NASA Citizen Science Panel

Duan Biggs

Speaker

Di Yang

Speaker

Marco Tedesco

Speaker

Maria Vernet

Speaker

Moderator: Becky Boger

#GLOBEMeeting2025

Engaging citizen scientists for inclusive Earth systems monitoring

Duan Biggs
Jenna Keany
15 July 2025

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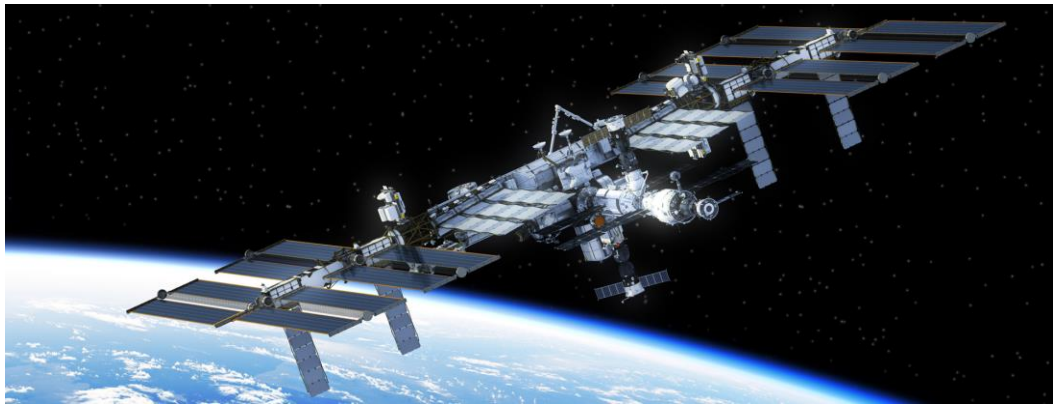
The Challenge

- NASA’s estimates for aboveground carbon from the GEDI instrument needs additional ground truthing

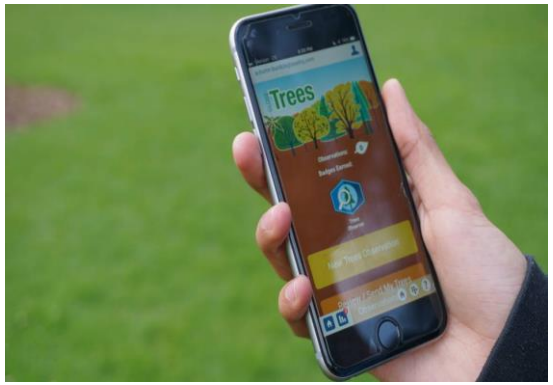


- Opportunity to involve rural, local communities in collecting citizen science data for NASA

Project Goals

1. This project will engage citizen scientists to collect data on tree height, diameter, and species that provides on ground validation to improve NASA’s Earth Systems Monitoring GEDI L4a biomass product.
2. Assess motivations and preferences of local communities to collect citizen science data using GLOBE
3. Expand the use of GLOBE by engaging with GLOBE's citizen science network across four countries (Kenya, Malaysia, Ecuador, US Tribal Nations).

Improving Forest Carbon Estimates in the Tropics



- Using the Globe Observer mobile app, we are training citizen scientists to upload tree height, DBH, and species within GEDI footprints
- This will help validate and improve GEDI's aboveground carbon estimates

GLOBE Framework development – using focus groups in Kenya and US Tribal Nations

- We are developing a framework for using citizen science in rural and low-income regions that implements best practices in the engagement of Indigenous People and Local Communities.
- We will use focus groups to assess local community's motivations for collecting tree citizen science data in Amboseli, Kenya (starting Jan 2026)

If interested in collaborating, please contact:

Duan.Biggs@nau.edu

Jenna.Keany@nau.edu

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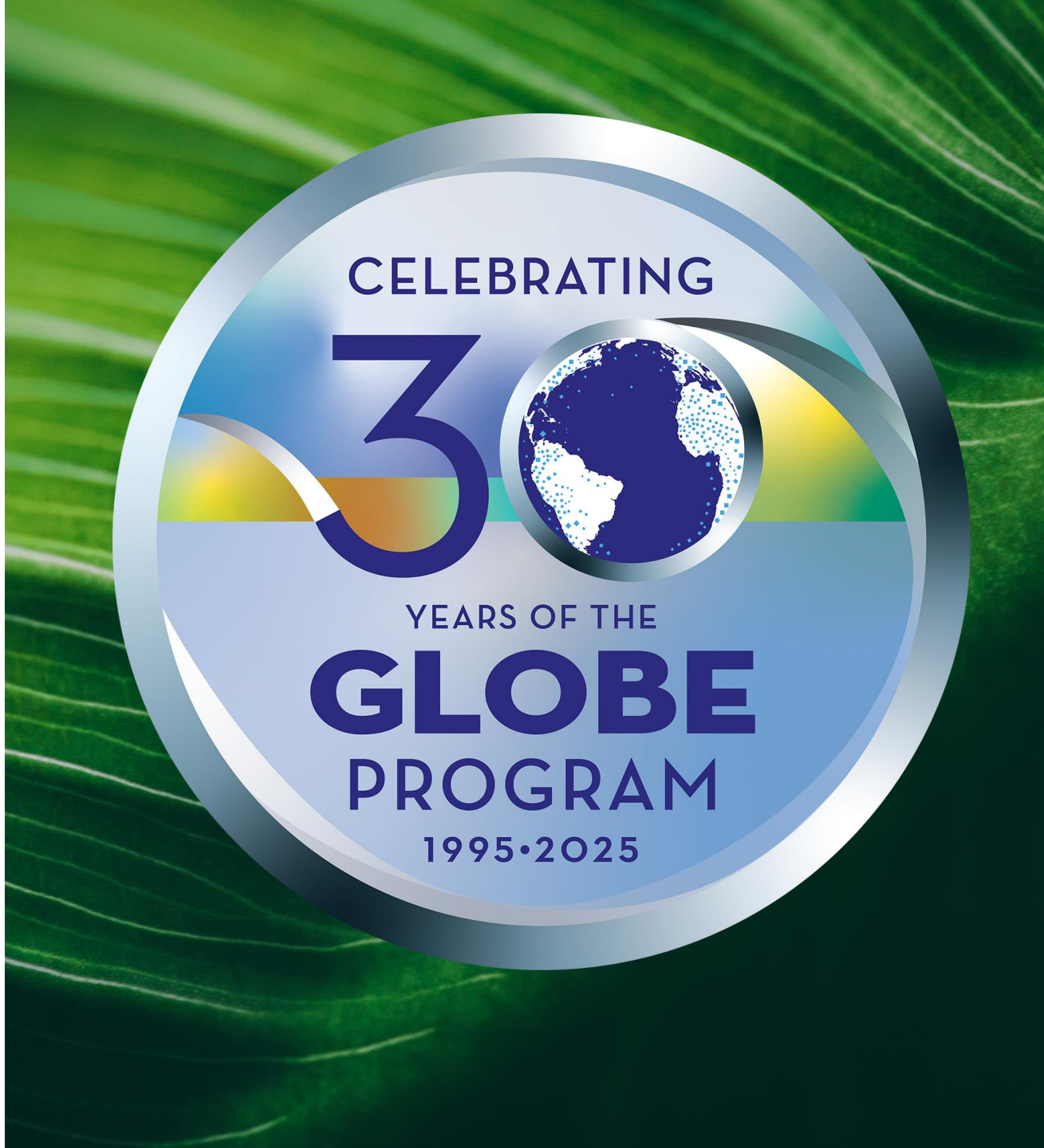
AI and the GLOBE Observer: Citizen Science in Land Cover and Mosquito Habitat Mapping

