



THEGLOBEPROGRAM

Annual Review 2011



What is the GLOBE Program?

GLOBE is a science and education program that connects a network of students, teachers and scientists from around the world to better understand, sustain and improve Earth's environment at local, regional and global scales. By engaging students in hands-on learning of Earth system science, GLOBE is an innovative way for teachers to get students of all ages excited about scientific discovery locally and globally. To date, more than 23 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. Since beginning operations in 1995, over 59,000 trained teachers and 1.5 million students in 112 countries have participated in GLOBE.



"GLOBE is the quintessentially ideal program for involving kids in science"
- Nobel laureate Dr. Leon Lederman.

The GLOBE Program Office (GPO) supports the worldwide GLOBE network from offices at the University Corporation for Atmospheric Research (UCAR) in Boulder Colorado and the University of Texas at Tyler, with Regional Help Desk Offices in Argentina, The Czech Republic, India, Jordan, South Africa and the United States. GLOBE activities are steered by the GLOBE International Advisory Committee (GIAC), which brings together representatives from GLOBE countries around the world.

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GLOBE Honors the Life of

Andy Tasker

The GLOBE Program recognizes, honors and celebrates the life of Dr. Andy Tasker (Andy as he preferred to be called) and his longstanding commitment to stewardship of the Earth. Andy devoted his life to

education, to land preservation, to wildlife and nature, to family and friends and to building community—at home and throughout the world. He was motivated by a sincere interest in improving the quality of life of all living things.

Andy's passion was to raise awareness and understanding of Earth as a system on local and global scales. Beginning in 1996, he served as the Country Coordinator of GLOBE in the United Kingdom. In 2004, he was elected to the Board of GLOBE Europe and was named Chairman of the Board and served as regional representative to the GLOBE International Advisory Committee (GIAC) from 2008–2010. In 2011, Andy took his place on the world stage when he was named Director of the GLOBE Program Office (GPO) in Boulder, Colorado.

While Andy debated an early retirement, he often shared his sense of urgency to help the GLOBE Program reach its maximum potential. He was determined to create a better world through GLOBE. Andy assumed leadership during a critical time for the program—and for a while it seemed to make him stronger. His tenacity, his vision and his unwavering support are things the Program will forever cherish. GLOBE will always remember Andy for his humor, immense courage, his graceful yet steady command and the ever-present twinkle in his eye.

The GLOBE Program in 2011

The international GLOBE network of students, teachers, scientists and partners engaged in hundreds of projects and activities during 2011. This Annual Review highlights only a sampling of stories that greatly impact the GLOBE community.



Expanding International Perspectives about Climate ... 15th GLOBE Annual Meeting

Held on the outskirts of Washington D.C., in Bethesda, Maryland from 17–22 July, more than 180 participants from 46 countries participated in the 15th GLOBE Annual Meeting with a keen focus on international perspectives about climate.

Representatives from 16 different embassies in Washington D.C. joined their respective country coordinators at various times throughout the event and delegates from 29 countries visited their home embassies to share information about GLOBE achievements in their countries. U.S. Partners were also provided with opportunities to share their success stories resulting in 12 U.S. GLOBE Partners making 11 U.S. Senate and seven U.S. House visits.

In addition, members of the GLOBE community exhibited materials and presented posters highlighting their local GLOBE activities. The presentations, posters and activities served as a platform to inform the broader GLOBE community of successful international implementation models of the Program.

Of critical importance, participants at the Annual Meeting were led by GLOBE Director Dr. Andy Tasker on an initiative to craft strategic goals and performance indicators for each of the key areas of the GLOBE Program including: science, education, international, technology and communications. Through an iterative process with the broader GLOBE community and with the assistance of The GLOBE Program Office (GPO) staff, Dr. Tasker finalized the Program's strategic plan (through 2017) that includes the collective vision of the community to move GLOBE forward in a thoughtful, meaningful and collaborative fashion.

