



The GLOBE Program

Trees, Leaves, and IOPs: One Year of the Trees Around the GLOBE Student Research Campaign

#GLOBE23

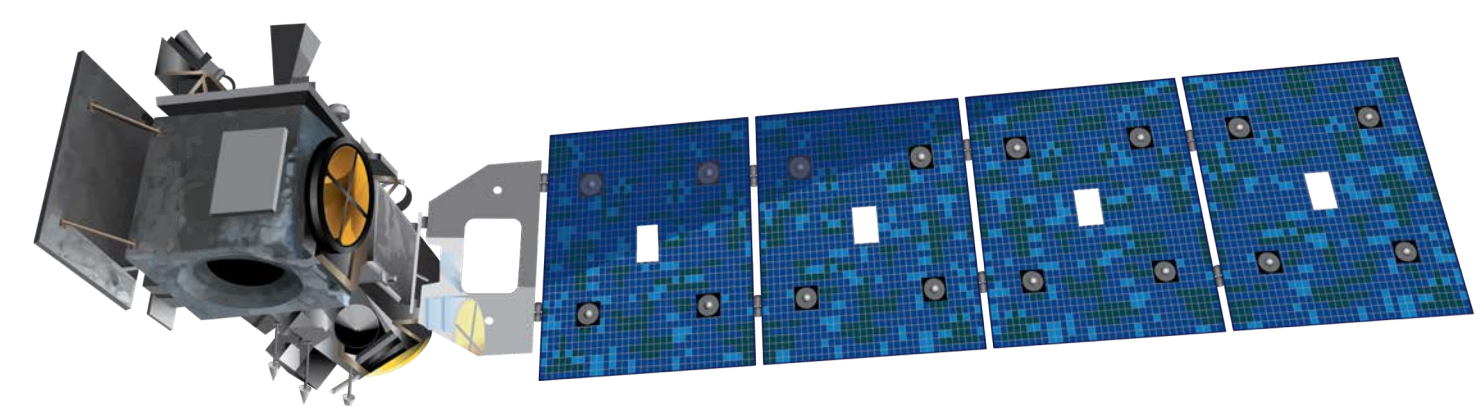


Brian Campbell, Trees Science Lead, NASA Wallops Flight Facility, Wallops Island, Virginia USA

The Background



The Trees Around the GLOBE Student Research Campaign commenced on September 15, 2018 in conjunction with NASA's ICESat-2 satellite launch on the same date at 6:02am PDT. This campaign is a student research campaign focusing on tree height - one of the measurements conducted by the ICESat-2 mission.



Why Tree Height?

Tree height is not just a measurement - it is a gateway to understanding many things about the environment and is the main indicator of how well an ecosystem can grow trees. The structure of tree canopies, the 3D arrangement of individual trees, has a huge effect on how ecosystems function and cycle through carbon, water, and nutrients.



- Why Trees?
- + Tree Research Experts
- + Satellite/Instrument Data & Maps
- + Student Data (GLOBE Measurements & Cultural)
- + GLOBE Global Student and School Collaboration Networking
- = Trees Campaign

