United States GLOBE Partner Yearbook
2020

www.globe.gov/web/united-states-of-america
ABOUT GLOBE

Announced in 1994 and launched in 1995, the Global Learning and Observations to Benefit the Environment (GLOBE) Program has been a leader as an international science and education program that connects a network of students, teachers, and scientists in order to better understand, sustain, and improve Earth’s environment at local, regional, and global scales.

More than 186 million measurements have been contributed to the GLOBE science database, creating useful, standardized, research-quality data that support informal and professional scientific exploration.

Generations of students and teachers in more than 120 countries have moved through and beyond the GLOBE Program. Widely available information technology and tools have enabled citizen scientists to participate in GLOBE anywhere and anytime. By engaging teachers, students, and the public in authentic learning of Earth Systems Science (ESS), GLOBE serves learners of all ages who are enthusiastic about scientific discovery locally and globally.

THE GLOBE VISION

A worldwide community of students, teachers, scientists, and citizens working together to better understand, sustain, and improve Earth’s environment at local, regional, and global scales.

THE GLOBE MISSION

To promote the teaching and learning of science, enhance environmental literacy and stewardship, and promote scientific discovery.

For more information, we invite you to visit www.globe.gov.

GLOBE is sponsored by the U.S. National Aeronautics and Space Administration (NASA), and supported by the National Science Foundation (NSF), National Oceanic and Atmospheric Administration (NOAA) and the United States Department of State. The GLOBE Implementation Office is supported under the NASA Grant and Cooperative Agreement NNX17AD75A awarded to the University Corporation for Atmospheric Research.
ABOUT GLOBE PARTNERSHIPS

GLOBE Partners facilitate the implementation of GLOBE within a service area. Partners recruit, train, and mentor new GLOBE teachers and facilitators to promote the teaching and learning of science, enhance environmental literacy and stewardship, and promote scientific discovery.

These organizations are invited to become U.S. GLOBE Partners:

- **Nonprofit or governmental organizations** who support student inquiry and research about the environment
- **Businesses and organizations** whose corporate mission is to invest in successful educational outcomes of students and the community at large

Each U.S. GLOBE Partner must have a formal affiliation with an institution of higher education, a school district, a state department of education, or a recognized informal education organization (501c3) such as STEM learning centers, museums, and foundations that can sustain the implementation of GLOBE in their communities.

New and prospective GLOBE Partners must demonstrate the capacity to recruit, train, and mentor teachers in the identified service area(s). Their efforts must focus on capacity-building, program sustainability, and student inquiry and research.

View a list of current GLOBE U.S. Partners at [https://www.globe.gov/web/unit-ed-states-of-america/home/resources](https://www.globe.gov/web/unit-ed-states-of-america/home/resources). If you would like information about becoming a GLOBE Partner, please contact the Community Support Team at globehelp@ucar.edu.
UNITED STATES GLOBE PROGRAM OFFICE

The United States GLOBE Program Office (“The Office”) is supported through a sub-award from the GLOBE Implementation Office. Headquartered at the Leitzel Center at the University of New Hampshire, The Office is managed by Jennifer Bourgeault, United States Country Coordinator, and assistant Haley Wicklein.

The Office supports a diverse group of 126 fully-engaged GLOBE Partners to create a strong, self-sustainable framework for training and responsive support for every GLOBE member in the country. The Office works with the U.S. Partner Forum to contact and provide support for every Partner in the country on a personal basis and through a regional model.

Activity/Program Highlights

- The Office hosts regular webinars on topics such as GLOBE website troubleshooting, funding and educational opportunities, and other topics as suggested by the Partners. These webinars, called Watercoolers, model the idea that informal gatherings around watercoolers at work can lead to valuable exchanges of information and new collaborations.
- The Office publishes and encourages Partners to publish stories on U.S. GLOBE students, teachers, Partners, and organizational accomplishments, featured on the GLOBE website and U.S. GLOBE social media accounts (@US_GLOBE and https://www.facebook.com/groups/US.GLOBE.Educators/).
- The Office coordinates six annual in-person Student Research Symposia (SRS) for teacher/student teams supported with funding from NASA (grant 80NSSC18K0135) and Youth Learning As Citizen Environmental Scientists (YLACES), along with strengthening the local scientist network and GLOBE alumni on a regional level and engaging these groups in GLOBE events.
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<td>ESC Region 05 - Silsbee Conference Center - TRC</td>
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<td>ESC Region 18 - TRC</td>
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<td>Our Lady of the Lake University - TRC</td>
<td>Peggy Carnahan <a href="mailto:pscarnahan@ollusa.edu">pscarnahan@ollusa.edu</a></td>
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<td>Texas STEM Coalition (pg. 48)</td>
<td>Michael Odell <a href="mailto:modell@uttyler.edu">modell@uttyler.edu</a> (903) 566-7149</td>
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<td>NASA Langley Research Center (pg. 51)</td>
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# UNITED STATES GLOBE PARTNERSHIPS

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<td>West Virginia</td>
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These news articles were posted on the GLOBE website in 2020. The full stories are available from the linked title.

