Let's Talk NASA GLOBE Tree Height: Trees Around the GLOBE Student Research Campaign and the NASA GLOBE Trees Challenge 2022: Trees in a Changing Climate

GLOBE Slovenia
24 October 2022

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Lead - ICESat-2 Mission Education

Lead - NASA GLOBE Observer Trees Science

Lead – Trees Around the GLOBE Student Research Campaign

Lead – NASA Wallops Earth Science STEM Engagement

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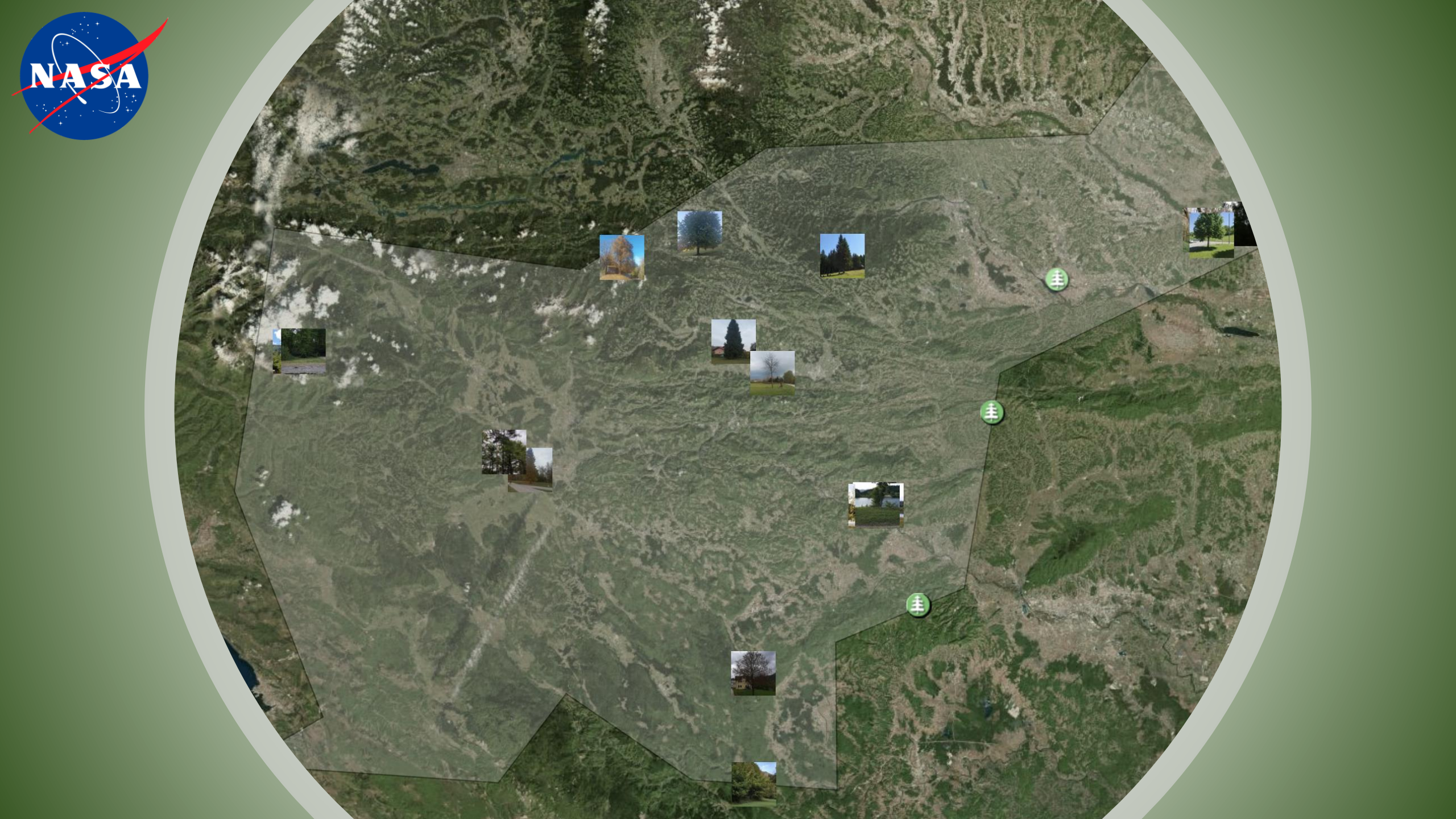


GLOBE Trees

Looking at Trees and Tree Height

WHY IS TREE HEIGHT SO IMPORTANT AND WHY DOES NASA CARE....and WHY SHOULD YOU?