Student Climate Research Campaign

The Student Climate Research Campaign (SCRC) launched in September 2011 with an immediate and meaningful impact on the Program. GLOBE saw a significant increase in activity and data entry from GLOBE schools from around the world. The goals of SCRC are threefold:

- Increase student understanding and awareness of climate, including the broad and integrative nature of climate, the role of climate in shaping community and the difference between climate and weather
- Increase student understanding of and ability to conduct science research focused on climate
- Improve student global awareness through collaborations among students, teachers, and scientists that are focused on understanding the Earth as a system

During the first year of SCRC, one of the primary objectives was to engage students in the collection of data with an eye toward contributing to the climate record. New climate-focused GLOBE learning activities provided tools for educators to participate in GLOBE through the lens of climate. Teachers used "From Weather to Climate" to explore long-term data with students including the National Oceanic and Atmospheric Administration (NOAA) Global Historic Climate Network (GHCN) dataset. A new interactive Google Earth interface with the "What is Your Climate Classification" activity allows for student to upload activity results and compare them with schools from around the world. In addition, GLOBE received outstanding participation from the community as participants from 48 GLOBE countries—representing all six GLOBE regions—participated.

On a parallel track, The GLOBE Program Office (GPO), working in a collaborative fashion with the National Science Foundation (NSF), launched the Learning to Research (L2R) project. L2R is a subset of SCRC and brought together 36 teachers from 12 states and Puerto Rico in an effort to collaborate on the development and classroom implementation of student climate research projects. The feedback from these GLOBE teachers was used to improve the SCRC experience for GLOBE schools participating in the campaign. The top student projects were selected to present their research at the GLOBE Annual Meeting in St. Paul, Minnesota in 2012. In addition, a record high of 110 teachers applied for the program for the 2012-13 academic year.

GLOBE International Scientist Network: Collaboration and Innovation in Action

The GLOBE Program Office (GPO) Science and Education Team identified many of the scientists working with GLOBE around the world and convened the GLOBE International Scientist Network (GISN) in 2011. To date, more than 46 scientists with varying educational and research backgrounds actively participate in the program. These scientists represent each GLOBE region—including the countries of Argentina, Bahrain, Canada, Czech Republic, Greece, Lebanon, Namibia, Netherlands, Norway, Switzerland, Tanzania, Thailand and the United States of America. In addition, these scientists have held positions in academia, government and the private sector. Their research interests are as wide ranging as both their employment experience and geographical location. Examples of areas of interests of scientists involved with the network include: land cover, climate change, clouds and Earth's energy balance, soil science, phenology, air pollution, aquatic animal behavior and remote sensing. GPO continues to thoughtfully build the network by connecting with scientists from all GLOBE countries.

GLOBE Technology ... Building a Bridge to the Future

Technology is always evolving and work by The GLOBE Program Office (GPO) over the year has left us better placed to lead in shaping the future of the Program, better placed to boost capacity and functionality within GLOBE and more soundly positioned to respond proactively to the dynamic needs of the broader GLOBE community.

In 2011, GPO evolved, enhanced and added more technological value to the Program. Furthermore, over the last year, we have delivered substantial change so we're fit to serve current and future GLOBE members. Of principal note, GPO, working in cooperation with NASA's selected vendor Raytheon, took meaningful steps toward the overall development, refactoring and migration of the GLOBE website to a new portal website

system known as Liferay. The new web portal will provide the GLOBE community with a robust suite of services that will allow members to communicate, collaborate and investigate in meaningful ways.

On a corresponding track, the GLOBE Technical Team (GTT) strategically and meaningfully enhanced staffing in mission critical areas of management, database and software development to ensure GTT brings the best possible products and projects to the GLOBE Community. Moreover, the ageing technical systems have been standardized and put into better working order in an effort to reduce downtime and redundancy and to allow for expansion moving forward. As part of the standardization process, the old visualization system was repaired and brought back online. This will provide users with access during this transition process to the new website portal and serve as a reference resource for the ongoing development of new visualization products.

From a systems perspective, a major milestone that moves the technical capability of GLOBE into the 21st century was reached with the November 2011 installation of the new Liferay Portal Website hardware and core software systems in the University Corporation for Atmospheric Research (UCAR) Mesa Laboratory supercomputing facility located in Boulder, Colorado by representatives from Raytheon and facilitated by GTT and UCAR systems engineering staff.

Pilot testing of the new portal website also commenced in 2011 with substantial input from various users from the GLOBE community. This collaborative process provided meaningful input in real time—adding functionality as the website feature requests were received and implemented.



The GLOBE Program Launches Innovative Social Media Platforms

*T*he Program is engaging in social media with a strategic eye towards amplifying the conversation within the GLOBE community and beyond. To that end, GLOBE launched its new look and highly integrative social media pages. GLOBE profiles will keep the community up to date on GLOBE news, important announcements and Earth System Science related information. In addition, the Program shares interesting facts about climate daily and continues to grow the networks through broad engagement and outreach.