**EDUCATION: TEACHER FEATURES**

**GLOBE-at-Home Strategies for Success.** GLOBE Mission Earth teachers Jessica Kunz and Zulema Gonzales talk about how they support GLOBE activities in the midst of the pandemic. In a roundtable virtual presentation, they shared examples of their lesson plans and engagement strategies.

**Montverde Academy’s Eyes on the Ground Sharpen NASA’s View of the Sky.** NASA’s view of the sky has been enhanced by the work of students at Monteverde Academy in Florida. Teacher Caryn Long shares her experience of teaching students about jet contrails using GLOBE protocols. Students such as middle schoolers Charlotte Newton, Sara Echavarria, and Ryan Sapp, and their classmates have impressed NASA scientists as they continued to collect data from home during the COVID-19 pandemic.

**For Students from Maine, SRS Delivers a Life and Learning Experience.** Students from Old Town High School, Maine, and their two teachers, report on how the Student Research Symposium in Boston changed their ideas about science, and the wider world. Teacher Ed Lindsey explains how GLOBE is a “perfect fit for Old Town’s Alternative Education Program,” designed for students who opted out of school for various reasons and decided to return to high school with a new approach to learning.

**Teacher Feature: A Q&A with GLOBE Teacher Hannah VanScotter.** Hannah Van Scotter, a GLOBE teacher at Jefferson Montessori Academy in Carlsbad, New Mexico, talked about her experience with GLOBE and the regional Student Research Symposium in a Q&A. “I came from industry into teaching, so I have a different mindset from other teachers,” said Hannah, a geologist by training and experience. GLOBE focuses on “real data students can actually collect in real time.”

**Teacher Feature: A Q&A with GLOBE Teacher Elodie Bourbon.** Teacher Elodie Bourbon answered a GLOBE Q&A about her work with Earth Science students for whom English is a second language. “My students like GLOBE and, sometimes, what they need and want to learn can be very basic,” said Elodie. “This year we did the atmosphere work with newcomers in the country who didn’t know the basics of weather. Sometimes, it’s as simple as learning the word for ‘cloud’ in English.”

**Using Grants to Fund GLOBE Teaching and Training in West Virginia.** Rick Sharpe, GLOBE teacher and training coordinator, discussed his ideas on using grants to fund GLOBE programming in West Virginia. His students at Huntington High School study climate change (aerosols, surface temperature, the urban heat island effect) and water quality (the impact of sewage spills, erosion, and economic development on a local stream). The work is funded by grants from institutions like NASA, Dominion Energy, the Environmental Protection Agency, and the Benedum Foundation.
Student Research Symposia goes virtual in a time of pandemic. After months of discussion and planning, Jen Bourgeault and GLOBE leadership made the difficult decision to make the 2020 Student Research Symposia virtual experiences. The COVID crisis called for collecting a lot of input from GLOBE participants, reflecting on both the legacy and responsibilities of the SRS program begun in 2016, and coming up with a new plan.

GLOBE Partners Support SRS and IVSS Students through Local Symposia and Travel Support. Representatives of four GLOBE partnerships discuss how, and why, they provide mentoring support for teachers and students as they prepare for the regional Student Research Symposia and the International Virtual Science Symposium. Partners from Purdue University, Boston University, the Metropolitan State University of Denver, and the University of Toledo detail their efforts to bring students to these events.

Earth Team Interns as GLOBE Field Scientists. Earth Team interns work as GLOBE Field Scientists through GLOBE Partnership Earth, a non-profit environmental education organization in California. Students are introduced to the notion of becoming lifelong environmental stewards through experiential education and community connections. The program takes a long-term, multi-year approach to environmental education from short-term class visits to year-long after-school internships.

MULTI Student Research Showcase Inspires Focal Students. “Focal students” in Colorado—those who may not envision a science career in their future—met people like them who have gone into the science career “pipeline” at the MULTI Student Research Showcase, sponsored by the Metropolitan State University. In addition, Community College of Denver (CCD) students and recent graduates presented research posters stemming from a field research course in the Rio Mora National Wildlife Refuge.