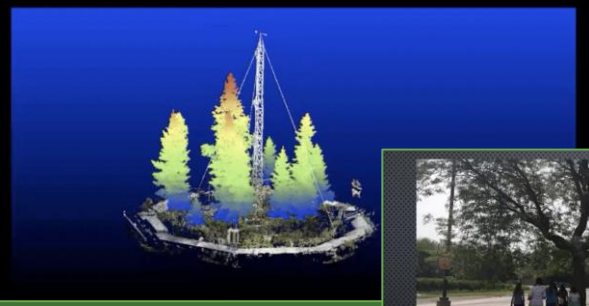
Tree height is the most widely used indicator of an ecosystem's ability to grow trees

Tree height allows you to track the growth of trees over time

The GLOBE Tree height observations can help researchers understand the gain or loss of biomass which can inform calculations of the carbon that trees and forests either take in from or release into the atmosphere.

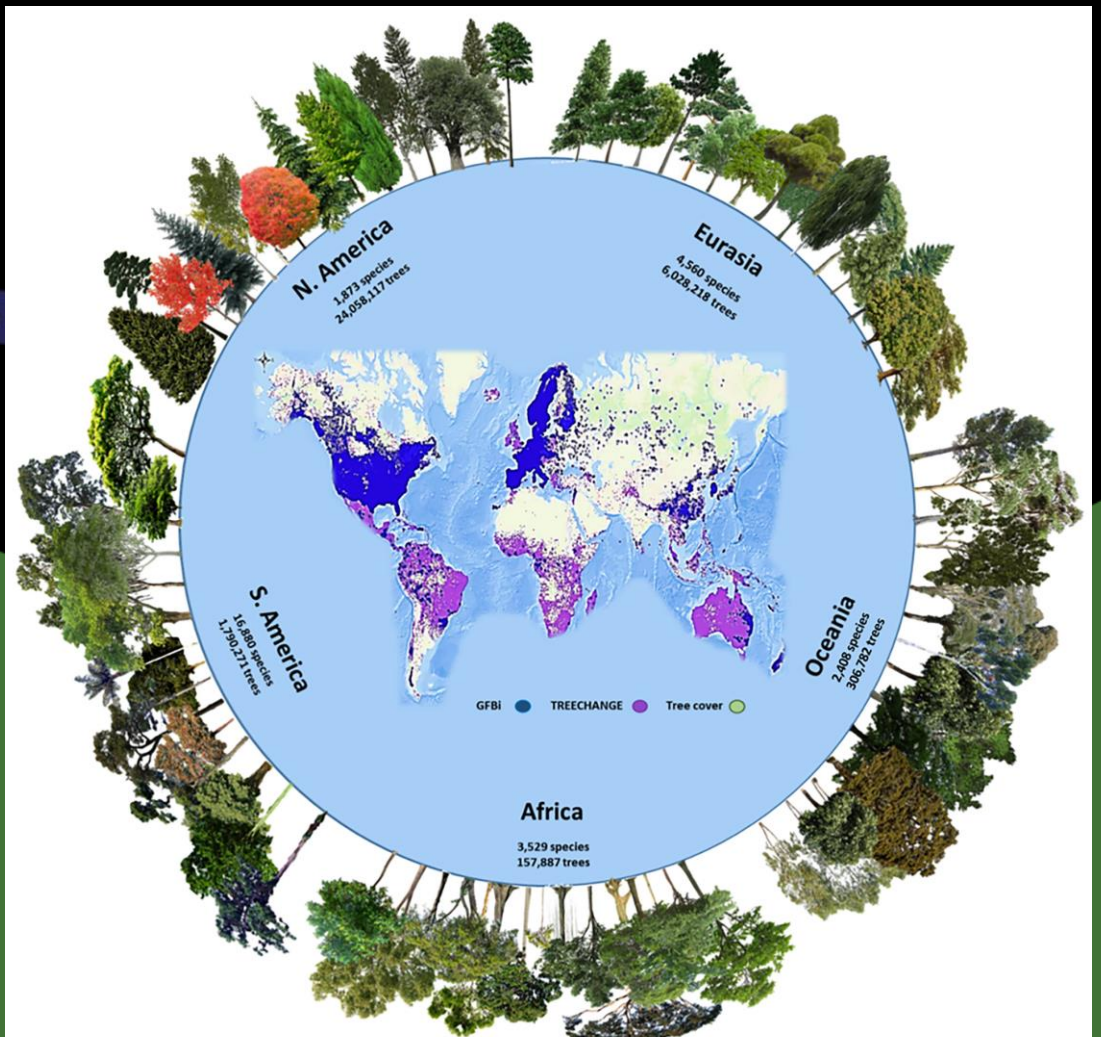
NASA missions utilize an onboard laser altimeter systems to measure the height of our planet, one photon at a time. The advanced technology of ICESat-2 can measure the height of trees and forests all around our planet.

