Introduction to GLOBE

A Worldwide Science and Education Program

eTraining Module

Welcome to GLOBE: Global Learning and Observations to Benefit the Environment

- GLOBE is a science and education program that connects a network of participants and scientists from around the world to better understand, sustain and improve Earth's environment at local, regional and global scales.
- To date, more than 280 million measurements have been contributed to the GLOBE database, creating meaningful, standardized, global research-quality data sets that can be used in support of student and professional scientific research.
- It's easy to get started! You'll find out how in this module!

Overview and Objectives

This module:

- Introduces the GLOBE Program
- Describes the GLOBE Investigation areas
- Identifies resources and community science opportunities

After completing this module, you will be able to:

- Describe why participants apply GLOBE protocols when collecting data
- Identify the 4 GLOBE investigation areas as parts of the Earth system
- View GLOBE data using the GLOBE Visualization System
- Know how to become a GLOBE member and start using GLOBE in your community.

To become a GLOBE member you will need to:

- Get started by creating an account on the GLOBE website or the GLOBE Observer App.
- Complete the training for each protocol in which you plan to enter data.

Ready? Let's get started!

I. What is GLOBE?

GLOBE is a network of worldwide partners, participants, learners, educators and scientists who work together to increase their understanding of the Earth as a system…

I. What is GLOBE? (continued)

GLOBE participants build understanding by making environmental observations and asking questions

I. What is GLOBE? (continued)

Participants collect data…

I. What is GLOBE? (continued)

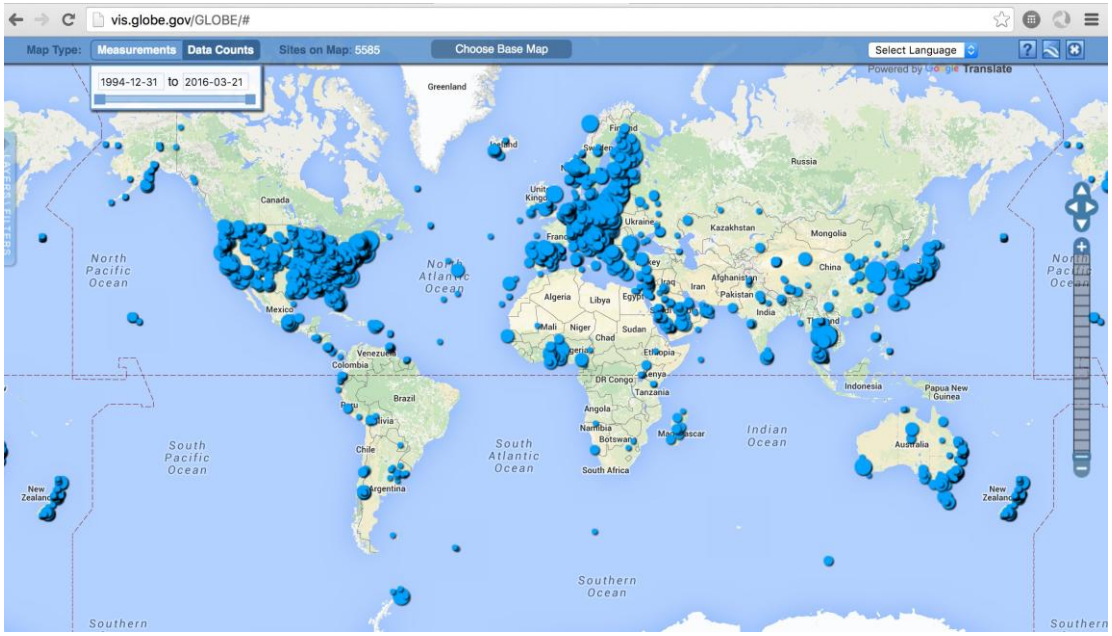
Conduct laboratory analyses…

I. What is GLOBE? (continued)

Upload their data to the GLOBE database…

I. What is GLOBE? (continued)

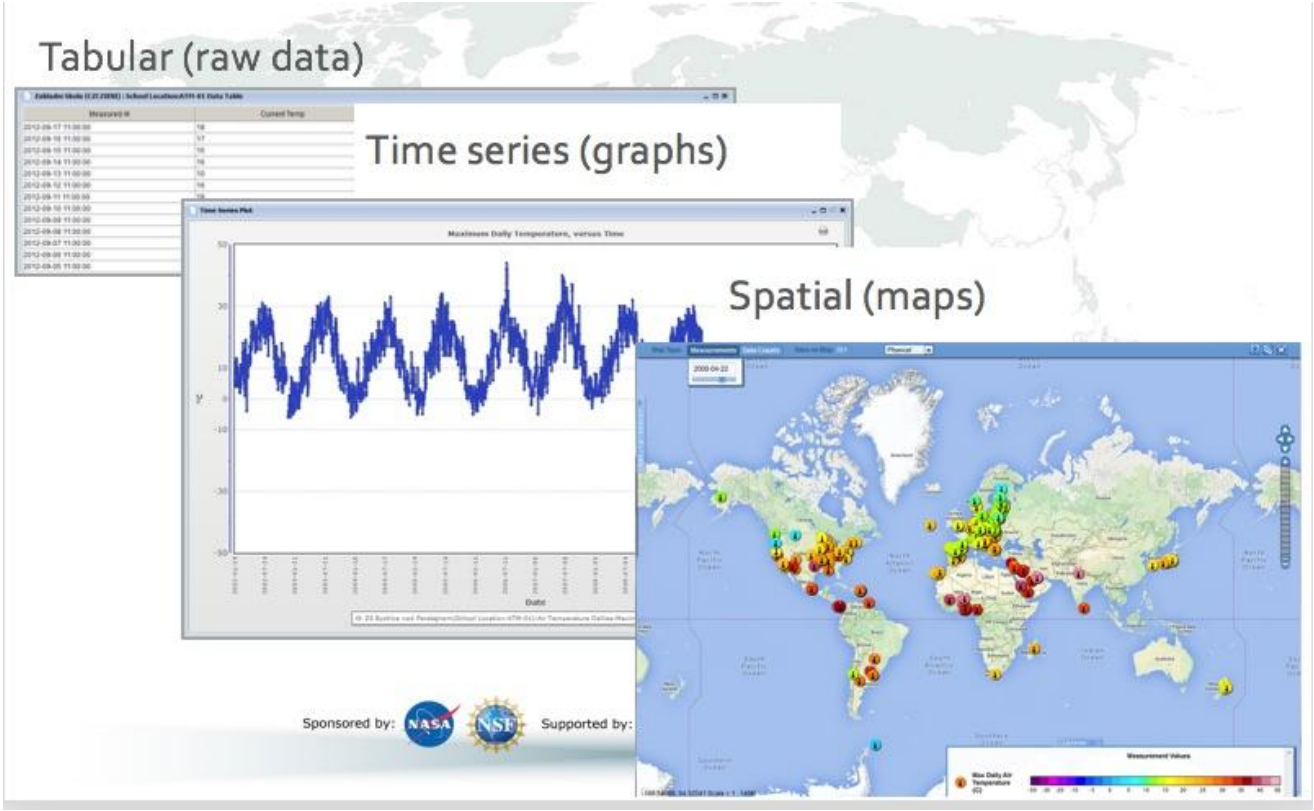
And share their data with others as well as research scientists around the world.