Vernal Windows of Opportunity. Climate change has had a profound effect on vernal windows, changing the timeline in terms of when winter ends and spring begins. Liz Burkowski of the University of New Hampshire explains why the topic is a perfect research topic for GLOBE schools. “I created a lesson plan activity that introduces teachers to the vernal windows concept,” Liz said. Students record vernal window events on cards—snow melt, soil thaw, peak stream flow, ice out, and snow free dates. “The students have to put them in hypothesized order of events. You think you know how things unfold through the spring until you do this activity.”
COMMUNITY: PARTNERSHIPS

**California Strong Collaborative.** The study of Earth System Science in California gets a boost with the new University Corporation of Atmospheric Research GLOBE Collaborative. Five organizations have come together to create and implement a sustainable plan for strengthening ESS practices in the region and building strong connections between GLOBE, Earth System Science, NASA scientists and ambassadors, and students.

**GLOBE Partner California Academy of Sciences Supports Educators in Out-of-School Programs.** The Science Action Club, an out-of-school program designed to inspire middle schoolers to connect with nature, has been implemented in hundreds of sites from Anchorage to Albany to ignite curiosity, foster workforce development skills, and build STEM identity. SAC was created by the California Academy of Sciences.

**WestED/UC Berkeley Team Offer Resources for Supporting Teachers During COVID-19.** The GLOBE Mission Earth team created resources and offered advice for teachers on teaching virtually during the COVID pandemic. The team at WestED/UC Berkeley adapted to the “shelter at home” mandate with virtual meetings such as a session with GLOBE Mission EARTH (GME) teachers from California and Hawaii to discuss on-line learning strategies and ways to keep student research projects alive.

**Q & A with Janelle Johnson, Associate Professor of Teacher Education at MSU Denver.** In a Q&A session, Janelle Johnson, a STEM equity expert at Metropolitan State University Denver, talks about the challenges and promise of bringing GLOBE into the worlds of students from all walks of life. Discussing the focal student concept, “It’s common for teachers to plan for the middle or average or typical student. But when we’re thinking about gaps in achievement that really represent opportunity gaps, we want to learn from the students who have been less engaged with science, who have had less opportunities,” she explained.

**SRS, Professional Development and Classroom Visits for the Boston University Mission EARTH Team.** Kathleen Johnson of Boston University GLOBE Mission Earth writes about highlights from her work with New England regional GLOBE programs, hosting the Northeast regional symposium, and a new professional development model. Team members also began making in-school visits prior to the onset of COVID.

**At Stone Child College, GLOBE Bridges Indigenous and Western Ways of Knowing.** The relationship and similarities between western ways of knowing and indigenous ways of knowing have been fostered by Stone Child College, a tribal college on the Chippewa Cree Rocky Boy reservation in north central Montana. Douglas Crebs, GLOBE partner, collects and reports GLOBE pedosphere and atmosphere data and uses the data as part of atmospheric sciences weekly labs for lower-level undergraduate courses where students study climate change.

**Pacific Islander Teachers on the Island of Hawaii Advance Sustainability Through Earth Science.** Pacific Islander teachers were treated to a two-day virtual conference by Linda Bailey Hayden of Elizabeth State University on integrating GLOBE into their instruction. A two-tiered training approach included selected online e-trainings related to atmosphere, biosphere, hydrosphere and pedosphere and follow-up coaching and mentoring from seasoned GLOBE trainers.

**GLOBE Satellites in Education Team (G-SET) Established.** The GLOBE Satellites in Education Team discusses how their work promotes the citizen science goals of GLOBE. Said GLOBE Partner John Moore, “we hope to make a profound impact on STEM education, create career pathways, expose the excitement to young people, and create enhanced diversity within the geosciences.”
New GLOBE Initiatives at Queens College, NY. Queens College in New York unveiled two new initiatives, said GLOBE partner Peter Schmidt. The first is a pilot program to train 10 to 12 high school teachers to use GLOBE resources and methods to teach a college-level research class in their high schools. The second is a summer science program, based on GLOBE research, for high school students in the College's College Now Program.

Bowling Green State University Engages Undergrads and Citizen Scientists in GLOBE. GLOBE undergraduate student research and federal grant development are fostered by the GLOBE Midwest Region Partnership based at Bowling Green State University, Ohio. The partnership promotes GLOBE in the region and beyond. Their Science and Math in ACTION Program is a “Choose Ohio First” funded endeavor that prepares middle and high school math and science teachers to excel in best practice instruction.