Tree height is an indicator of the environment



GLOBE Trees

There are 3.03 trillion trees and 78,000 tree species on Earth. Each tree is an indicator of a changing climate!



Year 5: 1 October 2022 - 30 September 2023

Looking at Change Over Time and Organizing Student Research

Our goal is to help teachers guide students with their student research projects focusing on tree height, land cover, greenings (green-up/green-down), and carbon cycle, by showcasing how to use new and archived GLOBE data, online data tools and maps, and bringing together GLOBE schools for project collaboration for IVSS 2023. This year, the campaign will focus deep on getting students really focused on the trees and land cover in their local regions by taking a detailed look at the characteristics in every land cover and tree height photo they take.

https://www.globe.gov/web/trees-around-the-globe/

GLOBE Trees

The Trees Around the GLOBE Student Research Campaign

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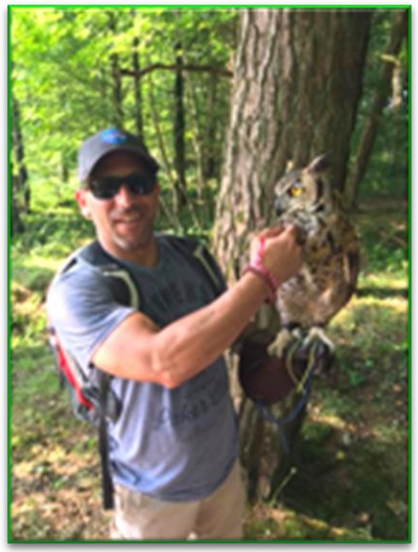

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GLOBE Trees Core Campaign Team

Cross-Campaigns Collaborations

Trees Around the GLOBE Student Research Campaign

Tree Height, Land Cover, Greenings
https://www.globe.gov/web/trees-around-the-globe

European Phenology Campaign

Greenings (Green-up, Green-down, Carbon Cycle)
https://www.globe.gov/web/european-phenology-campaign