GLOBE's Data Visualization System shows where students have uploaded water temperature data. The GLOBE database contains more than **30 years of data collected at more than 43,000 organizations** around the world.

I. What is GLOBE? (continued)

Participants and scientists download data from GLOBE's database in different formats and conduct scientific analyses on data they have collected as well as global data sets provided by other participants .

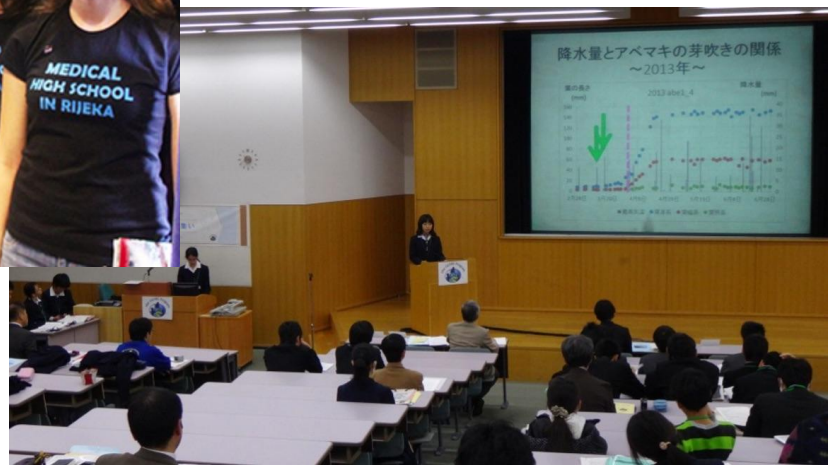


I. What is GLOBE? (continued)

When research is completed, participants can report on the outcomes of their investigations at science fairs, including GLOBE's annual Virtual Science Symposium.

I. What is GLOBE? (continued)

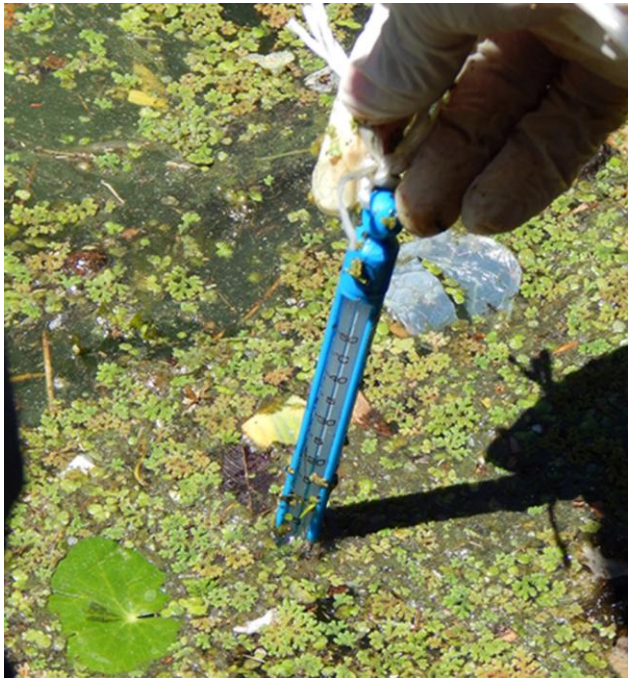
And they report their findings at scientific meetings and publish reports

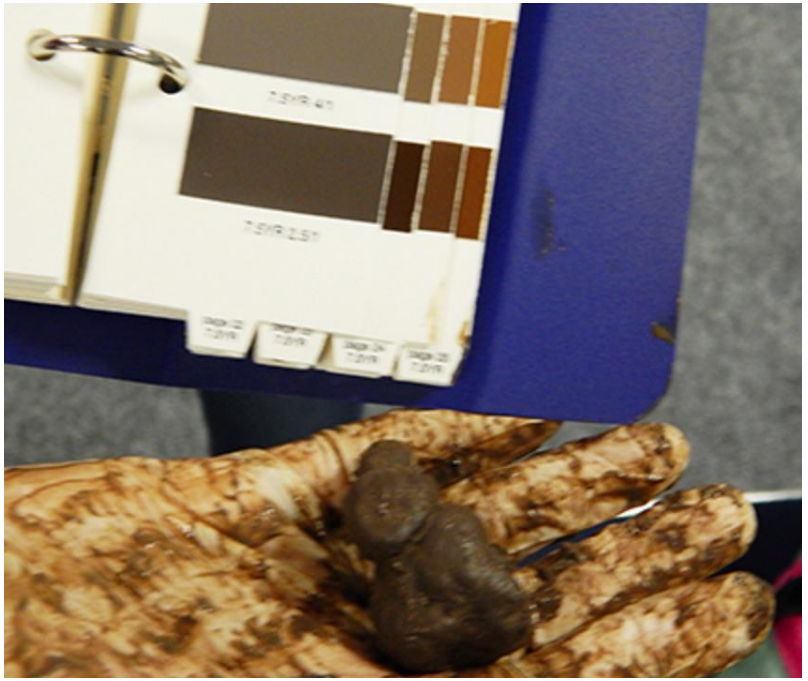


[Participant Research Reports]

I. What is GLOBE? (continued)

No matter where in the world, all participants collect their data the same way, using procedures developed by research scientists. These are called **GLOBE Protocols**.