GLOBE Mission EARTH at the University of Toledo in the time of COVID. Professional development, student engagement strategies, and webinars on teaching in the era of COVID were featured by GLOBE Mission Earth at the University of Toledo, Ohio. Included were a session titled NASA Resources, The GLOBE Program, and Student Research for the Michigan Science Teacher Association and an introduction to GLOBE for teachers at NASA Glenn Research Center.

Alder Creek Community Forest embeds GLOBE in “Story of Your Place” curriculum. The Story of Your Place curriculum at Alder Creek Community Forest in Douglas County, Oregon, embeds GLOBE protocols to familiarize students to the physical and biological characteristics of their homes and communities.

Texas resident Jennifer Hammonds connects Sustainability Action with GLOBE. Texas resident Jennifer Hammonds reflects on the partnership between GLOBE and the Eco-Schools project, both celebrating their 25th anniversary. Jennifer leads Eco-Schools USA, a project sponsored by the National Wildlife Federation that follows a seven-step framework to ensure lasting and school-wide impact in community involvement linking GLOBE to existing curricula.
The University of Alaska Partnership, through the Arctic and Earth STEM Integrating GLOBE and NASA project, has successfully advanced the development of a new model of culturally responsive climate change investigation and stewardship using NASA and GLOBE assets for rural, underrepresented indigenous communities.

In 2020, our climate change education model was adopted by projects including an NSF Navigating the New Arctic project Fresh Eyes on Ice. We have had regular curriculum writing collaboration meetings with the Association of Interior Native Educators and International Arctic Research Center to co-produce a series of lessons on Koyukon Athabascan relationship to Birch (Kk'eeyh, Betula nealakshana).

We engaged 244 informal and formal educators in 12 professional development activities combining GLOBE training with culturally responsive climate change education. We launched GLOBE Grandma Green-down e-Learning videos with 100 children and their parents, a GLOBE in My Neighborhood GLOBE soil investigation in a community garden, and GLOBE hydrology investigation in a slough with fifteen youth and their families. A new “Dirty Snow” GLOBE Clouds and Solid Precipitation inquiry and research project engaged 45 middle and high school youth in four states, resulting in two 2021 IVSS submissions.


**Funding:** NASA and leveraged funding from other projects

**Areas of Expertise:** In-service professional development, programming for students, elementary GLOBE, pre-service teachers, GLOBE in undergraduate classrooms, education research, science research, citizen science, informal science, culturally responsive climate change education.

**Cooperating Organizations:** Arctic and Earth STEM Integration of GLOBE and NASA (SIGNs); NESEC; GLOBE Mission Earth; AREN; Smoky Mountain Collaborative; International Arctic Research Center; Bonanza Creek Long Term Ecological Research Program; Alaska Arctic Observatory Knowledge Hub; Association of Interior Native Educators; Alaska EPSCoR Program; NSF; AISL Arctic Berry Harvest-Public Participation in Scientific Research; Alaska Climate Science and Adaptation Center; Boys and Girls Club of Alaska; 4-H Club of Alaska; Navigating the New Arctic Community Office (NNA-CO); partnership of University of Colorado Boulder; Alaska Pacific University and the University of Alaska Fairbanks; Center for Alaskan Coastal Studies; Environmental Literacy for Alaskan Climate Stewards project (NOAA); Fresh Eyes on Ice project (NSF); Santa Ana College MESA Program; 365 SMART Academy /UAF Summer Sessions; Renewable Energy Alaska Project; SciAct STEM Ecosystems, led by Arizona State University.

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JET PROPULSION LABORATORY

www.globe.gov/web/jet-propulsion-laboratory

The JPL partnership supports local schools and science centers by conducting professional development workshops, taking part in educational webinars, and mentoring science interns at NASA’s Jet Propulsion Laboratory. We help grow the GLOBE program both domestically and internationally through teacher workshops focusing on the Atmosphere and Pedosphere protocols.

Dr. Erika Podest continues to mentor interns as part of the GLOBE Mosquito Habitat Mapper. Dr. Narendra Das has focused his efforts on creating a low-cost sensor that can be used by the GLOBE community to measure soil moisture in the pedosphere protocol and interface with the NASA existing database. Dr. Erika Podest and Dr. Narendra Das are members of the GLOBE International STEM Network (GISN).