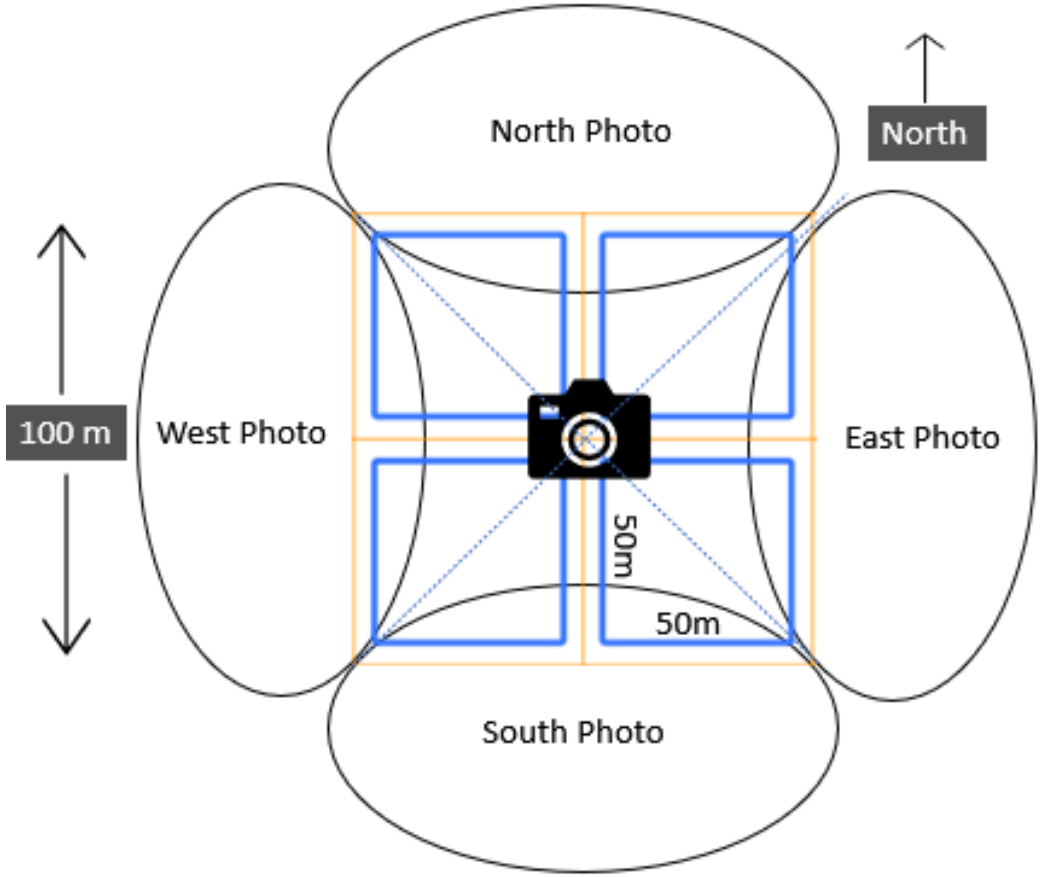
Dr. Di Yang
University of Florida
15 July 2025