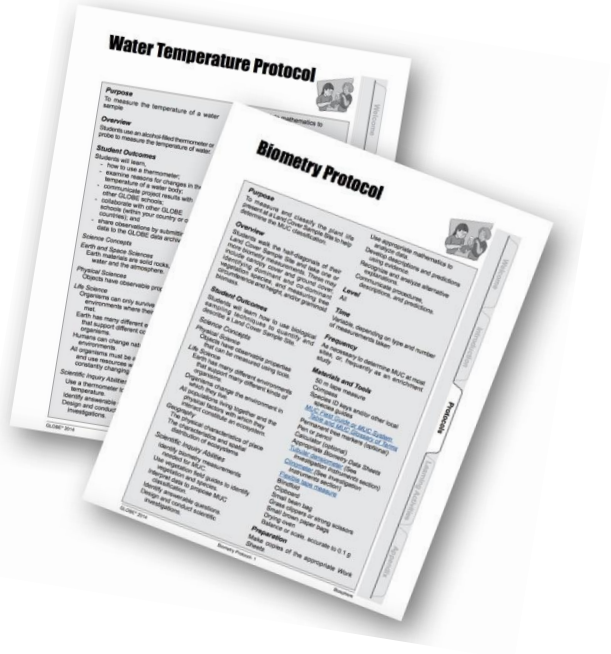


I. What is GLOBE? (continued)

GLOBE Protocols, instrumentation standards and reporting conventions make sure that GLOBE data are sufficiently accurate and precise to be used in scientific research:

I. What is GLOBE? (continued)

Because GLOBE members use standardized scientific procedures and equipment, the data they collect are research quality and can be used not only in student investigations but also by professional research scientists.



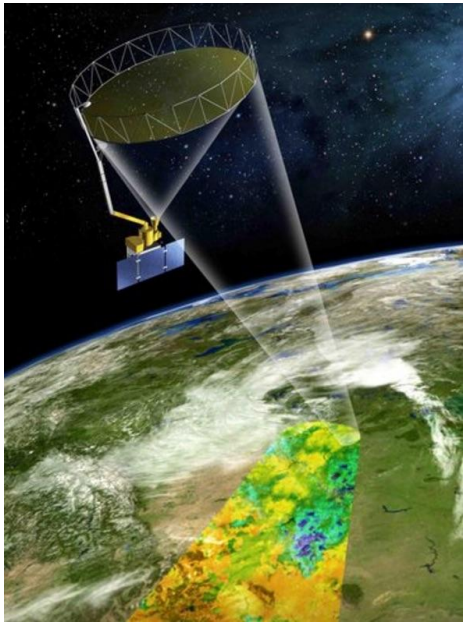
All GLOBE materials, including the GLOBE Facilitator's Guide, are available at no-cost from the GLOBE website. Some of the data protocols require no specialized instruments or can be completed using instruments the participants make themselves. Other investigations may require purchasing equipment. You can decide which investigations are most suitable for your participants and your budget.

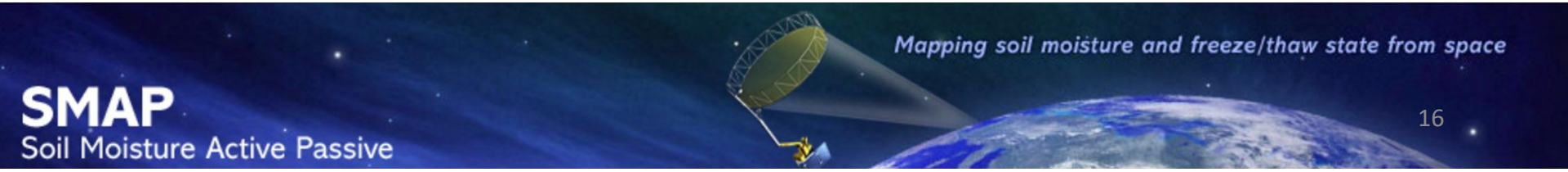
I. What is GLOBE? (continued)

Scientists are interested in many of the the same environmental questions as participants. They serve as mentors, collaborate on research projects, and even use GLOBE data in their own work. Find out more about the GLOBE International STEM Network (GISN).

I. What is GLOBE? (continued)

GLOBE's unique partnership with NASA creates opportunities for members to participate in exciting field campaigns and satellite missions

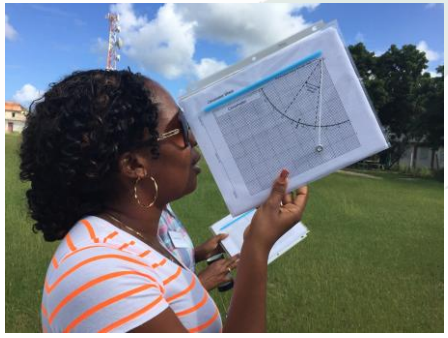




I. What is GLOBE? (continued)

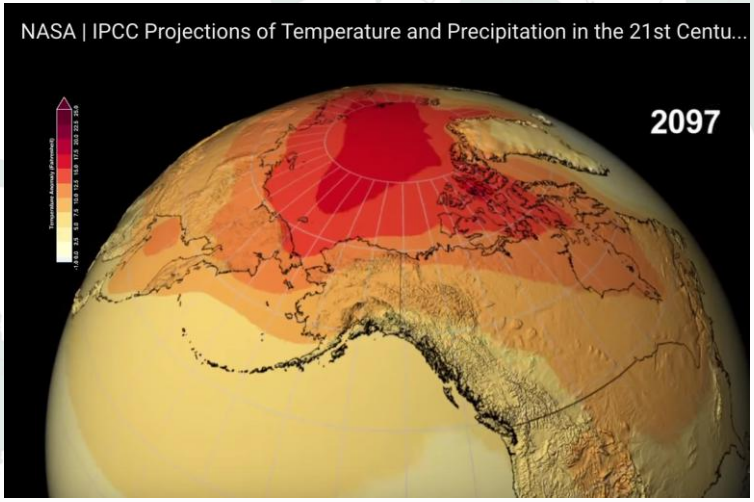
NASA's Earth science mission monitors changes in the Earth system, both remotely from space and through ground observations.