The partnership’s efforts to conduct pre/in-service teacher workshops, GLOBE refresher-trainings, informal discussions, outreach/communications, webinars, and student/teacher Q&As is led by Peter Falcon, Kalina Velev, and Rachel Zimmerman-Brachman. The team also supports the GLOBE Observer Citizen Scientist app, GLOBE SRS, and IVSS. Peter and Rachel are members of the NESEC GLOBE Observer working group and communications team and Peter Falcon is a member of the Trees Campaign.

The JPL team supports local schools with guidance on SRS and IVSS projects and providing Subject Matter Experts (SME) in science and engineering. We offer feedback to Spanish-speaking students from Central and Latin American countries via webinars. The team supports the GLOBE Program and GLOBE Observer app in outreach and communications events such as National Ocean Bowl, National Science Bowl, Explore JPL open house, Night at the Aquarium of the Pacific, EAA, Air Venture Air show, and AMS and AGU conferences. In 2020, the Partnership joined the GLOBE Earth System Science California Strong Collaborative.

Because of COVID19 restrictions on travel and public outreach events, the JPL partnership transitioned to web-based communications via workshops and webinars. For a list of activities and presentations, visit www.globe.gov/web/jet-propulsion-laboratory/home/publications.

Funding: NASA/California Institute of Technology

Areas of Expertise: In-service professional development, pre-service teachers, engineering, science research, citizen science, informal science.

Cooperating Organization: NASA

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www.globe.gov/web/wested-and-uc-berkeley

Our formal and informal programs shifted due to COVID in 2020. In March, we offered professional development for formal educators to determine the scope and challenges of their educational programs, adopting virtual support tools. Through NASA At Home website resources, we instituted a maker-day program where students could view and choose NASA design/build activities. We worked with schools to incorporate local subject matter experts into virtual classrooms and field trips and supported interns in their efforts to complete their research projects and attended their virtual presentations.

Throughout the summer, WestEd/UCB staff developed a plan to align GLOBE implementation with distance learning. The partnership invested in more than $20,000 and assembled 620 student toolkits in the areas of atmosphere, hydrosphere, and biosphere. We also shifted its professional development focus to data literacy and spatial reasoning. Four afternoons of professional development were provided to teachers in the fall 2020 covered data literacy, spatial reasoning, GLOBE implementation with student toolkits, and incorporation of subject matter experts into the virtual classroom.

The University Corporation of Atmospheric Research offered GLOBE partnerships an opportunity to form a collaborative of California organizations to advance Earth system science. The collaborative's vision is “to inspire and create knowledgeable and dedicated youth who take action and inspire others to be environmental stewards locally and globally.” We supported schools in California and Hawaii and afterschool internship programs through the ECLIPSE project, distributing student toolkits and arranging subject matter experts (SMEs) into the virtual classrooms.

**Funding:** GLOBE Mission EARTH is funded by NASA Cooperative Agreement Notice (CAN) #: NNX16AC54A, the ECLIPSE Project is funded through the National Science Foundation grant #1713456.

**Areas of Expertise:** Professional development/trainings, STEM career development, educational research.

**Cooperating Organizations:** University of Toledo, Boston University, Tennessee State University, University of California Berkeley, Lawrence Hall of Science.


**News Stories:** CA Strong Collaborative; GLOBE-at-Home Strategies for Success; Earth Team Interns as Field Scientists; WestEd/UC Berkeley Team Offer Resources for Supporting Teachers During COVID-19

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<th>Partnership Coordinators</th>
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METROPOLITAN STATE UNIVERSITY OF DENVER
COMMUNITY COLLEGE OF DENVER

www.msudenver.edu/case/multistem

The highlight of our year was a Student Research Showcase and EXPO in February 2020 where students presented their research projects. In addition to local elementary and middle school multi-STEM classes, we were delighted to include two high school groups from Navajo Prep in New Mexico who shared information on community-relevant water quality on tribal land in the four corners region. Students viewed research posters by Community College of Denver and Metropolitan State University students. College student groups including SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) and some non-profit groups provided hands-on activities for students and their families.

Unfortunately, our fourth (and final NSF grant-supported) multi-STEM teacher institute, scheduled at the Rio Mora Wildlife Refuge for June 2020, was cancelled due to the pandemic. We were able to sponsor some virtual events including watercoolers (topics included Student Research, Curls on the Block, Nature, Exploration & Energy and Bug Chicks) and a short course presented by the Denver Museum of Nature. We also participated in the STEM for All Video Showcase in May. An environmental educator with the Colorado Alliance for Environmental Education has joined our team in September. It has been great having Sami Schall join us for her year of Americorps service.

Funding: National Science Foundation ITEST Grant 1615193.

