



THEGLOBEPROGRAM

Annual Review

2020–2021

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GLOBE Milestones

1994	Earth Day, U.S. Government announces The GLOBE Program as a multiagency effort.
1995	Earth Day, The GLOBE Program launches (with 11 protocols); 33 countries join the program.
1998	Finland hosts the first GLOBE Learning Expedition (GLE) in Helsinki.
2000	USA hosts the second GLE in Fayetteville, Arkansas.
2003	Croatia hosts third GLE held in Sibenik.
2004	GLOBE receives the Goldman Sachs Award for being an “outstanding program that makes use of media/technology to educate students or teachers about other world regions and cultures, or international issues.”
2005	Earth Day; GLOBE celebrates its 10th birthday, with 15,000 schools in 106 countries.
2008	South Africa hosts the fourth GLE in Cape Town.
2009	GLOBE establishes Regional Offices in Africa, Asia and Pacific, Europe, Latin America and the Caribbean (LAC), and North Africa and the Near East (NENA) to support professional development workshops, capacity building, and regional sustainability efforts; GLOBE database reaches 20 million.
2011	GLOBE launches concept of Student Research Campaigns.
2014	India hosts fifth GLE in New Delhi.
2015	Earth Day, GLOBE celebrates its 20th birthday; offers 51 protocols; data reaches 128 million measurements.
2016	GLOBE provides online eTraining; hosts International Virtual Science Fair and six regional U.S. science fairs and various student scientific campaigns; launches a new mobile data entry app, called GLOBE Observer.
2017	Data reaches over 140 million measurements; International Virtual Science Symposium increases in number of submitted projects and worldwide representation; new mosquito protocol launched.
2018	Ireland hosts the sixth GLE in Killarney, Ireland; data reaches over 150 million measurements; U.S. Department of State initiative on mosquito education launched; all six GLOBE regions entered over one million measurements into the GLOBE database
2019	GLOBE (via the GLOBE Zika Education and Prevention Project) connects with Google Voyager to highlight a GLOBE story, “Stopping the Spread of Zika.”
2020	The GLOBE Program celebrates its 25th Anniversary! For the first time, the GLOBE Annual Meeting goes “virtual.”
2021	By the end of the 25th anniversary year, GLOBE has 125 countries participating in the program; reaches a new milestone with over 200 million measurements in the database; the community adapted to the ongoing pandemic and showed how resilient it is!

About The GLOBE Program

The GLOBE Program (GLOBE) is an international science and education program sponsored by the National Aeronautics and Space Administration (NASA); supported by the National Science Foundation (NSF), the National Oceanic and Atmospheric Administration (NOAA), and the United States Department of State (DoS). GLOBE is implemented by the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado, USA. For more than 25 years, GLOBE has connected students, teachers, and professional and citizen scientists from around the world to conduct hands-on science within their local environment to enhance their awareness of—and their scientific contribution to—the global environment.

The GLOBE Implementation Office is supported under NASA Grant and Cooperative Agreement C19M0120, awarded to the University Corporation for Atmospheric Research.

A Message from the Director

GLOBE Implementation Office

To the GLOBE Community,

We are living in a world that has been irrevocably changed by the coronavirus pandemic. To those who weathered the storm of illness and loss, I would like to extend my sincere sympathy. To those who brought aid and solace through work and through everyday acts of kindness; and to the students, teachers, and partners who carried on to teach and to learn in a topsy-turvy world, I want to extend my deepest regard.

In spring of 2020, we put out a call to the community asking for photographs taken during the pandemic year, knowing that an Annual Review full of zoom screen-grabs just wouldn't do. We received more photos than we could possibly print in this booklet. To all of you who contributed photos of doing GLOBE during the pandemic, thank you.

During this strangely muddled time, I find myself looking backward and forward at the same time. GLOBE is a complicated, complex, and cooperative venture with a rich and colorful history. It seeks to inspire, as well as create, an appropriate educational foundation for the development of the next generations of STEM professionals; and to help students and the rest of the general public gain an understanding of the local environment on this ever-changing and dynamic planet.



GLOBE does this by weaving the different strands of the program—the community (students, teachers, scientists, U.S. and International Partners and government liaisons); the involved sponsors; the staffs of the GLOBE Implementation Office (GIO), GLOBE Observer (GO), and Science Systems and Applications, Inc. (SSAI); the partners (U.S. and international) and others that participate through various types of funding from the sponsors, governments and local resources in over 120 countries. Through structured diplomacy between countries; the engagement of groups like Peace Corps and United National Environmental Program (UNEP) who bring with them name recognition, organizational presence, and goodwill toward people as well as the environment, GLOBE brings people together. Through hands-on science used in real-world situations; an ever-evolving technological infrastructure; multiple languages and educational pedagogies; and collaboration and cooperation among various sectors of the community, GLOBE speaks to the common values of those who seek solutions in science.

We use this solid foundation to carry forward. GLOBE reaches new audiences with the program's app, GLOBE Observer; the work with community volunteers; and with assistance from private funders and foundations (such as YLACES) that create relevant and exciting events (research symposia, in person and virtual meetings, trainings, etc).

This is what GLOBE is all about.

Thank you for remaining committed to being part of this great global community.

A handwritten signature in black ink that reads "Tony Murphy".

Tony

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The GLOBE Program

GLOBE: An International Community of Practice

For over 25 years now, The GLOBE Program has set the bar toward the sky for scientific and educational excellence. GLOBE has invited students, educators, and professional and citizen scientists from around the world to join together to create an international community of practice. In its day-to-day efforts, GLOBE has offered a unique opportunity for community members to engage in authentic scientific exploration using the same language: science.

Expanding personal comprehension and increasing precise data measurements, the people of GLOBE engage in hands-on investigations to deepen their comprehension of, and commitment to, our interconnected planet. GLOBE now consists of dedicated and engaged community members from over 125 countries and 131 U.S. partnerships.

GLOBE's international framework includes:

- **GLOBE Regions**—GLOBE administration is divided into six regions: Africa, Asia and Pacific, Europe and Eurasia, Latin America and Caribbean (LAC), Near East and North Africa (NENA), and North America (which consists of Canada and

the United States). GLOBE partners (country coordinators and U.S. Partners) facilitate the implementation of GLOBE in their country or within their service area.

- **GLOBE Working Groups**—GLOBE's five Working Groups (Diversity, Equity, and Inclusion; Education; Evaluation; Science; and Technology) are dedicated to enhancing the role of the program's diverse community members in shaping the future of GLOBE, and in supporting the development and implementation of GLOBE worldwide.
- **U.S. Partner Forum**—The U.S. Partner Forum (USPF), which represents six regions (Midwest, Northeast and Mid-Atlantic, Northwest, Pacific, Southeast, and Southwest) works to enhance the contribution of GLOBE toward improving STEM (Science, Technology, Engineering, Mathematics) education in the United States.
- **The GLOBE International STEM Network (GISN)**—The GISN is an international network of STEM professionals. These experts mentor teachers; explore national and international components of science and research; design and create unique field campaigns; and inspire students to engage in the hands-on exploration of cutting-edge STEM and research.



Hyunhwa Elementary School; Pyeongtaek, Republic of Korea



Staff of the GLOBE Implementation Office, April 2020

Whether in-person or virtual, GLOBE Annual Meetings, GLOBE Learning Expeditions (GLEs), and regional meetings bring the GLOBE community together as one. The goal of these efforts is to share best practices and solutions to common issues; engage in collaborative data-collection adventures and horizon-expanding expeditions; consider challenges and opportunities; and work together to chart the course of The GLOBE Program. In 2020–2021, during a pandemic that separated us from touch, yet united us in spirit, GLOBE experienced its first ever “virtual” Annual Meeting—expanding the ability of community members to “get together” and build an even more energized and inclusive movement.

GLOBE Implementation Office: To Serve and Support

The primary goal of the GLOBE Implementation Office (GIO)—hosted by the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado, USA—is to serve the immediate and long-term needs of all community members.

On a daily basis, the people of GIO work to provide informed support for the common elements of science, communication, education and evaluation, technology/website, and overall community support—all with a focus on diversity, equity, and inclusion. These common elements, along with the NASA-hosted Data Information

System (DIS)—which is focused on database and website infrastructure—are instrumental to enabling the worldwide implementation of GLOBE.

GIO staff provide cutting-edge technical support services; initiate and sustain activities that encourage and promote diverse community involvement and expansion; provide up-to-date training and mentoring; coordinate and facilitate campaigns, projects, and meetings; engage with other groups, such as the DIS team, the GLOBE Observer team, and the NASA-funded Science Activation (SciAct) Projects (managed by GLOBE partners); and generate high-quality education and science materials and resources.

In accordance with “The GLOBE Program Strategic Plan 2018-2023,” GIO’s strategic priorities are *“to improve student understanding of environmental and Earth system science across the curriculum; contribute to scientific understanding of Earth as a system; build and sustain a global community of students, teachers, scientists and citizens; and engage the next generation of scientists and global citizens in activities to benefit the environment.”*

During a very rough year, the people of GIO remained dedicated to, and focused upon, serving and supporting the community. Working separately, but always “together,” GIO remained vigilant in ongoing efforts to meet, and exceed, the needs of the people around the world; people who are the heart and soul of The GLOBE Program.

New Assistant Director Joins GIO in 2021

In January 2021, Dr. Denise “Skye” Yost joined GIO as the Assistant Director. Denise is a marine scientist, educator, and leader who is passionate about GLOBE’s international hands-on environmental science and education mission. Denise has extensive experience in physiology, ecology, genomics, and climate change research having studied coral reefs in collaborative settings around the world. As she works across The GLOBE Program and community, she will draw upon expertise developed over years leading interdisciplinary research programs with international, academic, and governmental partners.

Denise also brings to GIO her expertise in transformational education and pedagogy, experiential leadership, and facilitation. She has served in key administrative and service roles in higher education. Over the course of her career, she has developed expertise in theory and practice, drawing on training in social belonging, mindfulness and prevention science to design and implement leadership programs, workshops, and courses for diverse audiences. In this work, she has been privileged to interact with thousands of people and support positive trajectories of personal and professional development for individuals and teams within academic, governmental, and business organizations.

“Since joining GIO, I have enjoyed my work being immersed in and connected to what GLOBE so expertly fosters in the realms of science and education. Through the synergistic activities of the GIO team, the entire GLOBE community, and the events that bring us together, I have been inspired to



Dr. Denise “Skye” Yost

bring my skills as a scientist, educator, and leader to bear in my work. I will continue to strategize, facilitate and implement positive ways forward for all of us who share a passion for learning, observing, and taking positive action to understand the environment and human connections in our world. I am very much looking forward to meeting everyone in person in the future!”



Young student uploads green down data to GLOBE database, St Nicholas College Dingli Primary School; Malta

GLOBE: Scientific Impacts Around the World

The GLOBE Program is based on science—from data collection and data entry to analysis, research, and collaborative scientific studies. GLOBE offers field-focused opportunities for community members to collect and submit data that can be used in cutting-edge scientific research efforts. The table below shines a light on some of the critical results of the community’s ongoing data measurement efforts during 2020–2021.

By mid-2021, nearly 40,000 teachers from over 37,000 schools worked to contribute over 200 million measurements to the GLOBE database for use in their inquiry-based science projects. In addition, in 2020, citizen scientists, called “GLOBE Observers” have contributed over 284,918 measurements using a mobile app. By early May 2021, 95,180 measurements were contributed!

Given the fact that the world was in the midst of a global pandemic, and that various types and lengths of lockdowns had

Region	Number of countries entering data from 01 May 2019 through 30 June 2020	Total number of measurements entered by 30 June 2020	Total number of measurements entered 01 May 2019 through 30 June 2020	Total number of measurements entered by Citizen Scientist organizations 01 May 2019 through 30 June 2020
Africa	18	1,098,818	73,059	1,169
Asia and Pacific	13	2,226,813	813,982	28,367
Europe and Eurasia	42	73,296,856	4,058,299	19,030
Latin America and Caribbean	20	1,328,395	103,546	6,468
Near East and North Africa	12	1,598,232	401,819	1,328
North America	02	130,513,889	17,338,245	90,309
TOTAL	107	210,063,003	22,788,950	146,671

come into effect, The GLOBE Program—in consultation with the program sponsors (NASA, NSF, NOAA, DoS)—informed the community that any local or state/country regulations should be adhered to and, given the circumstances, that data collection may not always be a top priority. Community members, while adhering to health and safety regulations in their areas, also managed to use their “backyards” for data collection, showing the ingenuity and passion of the community for the program and what it stands for!

GLOBE: Diversity, Equity, and Inclusion Task Force

With the support of GLOBE Program Sponsors from NASA and NSF, in the fall of 2019 the GLOBE Diversity, Equity, and Inclusion (DEI) Task Force was created. In 2020–2021, the Task Force worked to develop a DEI Vision and Mission, as well as “DEI” definitions:

- **Vision:** The Global Learning and Observations to Benefit the Environment (GLOBE) Program is committed to promoting a culture of belonging with its community of students, teachers, scientists, and citizen scientists in order for all to contribute meaningfully to our understanding of the Earth system. GLOBE recognizes that the creation of diverse, equitable, and inclusive practices is central to achieving this goal and seeks to foster an environment that values diversity as a core

strength; addresses inequities; and ensures inclusion of all perspectives in guiding the planning and implementation of The GLOBE Program.

- **Mission:** Our mission is to ensure that GLOBE learners and community members around the world are valued as diverse individuals with different perspectives, and unique ways of thinking. We commit to encouraging open collaboration and communication to build and sustain a diverse, just, equitable, and inclusive program. Diversity: The collective mixture of visible and invisible differences and similarities that enhance the societal relevance and impact of GLOBE and includes the full spectrum of personal attributes, cultural affiliations, and socioeconomic (or professional) statuses that characterize individuals within society.
- **Equity:** Fair treatment, access, opportunity, and advancement for all people, with just inclusion in which all can participate, prosper, benefit, and reach their full potential. This means striving to identify and eliminate barriers that have prevented the full participation of some groups.
- **Inclusion:** Ensuring respect and value of the individual identities and contributions of participants engaged in executing GLOBE’s vision, mission, and strategic priorities and ensuring that GLOBE is a safe, welcoming, and supportive environment for all. This involves cultivating a culture of involvement and empowerment, and promoting and sustaining a sense of belonging.



DEI International Task Force

The Task Force also worked on the creation of a DEI Assessment Survey to assess the state of DEI “Knowledge and Practice” across the GLOBE infrastructure; to assess available DEI resources; and to discover categories of DEI assessment and evaluation not normally considered in GLOBE practice, as well as DEI considerations for the purpose of improving the quality of the interface between GLOBE and present and future members of its constituencies. The Task Force received substantive input from the community, and is working to translate that input into direct DEI action.

There is also a new DEI blogging portal available on the GLOBE website. “We are excited to start a new

blog highlighting stories of GLOBE members and their commitment to help GLOBE become an increasingly welcoming, diverse, equitable, and inclusive community,” Rosalba Giarratana, a member of the GLOBE DEI Task Force, said in the initial blog.

“We are grateful for the enthusiastic response to this initiative and, while we recognize there is a lot of work ahead of us, we are excited to be moving towards a more diverse, equitable, and inclusive GLOBE community, together,” Rosalba said. “Please stay tuned to learn more about GLOBE DEI efforts, and about how GLOBE members are helping shape the most welcoming community!”