Sponsored by: NASA Supported by: NSF NOAA



GLOBE Observer – Land Cover

Multi-view land cover classification – GO Land Cover Sampling Protocol



Multi-View Land Cover Classification


East


West


South


North

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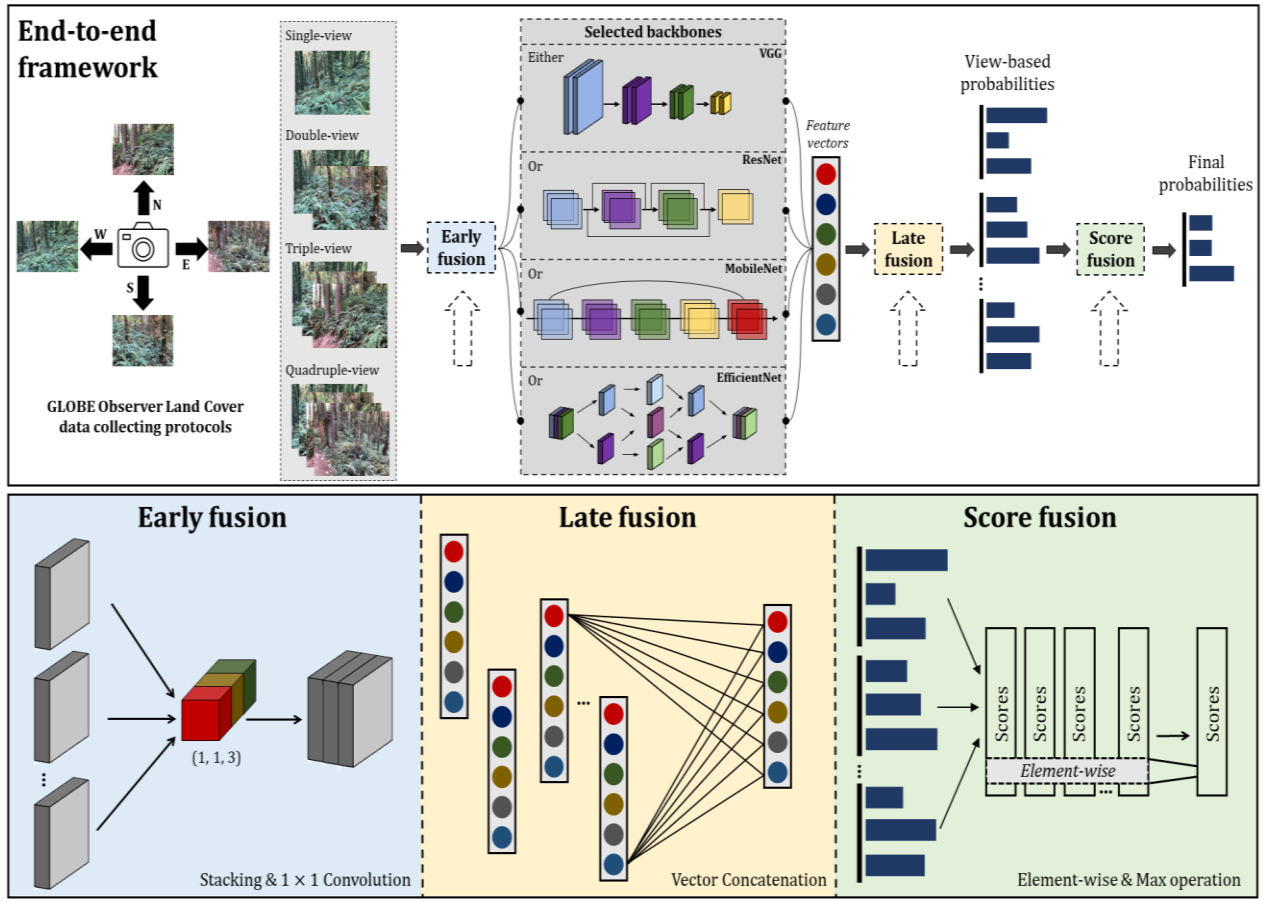
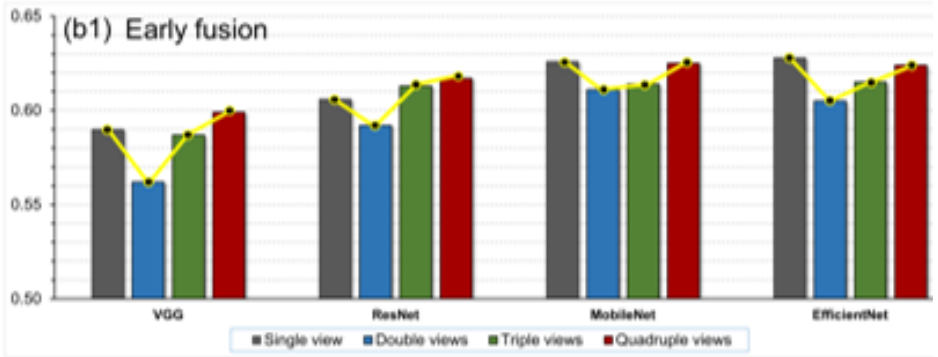
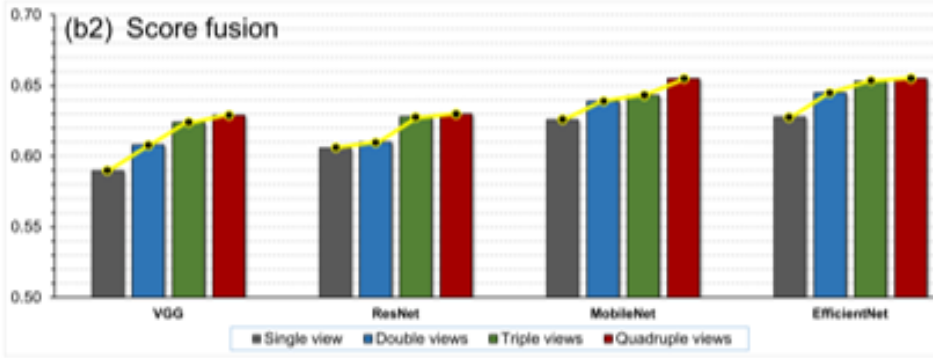
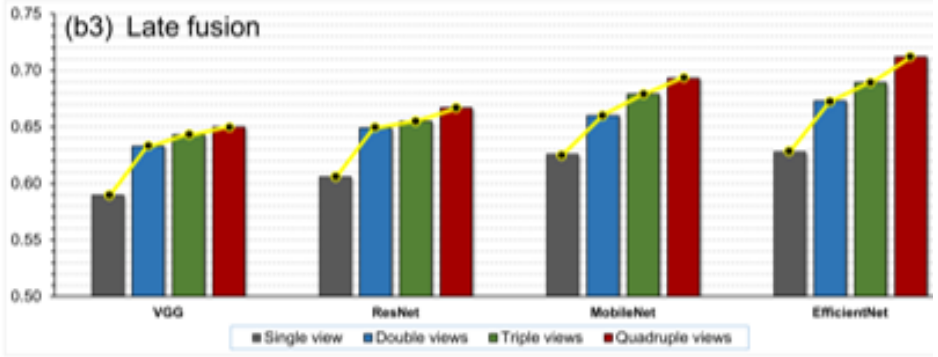
GLOBE Multi-View Land Cover Classification