Areas of Expertise: In-service and pre-service professional development, elementary GLOBE, education research, STEM equity, innovative models of professional development, data literacy.

Cooperating Organizations: Metropolitan State University of Denver, Community College of Denver.

News Stories: A Community-based Approach to Engaging Students and Teachers (videohall.com); MULTI Student Research Showcase Inspires Focal Students; Q & A with Janelle Johnson, Associate Professor of Teacher Education at MSU Denver

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On March 6-7, 2020, we held the final face-to-face workshop for GLOBE Weather (including atmosphere protocol training) a week before the global COVID-19 pandemic forced a shutdown of all public gatherings. We did not realize at the time how the global pandemic would change our lives and, overall, the workshop was very successful. Shortly after this shutdown, we focused on providing guidance for teachers who needed to teach GLOBE Weather during at-home learning. We also were able to have the GLOBE Weather curriculum translated into Spanish and French. Finally, we had one of our team members set up a station at home to begin collecting atmosphere data and submit to the GLOBE database.

**Funding:** NASA/NSF

**Areas of Expertise:** Informal science, programming for students, citizen science, elementary GLOBE, GLOBE weather, GLOBE data explorations.

**Cooperating Organizations:** Denver Museum of Nature and Science, Colorado ESS/GLOBE Collaborative: University of Colorado, Boulder CIRES, University of Colorado Fiske Planetarium, Colorado State University Natural Sciences Education & Outreach Center, College of Natural Sciences, Metropolitan State University, CoCoRaHS, St. Vrain Valley Schools.

**Publications:** [www.globe.gov/web/ucar-center-for-science-education/home/publications](http://www.globe.gov/web/ucar-center-for-science-education/home/publications)

**News Stories:** [Putting Citizen Science into Practice with CoCoRaHS](http://www.globe.gov/web/ucar-center-for-science-education/home/publications)

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The Purdue University GLOBE partnership offers teacher professional development sessions about GLOBE protocols every summer. Professional researchers from the relevant fields typically participate in the workshops. We also offer one-day single sphere workshops throughout the school year. In 2020, we worked closely with the Indiana Department of Education and K-12 Indiana science teachers to develop a statewide Climate Change Framework incorporating many GLOBE resources. Additionally, we work with educators to incorporate GLOBE Observer in their preservice teacher education classes. Because of the COVID pandemic, our partnership provided professional development and student learning experiences via digital media.

Purdue Partners Steven and Sarah also coordinate ‘Superheroes of Science’, a video program that highlights STEM content, provides professional development opportunities for teachers, and delivers learning experiences for students. [https://www.purdue.edu/science/K12/sos.html](https://www.purdue.edu/science/K12/sos.html)

For a list of Purdue University Partnership publications, visit [www.globe.gov/web/purdue-university/home/publications](www.globe.gov/web/purdue-university/home/publications).

**Funding:** The Indiana Department of Education, National Science Foundation, Haliburton Foundation, and alumni donors.

**Areas of Expertise:** In-service professional development, programming for students, elementary GLOBE, pre-service teachers, engineering, science research, citizen science, informal science.

**Cooperating Organizations:** Imagination Station, West Lafayette Parks Department, Tippecanoe County Partnership for Water Quality, Indiana Department of Natural Resources, The Nature Conservancy, and Purdue University Departments: Earth, Atmospheric, and Planetary Sciences, Chemistry, Agronomy, Forestry and Natural Resources.

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GLOBE Iowa engaged in professional development activities for local and international educators in 2020. Through a partnership with the UNI and UDEP, 11 Peruvian preservice educators participated in English Immersion through Environmental Education, Phase II. The workshop included six weeks of virtual instruction and one week of face-to-face instruction on the UDEP campus with a focus on mosquito and atmosphere protocols. A virtual workshop was offered for 26 UNI preservice educators. The workshop was integrated into the participants’ Science Methods course after the course went online in response to COVID-19. All participants completed one or more online atmosphere modules, gained experience collecting cloud data using the GLOBE Observer app, read GLOBE student reports and elementary GLOBE books, and researched other GLOBE protocols.

We promoted GLOBE Program and Midwest Region opportunities for teachers and students through direct emails to members and social media. The University of Northern Iowa STEM office also promoted GLOBE activities. Iowa-Q educators were specifically recruited and encouraged to bring students to the 2020 Midwest SRS. Two programs (LIST) were selected to participate before COVID-19 forced the cancellation of the SRS. The year-long Iowa-Q Institute concluded with Iowa-Q educators presenting their projects and adaptations at a virtual webinar.