- Orbiting satellites collect a lot of data about our planet, but taking measurements on the ground is just as important. By taking accurate measurements and sharing your data through the Internet, you're helping scientists validate remotely-sensed data from space. In addition, you develop detailed datasets that could never be created otherwise. GLOBE is one of NASA's ground Earth observation programs.



I. What is GLOBE? (continued)

The Earth is a system, and processes that create change take place on many spatial scales. Some processes, such as those that contribute to climate are closely connected to changes in the atmosphere and ocean that take place on a global scale. For this reason, GLOBE's coverage of whole regions, countries and continents enhances the value of the GLOBE database to understand the critical environmental issues such as contemporary climate change.

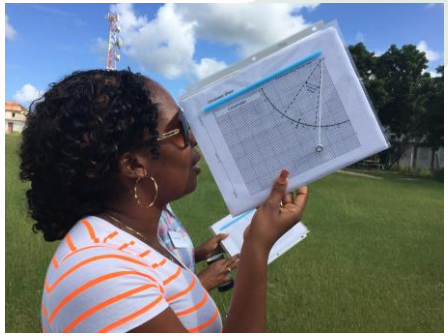


This NASA global data set combines historical measurements with data from climate simulations using the best available computer models to project how global temperature (shown here) might change up to 2100 under different greenhouse gas emissions scenarios. Darker red indicates where warming is projected to be greatest: dark red in the image shows a projected 15-17. 5 degrees Fahrenheit temperature anomaly in year 2097. ***Credits: NASA.***

I. What is GLOBE? (continued)

Some Earth processes and changes in the Earth system can be studied on a global scale; other interesting research questions may concern processes that take place on a scale of a meter or less.

The properties of our environment vary over different spatial scales, so it is essential that we collect data that can be examined as local, regional and global datasets. Changes can take place slowly or very quickly, so it's important to take measurements around the world on a continuous basis.



II. The International GLOBE Community

GLOBE is a Worldwide Science and Education Program

- Over 280 million research quality measurements have been collected since the program began in 1995.
- More than 358,000 members from over 43,000 organizations in 127 countries have participated in the program since it began.

GLOBE Countries

GLOBE Regions

Each GLOBE region has regular meetings and training events as well as an elected representative who serves on the GLOBE International Advisory Committee. Each region also has a Regional Help Desk Office that provides the main support services for that region, including GLOBE resources in international languages.

Shared Activities Connect GLOBE Members Worldwide

There are annual events where training workshops, participant investigations and meetings take place. Here are Thai Students at the GLOBE Annual Meeting, Los Angeles, CA, USA, presenting their research project (2015)

GLOBE Learning Expeditions (GLEs)

GLEs are international meetings where students conduct investigations and share their research. The 5th GLOBE Learning Expedition (GLE) took place from **4-8 August 2014** in New Delhi, India. More than 300 participants from 29 countries took part in a range of educational activities including research and poster presentations, field studies and dialogue with keynote speakers and scientists.

GLOBE Research Campaigns

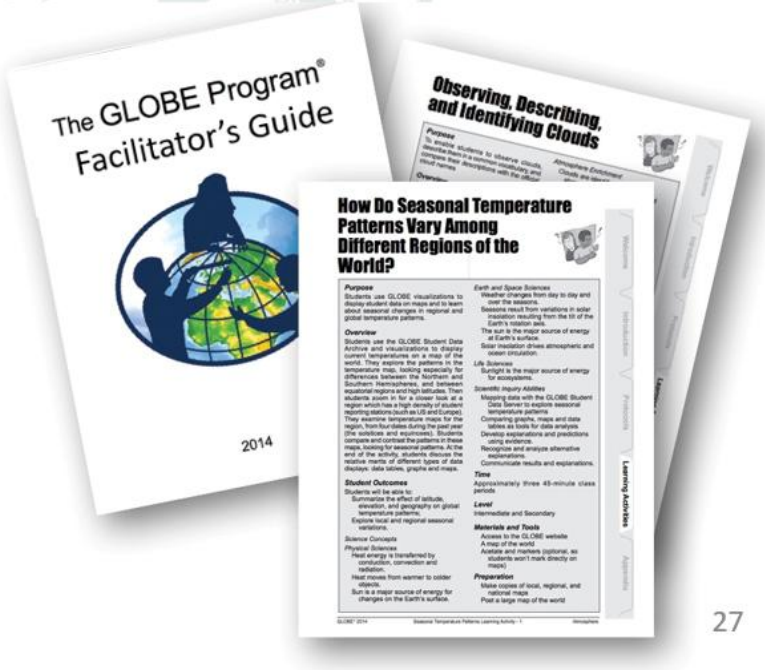
Scientists help organize scientific campaigns, mentor participants conducting research projects, and provide motivation and rationale to collect GLOBE data.

Web-based resources foster community connections

The GLOBE website highlights community activities through community profiles, GLOBE Stars reports, e-newsletters, and connects with other social media platforms.