Diversity Equity and Inclusion Task Force

Shadrack Agyiri (Ghana)
Jennifer Bourgeault (USA)
Katie Chapman (USA)
Kimberly Davis (USA)
Mindi DePaola (USA)
Francis Emralino (Philippines)
Wrayna Fairchild (USA)
Trena Ferrell (USA)

Rosalba Giarratano (USA)
Kate Goss (USA)
Nikitah Imani (USA)
Jill Karsten (USA)
Julie Malmberg (USA)
Josette Neal-De-Stanton (USA)
David Padgett (USA)
Richard Parsons (USA)

Marina Pavlic (Croatia)
Ana Prieto (Argentina)
Nate Raynor (USA)
Juan Felipe Restrepo Mesa (Colombia)
Elena Sparrow (USA)
Josephine Joy Tolentino (Philippines)

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Science in Action

Supporting NASA Satellite Missions and GLOBE Field Measurement Campaigns

A major focus of GLOBE endeavors is to support NASA's satellite missions through hands-on research and student research/field measurement campaigns. GLOBE campaigns are regional and worldwide projects that provide students with the opportunity to step out into the field and question, research, explore, measure, and collect data that NASA can then use to validate and “ground truth” its scientific data.

The current campaigns are:

- **The Trees Around the GLOBE Student Research Campaign:** This campaign, launched in 2018 in conjunction with NASA's Ice, Cloud, and Land Elevation Satellite 2 (ICESat-2) launch, is a student research campaign focusing on tree height. From May 2020 through May 2021, the campaign had several hundred participants from over 50 countries. By early 2021, data counts included: tree height (10,000+); land cover (7,000+ from 5,000 sites); and green-up/green-down (5,000+ from over 200 sites).
- **The GLOBE Mission Mosquito Campaign:** This campaign, which began in 2018, is creating an organized citizen science community who conduct and report local observations using The GLOBE Program's App, GLOBE Observer with its Mosquito Habitat Mapper Tool. Through this effort, citizen scientists identify potential mosquito breeding sites, sample and count mosquito larvae, and (with optional equipment) examine and photograph specimens to identify genus. They are also requested to eliminate the breeding grounds, if possible; for example, emptying tires, plant pot holders, etc.
- **The Urban Heat Island Effect (UHIE)-Surface Temperature Student Research Campaign:** This ongoing campaign—which now takes place in October, December, and March—is focused on examining the impact urbanization has on the Earth's surface temperature and how the surface temperature changes the dynamics of the Earth's atmosphere. In 2020–2021, teacher workshops for the campaign were virtual, and



Monitoring mosquitoes; Morang, Nepal

teachers engaged in eTraining to learn how to do the surface temperature protocol. The campaign finished up the 2020 efforts with 120 schools (420 study sites) participating. Although fewer schools participated due to the pandemic in 2020, students at participating schools recorded nearly 9,000 observations, an approximate 25 percent increase from 2019.

Mobilizing The GLOBE Program's App through GLOBE Observer Challenges

The GLOBE Program's App, GLOBE Observer, extends the reach of GLOBE by providing a way for all community members—those who have been dedicated to this expansive effort for years or those who have just joined in—to take and submit observations. These “citizen scientist” observations help professional scientists track changes in clouds, plants, and other life in support of Earth system science research. As of early 2021, over 194,500 (up from 166,000 in early 2020) citizen scientists had downloaded the program's app, and over 507,693 (up from 373,000) data were entered by citizen scientists.



2020 Community Cloud Challenge: Science is Better Together

During the four weeks (15 July–15 August) of the “2020 Community Cloud Challenge: Science is Better Together,” GLOBE community members and citizen scientists had the opportunity to learn how eight different NASA scientists study clouds to better understand our atmosphere and the important role citizen science observations play in that. The challenge generated more than 30,000 observations from more than 80 GLOBE countries around the world, including 26,564 cloud observations; 27,269 satellite matches; and 66,249 photos shared.



2021 Community Trees Challenge: Science is Better Together

During the four weeks (15 April–15 May) of the “2021 Community Trees Challenge: Science is Better Together,” GLOBE community members and citizen scientists worked to observe, learn, engage, and create as they tracked their progress on the Trees Challenge Activity Tracker. This challenge generated 2,441 tree height observations from 1,733 global locations. This makes up just over seven percent of the total tree height observations from 11 percent of the global locations since the release of the program's GLOBE Observer app with the Trees Tool. (Since the release of the Trees Tool, there have been 34,915 tree height observations from 15,014 global locations.)

Refreshing GLOBE's eTraining Program

As always, GLOBE remains dedicated to inviting—and inspiring—teachers (formal and informal) and science-enhancing observers (citizen and professional) to dive into the educational and scientific wealth of the program. Even before a pandemic made it nearly impossible to connect in person, GLOBE set about creating a professional way for teachers to access the training materials necessary to lead a classroom in data collection and lab procedures.

Now, in order to enter GLOBE data into the ever-expanding database (through the website or through The GLOBE Program's app, GLOBE Observer) teachers with approved accounts simply need to complete the necessary training by attending a GLOBE workshop (when the program is offering in-person trainings once again) or by completing the online eTraining modules. Once training is complete, these teachers can enter measurements—and join a community of

thousands teachers and observers from around the world! There are now 43 eTraining modules available (including modules introducing The GLOBE Program and all four protocol areas: Atmosphere, Biosphere, Hydrosphere, and Pedosphere).

Citizen scientists can still enter measurements through the program's app, GLOBE Observer, for clouds (excluding air temperature, humidity, and barometric pressure), Land Cover, Mosquito Habitat Mapper, and Tree Height.

Enhancing the GLOBE International STEM Network

The GLOBE International STEM Network (GISN) links STEM professionals/scientists with GLOBE teachers and schools, providing the opportunity for them to work directly with students on specific educational activities—with active members from all six GLOBE regions.

In late 2020, the GISN debuted new vision and mission statements:

- **Mission:** The GISN serves to enhance environmental literacy by promoting the use and collection of GLOBE data in support of student and GISN member research, supporting and mentoring students and other GISN members in their Earth science investigations, and collaborating with teachers and STEM professionals around the world.
- **Vision:** To foster a global community of STEM professionals who cultivate local research that contributes

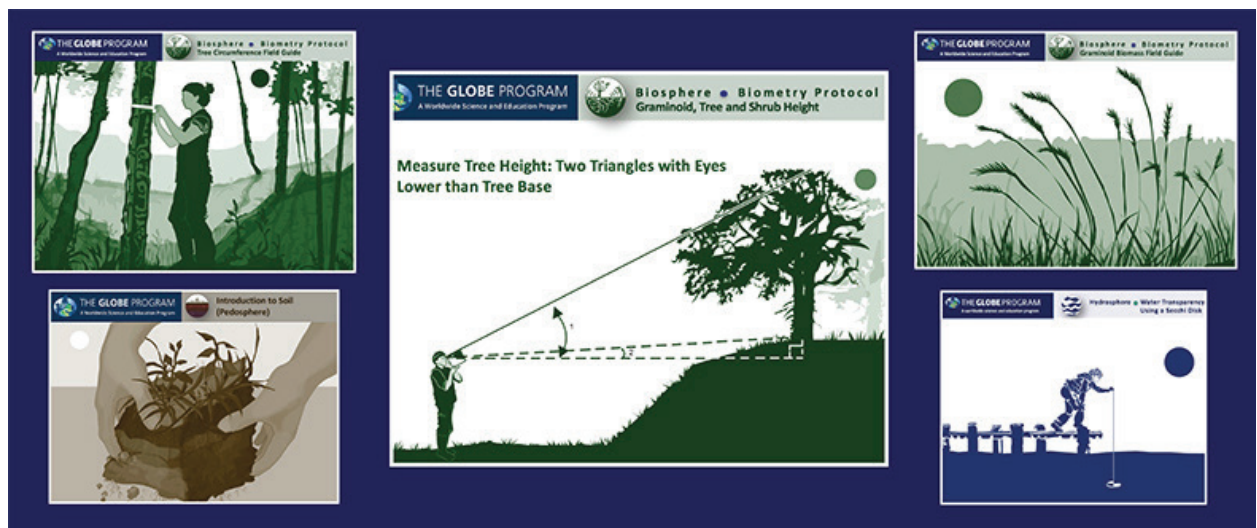
to a global understanding of Earth system science for students, teachers, and other STEM professionals.

In 2020–2021, the GISN webpage received an organizational update. In order to provide more clarity about the GISN, and to create clear paths for accessing/sharing resources and connecting/collaborating, sections were redefined and reinvigorated. GISN members are encouraged to add each other as “Friends” on the website to stay updated with each other’s scientific, collaborative, and educational activities.

Exceeding Expectations with the GLOBE Zika Education and Prevention Project

The GLOBE Zika Education and Prevention Project, in partnership with the U.S. Department of State, was a global initiative that worked with citizen scientists, public health officials (PHOs), teachers, and students to safely collect larvae samples in 30 Zika-affected countries in three GLOBE regions: Africa, Asia and Pacific, and Latin America and Caribbean.

In 2021, GIO received a six-month No-Cost Extension (NCE) with the goal of creating virtual training modules so that people could self-train and train others in small groups. A new module geared towards PHOs was created to help bridge the gap between data collection and data usage. These training modules will continue to be resources to help serve the GLOBE community now that the project has been completed. As of early 2021, there were more than 196,375 data points entered into the GLOBE database, resulting in roughly 27,000 new observations. Overall, participating countries submitted nearly 160,000 data points.



eTraining modules



Searching for mosquito larvae; Connecticut, USA



Students measure and record surface temperature on their schoolyard for the Urban Heat Island-Surface Temperature Field Campaign; Pyeongtaek, Republic of Korea

3

Education in Action

Supporting GLOBE NASA Science Activation Projects

GIO provides support for four innovative NASA-funded Earth Science Activation (SciAct) projects (through STEM agreements with GLOBE U.S. Partners). In 2020–2021, this work included:

- **GLOBE Mission EARTH (GME):** GME focuses on bringing together scientists, science educators, and other experts to develop a K–12 “Earth as a System” curriculum progression, embedding NASA assets and GLOBE resources into the classroom. In 2020, GME reached 79 teachers and over 4,600 students from across the United States. GME led the UHIE-Surface Temperature Field Campaign, supported students in their attempts to analyze air quality observations, and assisted students in completing research projects. In addition to other

projects, GME hosted virtual and hybrid professional development for teachers, and assisted teachers in working with their students remotely.

- **AEROKATS and ROVER Education Network (AREN):** The goal of AREN is to train the next generation of scientists, engineers, and other professionals to observe and understand Earth through experiential learning using NASA technology and data in real-world settings. In addition to other projects, AREN created learning activities aligned with GLOBE; developed GLOBE project-appropriate AREN protocols; trained Regional Educational Service Agencies (RESA) science consultants in GLOBE; and promoted GLOBE through social media.
- **Impacts and Feedbacks of a Warming Arctic: Engaging Learners in STEM using NASA and GLOBE Assets (Arctic and Earth SIGNs):** This project connects



GLOBE Aren Research Project students prepare for their last flight to collect data for their IVSS research project; Dearborn, MI, USA

youth and adults to climate issues and Earth science learning through inquiry-based GLOBE investigations and community stewardship activities. In addition to other projects, they continued to work with, and refine, the model that braids indigenous and western science to more fully follow co-production of knowledge and process for the core training workshop and curriculum development across project partners; to adapt it to the needs of diverse audiences and communities; and to disseminate it to a wide variety of national and international audiences.

▪ **NASA Earth Science Education Collaborative (NESEC):**

NESEC is a partnership between four organizations that are GLOBE partners: Institute for Global Environmental Strategies (IGES), and the Earth sciences at three NASA Centers (Goddard Space Flight Center, Jet Propulsion Laboratory, and Langley Research Center). In addition to other projects, the NESEC team shifted and adapted to support science at home and virtual events as part of adapting to the pandemic, including: supporting the overall NASA@Home initiative and producing weekly subject matter expert (SME) videos; shifting student research campaigns from fieldwork and data collection to focus on data analysis and research; expanding the 2020 Clouds Challenge from a data collection competition to a “learning together” experience about clouds; developing several new resources that can support science at home and families and partners; and continuing to connect with audiences through webinars, SME connections, and partner online events.

In 2020–2021, these projects engaged audiences in scientifically driven events—all geared toward energizing GLOBE community members.

Advancing GLOBE’s Trainer and Mentor Trainer Certification Process

The GLOBE Program has a long history of building the capacity of its community by certifying GLOBE Trainers and Master Trainers. The result was a vibrant, growing community with members who were equipped to accomplish the mission and strategic goals of GLOBE.

The training model has been in existence for much of The GLOBE Program’s history.



Students measure snow depth to determine average snowfall in wild berry research area, University of Alaska-developed project; Fairbanks, AK, USA

In order to continue the goal of providing high-quality training and professional development, it is important to have people leading GLOBE workshops who are knowledgeable about The GLOBE Program, with a firm understanding of protocols, procedures, and the quality of data being collected and recorded—and who can effectively guide teachers in how to implement GLOBE in their educational setting.

The GLOBE Trainer and Mentor Trainer Certification Process is a review and a revision of the current process. It also introduced the concept of a “Mentor” replacing the “Master Trainer” designation. The Education Working Group, who spearheaded the revision process, described Mentor Trainers in the following way: *“Mentor Trainers aid in advancing the community of Trainers by mentoring Candidate Trainers. It is not expected that all Trainers will want to become Mentor Trainers. Only those active Trainers with a passion for serving the GLOBE community by actively mentoring, observing, and assessing Candidate Trainers should seek this designation. Mentor Trainers should be scientifically competent to answer questions related to GLOBE protocols, encourage the use of GLOBE and other Earth system science resources, and eager to provide*

support and guidance to help Candidate Trainers become confident and competent to conduct their own GLOBE trainings” (GLOBE Trainer and Mentor Trainer Qualifications and Certification Process, 2020)

The process is meant to:

- emphasize the trainer certification procedure by refining the process as more streamlined, flexible, transparent, and accessible; and to guarantee the quality of trainers throughout the GLOBE community; and
- set up the Mentor Trainer Certification Process by defining Mentor Trainers (see above) as a resource to aid and advance the community of GLOBE trainers, and to create a system for Mentor Trainers to communicate with each other to ensure the quality of mentorship throughout the GLOBE community.

GLOBE is well on its way to adding informed, qualified, and dedicated GLOBE Trainers and Mentor Trainers to the list of community members ready, willing, and more than able to move the program forward to even higher levels of achievement.

Refining GLOBE’s Science Protocols

Over the past 26 years, The GLOBE Program has expanded in many ways, and this includes the number of protocols increasing from 11 to 55. With this, questions have arisen as to how well these protocols fit the needs of the community, whether there are too many protocols, and also whether new protocols are needed.

In 2020–2021, the GLOBE Science Working Group assumed the task of considering the number and type of science protocols, and identifying criteria to assess protocols in order to develop a recommended list of protocols to be considered for deactivation and possible deactivation. This effort included seeking input from the community of the proposed deactivation process. (A deactivated protocol means that data for the protocol cannot be entered into the database after a specified date, and that time and resources would no longer go toward updating or maintaining the protocol. However, existing data in the database and teaching and learning resources for the protocol would continue to remain available through the program.)

The objective of evaluating existing protocols is part of GIO’s ongoing efforts to make GLOBE responsive to the community. While GIO is confident that each of the 55 protocols has provided value to the community,

it is appropriate to assess current activities in order to strengthen the program and to provide opportunities for future growth.