The GLOBE Program

GLOBE Mission Mosquito

Mosquitoes, Tree Holes
https://www.globe.gov/web/mission-mosquito/overview

Urban Heat Island Effect – Surface Temperature Field Campaign

Land Surface Temperature – Shaded and Non-shaded tree areas

MULTIPLE WAYS STUDENT, EDUCATORS, AND CITIZEN SCIENTISTS ARE MEASURING AND OBSERVING TREE HEIGHTS, FROM THE GROUND UP

GLOBE Hand-Held Clinometer

https://youtu.be/Ky6KhGLw1AU

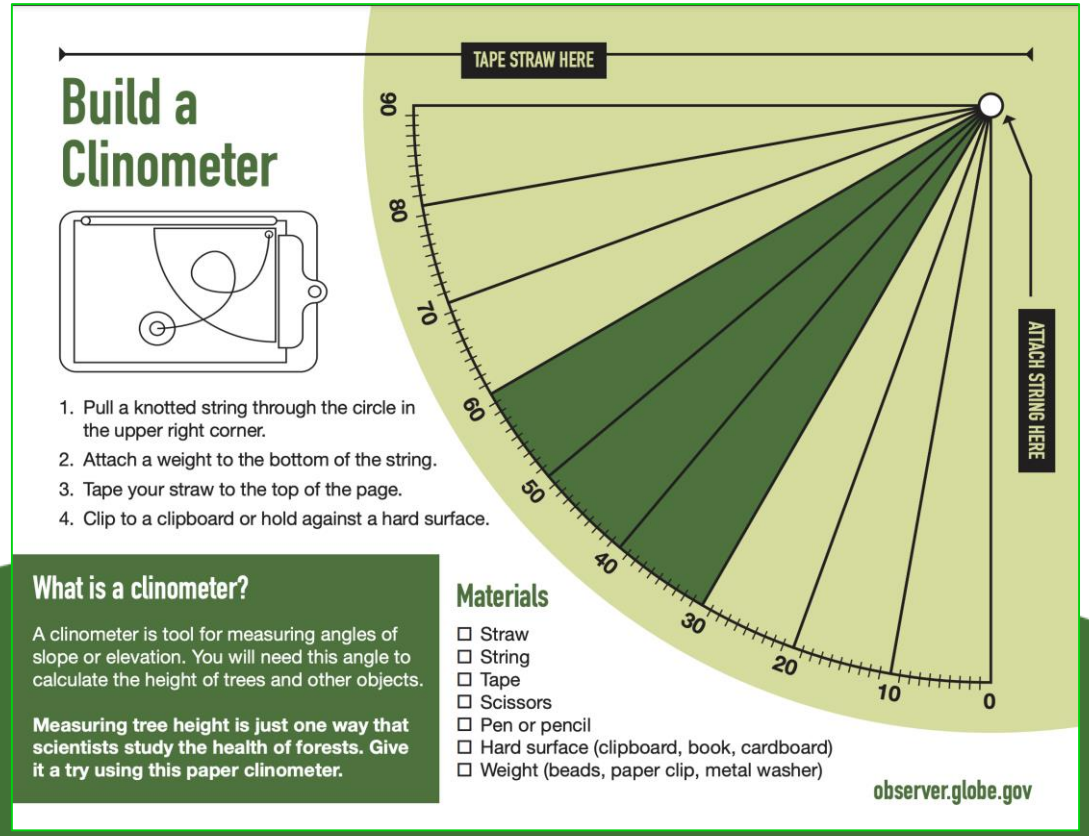
NASA GLOBE Observer Trees Tool for Citizen Science

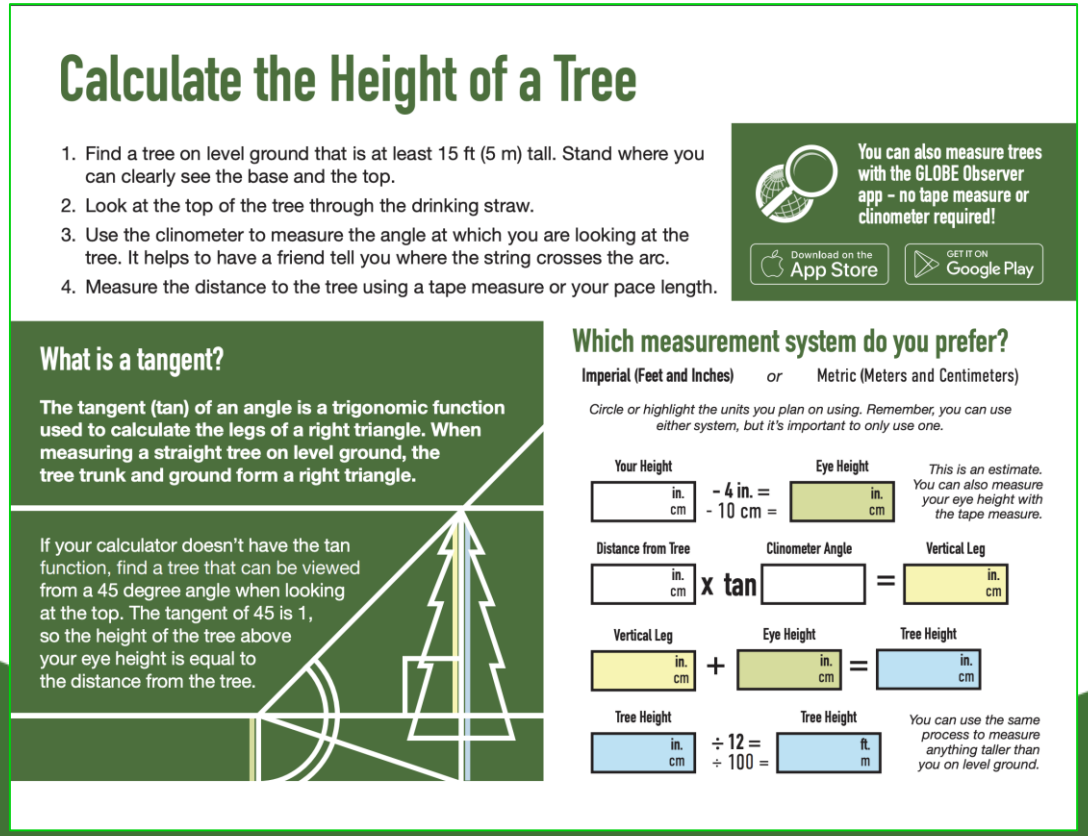
https://observer.globe.gov/do-globe-observer/trees