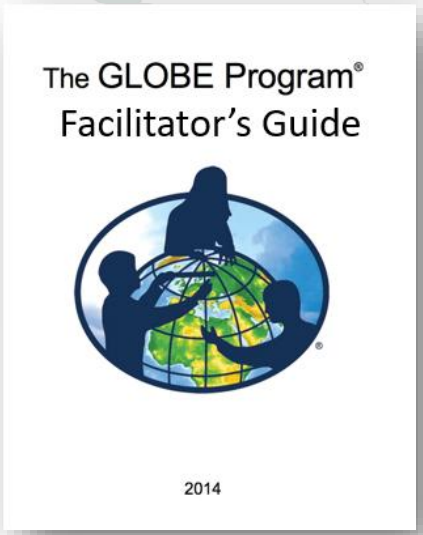
III. Using GLOBE with Learners of All Ages

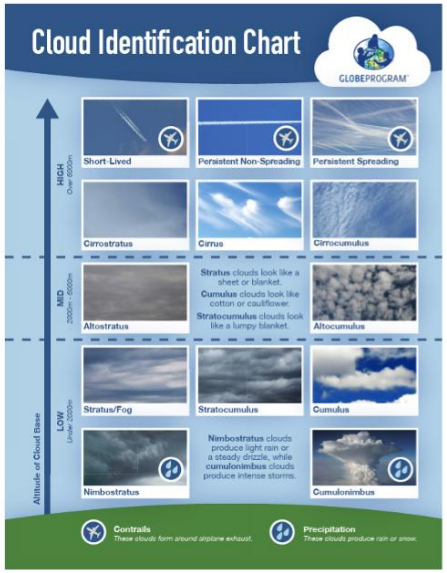
GLOBE includes a variety of grade level-appropriate, interdisciplinary activities and investigations aligned with national and state educational standards, which integrate easily into any curriculum. The projects are designed to help learners develop a wide range of skills such as critical thinking, scientific research methodologies, data analysis, independent learning and big picture thinking (taking local information and seeing global implications). Most importantly, the activities get learners excited about science and show them how to think globally, while acting locally.



GLOBE supports member professional development

- GLOBE members acquire expertise and confidence, through workshops and online training. GLOBE has developed a Facilitator's Guide which is used to train members in the protocols and learning activities. The Guide is available in several languages.
- GLOBE members are provided with an opportunity to share innovative ideas and challenges, to attend protocol and related professional development sessions, and to build connections for research efforts between organizations.





GLOBE Science Investigation Areas

The focus of GLOBE research is to understand the interaction of the different parts of the Earth system. GLOBE examines all the parts of the Earth system:

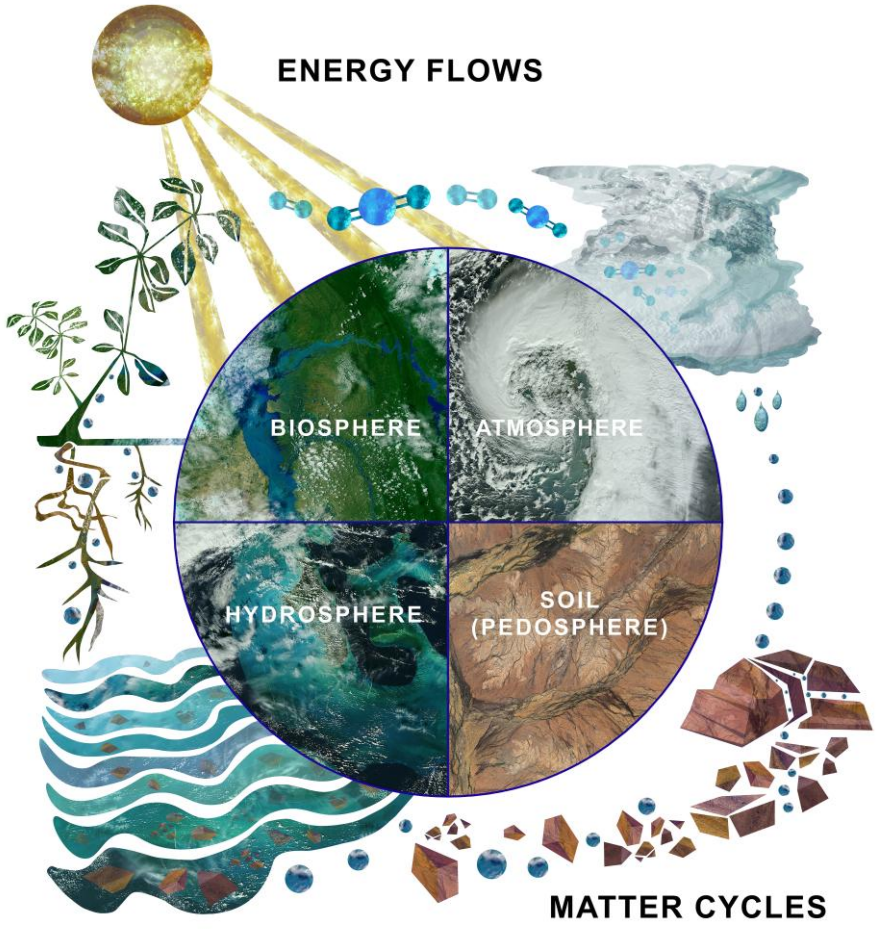
Atmosphere-Air

Hydrosphere-Water

Biosphere- Life

Pedosphere-Soil

GLOBE protocols provide the tools participants need to investigate and monitor the changes that are taking place on our dynamic planet.



Atmosphere



Atmosphere Investigation

The atmosphere investigation examines aspects of weather and climate, including protocols for air and surface temperature, clouds, precipitation, relative humidity, atmospheric pressure, aerosols, water vapor, and surface ozone.