Encouraging GLOBE Student Research Via 2020–2021 IVSS

The GLOBE International Virtual Science Symposium (IVSS) is a way for GLOBE students (K16) to show the world what they’ve learned through hands-on research. These focused research endeavors require students to collaborate with GLOBE International STEM Network (GISN) members—and to apply their work to a real-world problem.

In 2020, GIO received 263 projects from 29 countries. On Earth Day, a stipend drawing was held, and seven projects were selected randomly from a group of projects that received a four-star student research badge, and at least two other optional badges. The seven projects were:

- “El comportamiento de las palomas durante el Eclipse Solar 2019” (Argentina, Latin American and Caribbean Region)
- “Faith-based Communities Affecting Breeding Sites of Mosquito Larvae at Samui Island, Thailand using Drone imagery and GLOBE Observer: Habitat Mapping App” (Thailand, Asia and Pacific Region)
- “How Does Aerosol Optical Thickness (AOT) Vary Within 50 Kilometers of Lake Erie?” (United States, North America Region)
- “Identification of Mosquito Larval Species at SSA Mombasa, Kenya—2” (Kenya, Africa Region)
- “Representation of the Invasive Species of Trees and Shrubs in Daruvar—2” (Croatia, Europe and Eurasia Region)
- “The Effect of Irrigation with Sulfur Water on Soil, Land Cover, and Adaptation of Some Living Organisms” (Oman, Near East and North Africa Region)
- “The Effects of Aerosols on Water Quality” (United States, North America Region)

In 2021, GIO received 242 projects from 20 countries. On Earth Day, a stipend drawing was held, and seven projects were selected randomly from a group of projects that received a four-star student research badge, and at least two other optional badges. The seven projects were:

- “Assessing How Environmental Changes Affect the Distribution and Dynamics of Malaria and Crop Production Using Satellite-based NDVI” (Kenya, Africa Region)



A newly installed instrument shelter for atmospheric measurements, Schule Cantaleum Zurich; Switzerland

- “Effect of Population Density on Burrow Characteristics in the Fiddler Crab (*Uca bengali*)” (Thailand, Asia and Pacific Region)
- “Estudio Comparativo de la Temperatura Superficial entre Zonas Urbanizadas y Arboladas” (Spain, Latin America and Caribbean Region)
- “Investigation of Puerto Rico Communities Focused on Mosquitoes’ Habitats and Awareness” (United States, North America Region)
- “Los Cambios que Producen las Estaciones en Arboles y Arbustos de Pujato—Argentina” (Argentina, Latin America and Caribbean Region)
- “Possible Effects of River Flooding on Soil Parameters and Tree Growth Along an Urban River” (United States, North America Region)
- “The Effect of Pottery on Brackish Water in the KSA and Its Impact of Soil and Vegetation Cover” (Saudi Arabia, Near East and North Africa Region)

GLOBE would like to acknowledge the hard work and dedication of all students participating in the annual

IVSS—and for continuing to raise the bar on GLOBE-related research endeavors. In addition, a huge thanks to the teachers, GISN members, and other GLOBE community members who mentored students and encouraged them to submit final projects to the GIO. This event would not be possible without those who helped in the assessment of the students’ projects, from GIO staff to community members

Creating GLOBE’s Air Quality Protocol Bundle

The GLOBE Program Science Working Group has created a new GLOBE protocol bundle focusing on air quality. Air quality (a measurement of the amount of pollution in the air) is affected by a number of factors. These factors can include the source of pollutants, the type of pollutants, and local climatological and weather conditions. This bundle helps demonstrate the linkages between atmospheric phenomena, land cover use, and air quality.



Collecting data starts early at the Rapid City Public Library; Rapid City, South Dakota, USA

The purpose of the Air Quality Bundle is to provide students with a set of protocols to use to monitor local air quality, which can keep community members and stakeholders informed and help guide policy decisions. Scientists can use data gathered using GLOBE protocols to help ground-truth satellite air quality measurements.

Air Quality Bundle Protocols:

- Aerosol
- Air Temperature
- Barometric Pressure
- Clouds
- Precipitation
- Relative Humidity
- Visibility and Sky Color (a GLOBE Learning Activity)
- Measuring Wind Direction (a GLOBE Field Guide in the Surface Ozone Protocol and measured by automated weather stations)
- Land Cover Classification (Biosphere)

With this new addition to the GLOBE suite of resources, community members can more effectively and efficiently consider—and advance—issues around air quality.

Winning Awards with Elementary GLOBE

The Council of the American Meteorological Society (AMS) voted to award the Elementary GLOBE storybook *What's Up in the Atmosphere: Exploring Colors in the Sky* (text by Becca Hatheway and Kerry Zarlengo; illustrations by Lisa Gardiner), the Louis J. Battan Authors' Award, K-12.

The award is presented to the author(s) of outstanding learning materials that foster the understanding of atmospheric and related sciences in K-12 audiences. The formal presentation of the award took place in conjunction with the 101st AMS Annual Meeting, which was held virtually in January 2021.

In this Elementary GLOBE storybook, which is available on the GLOBE website as an “Air Quality Module,” the GLOBE Kids investigate colors in the sky and learn how air pollution affects sky color and our health. Learning activities engage students in describing sky color and conditions in the atmosphere, creating a model to learn how sky color and visibility are affected by aerosols, using prisms to explore properties of light and colors, and collecting aerosol samples.

4

Technology/Website in Action

Redesigning GLOBE's Website

In November of 2020, the Data Information System (DIS) team upgraded the behind-the-scenes software, Liferay, that supports the GLOBE website. This was a major upgrade, which included over a year of effort to shift all of GLOBE's capabilities and features into the new software version. The new version brings additional features, greater security, a more modern administrative interface, and performance improvements over the older version.

In delivering the changes, GLOBE worked to minimize the impact on community members. Many of the administrative and custom tools look nearly unchanged, but there are some more obvious changes. Access to account settings and "MyPage" are now located under the photo icon on the top-right of the interface, and access to various tools (like entering data and visualizing data) and management areas was moved to a left-side slideout interface. New features are still being added to the site—based on new available capabilities.

The goal of this extensive effort is to ensure that people visiting—and using—the GLOBE website can maneuver through features and options with greater ease of use and a greater sense of hands-on accomplishment.

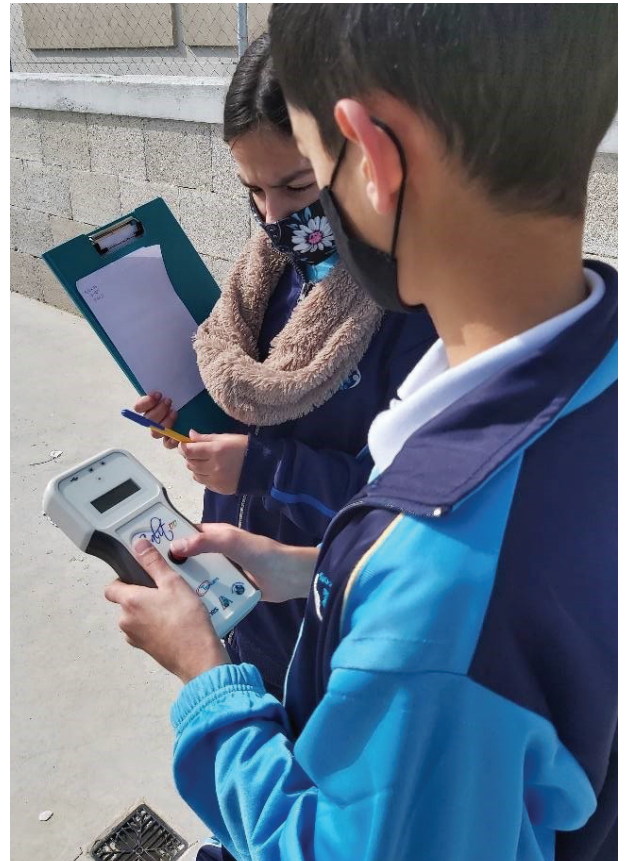
Elevating GLOBE's Atmosphere Protocols

GLOBE's data entry process now gives community members a new option that is even easier to use: all GLOBE atmosphere protocols are now available in The GLOBE Program's app, GLOBE Observer.

Trained and approved GLOBE members can now submit atmospheric measurements, such as temperature and rainfall, as well as bundle data, directly using the GLOBE Observer app. DIS is also working on moving other existing GLOBE sphere protocols into the app—so, stay tuned!

Assisting the GLOBE Community

As GLOBE community members explore, learn more about, and dive deeper into The GLOBE Program, there are many answers available on the website designed to provide



Students of the Kovel Station of Young Naturalists who took part in the spring and autumn European Phenology Campaign; Ukraine

up-to-date assistance. On an ongoing basis, the GLOBE Community Support Team (CST) works to provide tips and tools to make using GLOBE, and GLOBE resources, as easy as possible.

Need to know "what" it's all about? Check out the focused FAQs, including:

- GLOBE Program Overview
- GLOBE Accounts Information
- GLOBE Schools Information
- GLOBE Workshop Information
- GLOBE Website Tutorials
- GLOBE Protocols Information
- Instrument Information
- Data Entry Information

4

Need to know “how” to engage in the program? Check out the training tutorials, including:

- Setting up Your Data Site
- Entering Measurement Data
- Retrieve and Visualize Your Data
- Setting up Your GLOBE Account
- Creating Student Accounts
- Collaboration

Community members can also reach out to the CST via email (globehelp@ucar.edu) or via telephone (1-800-858-9947), Monday-Friday, from 7:00 a.m. to 3:00 p.m. Mountain Standard Time.

Expanding GLOBE Publication Possibilities

Thanks to the CST, a “new and improved” GLOBE publications page is up and running on the GLOBE website.

GLOBE has a long history of sharing impact and science findings through peer-reviewed publications. The peer-review process ensures that published articles represent the best scholarship currently available. Each article that is submitted to a peer-reviewed journal is sent to other scholars in the same field in order to get their opinion on

the quality of research, the relevance to the field, and its appropriateness for inclusion in the journal.

The new GLOBE publications page allows users to search for publications via filters (such as searching by author, date, and content related to GLOBE spheres or protocols). Community members can now even suggest publications that they would like to see added to the page—by simply filling out an online form that, if approved after CST review, will get added to the library.

Updating GLOBE Email Addresses

In 2020–2021, GIO announced a switch to a set of new email addresses in order to ensure that GIO can continue to meet the needs of the community, as well as due to security concerns. The new emails are:

- globestaff@ucar.edu (previously staff@globe.gov)
- globehelp@ucar.edu (previously help@globe.gov)
- globecommunications@ucar.edu (previously communications@globe.gov, events@globe.gov, and news@globe.gov)

GIO is located at the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado, USA. GIO staff are located at UCAR, which is why “ucar.edu” is being used with all new email addresses.



Students at 23rd GLOBE Estonia Learning Expedition during a hydrology learning session; Viljandi, Estonia

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Communications in Action

Informing the GLOBE Community with News and Events

A daily goal of the GIO is to inform, educate, inspire, and engage GLOBE community members. To achieve this, GIO scours the globe for what's new, what's happening (and when, where, and why it's happening), as well as all other pertinent information about what other community members are up to—then works to announce this “news” to the community. In alignment with the GLOBE Strategic Plan: 2018–2023, the goal of these efforts is to improve communication pathways among the GLOBE community; improve communication of GLOBE events, activities, and national and international achievements; and increase the promotion of GLOBE to new audiences.

GIO also invites community members, sponsors, partners, and collaborating organizations and programs to provide the information necessary to ensure that the website is constantly being updated with vital information regarding GLOBE-related news and events. In 2020–2021, more than 1,000 GLOBE-related news and events were posted to the website!

In addition to “printed” news and events listings on the website (as well as those shared in the monthly News Brief and mass mailings), GIO created and produced a number of vital and informative video presentations. During the pandemic, GIO worked to craft personalized virtual video messages to help ensure that all community members realized their invaluable significance to the enduring and expanding success of The GLOBE Program.

Inspiring GLOBE Student Vloggers

Selected in April, GLOBE's 12 new Student Vloggers (video bloggers) made their debut during GLOBE's anniversary celebration on Earth Day 2021. Vlog-style videos are filmed in part “selfie-style,” to help viewers embark on a journey into the vloggers world—into what they are doing, learning, and discovering. In line with the Strategic Plan for communications, these vlogs are vibrantly crafted in a manner designed to increase the use of new communication networks among different GLOBE community groups; to increase the awareness of the achievements of GLOBE



Students took to social media to tell their GLOBE stories; student vloggers, Argentina

5

community members; and to increase the promotion of The GLOBE Program to new audiences!

GIO would like to acknowledge the program's Student Vloggers! They are as follows (in alphabetical order):

- **Andrej**, age 15
(The Philippines, GLOBE Asia and Pacific)
- **Carlos**, age 14
(United States of America, GLOBE North America)
- **Christine**, age 17
(United States of America, GLOBE North America)
- **Hala**, age 16
(Saudi Arabia, GLOBE Near East and North Africa)
- **Hannah**, age 13
(Malta, GLOBE Europe and Eurasia)
- **Johannes**, age 18
(Estonia, GLOBE Europe and Eurasia)
- **Lakshmi**, age 13
(India, GLOBE Asia and Pacific)
- **Maia**, age 16
(Argentina, GLOBE Latin America and Caribbean)
- **Renada**, age 15
(Oman, GLOBE Near East and North Africa)
- **Sisanda**, age 16
(South Africa, GLOBE Africa)
- **Team: Lucio, Marianela, and Juan**, ages 19, 18, and 19
(Argentina, GLOBE Latin America and Caribbean)
- **Xavier**, age 15
(South Africa, GLOBE Africa)

Subscribe to GLOBE's YouTube channel to keep up with these vibrantly unique weekly journeys.



GLOBE student vloggers

Telling GLOBE Stories with New Community Profile Feature

The power behind The GLOBE Program is the passion, the purpose, and the people—GLOBE community members. The GLOBE Program values the level of daily dedication to, and ongoing support of, the program, as well as the enduring quality of the educational, environmental, and scientific contributions of our community members.

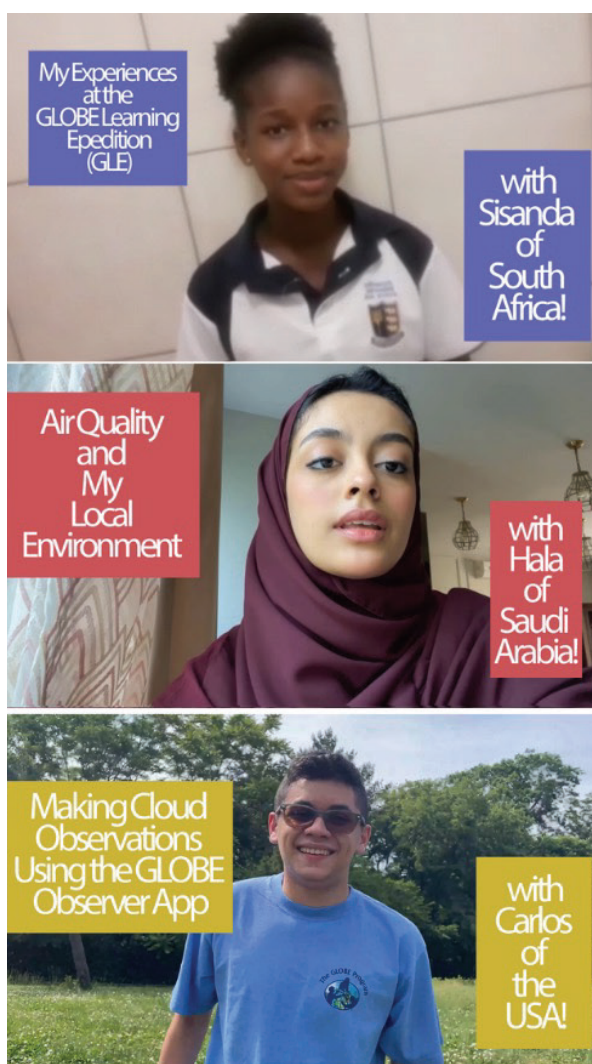
As a way of highlighting this invaluable dedication, GIO created a new feature designed to place a “spotlight” on the people of GLOBE in order to share the personal and professional stories of how working with GLOBE has impacted community members—in learning endeavors, classroom activities, scientific research, environmental observations, STEM careers, and the overall adventures of life. In line with the GLOBE Strategic Plan for

communications, an important goal of this storytelling endeavor is to increase communication about—and awareness of—the enduring achievements of community members throughout all regions, as well as to inspire current, and future, GLOBE adventurers.