GLOBE Trees

ONE WAY TO MAXIMIZE ACCURACY OF THE GLOBE TREE HEIGHT DATA IS TO TAKE TREE HEIGHT OBSERVATIONS WITH A HAND-HELD CLINOMETER AND THE NASA GLOBE OBSERVER TREES TOOL, THEN COMPARE THE MEASUREMENTS AND REPEAT!

The Hand-Held Clinometer for Measuring Tree Height





GLOBE **Trees**

Clinometer: an instrument used for measuring the angle of elevation of slopes. A clinometer can be used to measure the heights of trees, poles, towers, and buildings.

The NASA GLOBE Observer Trees Tool for Citizen Science allows citizen scientists to take tree height measurements, information that can be compared with data from NASA missions.

GLOBE Trees

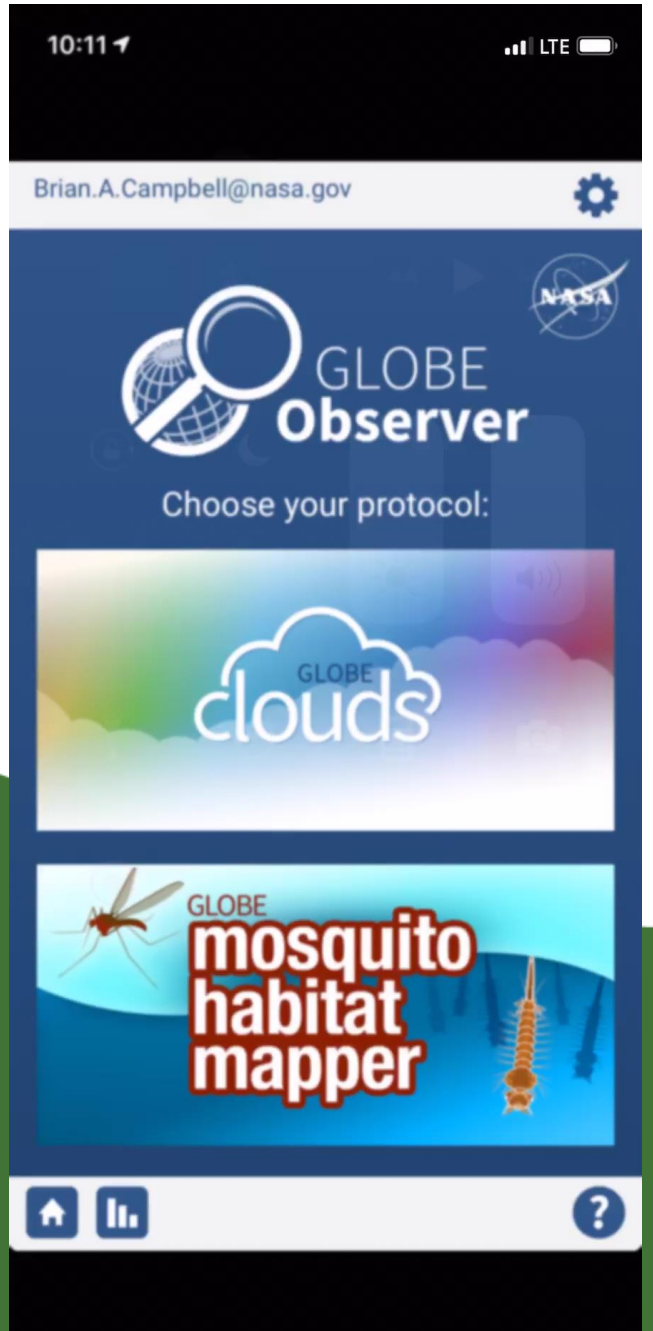
The NASA GLOBE Observer Trees Tool:
https://observer.globe.gov/do-globe-observer/trees

An Example Observation of the NASA GLOBE Observer Trees Tool

The 4 most important things to remember:

- **Only take NASA GO observations if it is safe and legal to do so.**
- **When choosing a tree, make sure you can see the base and top of the tree and be able to walk to its base in a straight line with no obstacles.**
- **Always keep your cell phone's camera at eye level when measuring the angles to the base of the tree and the top of the tree.**
- **Always make sure you have the correct height for the current observer taking the tree height observation - you can check this in the Trees Tool Introduction section.**

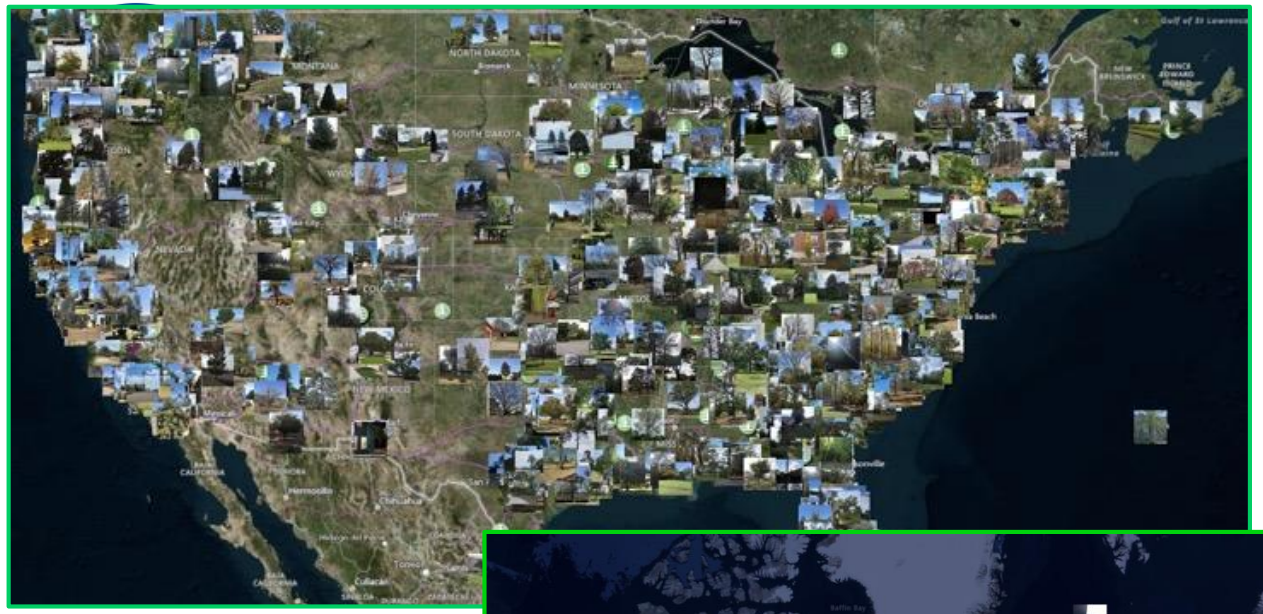
GLOBE Trees



Optional Observation: Tree Circumference

Tree circumference is a common measurement used by ecologists. It is the measurement around the trunk of the tree, taken at Diameter Breast Height (DBH). DBH is a standard measure 1.35 m from the ground surface and used by researchers, foresters and ecologists.

This information, along with the tree height, can help us estimate how much carbon dioxide has been pulled in by a tree over its lifetime.



Tree Height Measurements with a Hand-Held Clinometer

Tree Height Measurements with the NASA GLOBE Observer Trees Tool

IN THE GLOBE PROGRAM DATABASE, THERE ARE 73,000+ TREE HEIGHT OBSERVATIONS FROM 23,500+ GLOBAL LOCATIONS!