**Funding:** Environmental Protection Agency (EPA), Partners of the Americas Foundation, University of Northern Iowa STEM.

**Areas of Expertise:** In-service professional development, pre-service teachers, citizen science.

**Cooperating Organizations:** University of Northern Iowa (UNI), UNI College of Education, Universidad de Piura (UDEP), the GLOBE Program Midwest Region.

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**Partnership Team Member**
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**CBD**

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Prior to the COVID pandemic, we conducted preservice teacher workshops to introduce elementary GLOBE. In February, we hosted a “Water is Life” workshop that introduced teachers to the GLOBE Weather Curriculum developed by the University Corporation for Atmospheric Research (UCAR). Once COVID caused closures, we followed this up in June with a virtual workshop on NASA Earth Observer 2020 sponsored by NASA’s Langley Research Center (LARC) which was also open to teachers we had worked with during the summer of 2019.

One way we have been supporting schools is through our work with High Altitude Ballooning with virtual workshops and mailed-in payload.

**Areas of Expertise:** In-service professional development, elementary GLOBE, pre-service teachers, citizen science, informal science.

**Cooperating Organizations:** Fort Hays State University

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The Goddard GLOBE Partnership provides resources to schools and teachers in our 11-state region. We offer program support to integrate GLOBE into school curricula, webinars to provide additional training, answers to specific problems via telecons and telephone calls, and, if possible, face-to-face in-school support. We offer an equipment loan program for new GLOBE schools and students preparing for a Student Research Symposia (SRS). NASA’s Goddard Space Flight Center in Greenbelt, Maryland, is home to the nation’s largest organization of scientists, engineers, and technologists who build spacecraft, instruments, and new technology to study the Earth, the sun, our solar system, and the universe. 2020 was a challenging but busy year for our partnership with a wide variety of GLOBE events.

Virtual workshops and trainings were held as follows: GLOBE virtual trainings in Pennsylvania, Maryland, New York, and Virginia public schools; GLOBE hybrid staff trainings at the Renfrew Institute and Sugar Valley School District (both in Pennsylvania) about the GLOBE Weather Unit for Middle Schools; collaborative GLOBE projects with NASA GISS (NASA Goddard Institute for Space Studies in New York); GLOBE virtual training for MAEOE (Maryland Association of Environmental & Outdoor Education); work with minority/historically Black colleges and universities in the Washington/Baltimore area; a collaborative workshop with NOAA for teachers at Notre Dame University of Maryland; virtual GLOBE training in collaboration with the National Wildlife Federation for Arlington County Virginia Public Schools; and development, training, and implementation of GLOBE into a Legacy Bridges STEM Academy, Inc. pilot program in collaboration with Legacy Bridges Academy, Cheyney University (Pennsylvania), and the NASA Goddard Space Flight Center GLOBE Partnership.

**Funding:** NASA.

**Areas of Expertise:** In-service professional development, programing for students, elementary GLOBE, pre-service teacher training, GLOBE in undergraduate classrooms, education research, science research, citizen science, informal science, individualized GLOBE training and implementation.

**Cooperating Organizations:** NASA, NOAA, U.S. Department of State, National Wildlife Federation.
For the past five years, the Boston University GLOBE Mission Earth Team (BU GME) has worked closely with more than 17 schools and organizations in Providence, Rhode Island. The collaborative’s goal is to increase involvement in the GLOBE program and includes scientists, teachers, students, and citizen scientists throughout the United States and around the world.

In the 2020 academic year, BU GME worked with 31 teachers from 11 schools serving approximately 1,256 students. GLOBE made 84 in-person classroom visits, assisting students and teachers with GLOBE and GME activities; met with teachers to discuss resource needs, project planning, and activity requests; facilitated a sixth-grade classroom’s meeting with a NASA SME to discuss volcanos and aerosols; and checked in with teachers and students to learn what they were discovering through GLOBE and planning to explore next.

When the COVID pandemic made it impossible to visit classrooms after February 2020, we pivoted to virtual Zoom meetings with teachers and students and modified and created new digitally-friendly, inclusive activities and protocols that could be done at home. These new resources, for the GLOBE topics Atmosphere and Earth as a System, were posted on a Google Classroom platform.

Dr. Garik is the lead organizer for the New England Regional Earth Systems Science Collaborative under the purview of an NSF grant to UCAR. The intent is to create a network of environmental science education organizations in New England.