GLOBE community members are invited to visit the GLOBE website, under “Community” (Community Profiles) and share their GLOBE story.

Sharing GLOBE on Social Media

Reaching out to community members around the world through social media outlets continues to be a central, and critical, way to keep people up-to-date on news, events, trainings, meetings, science symposia, and all GLOBE-related activities and opportunities.





Students spell “GLOBE” at the Estonia GLOBE Learning Expedition; Viljandi, Estonia

GLOBE’s efforts on Facebook continue to promote greater interaction with the program, cultural sharing, and professional and citizen science across the world. As of early 2021, the GLOBE Facebook account gained 1,835 new followers (from May 2020), for a total of 107,396 followers. The GLOBE page also has a total of 107,203 “Likes.” Between May 2020 and May 2021, the team posted 490 times (twice per day), reaching (on average) 222,870 people with those posts, and engaging (on average) 33,170.

GLOBE’s efforts on Twitter have become an increasingly prominent focus for the program. By sharing a combination of program-related, community-related, and sponsor-related content, GLOBE’s Twitter follower count has continued to increase. In May 2020, GLOBE had 6,982 followers; this rose to over 8,000 in early 2021. During this performance period, GLOBE tweeted 615 times (about two tweets per day, with additional re-tweets), and “impressed” about 727,000 people.

GLOBE’s efforts on Instagram continue to promote upcoming events and opportunities, social media focuses (clouds, mosquitoes, etc.), and intriguing aspects of our planet. In May 2020, GLOBE Instagram had 1,490 followers; this rose over 2,000 in early 2021. On average, GLOBE posted 40 times, with individual photo posts (approximately one per week), and created/shared 45 Instagram stories (also approximately one per week). These posts reached, on average, approximately 27,000 people.

During the height of the pandemic, GLOBE (in coordination with NASA) worked to support the ever-changing community needs, focusing on providing “At Home” resources. Weekly demo/activity videos and new/updated webpages were created for this effort. GLOBE reached nearly 5.4 million people with these social media products.

Refreshing GLOBE Promotional Materials

To ensure that the “look” and “feel” of The GLOBE Program is always current and fresh, GIO made a concerted effort this past year to update a variety of “promotional” materials. The goal of these efforts is to help community members so that they, in turn, can reach out to potential partners and sponsors, as well as to international scientific and educational communities and organizations interested in knowing more about—and participating with—The GLOBE Program.

In 2020–2021, GIO updated and revised content, as well as crafted new content, for program “one-pagers,” including:

- Approach Potential Funders for Your GLOBE Activities
- Become a GLOBE Observer
- Become a GLOBE Partner
- Become a GLOBE Teacher
- Become a Member of the GISN
- GLOBE and Peace Corps
- GLOBE and the Global Goals for Sustainable Development
- GLOBE and UNESCO
- GLOBE and USAID
- GLOBE Countries
- GLOBE eTraining
- GLOBE Measurement Campaigns
- GLOBE Schools and NASA Satellite Missions
- GLOBE Zika Education and Prevention Project
- U.S. GLOBE Regions Map

Make sure to check them all out—and feel free to use and share them with others!

6

The GLOBE Community

Welcoming a New GLOBE Country

On 03 December 2020, the Republic of Slovenia became the 124th GLOBE country in a signing ceremony that was broadcast live. Minister Simone Kustec of the Yugoslavia Ministry of Education, Science and Sport, recognized The GLOBE Program's opportunities for international scientific collaboration, teacher training, open-source educational materials, and commitment to creating gender balance in STEM fields in the future. Kustec said she wanted the program to thrive in Slovenia.

As representatives of their respective governments, Dr. Simona Kustec and Ambassador Lynda Blanchard signed the bilateral Memorandum of Understanding, which officially launched Slovenia's participation in the worldwide GLOBE program.

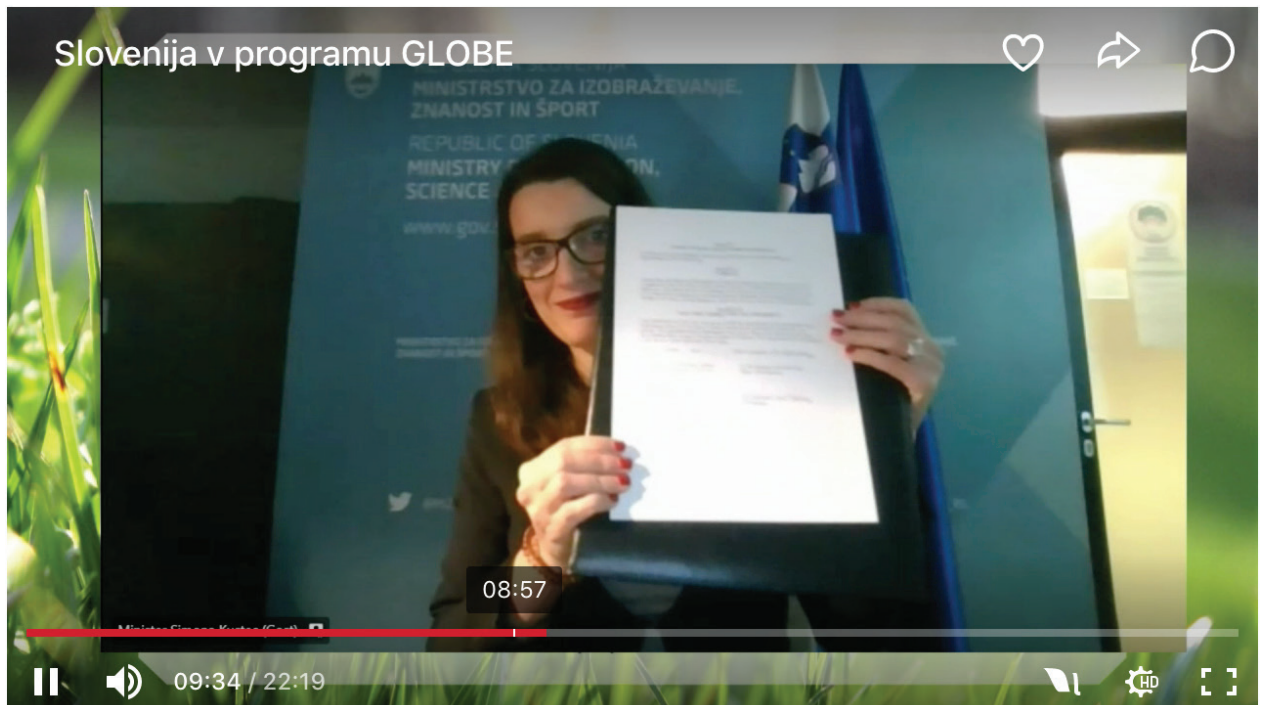
Dr. Allison Leidner, GLOBE Program Manager, joining online from Washington D.C., expressed NASA's delight at welcoming Slovenia during this, GLOBE's 25th Anniversary, year. "For over 60 years NASA has used the vantage point of space to study Earth, working with partners around the world. NASA's observations of Earth's complex environment are critical to understanding how the

environment is changing and could change in the future. The GLOBE Program has now contributed nearly 200 million measurements from a different perspective, the ground, of Earth's air, living systems, and soil," said Dr. Leidner. "The students, teachers, and citizen scientists responsible for these measurements make valuable contributions to scientific discovery and NASA's mission of understanding our home planet, my favorite planet!"

GIO Director Dr. Tony Murphy concluded this very cordial and seamless event with remarks about GLOBE's hope to assist Slovenia in building a strong program in science and education, with the support of GIO and GLOBE's Europe and Eurasia Regional Coordination Office, which is based in the Czech Republic. He mentioned GLOBE's community-driven strategic plan and GLOBE's five Working Groups with members for all regions, which together help to expand the impact of GLOBE around the world.

Gathering Virtually at the 2020 GLOBE Annual Meeting

The 2020 GLOBE Annual Meeting, which was to be held in Washington, D.C., USA, (as part of GLOBE's 25th Anniversary



Dr. Simona Kustec, Minister of Education, Science, and Sports; The Republic of Slovenia



celebration), went “virtual.” In an extensive effort to successfully shift gears, the GIO hosted its first interactive virtual annual meeting. Over the four-day event, there were presentations/updates from GIO, the technology team at SSAI, and program sponsors. There was also time for reports from the GLOBE Working Groups and the U.S. partners and country coordinators to meet about possible collaboration. Students from the 2020 IVSS also had the opportunity to present their research. The event drew the highest level of participation, with 429 registrants from 72 countries.

“This was not how we expected to host the annual meeting this year, especially for the 25th anniversary,” GIO Director Dr. Tony Murphy said. “However, due to the pandemic, we had to pivot to a virtual meeting from our regular in person event. I want to thank you all for attending all or some of the virtual sessions, and I hope you found them useful. I heard that some of you were up either very early or very late, depending on your time zone, to view the live broadcasts of the sessions... this was quite dedicated of you.”

“Your level of interest and engagement as a community in the program was clearly visible in that this was the largest annual meeting, with 429 registrants from 72 countries. I commend you for your commitment to the program and, again, I want to thank you for being part of this virtual GLOBE annual meeting,” Dr. Murphy said.

Seeking Information Via GLOBE’s Annual Survey

The GLOBE Annual Survey is one of the GIO’s primary data-collection tools for monitoring progress toward the goals outlined in the GLOBE Strategic Plan 2018-2023, and for providing information to the GLOBE Working Groups.

At the 2020 GLOBE Virtual Annual Meeting, highlights from the strategic plan were shared with the community. These

highlights were based on analyses of 2019 data-collection activities. Overall, the GLOBE community achieved 42 percent of performance targets, and were on target to achieve 27 percent of the performance targets by 2022. Below is a brief summary of the highlights in each of the strategic plan goal areas:

- **Education Goals:** The number of available GLOBE trainers in all regions increased since 2018, and the number of active trainers increased in most regions.
- **Science Goals:** The percentage of scientists who reported having used or referenced GLOBE data exceeded the 2022 performance target of 20 percent.
- **Community Goals:** Eighty new members joined the community.
- **Technology Goals:** The percentage of community members who use GLOBE science data entry often (at least once a month) exceeded the 2022 performance target of 30 percent.
- **Communication Goals:** The percentage of community members that reported sharing information about GLOBE with a new audience increased since 2018.

GLOBE’s community members play a vital role in ensuring that the program stays on track in terms of meeting goals, but also in ensuring that GLOBE’s Mission: “To promote the teaching and learning of science, enhance environmental literacy and stewardship, and promote scientific discovery” is carried out every single day!

Nurturing GLOBE Collaborative Endeavors

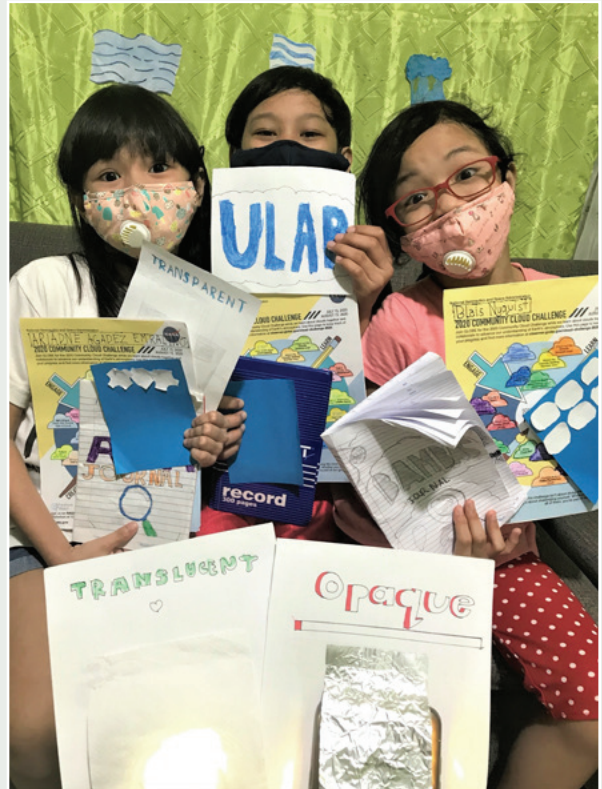
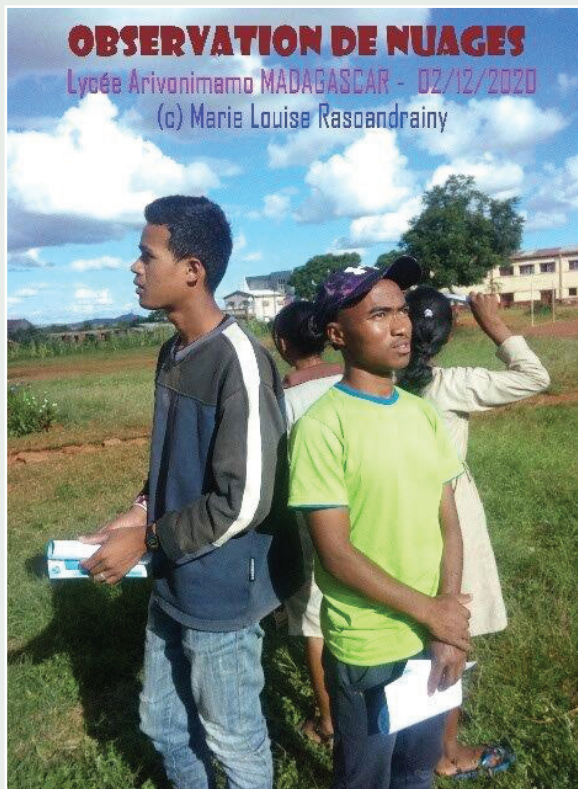
GLOBE’s ongoing collaborative efforts continue to focus on expanding and enhancing the work of the program. In 2020–2021, collaborative efforts included:



4-H Youth Program in science, technology, engineering, arts, and mathematics (STEAM) brings GLOBE activities to middle school students; Rapid City, South Dakota, USA

- **Peace Corps**—Peace Corps volunteers were pulled back due to the pandemic; however, GIO and Peace Corps communications continued on a number of topics. These included providing information to Peace Corps on GLOBE initiatives related to women’s empowerment and economic development; invitation to, and registration information for, the 2020 GLOBE Virtual Annual Meeting; and introduction to Department of Defense Education Activity (DoDEA) Pacific East School District for the opportunity to present GLOBE during a Virtual K-12 STEM Day, which occurred in February 2021.
- **United Nations Environmental Programme (UNEP)**—GIO worked with UNEP on a variety of initiatives. GIO created a UNEP section on the GLOBE website, incorporated UNEP’s comments, and made the section “live.” GIO also provided information to UNEP for its World Environment Situation Room, which now hosts GLOBE links under all four of its categories: health, biodiversity, hydro-meteorology and air quality measurements, and oceans. GIO worked with UNEP to identify strategies to promote collaboration between the respective networks.
- **National Wildlife Federation Eco-Schools International Collaboration**—GIO continued discussions with the National Wildlife Federation GLOBE Point of Contact on several countries where there is no current GLOBE Country Coordinator, including Iceland, Portugal, and the United Kingdom. This partnership contributed to Slovenia signing the GLOBE agreement (the Eco-Schools National Operator in Slovenia promoted GLOBE to the government and offered to play a leading role in its implementation; this has happened in a number of other countries as well). The Slovenian government told GIO in a January 2021 onboarding that it planned to work with Eco-Schools to engage schools in GLOBE.