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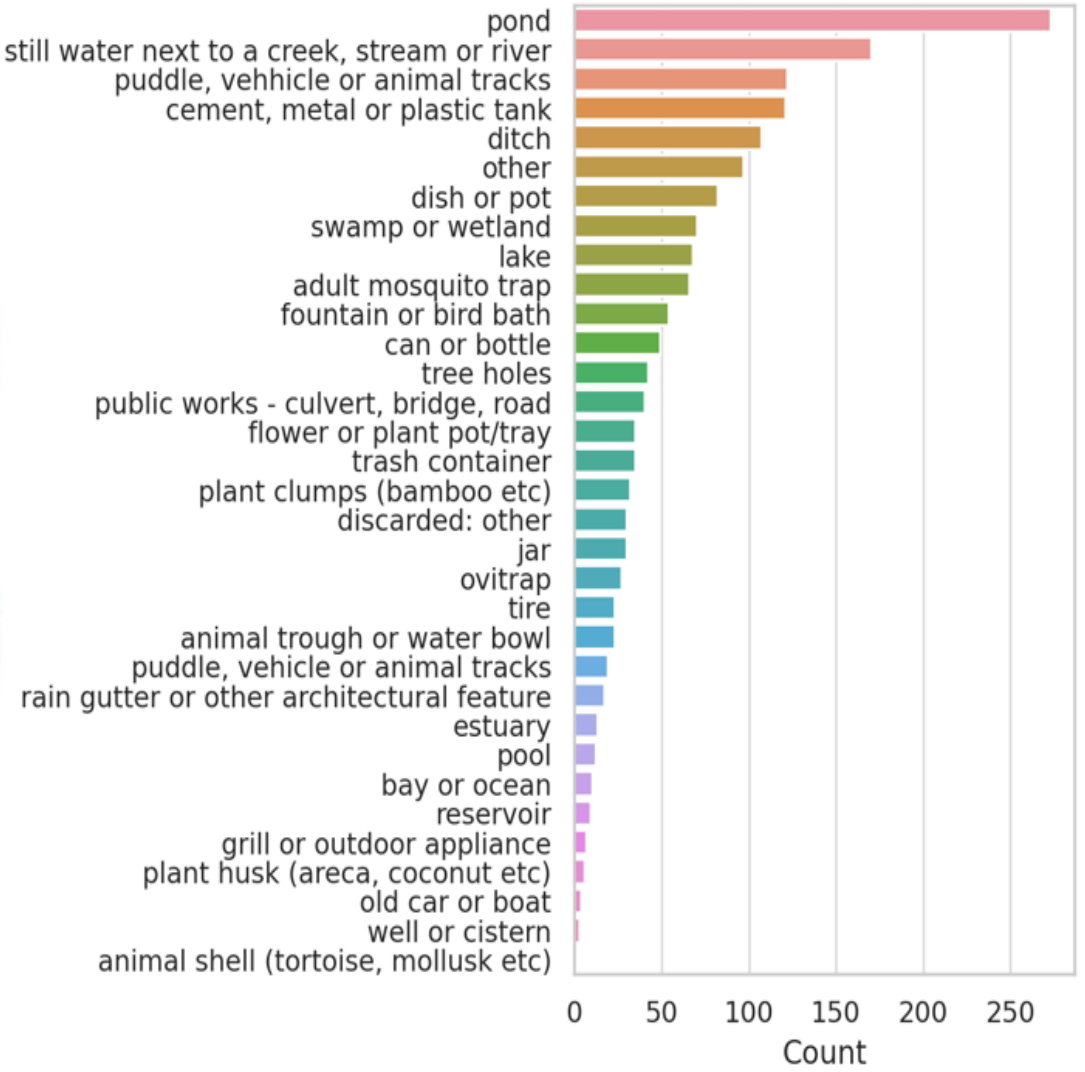
GLOBE Observer Mosquito