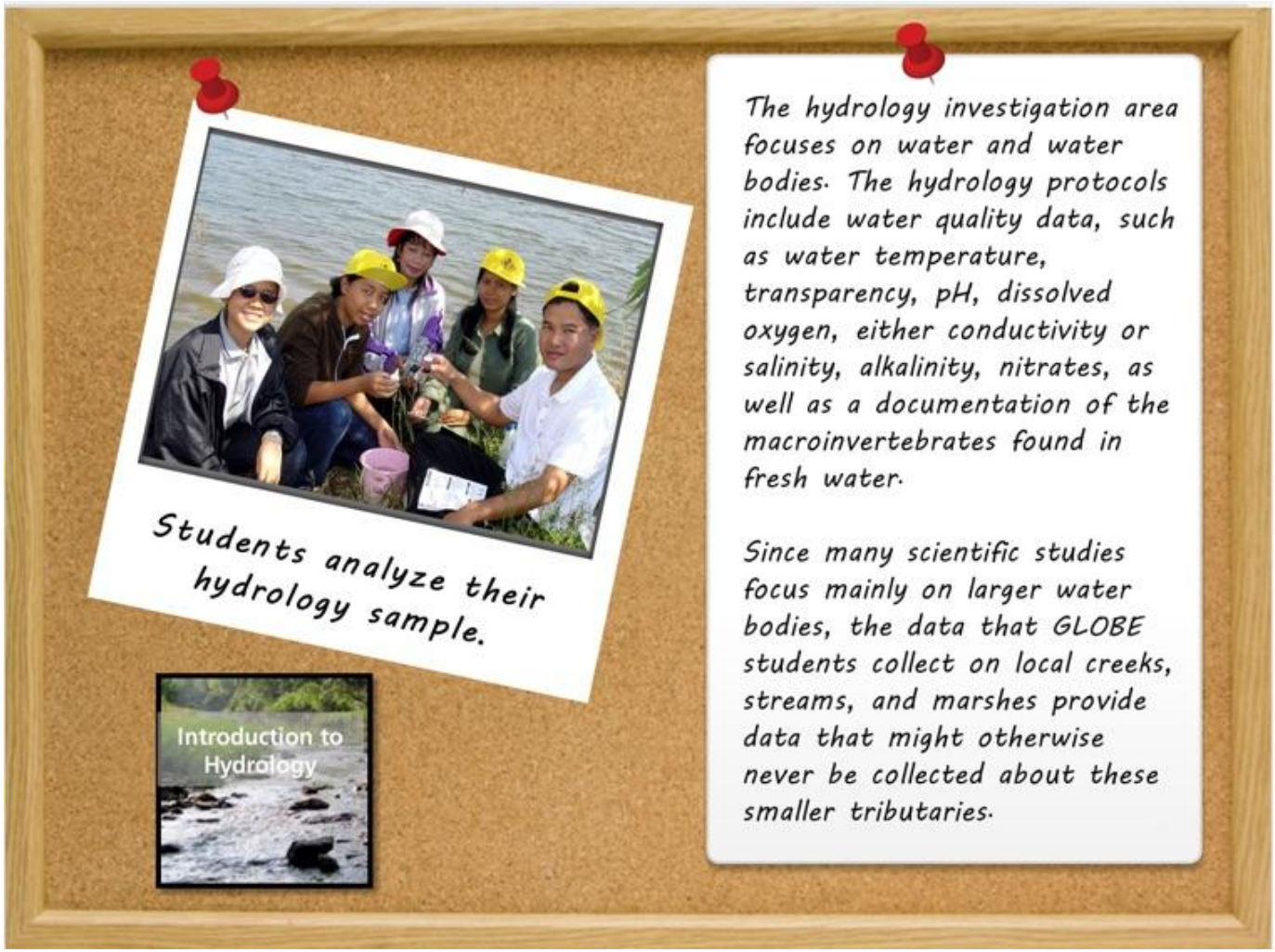
By establishing local GLOBE weather stations at schools, GLOBE students help collect additional weather data to help understand more about microclimates, urban effects, weather around the world, and climate patterns.

GLOBE students visit their atmosphere site.

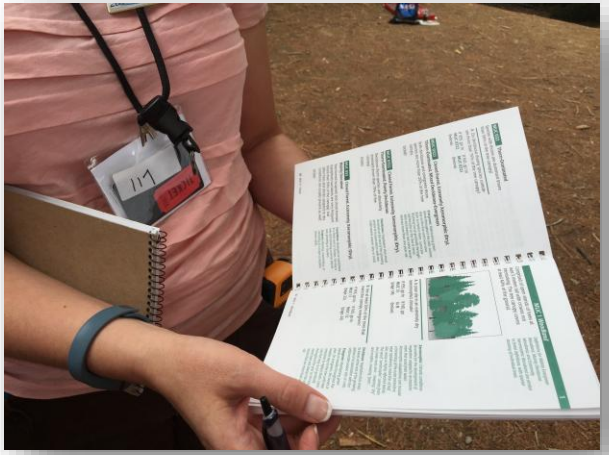
Hydrosphere




Hydrosphere Investigation



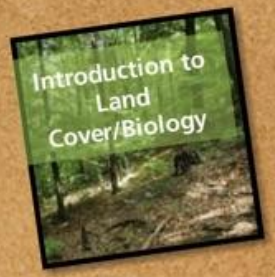
Biosphere



Biosphere Investigation

In the land cover investigation area, GLOBE students classify the land cover type using the Modified UNESCO Classification (MUC) system and take photographs of their land cover sites to help interpret satellite images of land cover and provide more specific data on land cover change over time. Other protocols include measuring the amount of biomass found on individual grassland, woodland, and forest sites.

GLOBE Students take biometry measurements.



Soil (Pedosphere)

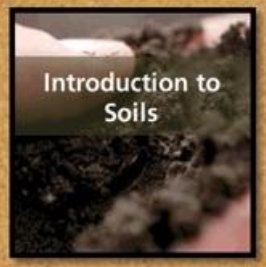



Soil Investigation

GLOBE students can collect data on soil temperature and moisture, and on soil characteristics, including its structure, color, consistence, texture, carbonates, bulk density, particle density, particle size distribution, pH, and fertility. There is also a protocol for measuring how fast water infiltrates the soil including the saturated soil water content.

The data GLOBE students collect about soil conditions relate to the growing season of plants (phenology), to what is growing on the land surface (land cover), to the quality of adjacent water bodies (hydrology), and to air and surface temperature, precipitation, and humidity (atmosphere) making it relevant to all of the other GLOBE investigation areas.