Photos from Around the Regions





GLOBE REGIONAL HIGHLIGHTS

Africa Region

2021 Regional Meeting

In March, the 2021 Africa Regional Meeting was conducted virtually. The meeting was attended by country coordinators, deputy country coordinators, teachers, students, and scientists from 10 countries, with a total of 35 people registered for the event. Topics of discussion included: current challenges to active and sustained participation; the current state of education in the countries; alternatives to current research initiatives (waterbodies, invasive plants, etc.); and meaningful ways to get the most out of working with GLOBE.

The region connected with a sponsor, XINABOX, who sent automated weather stations to all participating countries in Africa. (XINABOX is running a Space STEM program for students across the African continent, sponsored by Intelsat.) During the meeting, groups reported on sustainable development goals. Three achievements for the meeting were: active engagement between participants, in spite of the event's virtual nature; rejuvenation of participation in the program throughout the region; and meaningful participation that will extend beyond the COVID-19 pandemic.

Topical Highlights from the Region

As always, the Regional Coordination Office (RCO) encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as “highlights” of the region's ongoing, dedicated, work.

Science

The RCO focused on increasing ongoing awareness of The GLOBE Program via virtual events and activities. The RCO also published an article in the *Malaria Journal*: “Digitalized Mass Distribution Campaign of Insecticide-treated Nets (ITNs) in the Particular Context of Covid-19 Pandemic in Benin: Challenges and Lessons Learned.”



Students and community members celebrate new weather station; Nigeria



Celebrating Earth Day with a poster presentation; Ghana

Education

While most activities in the region ground to a standstill, the RCO worked on capacity building and professional development. To that end, the RCO embarked on a series of Zoom sessions (specifically, those mentioned below under “Community.”) They conducted protocol training, with the goal of guiding country coordinators and teachers to GLOBE’s eTraining modules. In addition, these sessions promoted discussions around the IVSS, and presented informed speakers who could enhance the region’s IVSS contributions.

Many countries in the region erected weather stations, and worked to promote The GLOBE Program on local and national media outlets. In collaboration with the U.S. Embassy, GLOBE Ghana celebrated Earth Day with a poster presentation. There was also a successful collaboration effort conducted with XINABOX as a funder and possible instrument supplier for the Africa continent. They are based in South Africa; however, their client base is worldwide—with the United States as their biggest market area.

Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- 22 April 2020: A Globe Hydrology Protocol Training Session;
- 12 May 2020: An IVSS Project Identification Session Webinar;
- 26 May 2020: “Crossing the Data Divide, Challenges that Prohibits Maximum Participation” Webinar;
- 18 June 2020: “From Infrastructure to Services, with Dr. Johan Stander (WMO)” Webinar;
- 19 June 2020: “Introduction to Atmosphere Protocol,” Webinar;
- 02 July 2020: “Introduction a GLOBE Modules” Webinar;
- 08 July 2020” A “Pre–Annual Meeting Country Input: Identify a Research Project that Will Engage the Whole Community,” Webinar;
- 10 July 2020: “Contribution des Pays Avant la Réunion Annuelle: Identifiez un Projet de Recherche qui Engagera Toute la Communauté” Webinar;
- 05 August 2020: A Mentor Trainer Information /Certification Process Session;
- 08 August 2020: A D’information et Processus de Certification des Formateurs Mentors Session;

- 11 September 2020: IAP Session;
- 19 September 2020: A Discussion sur le Protocole des Plantes Invasives et sa Mise en œuvre de Même que Sur le Processus de Certification des Mentor Session;
- 14 October 2020: A Current and Possible Collaborations Session;
- 12 November 2020: “Invasive Alien Plant Species, Water Bodies Project, and Trees Around the World Collaboration: Next Steps” Webinar;
- 26 November 2020: Data Modeling, Interpretation, and Producing IVSS Research Projects Session;
- 07 January 2021: “Zambia: Initial Discussion to Bilateral Processes” Webinar;
- 02 February 2021: “Globe Asia Pacific Meeting on Water Collaboration Project” Webinar;
- 6 March 2021: Intelsat Space STEM Workshop;
- 22-25 March 2021: Africa Regional Meeting;
- 27 April 2021: “GLOBE Zika and Education Project: Closing Out” Webinar; and
- 05 May 2021: Intelsat Africa Space STEM and SDG Program.

In addition to the sessions mentioned above, the RCO also held regular “Whatsapp” meetings with the regional countries, and held follow-up sessions with Zambia in order to further the conversation regarding joining the program. (Northrising University is spearheading the initiative.)

The RCO also worked to remain in regular contact with country coordinators and GLOBE teachers, where possible. This time was used to maintain momentum and to ensure continuity of the program beyond the pandemic.

GLOBE REGIONAL HIGHLIGHTS

Asia and Pacific

2021 Regional Meeting

In May, the 2021 Asia and Pacific Regional Meeting was conducted virtually. The meeting was attended by country coordinators, deputy country coordinators, teachers, students, and scientists from throughout the region, with a total of 80 people registered for the event. Topics of discussion included: challenges and achievements of “doing GLOBE virtually,” presentations by country coordinators, teachers, and students; student presentations; and training. The meeting also offered a presentation on the GLOBE Strategic Plan, and its ongoing implementation (in light of the pandemic) in GLOBE countries within the region.

Three achievements for the meeting were: development of active relationships between country coordinators in the region (to help country coordinators take advantage of the expertise of Working Group members); review of GLOBE activities in light of the pandemic, and the continuation of virtual meetings and webinars even when things return to “normal” (to help maintain the increased level of regional participation and the sharing of information and resources); and discussion and sharing of what has been learned during the pandemic, and how students were able to continue their research even in difficult times.

Topical Highlights from the Region

As always, the Regional Coordination Office (RCO) encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as “highlights” of the region’s ongoing, dedicated, work.

Science

A variety of science activities, meetings, and events occurred in various forms throughout the region, including:

- The RCO hosted a presentational webinar in June 2020 for the three “winning” schools in the region to discuss their outstanding work on the 2020 IVSS.





The May 2021 Asia and Pacific Regional Meeting

- The Swmsenwittayalai School (Bangkok, Thailand) hosted a presentation where students could discuss their IVSS project (mosquito breeding using drone imagery and The GLOBE Program's app, GLOBE Observer's Mosquito Habitat Mapper).
- The Philippine Science High School (Western Visayas Campus, Philippines) hosted a presentation where students could discuss their IVSS project (mosquito breeding site characterization: density, water quality, and natural attractants).
- The Princess Chulabhorn Science High School (Trang, Thailand) hosted a presentation where students could discuss their IVSS project (mosquito larvae diversity and abundance in relation to land cover in coastal areas in Trang Province, Thailand).
- The RCO hosted the "Water Collaboration Project" Webinar in February 2021 where students were able to showcase their hydrology protocol and water bodies research. In addition, a training covering the use of hydrology protocols in different types of water bodies was conducted; trainers also helped students with IVSS project reports. Students from India, Philippines, Taiwan, and Thailand presented their research papers.

Education

A variety of educational activities, meetings, and events occurred in various forms throughout the region, including:

- A Review on the Role of GLOBE Teachers—The RCO hosted a webinar in May 2020 for country coordinators, trainers, and teachers reviewing the "Role of GLOBE Teachers," and to discuss how teachers can help students stay engaged in the program during the pandemic. Teachers were also trained in the use of the GLOBE website, as well as in the GLOBE database.
- Status of Women Empowerment through The GLOBE Program—The RCO hosted a webinar in June 2020 for country coordinators, trainers, and teachers reviewing the way women are empowered through The GLOBE Program. GLOBE Partner Taiwan shared about this sense of empowerment for women in their country.
- Construction of Instrument Shelter Workshop—The RCO hosted a webinar in October 2020 for country coordinators, trainers, and teachers to demonstrate how to create a GLOBE instrument shelter from waste wood found on school premises. GLOBE Partner Taiwan shared their experiences on how to collect data in spite of the severe weather in their country (which results in their instruments frequently breaking down).
- GLOBE Philippines, Students' IVSS Projects—The RCO hosted a webinar in December 2020 for teachers and students to provide insight on the IVSS. Dr. Rod Allan De Lara, GLOBE Country Coordinator, shared ideas, experiences, and initiatives for sustaining the program during the pandemic. He also provided insight

into the GLOBE EduShare Program (which is open to GLOBE teachers and students), and shared about the country's participation in 2021 Trees Challenge. (He pointed out that instead of just measuring trees, GLOBE Philippines is planning on planting five million trees by 2025.)

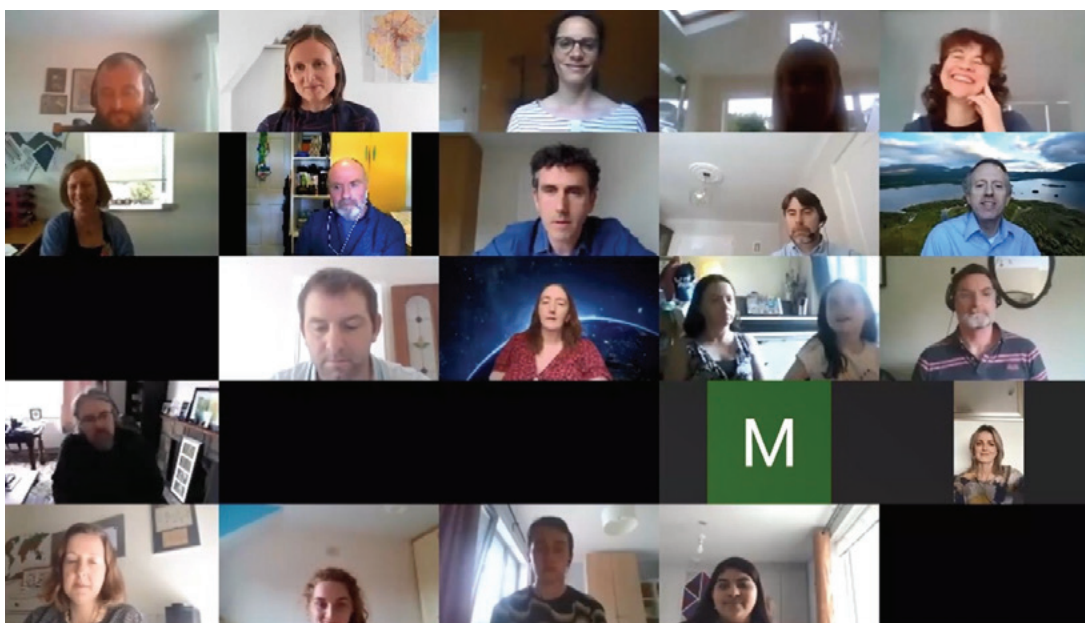
Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- The GLOBE Program: New Trainer and Mentor Trainer Certification Process—The RCO hosted a webinar in May 2020 for country coordinators and trainers to explain the new GLOBE Trainer and Mentor Trainer Certification Progress. Dr. Rod Allan De Lara, GLOBE Country Coordinator, provided insight regarding the lack of community input and understanding of the previous process (including qualifications and rubrics). He discussed the goals of the new process: to streamline the process, and to make it more flexible, transparent, and accessible.
- Buzzing Around! Adventure with the Mosquito Habitat Mapper—The RCO hosted a webinar in June 2020 for country coordinators, trainers, and teachers on the Mosquito Habitat Mapper (MHM), presented by Dorian Janney from NASA. Janney explained the MHM in detail, as well as the GLOBE Mission Mosquito Campaign. She also encouraged students to submit IVSS reports on mosquitoes, and to participate more in collecting data in order to help communities respond to the threat of mosquito-borne diseases.
- Social Media Tips and Tricks for GLOBE Countries in the Region—The RCO hosted a webinar in June 2020 for country coordinators. During the webinar, Autumn Burdick (SSAI) shared tips and tricks designed to help promote The GLOBE Program through social media in the region.
- Trees around the GLOBE: Students research Campaign—The RCO hosted a webinar in October 2020 on the Trees Around the GLOBE Students Research Campaign, presented by Brian Campbell.
- Soil Awareness and IVSS Projects—The RCO hosted a webinar in December 2020 for teachers and students from various GLOBE schools in the region to discuss World Soil Day. Dr. Garg, GLOBE Master Trainer, shared his views on reasons to study soil, as well as presented some ideas on IVSS projects related to GLOBE's Soil Protocol.



Water monitoring; Jhapa, Nepal



Virtual presentation of air quality research in Ireland

GLOBE REGIONAL HIGHLIGHTS

Europe and Eurasia

2020 Regional Meeting

In October, the 2020 Europe and Eurasia Regional Meeting was conducted virtually. The meeting was attended by country coordinators, deputy country coordinators, students, trainers, and scientists from 33 countries, with a total of 240 people registered for the event. Topics of discussion included: education in COVID-19 times; what has been learned and how GLOBE can continue to contribute information and resources to assist students and teachers; planning for 2020–2021; water bodies collaboration and GLOBE hydrosphere protocol training; presentations by teachers and students; and a trainer/mentor trainer certification “question and answer” session.

Three accomplishments for the meeting were: high community participation (with 24 student videos and 17 student/teacher presentations); high level of community interaction during the sessions (with time for everyone to pose/answer questions); and increased collaboration through the region.

Topical Highlights from the Region

As always, the Regional Coordination Office (RCO) encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as “highlights” of the region’s ongoing, dedicated, work.

Science

A variety of science activities, meetings, and events occurred in various forms throughout the region, including:

- **2020–2021 Tree Observations (within the European Phenology Campaign)**—Teachers and students crossed borders and language barriers to collaborate during the 2020–2021 Phenology Campaign. They exchanged observations of trees changing color (in autumn) and greening up (in spring); tracked the date when buds opened; took pictures of the greening-up; and shared their results at the discussion forum. Despite the pandemic, and the number of closed schools, many students and teachers continued to take observations of trees around their homes. In order to support distance learning opportunities, the



Student of the Kovel Station Young Naturalists taking part in the European Phenology Campaign; Kovel Station, Ukraine

RCO organized several webinars and online meet-ups to keep the campaign community involved. The community continued to grow: 118 schools from 14 countries joined the autumn portion of the campaign, and 182 schools from 22 countries joined the spring portion of the campaign.