Facebook — “Like” The GLOBE Program on Facebook. We encourage you to use Facebook’s “Share” tool to share our page with your current Facebook network. The tool is located in the drop-down menu under the “message” option of The GLOBE Program’s Facebook page.

LinkedIn — This is a great way to interact with us professionally.

Twitter — We will keep you updated in real-time with the news you can use.

YouTube — Stay connected with the Program through community videos.

Blog — The scientists are writing compelling stories and sharing important facts about Earth along with other relevant and timely topics. GLOBE encourages you to read the Blog and pass it along to your family, friends and the people you work with.

*T*hese developments have broadened and improved our core offerings by encouraging and enabling more partners, teachers and students to get involved in the Program. However, it is on a world scale where GLOBE’s impact is realized and the following pages contain a mere sample of these activities—providing a flavor of GLOBE and its many benefits to student learning, ranging from science and its practical applications to international partnerships and collaborations.

GLOBE around the world

Africa

GLOBE Africa Region:
22 Countries; 640 Schools;
1,105 Teachers; 1,098,644 Measurements

Students View Climate Differently From the Summit of Mt. Kilimanjaro

Mt. Kilimanjaro stands 5,895 meters or 19,341 feet above sea level. From this vantage point, the inquiring minds of GLOBE students went to work in September 2011 alongside dedicated educators and scientists who all gathered in Tanzania, Africa for the Kilimanjaro Xpedition—a climb up the largest freestanding mountain in the world.

The Kilimanjaro Xpedition is a GLOBE Africa and Seasons and Biomes endeavor that utilizes previous research alongside current measurements to illuminate a comparative baseline for future studies. This learning experience furthered students' understanding of climate in a fundamentally different way than in the classroom.

The mission on the annual treks is to study and report how climate factors evolve from year to year, from one biome to the next and to learn why these changes occur. Assisted by one of the world's leading experts on permafrost research, Dr. Kenji Yoshikawa, Associate Professor at the University of Alaska, Fairbanks, students and educators worked together to collect GLOBE data measurements

daily. The data was then uploaded to the worldwide GLOBE database. The team collected periodic Surface Temperature measurements by downloading data from digital sensors strategically placed higher and higher up each level of the mountain by members of the 2010 expedition. In addition, the crew collected modified Air Temperature and Cloud data at solar noon each day in order to submit data for each distinct biome, as well as measurements of the permafrost where it exists.

In 2011, trekkers shared their daily thoughts and experiences in the Xpedition journal—and it was a huge success online—receiving over 13,000 visitors from 92 countries and 1,152

cities over a nine-day span. More than 130 data measurements were collected and posted to the website via Google Earth. Hundreds of schools followed along online and 128 new biomes were reported this year on the website. And, for the first time in history, two live webinars were held from the mountain with over 100 participants in each session. GLOBE classrooms and community members from all over the world tuned in to hear on-the-spot reports from Xpedition reports from the mountain.



GLOBE around the world

Asia+Pacific

GLOBE Asia+Pacific Region:
16 Countries; 2,571 Schools;
3,277 Teachers; 1,273,699 Measurements

Climate Conference Launches SCRC Initiatives in Asia+Pacific Region

The Indian Environmental Society, in association with the GLOBE Asia+Pacific Regional Help Desk Office, launched GLOBE Student Climate Research Campaign (SCRC) activities at the Earth Science and Climate Change Research Conference, held from 25-28 September 2011, at the Goa International Center in India. More than 160 GLOBE students, teachers and scientists from India, Nepal, Thailand and the USA as well as emerging research scholars and scientists from academic and research institutions participated in the event.



Conference activities included cultural programs, poster and model exhibitions, scientific lectures and research presentations from both students and scientists. More than 40 students from GLOBE schools in Andhra Pradesh, Delhi, Goa, Punjab and Rajasthan in India as well as various schools in Thailand participated in approximately 30 poster presentations. Scientists and research scholars from universities and research organizations delivered an additional 15 presentations.

The Asia+Pacific Regional Help Desk Office distributed GLOBE instrument kits to all schools; students and scientists then conducted fieldwork together at local GLOBE study sites located in various ecological zones throughout the city to study the impacts of climate change. And, interactive sessions between the students and scientists from India, Nepal and Thailand allowed the students to describe their ongoing project ideas and receive advice for continued advancements in their research.