GLOBE Students performing soil protocols.



Who takes part in GLOBE Investigations?

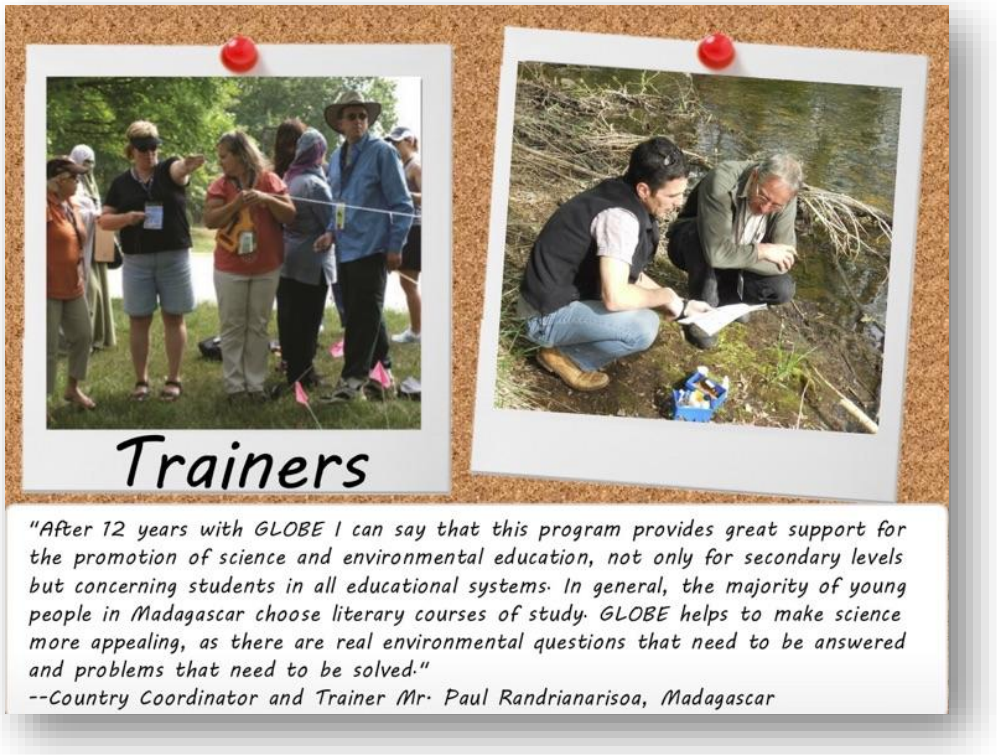
- GLOBE members of all ages (ages 5-18-years old) conduct scientifically meaningful environmental measurements, enter their data to the GLOBE science database, visualize their data and collaborate with scientists and other GLOBE members and communities worldwide.
- Learners of all ages also participate in GLOBE as a way to gain practical field experience in the Earth sciences in conjunction with their curriculum.
- All are welcome to use GLOBE's app, GLOBE Observer, to enter data.

Elementary GLOBE

- The youngest students can also participate in GLOBE. Elementary GLOBE is a series of science-based storybooks and associated classroom learning activities designed to introduce young students to Earth system science.

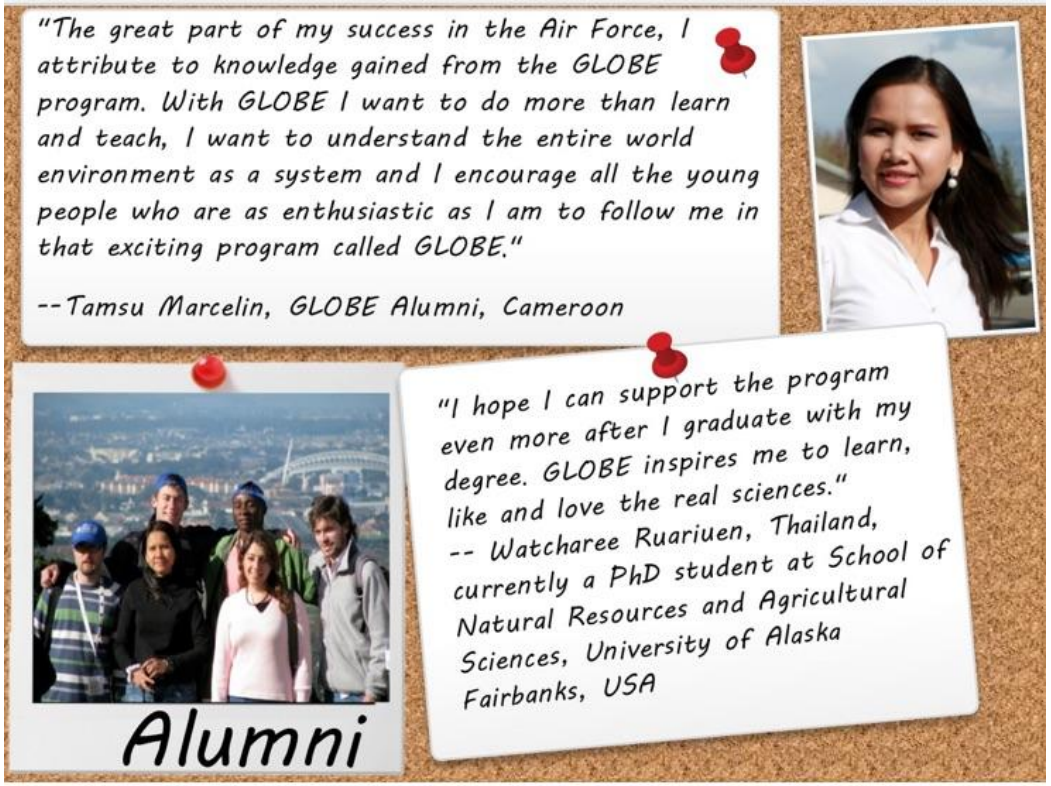
Elementary GLOBE

GLOBE Trainers and Mentor Trainers Support Members



Experienced GLOBE Trainers and Mentor Trainers conduct in-person training in collaboration with country coordinators and U.S. partners. These training events instruct members so they can ensure that the data their participants collect have fidelity and are research quality, so members and professional scientists can use them in their investigations. Most Trainers and Mentor Trainers began as GLOBE participants.