- **Marine Litter Investigations in Malta**—In December 2020, students from Gozo Middle School, Malta, collaborated with students from Turkey, Italy, and Spain—as well as people from the general public—to investigate marine litter with the goal of understanding its causes. Students measured various weather elements, observed and reported cloud cover, and recorded sea water conditions (sea temperature, pH and water clarity). Using a digital microscope, they sampled sand for microplastics and carried out a litter survey. They also visited a beach for a clean-up activity. The collected data collected the students to start their own investigation. Taking daily samples from two glass jars, one filled with sea water and the other filled with sea water with plastic litter added to it, the students tested their hypothesis. Through the data collected, it was concluded that plastic litter does have an effect on sea water temperature and sea water pH level.
- **Ukraine Cloud Atlas**—As part of The GLOBE Program’s 25th Anniversary, GLOBE Ukraine teachers and students participated by taking photos of sky and clouds. When capturing the beauty of clouds, they also identified the cloud type and entered the data to the database. The GLOBE Ukraine team collected more than 500 photos of different kinds of clouds and created a publication called “Clouds Calendar of Ukraine,” which now serves as a guide for the next generations of students, as well as for the public.
- **International Collaboration: Turtle Nest Site Observations in Malta and Costa Rica**—Students collected data from turtle nesting sites using an infrared thermometer and data loggers to measure sand temperature at a depth of 20 cm and 80 cm, surface temperature, air pressure, humidity, and air temperature. They also observed and recorded cloud type and cover through The GLOBE Program’s app, GLOBE Observer. Costa Rica and Malta came together to further investigate turtle nests. Through this effort, students collected and compared data and investigated whether different environmental conditions and climate change are affecting turtle nests. The students also prepared a video documenting their investigation.



Students taking atmospheric measurements at Dubovac Elementary School; Karlovac, Croatia

- **GLOBE Pilot Project on Microplastics in Water**—Students from the region were invited to join a pilot project on microplastic in water. The initiative was started by Deakin University (Geelong, Australia), and the GLOBE Italy team (who subsequently invited other country coordinators to join). The occurrence of microplastics in water, and even in the food chain, is a serious topic, and although it is not part of a GLOBE protocol, it has attracted the solid attention of GLOBE teachers. As a result, more than 50 schools from 13 countries were involved, in addition to the 40 schools from Italy. An online training was hosted by scientists from Deakin University. Teachers received a handbook on how to carry out the observations, along with a list of equipment needed. Schools will be testing the materials in practice, and will provide feedback to the scientist.

Education

A variety of educational activities, meetings, and events occurred in various forms throughout the region, including:

- **Online Student Conference in Czech Republic**—A National Virtual Student Conference was organized by the Czech GLOBE team in November 2020, with 12 student teams presenting their research projects. The online event was prepared to partially cover the void after the traditional “GLOBE Games” had to be cancelled in May 2020. Students were eager to present the research; and teachers appreciated yet another opportunity to come together, get inspired, and hear the expert comments by the Czech Board of Scientists.
- **Virtual Presentations of Air Quality Research in Ireland**—Due to restrictions associated with the pandemic, GLOBE Ireland was unable to conduct an in-person event to celebrate the end of the Air Quality Campaign in 2020. Instead, GLOBE held a virtual online event to celebrate the achievements of

the teachers and students who had worked diligently during the year. Over 45 people attended the virtual event, including teachers and students, along with a guest from Irish Environment Protection Agency, An Taisce, and GIO Director Dr. Tony Murphy. One student, Faye O' Carroll, from Dunboyne Senior Primary School, made a short video about the school's efforts, which was shown at the event. (The video has since been published on EPA social media to showcase student achievements and highlight The GLOBE Program.) The Irish GLOBE community has gathered over 230 nitrogen dioxide measurements since the campaign began in February 2019. This campaign has also led to teachers and students participating in related GLOBE atmosphere and biosphere protocols. To date, 60 teachers have collectively entered 2,800 data points on the GLOBE website.

- **Online Training in North Macedonia Restarts the Program in the Country**—The country coordinator in North Macedonia succeeded in launching the program in the country once again, after several years of school inactivity. With the support of the Ministry of Environment and Urban Planning, the U.S. Embassy in Skopje, GLOBE Croatia, a massive training for teachers was organized. More than 140 participants and guests joined the two-day online training. Most of those present were Macedonian and Croatian teachers; however, representatives from Slovenia, Montenegro, and the RCO were also in attendance. The event was organized for Earth Day, and was well covered in the Macedonian media. As a follow up, schools will receive hands-on training in specific GLOBE protocols, along with the equipment kit and further support from the country coordinator. The training was a unique example of international collaboration, bringing together trainers and teachers from several countries (and was held simultaneously in Macedonian, Croatian, and English).
- **GLOBE Connects with the Climate Change Education in Switzerland**—Climate Change Education and Science Outreach (CCESO) is an initiative of GLOBE Switzerland, which has a goal of developing teaching materials. Together with four teacher training colleges (in three languages), and with the OCCR Oeschger Centre for Climate Change Research, the GLOBE Switzerland team prepared materials based on GLOBE objectives that are aligned to the curriculum. The materials are available for all school levels and are strongly based on the latest scientific research, such as the IPCC report. They offer didactically high-quality teaching and learning opportunities appropriate to each subject and school level. The results of the project have been published on the GLOBE Switzerland website, as well as on the national education platform for sustainable development.
- **Kyrgyz Republic Promotes GLOBE to Geography Teachers through Online Course**—GLOBE Kyrgyz Republic launched a new online course for teachers that covers various topics of geography and cartography. Certain GLOBE activities and investigations have become part of this effort, attracting teachers to the program. The course has become very popular among teachers during the “pandemic year,” (who tune up every Saturday to watch a new episode.)

Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- **How We Talk about GLOBE and Science Reporters**—As a part of the Earth Day celebration, the RCO prepared a webinar for students and teachers to open the conversation on “How We Talk about GLOBE.” The aim of the initiative is to bring students and teachers attention to effective ways of communicating and promoting the program in local communities. GLOBE Czech Republic, with the help of an expert on environmental journalism, prepared a Science Reporters Handbook that should help students use various communication channels and formats to gain the support of the public. As part of the webinar, successful stories on how to increase community involvement were shared by GLOBE teachers.
- **Water Bodies Challenge**—In March and April, students from all over the region took part in observing their local water bodies as part of the Water Bodies Challenge, which was launched by the RCO on World Water Day, 22 March. The students were asked to introduce lake, river, stream, spring, seashore and/or any other water body close to their home, and to discuss the significance of the water area for the environment and for the community. Students had the option to create a video or prepare a GIS StoryMap online. Altogether, 31 student teams joined with 21 videos and 12 story maps from the following countries: Belgium, Croatia, Estonia, Germany, Malta, North Macedonia, and Ukraine.



Taking air pollution measurements at High School Dimitar Vlahov; Strumica, North Macedonia

- **GLOBE Italy’s Online celebration:** Valuing Water (Rivers in Spring)—Every year, on 22 March, GLOBE Italy organizes a well-attended community event called “Rivers in Spring: World Water Day” in Mantova, North Italy. Due to the pandemic, the event went virtual, and involved numerous schools, science institutions, local authorities and environmental agencies in the day-long event that had both Italian and international representation. Presentations and videos from several GLOBE schools, as well as a presentation by a NASA scientist, were part of the event.
- **Malta Cloud Challenge**—In order to celebrate Earth Day, International Environment Day, and The GLOBE Program’s 25th Anniversary, GLOBE Malta, the US Embassy, and the Malta Embassy in Washington, D.C., organized a joint project to highlight U.S. and Maltese collaboration efforts designed to better understand Earth systems and the global environment. The project involved participants recording their research and developing creative ways in which to present their findings. Due to pandemic restrictions, participants made their observations solely from their garden, yard, roof, balcony or window. Altogether, 108 students from nine schools participated, and presented their individual projects to highlight their observations of cloud formations.
- **Estonian Students Meet Face-to-Face at Learning Expedition**—In August, the 23rd GLOBE Estonia Learning Expedition 2020 kicked-off GLOBE’s 25th Anniversary celebrations in Estonia. The event was organized by Kilingi-Nõmme Gymnasium and Rakvere Science Secondary School. Various hands-on exploratory activities were carried out during the four-day event, which hosted 90 participants from 20 schools. The event was successful, and COVID-free as well. Most of the activities were held outdoors in order to reduce the risk of infection. During the event, seven research reports were prepared to be submitted to the IVSS.
- **Slovenia Joins The GLOBE Program**—In December 2020, the European GLOBE network was enriched by yet another partner country—Slovenia. Since that time, the coordinating organization, the Centre for School and Outdoor Education, prepared the plan for launching the program in the country and initiated GLOBE-related activities. The program will be implemented in collaboration with residential centers for outdoor education all over the country, as well as with the Eco-Schools national network.
- **GLOBE Program for Disadvantaged Communities in Slovak Republic**—Country coordinators from the Daphne Institute of Applied Ecology started a project to assist children from disadvantaged communities to motivate them. This was in response to the pandemic, which unduly affected some of the most

vulnerable social groups. The plan is now to involve schools with children from socially disadvantaged environments in The GLOBE Program so that they can benefit from GLOBE's hands-on approach, materials, and tools. The goal is to support teachers in the regular use of outdoor education and hands-on learning to strengthen students' personal competencies and motivation to learn, as well as their environmental thinking. Online training for teachers from selected schools was prepared in March, in addition to ongoing learning opportunities.



GLOBE REGIONAL HIGHLIGHT

Latin America and Caribbean

2020 Regional Meeting

In November, the 2020 Latin America and Caribbean Regional Meeting was conducted virtually. The meeting was attended by country coordinators, deputy country coordinators, teachers, students, trainers, and scientists from 24 countries, with 160 people registered for the event. Topics of discussion included: discussion of what's "new" with the GLOBE website; the protocol deactivation process; how to use GLOBE data for 2021 IVSS research projects; training; sharing best practices; presentation on GLOBE campaigns; presentations on GLOBE Observer; and discussion of future activities.

Three accomplishments for the meeting were: simultaneous translation during the entire meeting; expanded participation from throughout the region; and effective interaction with speakers and other GLOBE community members.

Topical Highlights from the Region

As always, the Regional Coordination Office (RCO) encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as "highlights" of the region's ongoing, dedicated, work.

Science

A variety of science activities, meetings, and events occurred in various forms throughout the region, including:

- **International Day of Girls and Women in Science 2020**—In February, the National Council of Science, Technology, and Technological Innovation (CONCYTEC) held the "International Day of Girls and Women in Science 2020" in Lima, Peru. During the event, GLOBE Peru shared and presented GLOBE activities on soils and mosquito research. The biologists Claudia Caro and Silvia Agüero; and GLOBE teacher Ninozca Lazo and two of her students, Nícole García and Jhadira Perez, instructed students of varying ages. Promoting science and the spirit of inquiry from an early age is one of the purposes of The GLOBE Program and the goal of the GLOBE Peru team for this event was to encourage young students to do science in a practical way.
- **"How Do We Use GLOBE Protocols to Measure Air Pollution" Webinar**—In May 2020, the RCO hosted a webinar attended by community members from Argentina, Bahamas, Bolivia, Chile, Colombia, Costa Rica, and the Dominican Republic. The webinar focused on GLOBE protocols designed to measure air pollution. The class was hosted by María Lorraine del Ruiz-Alma (Country Coordinator Dominican Republic), Dr. Henry Clarke, Dr. Audry Belén and Biologist Jessica Weir. The 72 participants had the opportunity to learn basic concepts surrounding aerosols and the use of atmospheric protocols.
- **Virtual Science Fair using TEAMS**—In June 2020, GLOBE Dominican Republic hosted the first virtual Science Fair, using the "TEAMS" platform. Participants from the Bahamas, Bermuda, Canada, Colombia, Dominican Republic, Mexico, and the United States attended the event. The fair was presented during the first day of the Microsoft Global Learning Week.
- **Obscure Camera Contest**—In December 2020, GLOBE Argentina, along with the Space Camp Program



Observing the solar eclipse; Argentina

organized the “Obscure Camera Contest” for Argentine high school students focusing on the Eclipse. Prizes provided by the Space Camp Program were awarded to three out of the 28 students who were able to build their own telescope to watch the total solar eclipse.

- **Campaign to Measure Solar Eclipse**—At the suggestion of the RCO, GLOBE Uruguay coordinated a campaign to observe and measure the solar eclipse on 14 December. This effort involved educational centers from different parts of Uruguay, and demonstrated the commitment and enthusiasm of teachers and children. Through a webinar, the teachers were prepared and informed of the applications to be used to obtain the times and displacements of the eclipse shadow according to the location where the observations were to be made. They were also trained in the observations of various variables that can present changes when an eclipse occurs (fauna, flora, etc.) and provided with the necessary materials (protocols, field guides, booklets) through the Educantel platform. Prior to the eclipse, the teachers worked in class to discuss: what is an eclipse; how does it occur; what effects can it have; what is the temperature; how is it measured; and how coverage and type of clouds are recorded. The instruments needed by teachers and students were provided by GLOBE.



GLOBE Science Fair; Peru

- **Solar Eclipse Event**—Community members from the region (including Argentina, Brazil, Bolivia, Chile, Ecuador, Paraguay, and Peru) came together on 14 December 2020 to scientifically experience the eclipse. The eclipse was seen in a “total” way in a wide area throughout Argentina, Bolivia, Brazil, Chile, Ecuador, the Malvinas Islands, and Peru. Approximately 1,000 lenses were distributed throughout Argentina. In Argentina, Brazil, Chile, Paraguay, and Peru, measurements of ambient temperature, soil surface temperature, cloud observation, animal observation (especially insects and birds) were recorded, and could be seen in The GLOBE Program’s app, GLOBE Observer.
- **Biosphere Protocol**—GLOBE Suriname conducted biosphere protocol training designed for tropical regions. The Green Heritage Fund Suriname is working in the marine environment and the coastal plain, where the larger part of the country’s population is located and a need was felt to work on a biosphere protocol that would allow ecosystem study, and that great importance on the mitigation of climate change. For that reason, GLOBE Suriname developed a biosphere protocol fit for the tropical region of which the draft is now completed. The Mangrove Protocol is a “bundle,” and includes the following protocols: Vegetation Survey Protocol; Bird Survey Protocol; Crab Burrow Protocol; Aerial Root Density Protocol; Salinity Protocol (GLOBE); Water Temperature Protocol (GLOBE); Water Transparency Protocol (GLOBE); pH Protocol (GLOBE); Dissolved Oxygen Protocol (GLOBE); Nitrate Protocol (GLOBE), and the Alkalinity Protocol (GLOBE).