The Students in the Field



Michigan, USA



Croatia



Switzerland

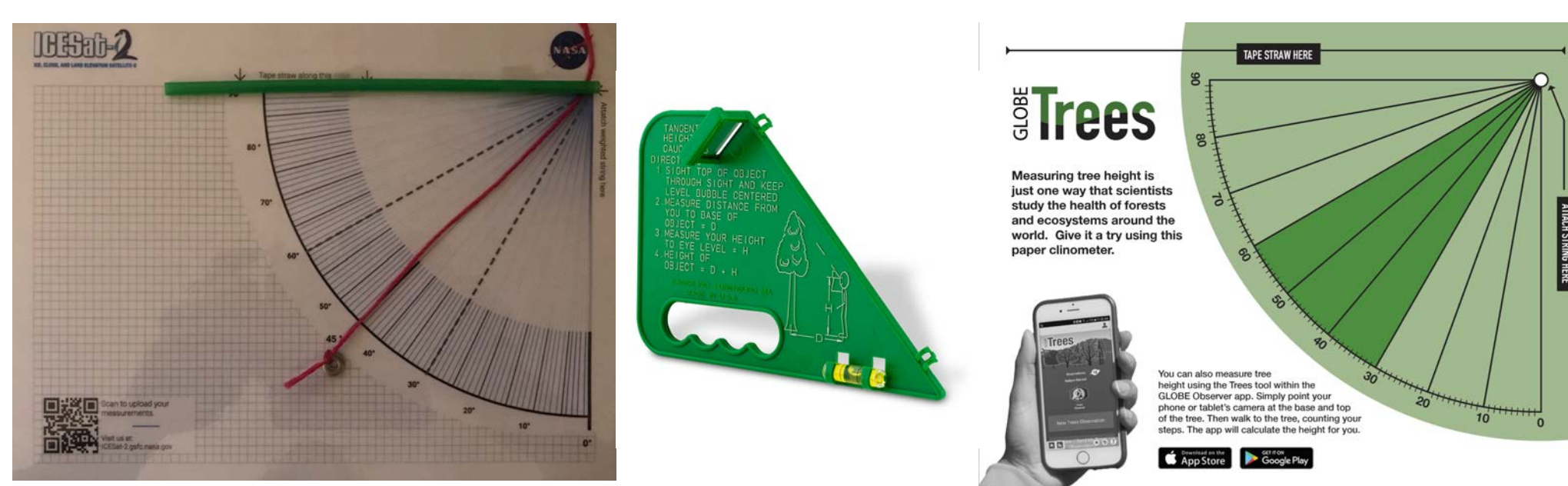