GLOBE alumni give back to the community



The GLOBE Alumni Network is a group of individuals who participated in GLOBE as a student and have continued their involvement after graduation. The GLOBE Alumni Network was started by students in Europe who worked with their country coordinators to stay connected to GLOBE as volunteers. There are now GLOBE alumni all over the world!

GLOBE Member Support

- GLOBE's training program prepares members to conduct fieldwork activities and apply those lessons with learners. Members learn how to mentor learners in collecting, reporting and using high-quality data to perform and analyze scientific investigations. GLOBE connects you with other members, giving you and your participants the opportunity to collaborate with others across the world on scientific investigations and data analysis.



GLOBE Facilitator's Guide

- Beyond training, the GLOBE Facilitator's Guide offers all the information you need to incorporate the GLOBE program into your classroom, library, or program. Each investigation area includes:
- **Introduction:** an overview of the investigation area and important science concepts
- **Protocols**: background science and learner connections associated with GLOBE measurement procedures
- **Field and Lab Guides:** a step-by-step description of the protocol procedure
- **Data Sheets**: allow the organized recording of data by participants, and ensures that no data have been overlooked
- **Learning Activities:** example lessons created by scientists and educators to support understanding of scientific procedures and concepts
- **Looking at the Data:** examples of how GLOBE datasets can be used by participants in their own investigations

Other Resources to get you started:

GLOBE Implementation Guide:

- Provides an introduction to the GLOBE program and what you and your participants will do as part of the GLOBE program
- Assists in planning the use of GLOBE with your participants
- Provides sample atmosphere, soil, Earth system, and biosphere unit plans to give you ideas about how to incorporate GLOBE activities and data into your program.

Appendix:

- Discusses inquiry and other pedagogic strategies, provides a guide to where and how often individual protocols should be conducted, and presents rubrics you can use to assess learning

Toolkit:

- Introduction to Remote Sensing and how GLOBE data support NASA satellite missions
- Press kit for communicating your GLOBE activities with your community
- Identifies protocols by complexity and appropriateness for different grade bands
- Describes specifications of instruments used in GLOBE investigations

Frequently Asked Questions: What is the time commitment?

Do you have time to do GLOBE with your participants? Yes, because you decide your level of participation. Through GLOBE, you can contribute data about the air, water, soil and vegetation around you. Some observations are needed only once while others should be taken every day. Many of these data are collected routinely only by GLOBE members. The datasets you help build will continue to be useful for years, decades and even centuries. It can be challenging work, but the excitement that comes with discovery and impact makes it worthwhile.

Any little bit helps. At GLOBE, the priority is collecting today's data so we can better understand our changing world tomorrow.

Frequently Asked Questions: What is the cost?

The scientific procedures used by GLOBE have been designed by scientists to be both accurate and affordable to conduct. Some require equipment you may already have in your organization, such as a meter stick or a thermometer. Some of the equipment can be easily built by participants. Other protocols, such as the Cloud Protocol require no special equipment. You can find out what instruments are needed in the Toolkit in the GLOBE Facilitator's Guide. The Toolkit is also useful because it lists the GLOBE protocols by learner skill level.

All that is needed to conduct the Cloud Protocol is either a copy of the GLOBE Cloud Chart, or a free download of the GLOBE Observer app.

Frequently Asked Questions: Who Can Participate?

GLOBE Community

The GLOBE Program originated as a K-12 science and education program, but over the years it has expanded to include undergraduate students and faculty, pre-service teachers, and citizen scientists. Anyone can participate in GLOBE. You will need to create a GLOBE account.

The Public Face of GLOBE: GLOBE Observer

In 2016, GLOBE expanded its citizen science program to include opportunities for learners of all ages. This is called GLOBE Observer. This public citizen science program is self contained within a mobile app available for both Android and Apple devices.

In 2025, GLOBE transitioned to a single account type, so if you have an account on the website or GLOBE observer app, you can enter data for all protocols.

The GLOBE Program is established in each country with a bilateral agreement between the its government and the U.S. Department of State.

If your country is not part of GLOBE, you can still use the materials but you are not able to upload data. For more information, visit www.globe.gov.

We need you!

- GLOBE's coverage of whole regions, countries and continents enhances the value of the GLOBE database to understand the dynamics of the Earth system
- The more members who participate in data collection, the more extensive the data coverage and the more valuable the GLOBE database becomes for everyone.

Bringing Science to Life

GLOBE has already collected more than 280 million measurements from 127 countries around the world. By collecting GLOBE data, you are expanding science's understanding of Earth's dynamic environment and our changing climate.

Never has there been more environmental challenges for science to address than those posed by our dynamic Earth system today- and we need your help!

GLOBE Stats

280,416,163	Total Measurements
35,218	Measurements this month
1,271,971	GLOBE Citizen Scientists
	• 55,315 *Educators*
	• 913,031 *Students*
	• 303,625 *GLOBE Observers*
43,242	Schools and Non-school Organizations
127	Countries

(Example of data from December 2025)

How do you get started?

You have started! You can take an optional quiz on this eTraining module. Then, select an investigation area and complete the eTraining introduction module. Once you have completed a GLOBE Protocol eTraining module and passed the quiz, you are ready to report data.

Get engaged in your regional community. Contact your GLOBE Country Coordinator, or if you are in the United States, your GLOBE partner. Link to GLOBE Country Coordinator/Partner Contact Information

Please provide us with feedback about this module. This is a community project and we welcome your comments, suggestions and edits!

For more information:

GLOBE Program

NASA Earth Science

NASA Global Climate Change: Vital Signs of the Planet

The GLOBE Program is sponsored by these organizations:

December 2025. GLOBE Implementation Office: Science, Training, Education, and Public Engagement Team.
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Welcome to the GLOBE Community!