GLOBE around the world

Europe+Eurasia

GLOBE Europe+Eurasia Region:
40 Countries; 3,604 Schools;
5,791 Teachers; 12,070,818 Measurements

Students put GLOBE Data Collection into Practice at Croatia Annual Competition

Croatia's 14th Annual GLOBE Conference and Competition took place 11-13 May 2011 in Čakovec, Northern Croatia. Over 160 students from 52 GLOBE schools came together to present their work, to inspire each other through a competition in knowledge of GLOBE Protocols and to enhance their understanding of the meaning of GLOBE data. Each school team is comprised of three students and one GLOBE teacher. The competitions are interactive—requiring students to find and pass through several checkpoints, marked on a map—using a compass and precisely following the orientation indicated in their instructions. At each checkpoint, teams answer theoretical and computational questions about GLOBE protocols, data collection and their analyses of these data in relation to their research projects.

In one location, students were required to observe a nearby stream marked on their map. They then had to determine and mark the best place to take water samples, noting possible contaminants such as runoff from neighboring housing structures. Students were asked to think about the safest

GLOBE measurements that would indicate the presence of sewage contamination of the water and to write down two GLOBE protocols that could be used to test for the presence of pollution, as well as explain the reasons for their choices. Another question asked students to determine

how many gallons of precipitation could be collected from a given area if 40 liters of precipitation had fallen in the past 24 hours.

Bolstered by the Annual Conference, the GLOBE network continues to thrive in Croatia. Since Croatia joined the GLOBE community on 12

April 1995, the Program has been implemented in 142 Croatian schools and many national science events have included presentations by GLOBE representatives. In the spring of 2011, GLOBE Teachers gave a presentation and led a practical workshop teaching GLOBE Atmosphere Protocols to students at a conference hosted by the Croatian Meteorological Society for World Meteorological Day in March 2011, which promoted public awareness and education.



GLOBE around the world

Latin America+Caribbean

GLOBE Latin America+Caribbean Region:
18 Countries; 593 Schools;
1,005 Teachers; 594,791 Measurements

The Next Generation of GLOBE Climate Scientists in Peru

The year 2011 was busy for the GLOBE community in Peru. The following is a sampling taken from many projects that were developed and implemented over the course of the year to advance student research skills and to share knowledge with local communities.



A group of students from the National Agrarian University, La Molina are working to train students in the development of simple technologies that allow for the types of low-cost atmospheric data collection attainable by most elementary schools. For example, students build instrument shelters out of wooden fruit boxes—costing approximately 50 cents—and electric thermometers that cost about one (U.S.) dollar.

With support from the Peace Corps, students prepared a guide for building the low-cost shelters and how to use them. GLOBE students presented their method for building a low-cost instrument shelter to the Air Force of Peru and other communities and universities.

GLOBE students participated in the National School of Atmospheric Sciences research project in which they received training on air pollution and climate change issues. A group of students also visited the facilities of the Catholic University of Peru to learn more about solar energy uses.

Students presented a proposal for participation in the GLOBE “Food and Environment” project, interacting with people in the market to gain knowledge about local biodiversity and awareness about the importance of the climate as it relates to sustaining food.

Pre-service teachers of Enrique Guzman y Valle University received basic information about the benefits of the GLOBE Program in education.

GLOBE students, along with their teacher, were interviewed on two radio stations in Lima, Radio San Borja and Radio Cielo, to broadcast the importance of the GLOBE Program.

Through the Climate and Land Cover Project (CLC) students are improving climate models by taking comparative pictures of land cover study sites.

All activities developed by GLOBE students were presented at the end of the year at a fair for the Department of Science of the National Agrarian University, La Molina that was open to the entire university community.

GLOBE around the world

Near East+North Africa

GLOBE Near East+North Africa Region:
13 Countries; 349 Schools;
631 Teachers; 729,734 Measurements

Students in Bahrain Attend Inaugural GLOBE Girls' Science Camp



On 3-4 February 2011, over 40 Bahraini students from 17 secondary girls' schools came together to attend the first GLOBE Girls' Science Camp hosted by the GLOBE Team in Bahrain. The camp was a great success and marks a new accomplishment for GLOBE students, teachers, and the scientific community in Bahrain. Since joining the GLOBE community in 2001 with one school and 15 students, Bahrain has expanded its GLOBE network to include 49 public and three private schools. Although Bahrain is only 760 square km in size, the country

boasts 161 km of coastline and remains deeply impacted by its surrounding marine life.