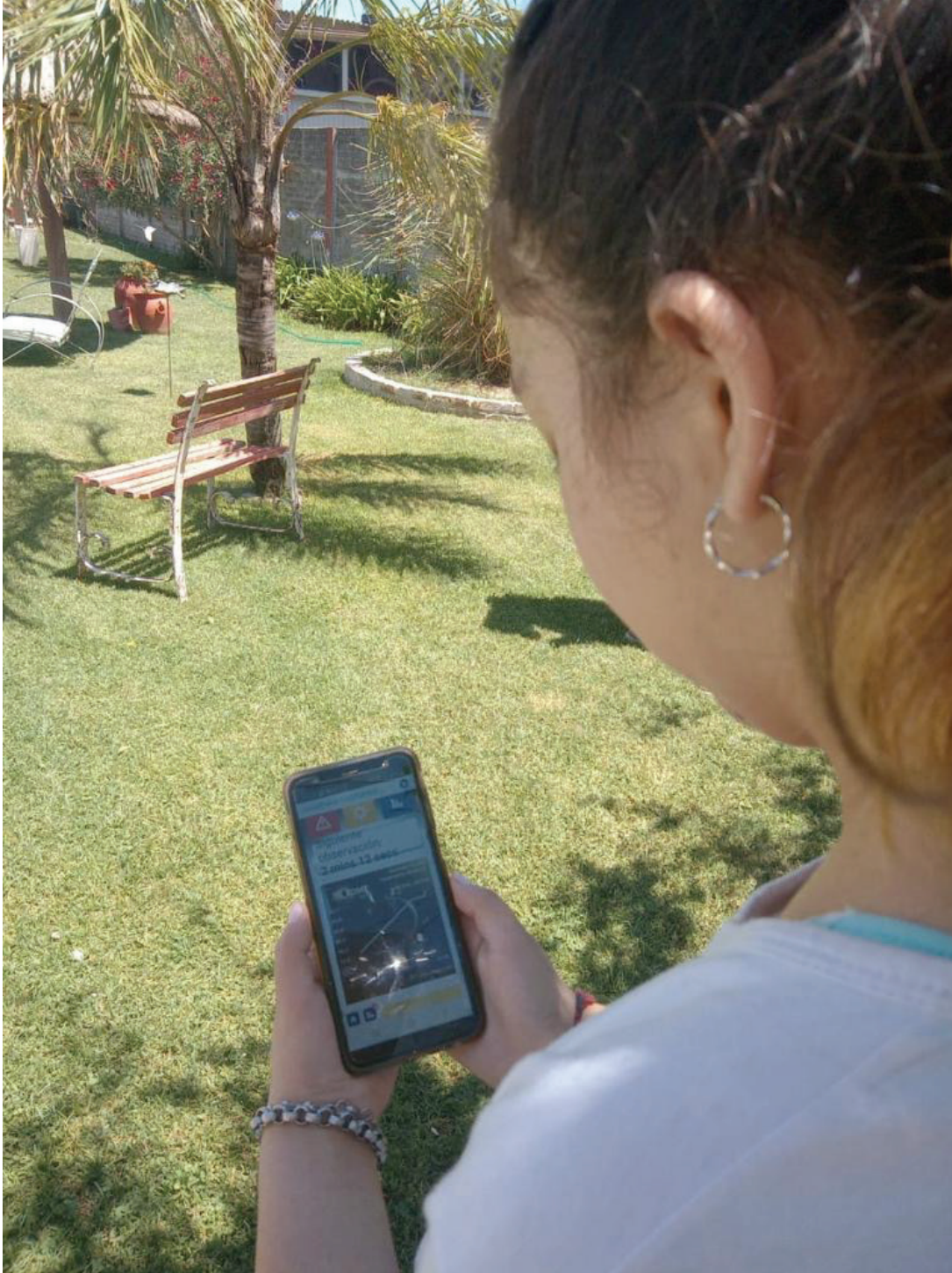
Education

A variety of educational activities, meetings, and events occurred in various forms throughout the region, including:

- **Biosphere Course**—GLOBE Peru, in connection with GLOBE Uruguay, conducted a course on the biosphere from February through March 2020. The program was directed towards teachers from Peruvian schools, and was developed through the Educantel platform. Master Trainers from GLOBE Perú: Claudia Caro Vera and José Martín Cárdenas Silva; as well as from GLOBE Uruguay, Andrea Ventoso, introduced the more than 50 participants to The GLOBE Program and the biosphere. They also delved into land cover classification; canopy, and ground cover; the height of grasses, trees and shrubs; canopy circumference; grass biomass; foliation of herbs, trees and shrubs; field practice, and the use and management of GLOBE applications and webpage.



- **Solar Eclipse Workshop**—In March 2020, with the solar eclipse in mind, the RCO hosted a teacher training workshop in Junin de Los Andes (Argentina), which focused on “How to observe the Eclipse.” Master trainer Ana Prieto and the Regional Coordinator, Mariana Savino, conducted the workshop. The 22 participating teachers were trained in the use of The GLOBE Program’s app, GLOBE Observer, as well as in taking cloud and temperature measurements—before, during, and after the eclipse.
- **Information and Communications Technology (ICT) Webinar**—In March 2020, GLOBE Peru hosted the webinar: “GLOBE Program: Tool to Develop ICT Inquiry and Use Skills.” During the webinar, GLOBE Peru National Coordinator, José Martín Cárdenas Silva, presented on The GLOBE Program and its proposal to develop ICT inquiry and use skills in students.
- **How to Use GLOBE Data Workshop**—In May 2020, the RCO hosted a workshop on how to use GLOBE data. Master Trainers Ana Prieto, Claudia Caro, and Marilé Colón Robles, presented the workshop. During the lecture, the 63 participants learned how to access existing resources in order to carry out research with students using GLOBE data. The workshop also provided participants with information about how to access, search, consult, and download satellite images from a variety of NASA platforms, cell phone apps, and other resources.
- **How to Organize a Virtual Science Fair Webinar**—In April 2020, the RCO hosted a lecture on how to organize and carry out a virtual science fair. The 54 participating teachers were guided by Dominican Republic Country Coordinator María Lorraine del Ruiz-Alma, Dr. Henry Clarke, Dr. Audry Belén, and Jessica Weird. During the lecture, teachers learned how to organize a fair, including goal setting; date, platform and timeline selection; schedule planning; staff recruiting; Microsoft Office 365 (to collaborate with students); how to use TEAMS for both teachers and students; rehearsals; awards; invitations; and how to conduct the actual fair.
- **The GLOBE Program Applied to the Classroom Webinar**—The RCO hosted a webinar in June 2020 that addressed the difficulties teachers may face when implementing GLOBE. Master Trainer Marta Kingsland instructed 53 participants on the process of implementing the program in the classroom. The webinar dove into the challenges of integrating the objectives of the program into class curriculum, and taught strategies (using examples, case studies, resources, and activities). Teachers were able to ask questions and share their experiences with the international community.
- **Eclipse 2020 Webinar Series**—From August through December 2020, the RCO, along with GLOBE Argentina and GLOBE Chile, hosted a series of lectures designed to help community members prepare for the eclipse. Lecturers from Argentina, Chile, and NASA provided an introduction to The GLOBE Program, as well as explanation as to what a solar eclipse is all about. They also trained on: how clouds affect the visibility of the eclipse; results from the scientific community in relation to the total solar eclipse in North America in 2017; and how to use The GLOBE Program’s app tool, GLOBE Observer Eclipse. They also discussed clouds and their impact on air temperature; what to measure before, during, and after the eclipse; and gave lectures on homemade instruments to observe the eclipse and solar eruptions. The webinars were held every two weeks, with approximately 60 people in attendance for each one. People from 16 countries participated, both from the region and from Europe and North America.
- **Webinar for Teachers**—During December, within the framework of National Science Week 2020 and World Soil Day, GLOBE Peru held a three-day webinar for teachers. The first day, “Citizen Research and the Use of the GLOBE Observer application: Investigating Clouds,” and the second day, “Citizen Research and the Use of the GLOBE Observer Application: Investigating Mosquitos,” were presented by Country Coordinator José Martín Cárdenas Silva. The third day, “Promoting Soil Research from an Early Age” was presented by Professor Ninozca Lazo; GLOBE teacher María Parado de Bellido; Silvia Aguero (Institute of Soil Biology); Emilio Lecaros (Entomologist); and Master Trainer Claudia Caro.
- **GLOBE Implementation**—During the 2020 school year, GLOBE was implemented in one high school in the District of Nickerie in Suriname. Adapting to pandemic conditions, Assistant Country Coordinator Meriam Kalloe, who works as a biology teacher in the District of Nickerie, developed a student guide using GLOBE cloud and mosquito protocols. Students in the country were able to use the guide Kalloe developed to conduct fieldwork at home, and teachers were able to use their reports to calculate the student’s final grade.



Taking eclipse measurements; Argentina

- **Earth Week Workshops**—The Benjamin Franklin Science Corner was closed during the pandemic, and could not serve as a place where high school students could learn how to implement GLOBE, so GLOBE Paraguay adapted its content to a virtual format and organized workshops via Zoom. In April, for Earth Week, the Science Corner coordinated virtual Zoom workshops for students and teachers in Paraguay, with Ana Prieto from Argentina. GLOBE Paraguay worked closely with the Ministry of Education and the RCO to create the workshops. In addition, GLOBE Paraguay translated “The Art of Clouds” into Spanish. Using the GLOBE Cloud Chart, they were able to include this activity into the Americana Box. (The Americana Box is a subscription box intended for low-income families with no Internet access.) This activity was introduced to 90 families in 2020, and is being distributed to 210 families in 2021.

Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- **Earth Day Campaign**—During the weeks prior to the celebration of Earth Day and GLOBE’s 25th Anniversary, the RCO encouraged the community to use The GLOBE Program’s app, GLOBE Observer, to



collect data on trees and clouds from home. On Earth Day the community was encouraged to use social media to show themselves collecting data from their windows, balconies, parks, yards, etc.

- **Protocol Trainings**—GLOBE Paraguay, along with The Benjamin Franklin Science Corner, began working in the community with GLOBE Observer. At two different sessions, citizen scientists were trained in the use of the clouds tool and the MHM tool. GLOBE Paraguay was also able to train a group of citizen scientists in Ayolas, Misiones, on how to measure and collect data during the eclipse in December 2020.
- **COVID-19 Website Page Development**—The RCO developed a “GLOBE COVID-19” page on the website, and provided country coordinators with information about how to keep implementing The GLOBE Program during the pandemic. They also worked with teachers on how to use GLOBE resources for virtual lessons during the pandemic. Teachers were encouraged to use GLOBE eTraining slides and classroom activities.

GLOBE REGIONAL HIGHLIGHTS

Near East and North Africa

2020 Regional Meeting

In November, the 2020 Near East and North Africa Regional Meeting was conducted virtually. The meeting was attended by country coordinators, deputy country coordinators, teachers, students, trainers, and scientists from nine countries. Topics of discussion included: an overview of The GLOBE Program; updates from the region; a presentation from SSAI on the new website features; discussion of 2021 IVSS needs and requirements presented by GIO staff; and coverage of student presentations.

Three accomplishments for the meeting were: focus on pursuing the development of GLOBE in all countries within the region; developing increased involvement in GLOBE during the pandemic; and focus on learning through electronic means (via direct and/or distance learning).

Topical Highlights from the Region

As always, the Regional Coordination Office (RCO) encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as “highlights” of the region’s ongoing, dedicated, work.

Science

A variety of science activities, meetings, and events occurred in various forms throughout the region, including:

- **GLOBE Observer Activities**—Due to the pandemic, GLOBE Kuwait prepared and hosted webinars with teachers and students with the goal of increasing interaction and participation in The GLOBE Program, as well as focusing data collection through The GLOBE Program’s app, GLOBE Observer. GLOBE Kuwait provided a significant number for data entry 2020–2021, in spite of the fact that it is a “new” country in the program.
- **Protocol Training Workshops**—GLOBE Bahrain teachers, from the Talent Students’ Center, prepared and hosted workshops related to the use of GLOBE protocols. These workshops were presented to students directly during online activity classes, and were circulated to all the GLOBE schools in the country.
- **Virtual Science Club Launch**—GLOBE Saudi Arabia launched a project called “The Virtual Science Club,” in early 2021. The idea of the club is to encourage students to focus on GLOBE program activities during the pandemic, specifically science-related activities. The Virtual Science Club is dedicated to helping students acquire the skills of the twenty-first century researcher.
- **2020–2021 IVSS Projects**—In spite of the fact that many students and teachers in the region were affected by the pandemic, and many struggled to conduct research during long lockdown hours, students’ and teachers’ love for research drove them to finish their IVSS research and reports. Although many countries were unable to participate due to the pandemic, students from Bahrain, Jordan, Kuwait, Oman,

and Saudi Arabia submitted reports and conducted presentations that, at the beginning of the year, were thought to be impossible.

- **Earth Day Celebrations**—For Earth Day, students in the region were asked to take observations of plants and weather conditions from their local area (from the window of their home or garden), and send in their photos (with related information) to share on their country’s website, as well as the GLOBE website, during the week preceding Earth Day. It was a successful, and beautiful, competition.

Education

A variety of educational activities, meetings, and events occurred in various forms throughout the region, including work in GLOBE Bahrain, where the number of GLOBE schools increased by more than 120 schools—thanks to workshops provided for teachers and students, where GLOBE protocols and activities were presented.

Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- **Training Workshops**—In 2020–2021, GLOBE Bahrain prepared and hosted a series of workshops covering GLOBE protocols. These workshops included:
 - An introductory workshop on The GLOBE Program, including instructions on how to register for the program and how to enter data;
 - Workshops covering GLOBE’s atmosphere, soil, and water protocols. Approximately 110 GLOBE teachers participated in these workshops.
- **Social Media Outreach**—GLOBE Oman used social media outlets to share about The GLOBE Program during 2020–2021. GLOBE Oman made use of these platforms to share about the program, in general, as well as to invite participation in GLOBE events and to document the work engaged in by GLOBE teachers and students during the pandemic.

GLOBE REGIONAL HIGHLIGHTS

North America



2020 Regional Meeting

In October, the 2020 North American Regional Meeting (NARM) took place virtually, via Zoom. Partners, sponsors, RCOs, and GIO staff registered for this event from across the United States and Canada—with a total of 89 participants. The NARM featured 20 unique sessions and 23 speakers; in addition, 14 lightning talks were presented. Due to the virtual nature of this meeting, GIO was able to use live closed captioning and networking sessions to provide avenues for participants to engage with the sessions and each other.

UNITED STATES TOPICAL HIGHLIGHTS

As always, the United States GLOBE Office, encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as “highlights” of the region’s ongoing, dedicated, work.

Science

A variety of science activities, meetings, and events occurred in various forms throughout the region, including work by the U.S. GLOBE Office to increase the participation level of STEM professionals. In order to facilitate better matching between GISN members and teachers and students, a survey requesting demographic and life experience information was distributed to all current members. A survey for teachers was also developed and distributed, asking for school demographics and preferences in the type of GISN



Students monitoring the Singing River Academy weather station; Gautier, MS, USA

engagements they would like (small group mentoring, classroom presentations, activities, etc.). Using these data, the U.S. GLOBE Office will assist in creating classroom matches starting in fall 2021. To support these efforts, the U.S. GLOBE Office hosted two webinars in April 2021. Jessica Taylor, NASA Langley, presented a webinar on role models, and a panel of teachers shared their experiences and promising practices for working with GISN members.