Mosquito -> MicroHabitat

A bar plot showing how frequently each category appears in the dataset.



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Solutions & Societal Value

To benefit humanity, we:

- Offer models, scientific findings and info through Open-Source Science principles
- Provide science applications and tools to inform decision

Forecasting Mosquito-Borne Disease Risk in a Changing Climate: Integrating GLOBE Citizen Science and NASA Earth System Modelling.

EBERGE- Earth observations for Mosquito-borne disease monitoring using citizen sciEnce, Risk Geomapping and prEdiction

Global Citizen Science Network

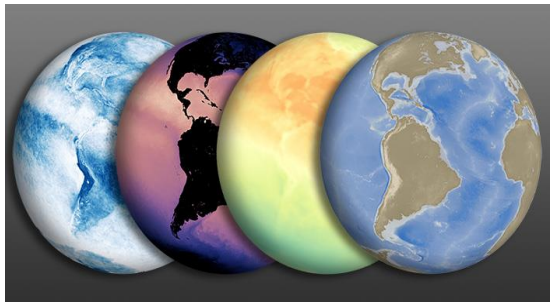
- 100+ Countries
- 80,000 + GLOBE Observers
- Near Real-Time Monitoring

AI-Powered Integration

GLOBE Data

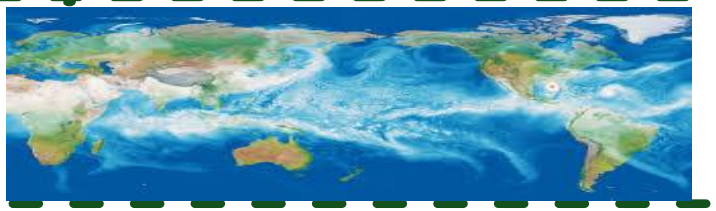
GLOBE

NASA Earth Observation



Climate Modeling

Earth System Models



Climate Scenarios

- SSP1-2.6 (Sustainable)
- SSP2-4.5 (Middle Road)
- SSP5-8.5 (High Emissions)

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Call for Action

NASA GLOBE Workshop Series

AI/ML-derived land cover mapping tools address the question of how to build models that improve automatically based on experience. Those tools are growing rapidly in all disciplines.

