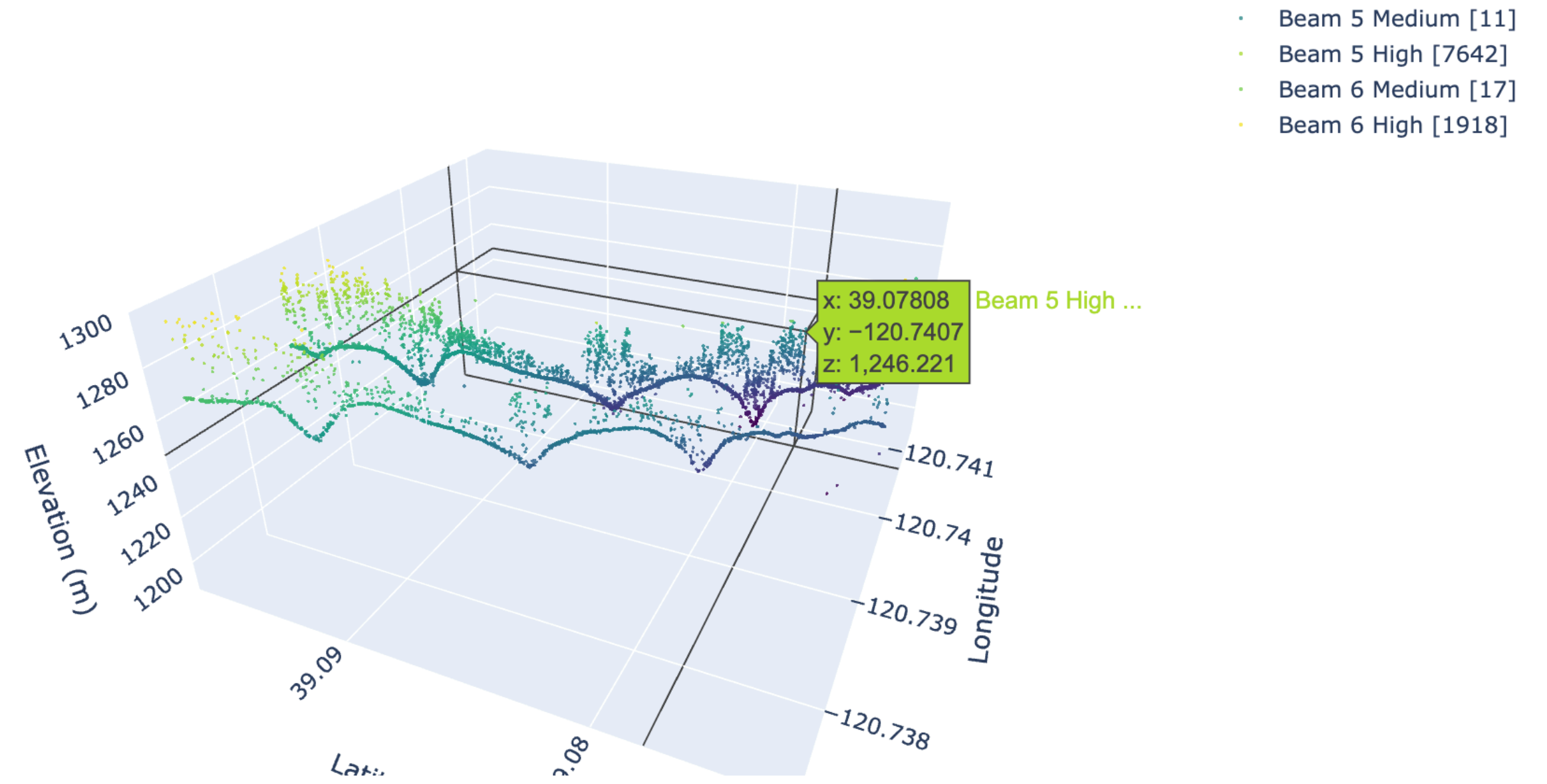
KEYS TO SUCCESS

when providing services for large, complex datasets distributed across multiple products:

> **Create an intuitive, responsive, browser-based interface giving access to primary elements of the dataset**

> **Consult with science leads and data product designers to fully understand the data**

> **Ensure the system serves the needs of both expert and novice users of the data**

> **Involve key stakeholders in design, testing and continual improvement of the service**

> **Advertise and demonstrate the service widely, coinciding with the release of the data, to attract new users and position it to become the "go-to" service for accessing the data product**

http://openaltimetry.org/

Repository for ICESat and ICESat-2 data:

http://nsidc.org/

Manuscript with details on OpenAltimetry:

http://cires.colorado.edu/~khalsa/OA_for_ESI_special_issue.pdf

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