New York USA

The Tree Pics



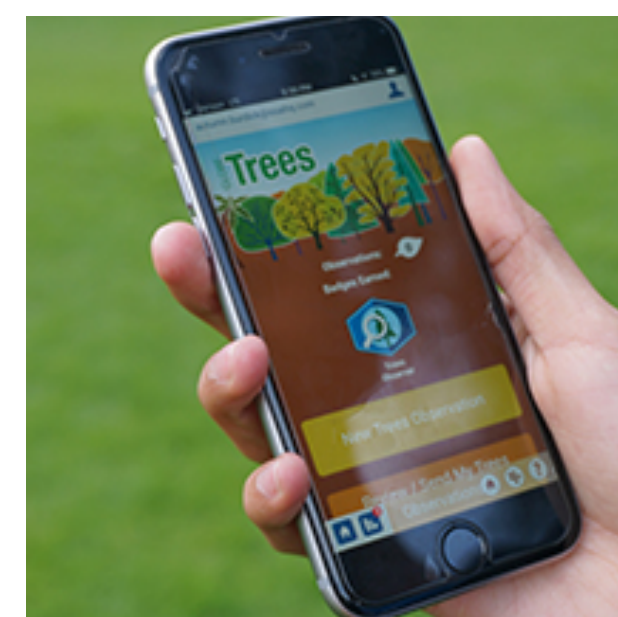
The Tools



Clinometers



Tape Measure