Objective: Design collaborative interactive AI/Machine Learning (ML) and remote sensing projects for students in biology, earth, environmental, and computer sciences

a) Increase students' skills and content knowledge in AI and Machine Learning
b) Introduce students to exploring land cover, mosquito habitat and introduce remote sensing technology
c) Predict and mapping Wyoming land cover by their collected dataset

Success with AI/ML requires more than just training an AI model. The solid AI land cover workflow involves preparing the data, creating a model, designing the system, assessing the outcomes.

AI Applications can have a positive and/or negative effect on humanity, which makes data literacy critical. Data quality, data sources, and the AI model selection can completely flip the outcomes.

About

About EMERGE

EMERGE stands for Engaging Communities in Environmental Research and Geospatial Education.

It is a statewide initiative that helps libraries, educators, and individuals across Florida engage in public health and environmental science using real-world data tools and citizen science.

EMERGE Mailist:

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UF UNIVERSITY of FLORIDA

X-snow: A citizen science snow project

Marco Tedesco

07/15/2025

Sponsored by: NASA Supported by: NSF NOAA

X-Snow is designed to **enhance our understanding of snow properties and improve remote sensing estimates and modeling outputs**, while connecting community members with their environment with a specific focus on the East coast.

We are currently working with local community groups, high schools and individuals and are looking for additional partners in this region.

Early partnerships:

- The Catskill Center
- The Adirondack Wild Center
- The Schoharie River Center
- several regional high school teachers C their AP Environmental Science classes.

Margie Turrin
½ PI

Marisa Annunziato
Educational and Outreach

www.xsnow.us

Stella Dull
Social Media Manager

The importance of snow citizen science

Snow cover helps **regulate the temperature** of the Earth's surface

Seasonal snow is an **important part of Earth's climate** system.

Snow melt helps **fill rivers and reservoirs** in regions around the world

On a smaller scale, variations in snow cover can **affect regional weather patterns.**

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- Snow depth
- Meteorological
- Surface albedo
- Snow grain size
- Traditional Snowpit
- Drone data
- Microplastics

PROTOCOLS FOR DATA COLLECTION

Tier 1

This is the simplest and most intuitive protocol to collect basic information on snow.

Link to the Protocol Description
Link to the Data sheet

Tier 2

This is more sophisticated than Tier 1 but still very affordable !

Link to the Protocol Description
Link to the Data sheet

Tier 3

This is the most sophisticated tier where snow data is collected in a snow pit !

Link to the Protocol Description
Link to the Data sheet

Fieldwork activities are designed to collect data necessary for validating the accuracy of satellite measurements and models of the snowpack. 3 different tiers of data collection from the very simple temperature, snow depth, photo collection up to a more intense snow pit density collection:

We are building community throughout fall, and we are considering a snow school with NASA in winter 2026.

We are looking to build on existing citizen science projects that could share datasets or images of opportunities or to collaborate to benefit from our network in summer and spring

Thanks to the NASA Citizen Science Project for funding us—Gerald “Stinger” Guala, Sarah Kirn (GMRI) and Marc Kuchner (NASA HQ)

Icebergs and the GLOBE Tree App: Citizen Science in Greenland coastal waters

Maria Vernet

15 July 2025

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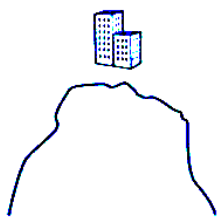
Iceberg size

Iceberg type	Iceberg Size	Height above sea surface (meters)	Length (meters)	Weight (Megatons)
Growler		less than 1 metre	less than 5 metres	0.001
Bergy Bit		1 metre to less than 5 metres	5 metres to less than 15 metres	> 0.01
Small Berg		5 metres to 15 metres	15 metres to 60 metres	>0.1
Medium Berg		16 metres to 45 metres	61 metres to 120 metres	2.0
Large Berg		46 metres to 75 metres	121 metres to 200 metres	10.0
Very Large Berg		Greater than 75 metres	Greater than 200 metres	Greater than 10.0 metres