Education

A variety of educational activities, meetings, and events occurred in various forms throughout the region, including:

- **Materials and Resources/Natural Inquirer and GLOBE Project**—This effort was launched in winter 2021, with funding from the USDA Forest Service. The U.S. GLOBE Office is coordinating a crosswalk between issues of the Natural Inquirer and The GLOBE Program protocols and learning activities. The products will be created by teachers and partners, and will be posted to the GLOBE website and social media accounts.
- **Professional Development**—Through funding from the Alabama Math Science and Technology Initiative (AMSTI) GLOBE Partnership, the U.S. GLOBE Office provided a virtual GLOBE training for approximately 100 AMSTI specialists (trainers) in April 2021. A group of five GLOBE partners/trainers from across the country provided the Earth Systems-themed, two-day workshop. A second two-day workshop is being planned for the summer or early fall 2021. In July 2020, the University of Toledo Partnership conducted a joint professional learning experience, called the “Great Lakes Student Research Campaign,” for 17 teachers with the State University of New York at Fredonia Partnership, Northern Michigan University Partnership, Wayne RESA Partnership, and Defiance College. It was a mix of virtual and in-person training days. The workshops were funded through NOAA’s B-WET Program. National and local speakers from NOAA, NASA Science Activation, and the U.S. GLOBE Office joined, virtually.
- **Student Investigations**—In lieu of an in-person event, the 2020 Student Research Symposia (SRS) leadership team offered students an opportunity to upload their projects to the GLOBE website to



Taking air temperature for GLOBE IVSS research project; Dearborn Heights, MI, USA

receive comments from their peers and STEM professionals. There were 31 projects submitted to the discussion board, representing 12 schools from eight different states. This opportunity resulted in 63 students, with the support of 12 teachers, submitting projects that were posted to the GLOBE SRS Project Discussion Board, and reviewed by STEM professionals. Almost half of the projects were submitted to the IVSS. The SRS leadership recruited STEM professionals to review student projects through the GLOBE Partnership listserv and their own networks. GLOBE partners who served as part of the SRS leadership team recruited faculty from their own institutions to assist, and the USDA Forest Service recruited two of their scientists. A total of 10 University of New Hampshire PhD and Masters students, along with several faculty members, participated as STEM professional reviewers. In total, 32 STEM professionals signed up and reviewed projects. At the conclusion of the review period, all the SRS projects and STEM professionals' reviewer comments from 2020 were moved over to the Student Research Projects area of the website.

- **2021 Student Research Symposia**—The in-person 2021 SRS were canceled due to the pandemic; however, two regional groups of partners held virtual events for students in their areas. WestEd/University of California Berkeley hosted a GLOBE+ SRS, which included members of the California Strong Earth Systems Science Collaborative and Purdue as supporting institutions. Students heard from guest speakers in STEM fields and submitted posters virtually for review. Partners in the Midwest (the Midwest Earth Systems Science Collaborative) hosted a virtual SRS in May 2021. Lead partners were University of Toledo, Wayne RESA, and University of Wisconsin-Madison.
- **Evaluation: Publications and Communications**—There were 21 news stories published about GLOBE partnerships, covering teachers supporting student research during the COVID-19 pandemic, as well as articles featuring United States GLOBE community members including teachers, partners, and STEM professionals. Thirty-one GLOBE presentations were presented at the American Geophysical Union Fall Meeting. In addition, three SRS videos supporting future recruitment of student and teacher teams for the SRS were created. Two are “experience” videos from the Southwest and Northeast & Mid-Atlantic SRS, one



highlights the impacts of the events overall. The film from the Northeast and Mid-Atlantic Region video was entered into the NSF “STEM for All Showcase” in May 2020, where a robust discussion developed about the events. Teachers who supported students at the SRS were co-presenters. A total of four videos were submitted to the STEM for All Showcase that highlighted GLOBE between 05–12 May 2020:

- “Students Connect through Science at the GLOBE Symposia” (featuring the 2019 Northeast & Mid-Atlantic SRS);
- “GLOBE Mission EARTH: Inspiring Tomorrow’s STEM Professionals” (University of Toledo Partnership, along with WestEd/UC Berkeley, Boston University, Tennessee State University, and NASA Langley);
- “Connecting Students to Earth SySTEM through Mixed Realities” (Institute for Earth Observations Partnership, New Jersey);
- “A Community-based Approach to Engaging Students and Teachers” (Metropolitan State University Denver Partnership).

Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- **Community Growth**—Legacy Bridges STEM Academy is a new GLOBE Partnership in Pennsylvania.
- **Interactions and Collaboration**—The monthly Watercoolers went to a weekly schedule in 2020–2021 in order to provide a place for the U.S. GLOBE community to gather during the time of COVID–19, when other face-to-face interactions were reduced. (Watercoolers are informal meet-ups focused on sharing ideas around a weekly theme.) There have been over 30 Watercoolers with presentations by community members and discussions around virtual learning. Over 110 unique users attended the Watercoolers, which average 17 participants a week. Topics included: presentations by the U.S. Partner Forum (USPF) members about their region and partnerships; Forests of the Future Curriculum; GOES 16/17 Virtual Science Fair; Black History Month and Women’s History Month; Bitmojis and GLOBE; Data Literacy; WeatherSTEM and GLOBE; and My NASA Data.
- **U.S. GLOBE Partnership Yearbook**—The U.S. GLOBE Office created an annual Yearbook, with one page for each partnership, to share their annual GLOBE accomplishments. The final products are available as flip books on the United States webpage, and hard copies can be ordered for distribution at recruitment events and to interested organizations. Work has started on the 2020 Yearbook with a publication date of late spring/early summer 2021.
- **U.S. Regional Newsletters**—The USPF members worked with the U.S. GLOBE Office to create six versions of a regional newsletter (one for each region), plus a NASA-focused version by the NASA representative. These are emailed quarterly to the GLOBE Partnerships in each of the geographic regions of the United States. Each newsletter features one or more regional highlights and a “Partner of the Month” item. There is also a list of all upcoming regional workshops, as well as rotating sections (such as regional SRS news, GLOBE North America, GLOBE Worldwide or Tech Tips).

CANADIAN TOPICAL HIGHLIGHTS

As always, the Canada GLOBE Office, encouraged, supported, and hosted (virtually) numerous events (meetings, training, activities, field studies, and research efforts) during 2020–2021. The items listed below are only to serve as “highlights” of the region’s ongoing, dedicated, work.

Science

A variety of science activities, meetings, and events occurred in various forms throughout the region, including work on the Geological Bumble Bee Program. The Geological Bumble Bee (GBB) program (2012 to present) involved approximately 800 Calgary students (grade 2–9) building and installing approximately 800 Bumble Bee Boxes (BBB) while concurrently collecting rocks to characterize glacial material deposited 15,000 years ago. These students return to the field in the fall to collect their BBB and analyze the Bumble Bee colonies that occupied their boxes. Mount Royal University Bachelor of Science (Scherger) and Education (Kurila) students volunteered and assisted with various components of this program. Plans for



Engaging in macroinvertebrate studies; Alberta, Canada

the CSL program have the GBB expanding across Canada, so that K–12 groups can monitor these important pollinators that are under threat from diseases and climate change.

Making a Difference Award—The “Incredibee” grade 2 group won the “Making a Difference Award” at the City of Calgary Mayor’s Environmental Expo. Feedback from this group included, “Yesterday, we built bee boxes! I think that was the best day of my life so far!” and “I used to think that bees were mean, nasty...Now I know that bees are helpful to the world.” These quotes speak to the power of these hands-on, place- and curriculum-based citizen science research projects. Parent volunteers reported a high degree of satisfaction with the GBB hands-on field study, versus what they have traditionally experienced on field trips around the city where programs were delivered, rather than generated alongside students. Educators (teachers and curriculum specialists) emphasized the strong impact of these authentic, field-based activities versus the traditional didactic pedagogy often experienced in a science program.

A variety of educational activities, meetings, and events occurred in various forms throughout the region, including:

- **GLOBE Canada Builds Momentum**—Over 200 teacher accounts were created.
- **GLOBE Canada Website Development**—The Canada GLOBE Office worked to enhance and expand the website.
- **GLOBE Weather Curriculum**—The Canada GLOBE Office began disseminating necessary GLOBE equipment and resources to the community.
- **University of Cologne Partnership**—DADD (German Foreign Exchange Service) partnership grant: “University Network for Internationalization in Teacher Education (UNITE),” and international partners (Argentina, Austria, Canada, Estonia, Germany, Mexico, the United States, and Vietnam) built a coherent framework of pre-service teacher education to facilitate student exchange (GLOBE science education is a major component to this grant).
- **Virtual Summer School**—In October 2020, GLOBE Canada participated in the UNITE Virtual Summer School.

- **Truth and Reconciliation Commission (TRC)-GLOBE-Climate Action and Indigenization**—TRC is a social movement that Canada is currently going through to respond to the hideous legacy of Indigenous Residential schools; there have been 94 calls to actions, many of them education related.

Community

A variety of community activities, meetings, and events occurred in various forms throughout the region, including:

- **Outdoor Experiences**—GLOBE Canada and community members engaged in activities designed to explore urban-rural natural areas; these efforts were led by educators/elders from Indigenous communities.
- **Curriculum of Place**—GLOBE Canada made attempts to enact a “Curriculum of Place” that recognizes the intimate relationship Indigenous people have with land, and emphasizes relational ways of knowing, integrated with GLOBE protocols. An example of this effort includes the “Keepers of Our Place: Community Weather and Water Monitoring Project.” This project includes three distinct communities who are neighbors in the southwest portion of the city of Calgary, Alberta, Canada. These communities are: Connect Charter School, which is a tuition-free, grades 04-09, public school that focuses on preparing students to become as extraordinary citizens through a disposition of inquiry supported by Place-Based Education (PBE); Tsuut’ina First Nation Band Middle School, which serves grades 04-08 students of the Tsuut’ina Nation (the school celebrates Tsuut’ina history, language, and culture while meeting Alberta Education); and Mount Royal University-Department of Education, which is a four-year direct-entry B.Ed. degree program, with an emphasis on connecting theory with practice. The focal issue for these three communities is the recent development of a major transportation route (“ring road”), that intersects them, which has created a myriad of complex social, geographical, environmental, economic, and cultural issues; and the implications of such development is not yet understood. These communities are collaboratively reconsidering their place as “true” neighbors and community partners, as they share a geographical space and have comparable goals governed within a framework of Place-based Education (PBE) and Land-based Education (LBE).
- **Awards**—The “Excellence in Learning Partnerships Award 2020,” (Partners in Place: Building Community through Experiential and Place-based Education, Calgary Foundation-Community Grant) was achieved. The partnership includes Calgary Connect Charter School, Tsuut’ina Education Middle School, and Mount Royal University. The Partners in Place project is a community-building reconciliation initiative. Partners in Place provides an ongoing commitment among Connect Charter School, Mount Royal University, and Tsuut’ina Education. The major focus of this program is community impact and relationship building. All aspects of this partnership and planning have embraced the values of collaboration, respect, and inclusion.
- **Regional Meetings**—During 2021, GLOBE Canada participated in several regional meetings with community members to provide GLOBE Canada, GLOBE program, and GIO updates.





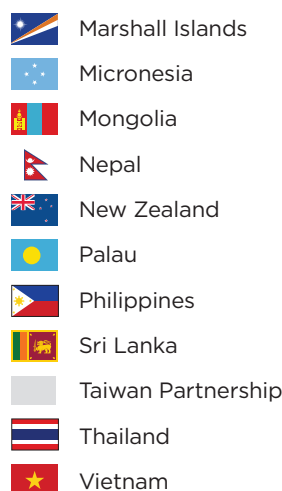
Student observing the yellowing of birch tree leaves; Kinashivska Secondary School, Ukraine

Thanks to Our GLOBE Countries Around the World

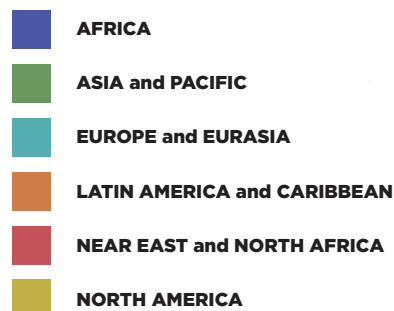
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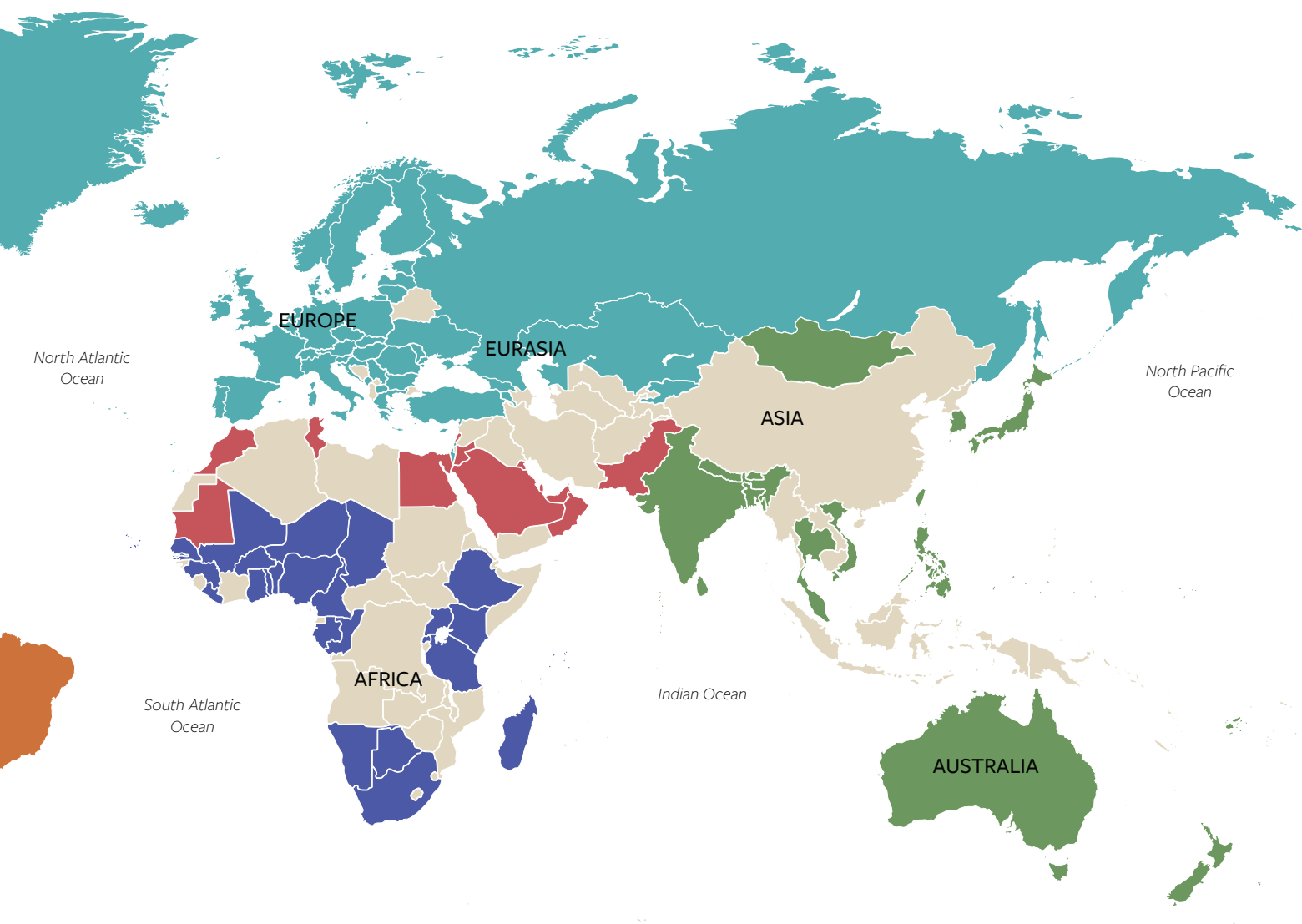


ASIA AND PACIFIC



EUROPE AND EURASIA





The Annual Review can be found online at www.globe.gov/about/annual-reviews

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