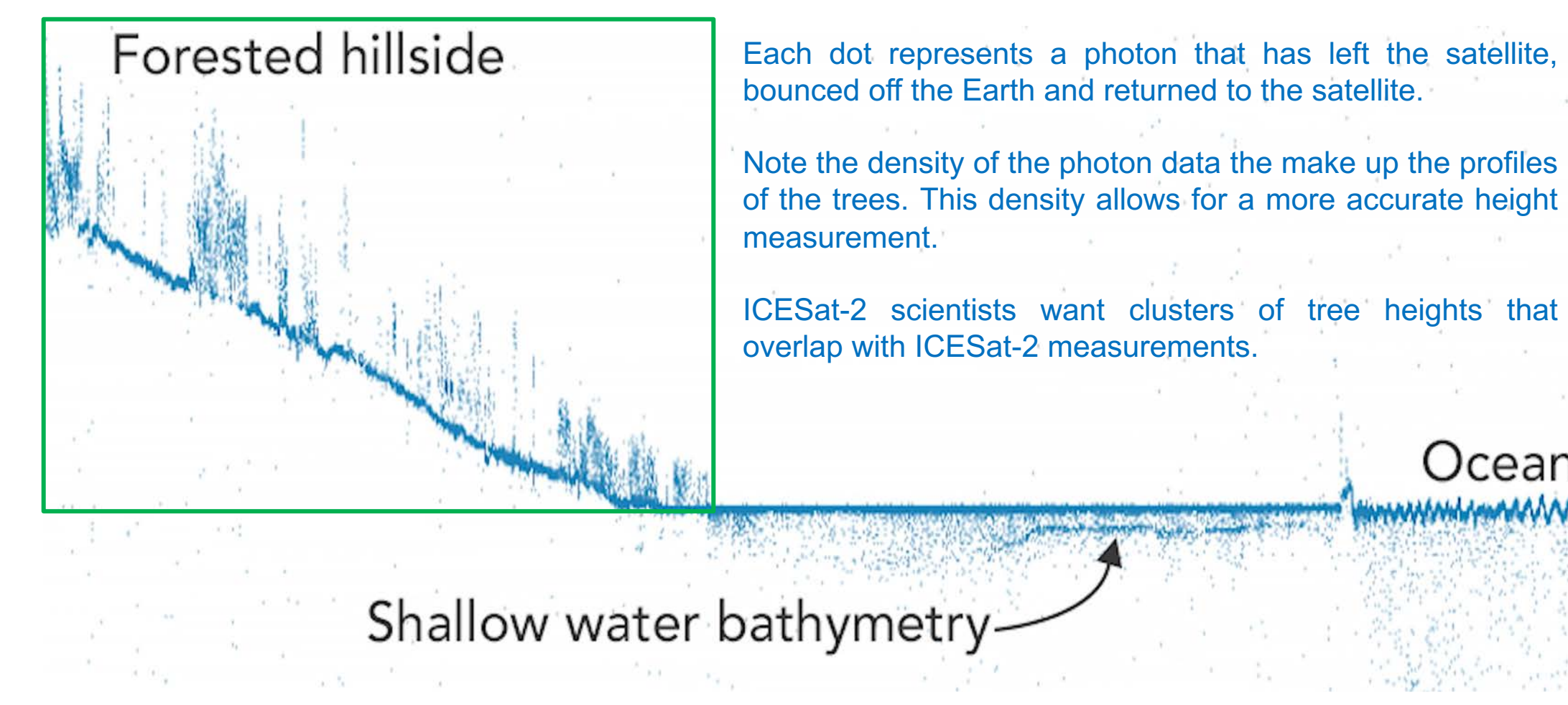
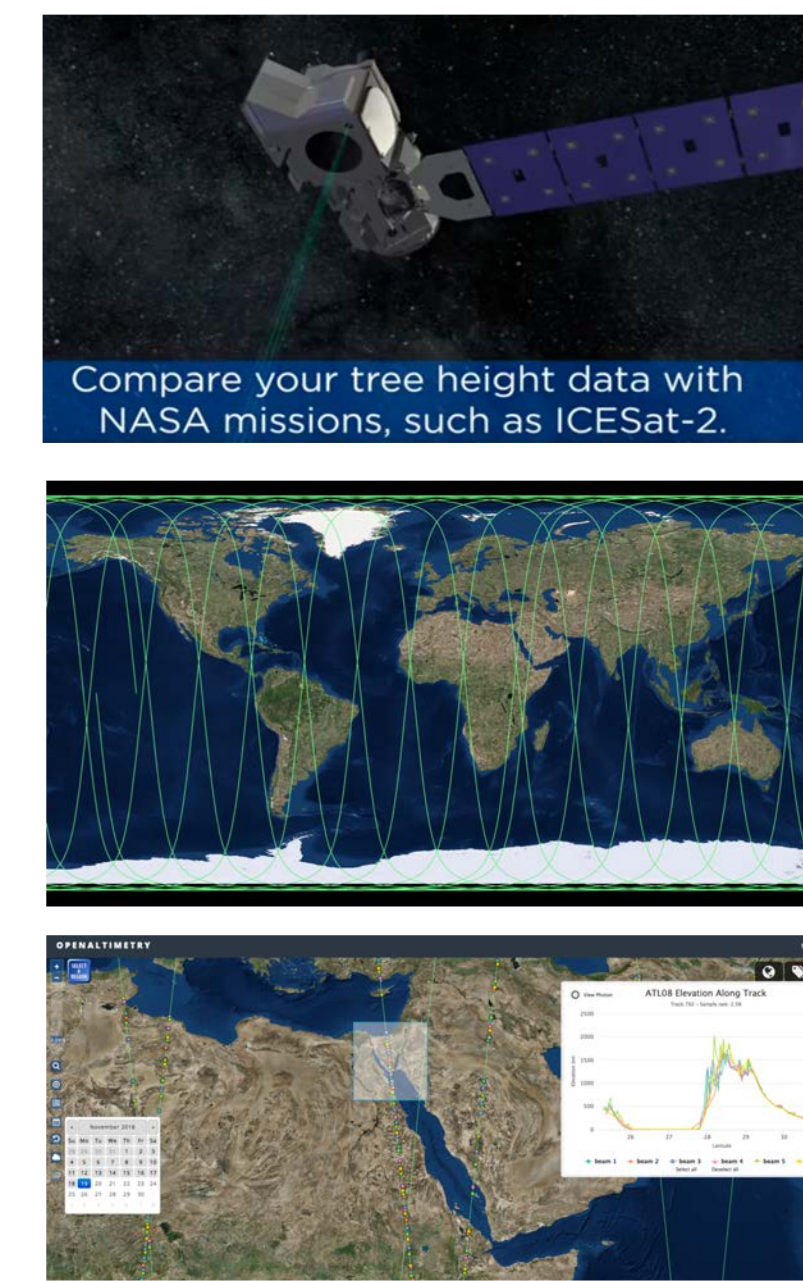
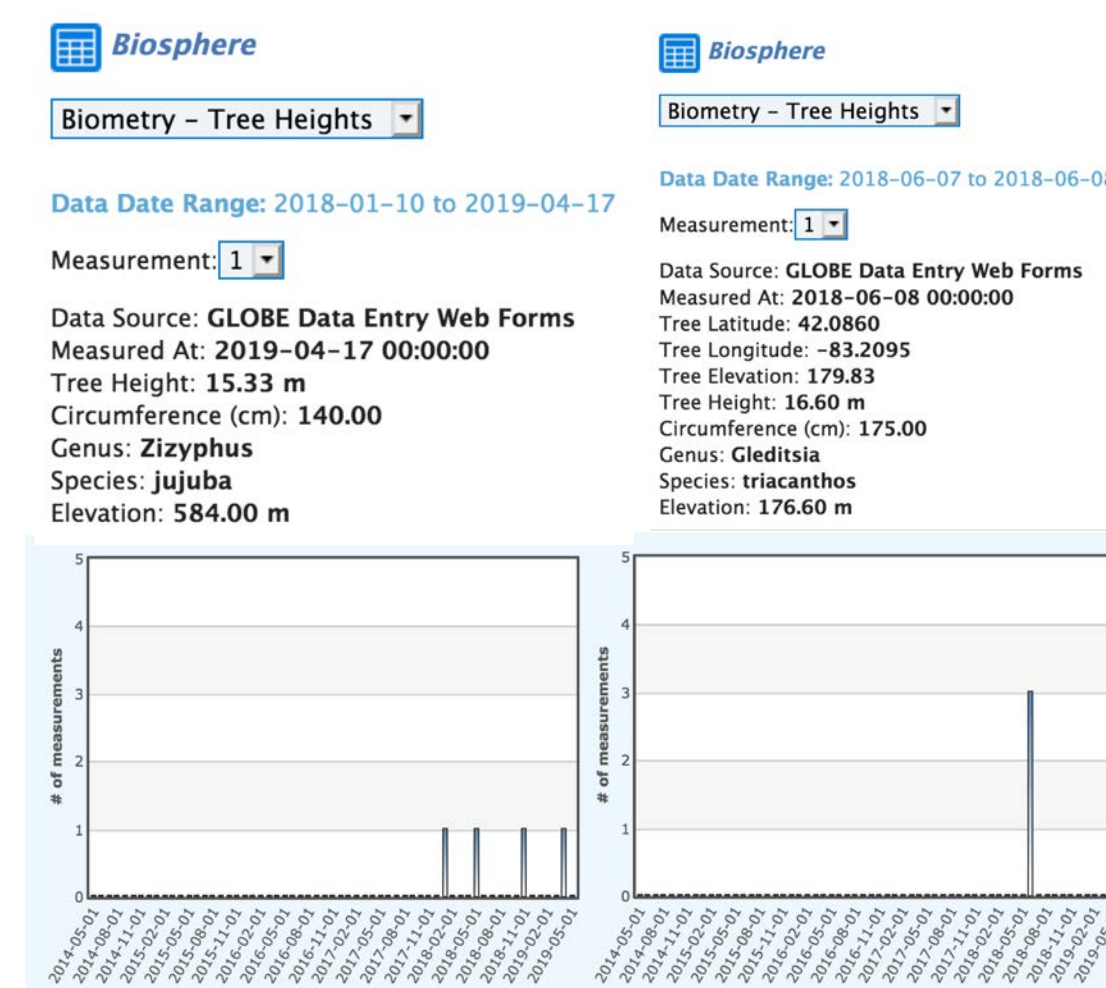