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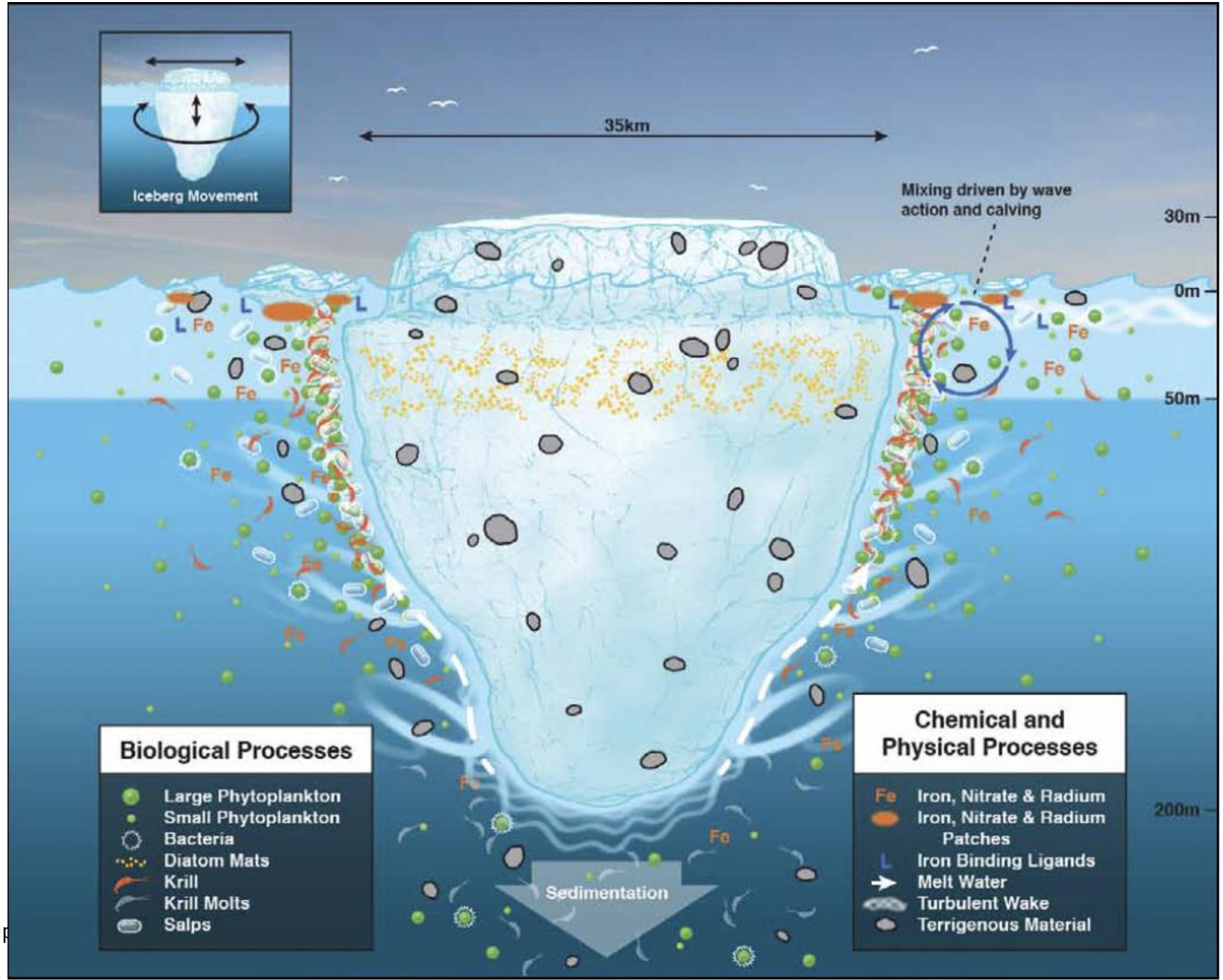
The Iceberg Ecosystem



The GLOBE Observer Tree App adapted to Icebergs:

1. **The App provides photos taken correctly and consistently by citizen scientists, geographical location, storage**

2. **With a range finder we take distance to the iceberg (instead of steps to the tree), iceberg height, iceberg width**

3. **Extra information is kept in Notes in the App**

4. **With sophisticated range finders we obtain wind speed and direction, air temperature, humidity**

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