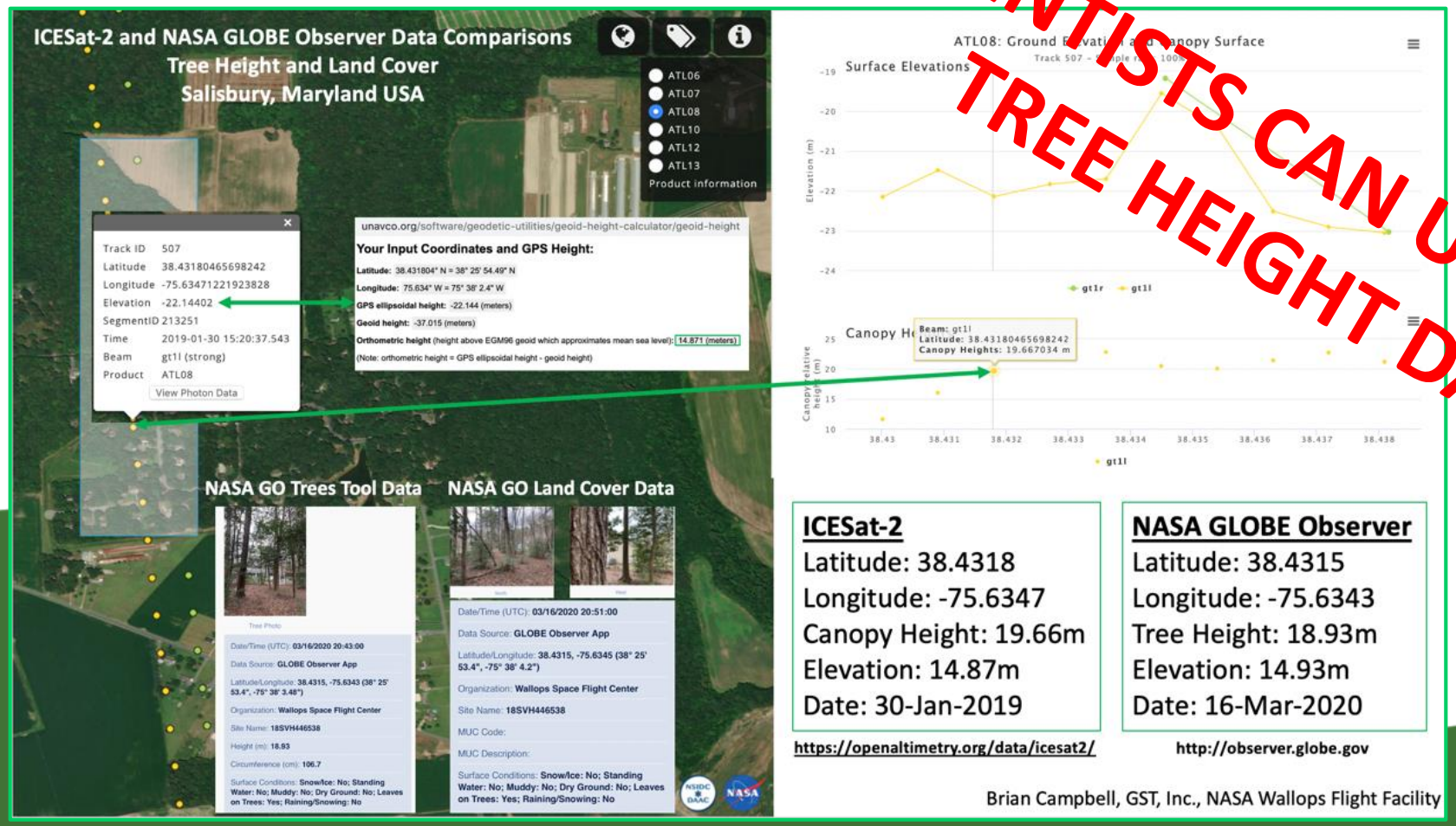
GLOBE Trees

Where is all the GLOBE Tree Height Data coming from?

THE ONLINE OPEN ALTIMETRY TOOL TO VISUALIZE ICESAT-2 TREE HEIGHT DATA AND COMPARE TO GLOBE TREE HEIGHT DATA

Looking at groups of trees and ICESat-2

SCIENTISTS CAN USE YOUR TREE HEIGHT DATA



GLOBE Trees

Comparing NASA GLOBE Observer Tree Height Data to NASA Satellite Data on Open Altimetry