NASA GO App

The Dual Purpose

The ICESat-2 satellite uses an on-board laser altimeter system to measure the height of Earth. Measurements of ice sheets, sea ice, trees, bodies of water, mountains are all part of what ICESat-2 measures.

Scientists from the ICESat-2 Mission will periodically review the tree height data collected by the GLOBE community throughout this campaign. The data will allow scientists to compare the GLOBE data to the ICESat-2 data and in potential professional research



Each dot represents a photon that has left the satellite, bounced off the Earth and returned to the satellite.

Note the density of the photon data that make up the profiles of the trees. This density allows for a more accurate height measurement.

ICESat-2 scientists want clusters of tree heights that overlap with ICESat-2 measurements.

The IOPS

Campaign Intensive Observation Periods (IOPs) are focused periods of time where students are encouraged to collect large amounts of tree height and land cover data and enter it in the GLOBE database.

Data that is collected during an IOP will provide other GLOBE students, scientists, researchers, and educators large amounts of concentrated data over a short period of time.

This can also be referred to as "Data Density." Ground-based data density can serve as way to help validate data coming from satellites and airborne instruments.

691 Measurements - January 2019

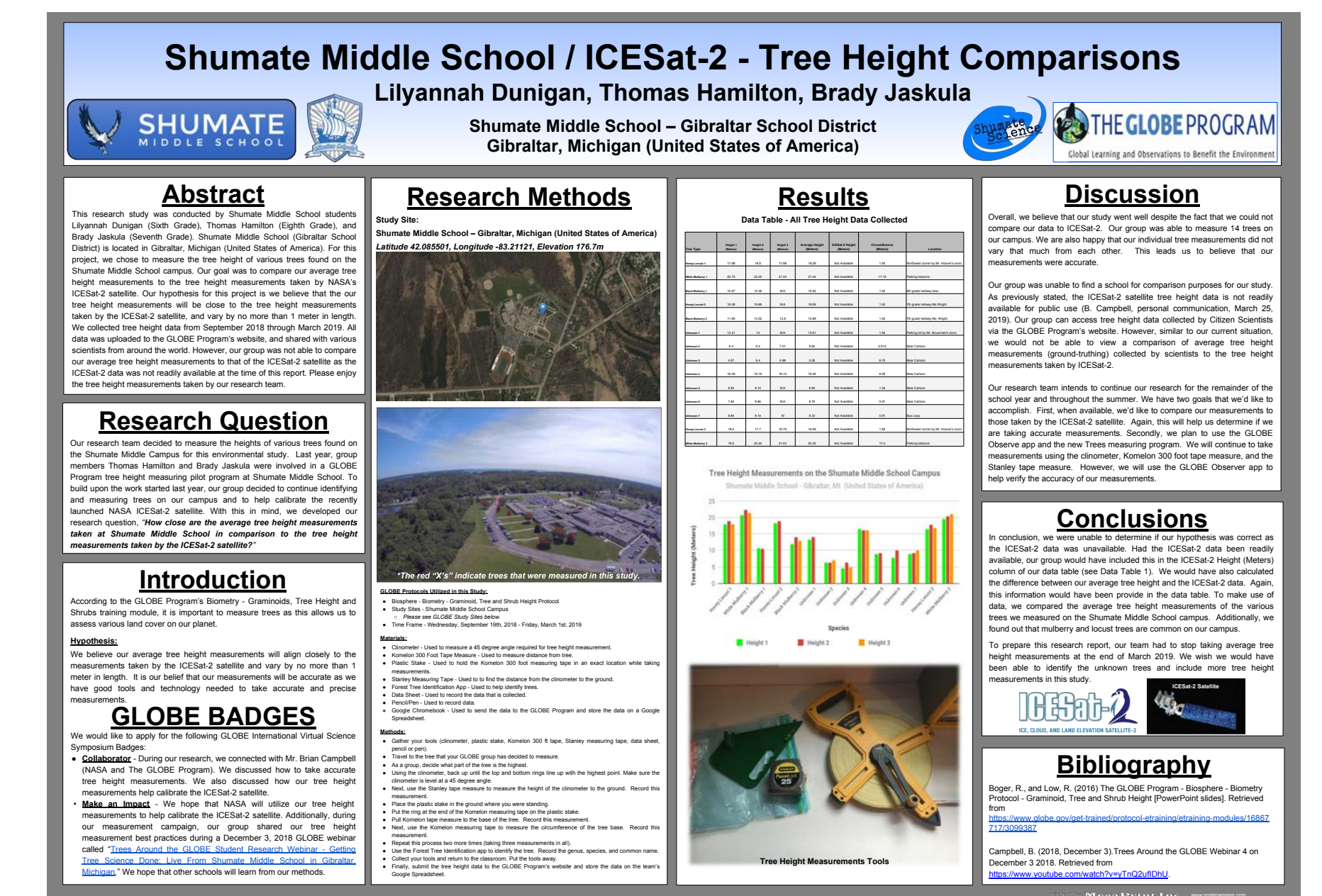
3,520 Measurements - April 2019



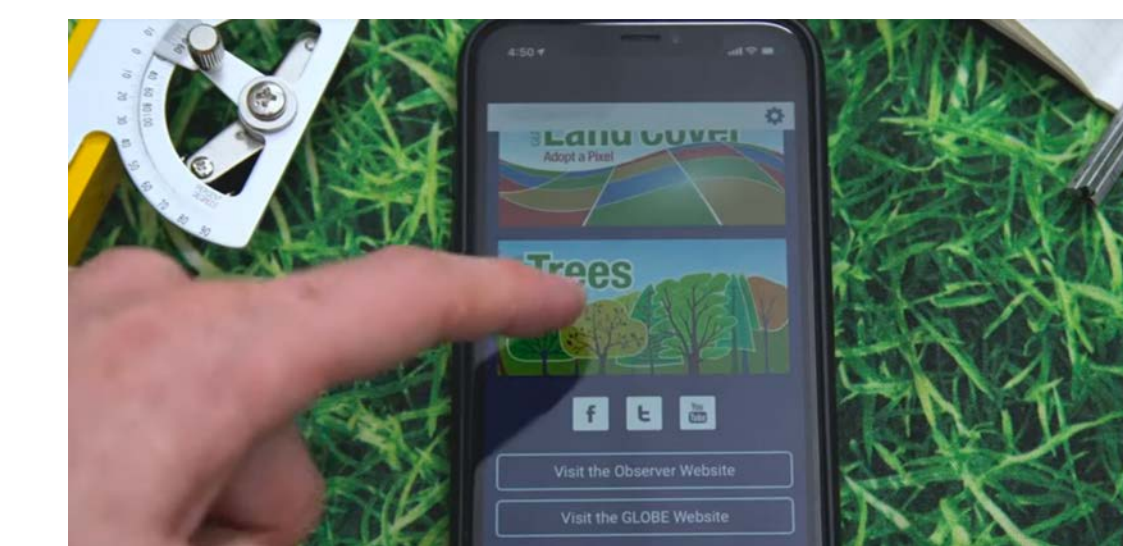
The Metrics



- 6500+ Tree Height Measurements
- 6400+ Green Up/Green Down Measurements
- 5500+ Land Cover Measurements
- 11 webinars (10 campaign specific, 1 FB Live)
- 505 direct participants from 26 countries
- 2 IOPs with 4,211 measurements
- 22 blogs with 16,000+ views
- 62 uploaded documents
- 4 IVSS projects related to campaign



The NASA GO Trees Tool



The Trees observation tool in the NASA GLOBE Observer (NASA GO) app allows citizen scientist observers to use their mobile devices to take tree height and tree circumference measurements all over the globe.

The Websites

- Campaign: <http://www.globe.gov/web/trees-around-the-globe/overview>
- App: <http://observer.globe.gov>
- ICESat-2: <https://icesat-2.gsfc.nasa.gov/>
- NSIDC: <https://nsidc.org/data/icesat-2>
- Open Altimetry: <https://openaltimetry.org/data/icesat2/>