From their location at a permanent scout camp operated by Bahrain's Ministry of Education, students spent two days actively exploring the beach and learning about their environment through a number of interactive, hands-on workshops. Using GLOBE Protocols to identify and classify land and marine organisms, students became aware of the myriad of life forms, both land and marine, in the Kingdom of Bahrain and gained invaluable scientific skills and expertise.

In addition to collecting their own data, students attended a number of workshops and seminars. In one of the training workshops led by Mr. Hashim Saeed, an expert on marine management, students learned about marine life in Bahrain. The workshop included a beach survey of coastal waste and pollution, and students studied the anatomy of crabs from different coasts in Bahrain. They were taught to recognize the difference between a clean sea crab and one that has been exposed to pollution, allowing them to discover the impact of pollution in a close and personally relevant way. Other activities included a workshop on desert plants, hosted by Dr. Nadmi Khalil, an expert in the Public Commission for the Protection of Marine Resources, Environment and Wildlife, who also provided a seminar on the role of women in the preservation of the environment.

Altogether the Bahraini Girls' Science Camp provided a remarkable fusion of hands-on experience and educational workshops; students were able to cultivate a new awareness of their environment and apply it to authentic scientific research.

GLOBE around the world

North America

GLOBE North America Region:
2 Countries; 16,995 Schools;
46,392 Teachers; 7,271,519 Measurements

Pre-K GLOBE Students Utilize Mud Puddles for Research in Louisiana



Ms. Norma Stigall, GLOBE Teacher at Phoenix Magnet Elementary School in Alexandria, Louisiana led her Pre-K class on a scientific expedition to study the scientific elements of the world they live in. Ms. Stigall introduced these young students to the hands-on approach of GLOBE by guiding them through the steps of observing and measuring the ever-changing aspects of their environment. With rulers in hand, a group of four-year-old students set out to observe and study Atmosphere and Phenology factors within selected areas. Learning the concept of using different measurement tools such as a rain gauge to measure rainfall, or a ruler to measure shallow water depth, these young scientists began to learn the meaning of terms such as length, width, height and depth in relation to GLOBE data measurements.

In addition to measuring different aspects of their environment using various tools, students took the time to observe the diverse plant life and various insects and to classify the animals they identified. Students studied flowers and described the types of ants that they discovered. With the help of a magnifying glass they were able to study the different parts of an insect and some aspects of

what makes it an insect. According to Ms. Stigall, “The students loved to study the anthills and by the end of the year, they were able to identify different types of ants.”

The group of four-year-old scientists presented their findings using songs, poems, illustrations and movements. Phoenix Magnet Elementary School has been with GLOBE since 1997 and has submitted GLOBE data on Cloud Observations, Solid and Rain Precipitation and Air Temperature. Pre-K research activities at Phoenix Magnet School season the minds of young science students to learn through physical experience and pave the way for progressively intensive research throughout their academic careers.

Thanks to our GLOBE Partners around the world ...

 Argentina	 Costa Rica	 Greece	 Liechtenstein	 Netherlands	 Senegal
 Australia	 Croatia	 Guatemala	 Lithuania	 New Zealand	 Republic of Serbia
 Austria	 Cyprus	 Guinea	 Luxembourg	 Niger	 South Africa
 Bahamas	 Czech Republic	 Honduras	 Macedonia	 Nigeria	 Spain
 Bahrain	 Denmark	 Hungary	 Madagascar	 Norway	 Sri Lanka
 Bangladesh	 Dominican Republic	 Iceland	 Maldives	 Oman	 Suriname
 Belgium	 Ecuador	 India	 Mali	 Pakistan	 Sweden
 Benin	 Egypt	 Ireland	 Malta	 Palau	 Switzerland
 Bolivia	 El Salvador	 Israel	 Marshall Islands	 Panama	 Tanzania
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 Burkina Faso	 Ethiopia	 Japan	 Mexico	 Peru	 Trinidad and Tobago
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		 Lebanon	 Nepal	 Saudi Arabia	 Uruguay

... and thanks to our global supporters!