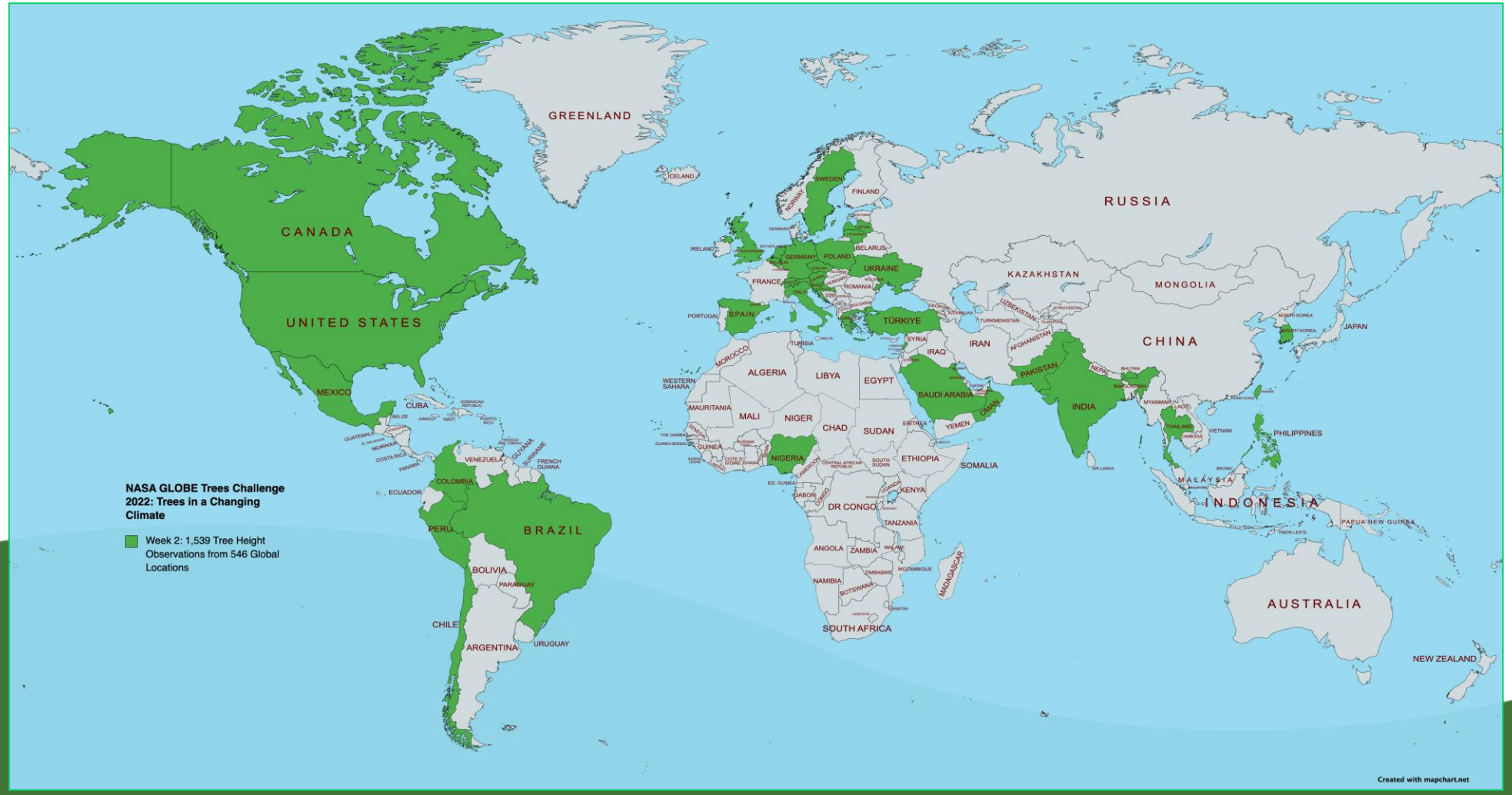
http://openaltimetry.org

NASA GLOBE Trees Challenge 2022: Trees in a Changing Climate

With the 3.03 trillion trees and 78,000 tree species on Earth, we are constantly striving to build and sustain the global inventory of tree height observations and to collect as many tree circumference measurements as possible. Scientists especially need data from multiple trees in areas that contain many trees. This data density is a way for scientists to build a more robust dataset of the tree heights from the ground and space.

GLOBE Trees

https://observer.globe.gov/trees-2022



GLOBE **Trees**

The Challenge numbers so far!

1,539 Tree Height Observations from 546 Global Locations

ASSOCIATED LINKS AND CONTACT INFORMATION

GLOBE Trees

THE GLOBE Program:
http://www.globe.gov

NASA GLOBE Observer Trees Tool:
https://observer.globe.gov/do-globe-observer/trees

NASA GLOBE Trees Challenge 2022: Trees in a Changing Climate
https://observer.globe.gov/trees-2022

NASA GLOBE Observer Land Cover Tool:
https://observer.globe.gov/do-globe-observer/land-cover

GLOBE Trees Family Guide:
https://observer.globe.gov/trees-family-guide

ICESat-2 on Open Altimetry:
http://openaltimetry.org

ICESat-2 Mission Website:
https://icesat-2.gsfc.nasa.gov/

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