BU GME presented posters and talks at scientific and educator conferences about our activities and our impact on the urban schools, including the 2020 AGU, and hosted six professional development workshops. Elizabeth Joyner and Angela Rizzi of the NASA Langley Research Center joined us remotely for three workshops about the My NASA Data resources.

Funding: GLOBE Mission EARTH is funded by NASA.

Cooperating Organizations: Boston University; The University of Toledo, Ohio; WestEd/University of California; Berkeley, California; Tennessee State University; and NASA Langley Research Center.
The year 2020 was challenging for all students, families, and teachers. The Global STEM Education Center, Inc. devoted its efforts to providing support and maintaining great relationships with our US GLOBE partnership schools. We continued recruiting new schools despite this difficult time, making new connections, and presenting virtually to school committees, superintendents, and school principals, including:

- Nipmuc High School, lead teacher James Gorman
- Blackstone Valley Vocational Career Technical High School, lead teacher Christine Cote
- Instituto Neil Armstrong, San Nicolas de los Garza, Mexico, lead teacher Raziel Cázares
- Old Colony Regional Vocational Technical High School, Superintendent, Aaron Polansky
- Angstemua K-12 School, Kharkiv, Ukraine, lead teacher Ms. Uliana
- Gymnazium #3, Arkhangelsk, Russia, lead teacher Ms. Fedotova
- Finham Park Two, Coventry, United Kingdom, headteacher Russell Plester

We began developing an online teacher professional development resource on team-work skills based on 4D Systems and “How NASA Build Teams,” intercultural communication skills, science diplomacy skills, and online teaching and learning. We hope to finalize this resource in 2021 and share our experience with the GLOBE team. As part of our continued commitment to equitable high-quality education, diversity, and inclusion, we reached out to the vocational high schools in Massachusetts, which are underrepresented in some national STEM initiatives. We increased our participation in the GLOBE virtual Watercoolers and participated in all GLOBE virtual meetings for the US GLOBE Partners, including the GLOBE Latin America and Caribbean and Europe and Eurasia virtual annual meetings.

GLOBE protocols used included Atmosphere (air temperature, precipitation, clouds and contrails, relative humidity, surface temperature) and Biosphere (biometry, trees).

As a small 501(c)(3) non-profit, we are committed to equity, STEM careers, global citizenship, diversity and inclusion, and assisting schools beyond the greater Boston area with underserved and underrepresented groups.

Areas of Expertise: In-service professional development, informal science, programming for students, after school programs.

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Active for more than 20 years, GVSU GLOBE is part of the Midwest Collaborative. GLOBE hydrology protocols continue to be the staple of our onboard outreach program that serves more than 5,000 participants each year. The outreach program pivoted to online with the onset of COVID in 2020. Students in the GVSU Geology Department continue to take advantage of the GLOBE online training, focusing on atmosphere protocols.

GVSU received a grant from the Michigan Space Grant Consortium to support teacher professional development. Michigan Resources on Climate and Land Change Education (MiRCLE), a project of GVSU Climate Change Education Solutions Network, is an online learning community providing Michigan-specific place-based interdisciplinary resources for 6-12 grade science and social studies teachers. It integrates NASA Land Cover and Land Use Change (LCLUC) and GLOBE materials with Michigan Science Standards (MSS) and the recently revised social studies standards.

Land-use and land-cover changes affect local, regional, and global climate processes. Land is both a source and a sink of greenhouse gases and plays a key role in the exchange of energy, water, and aerosols between the land surface and the atmosphere. Integration of these topics is often challenging for middle- and high-school teachers due to their complexity and interdisciplinary nature.

The MiRCLE team works with 16 teachers joining remotely from across the state promoting a collaborative interdisciplinary approach to teaching and learning. With the assistance of GVSU faculty members and external experts, these teachers developed open-access lesson plans and visualization tools based on NASA educational assets for Michigan case studies. Educators can earn continuing education units for their participation. The project has been funded for a second year.

Funding: GVSU.

Cooperating Organizations: GVSU Regional Math & Science Center, GVSU Climate Change Education Solutions Network

Areas of Expertise: In-service professional development, elementary GLOBE, pre-service teachers, GLOBE in undergraduate classrooms, informal science.

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Northern Michigan University is a four-year (or more) public school in Marquette, Michigan. It is classified as a Master’s College and University (medium programs) by Carnegie Classification and its highest level of offering is a Doctor’s degree. Representatives attended the summer 2019 Detroit GLOBE Annual Meeting.

Five faculty members from Great Lakes region universities led a summer professional development workshop to help K-12 teachers effectively engage their students in researching the water quality of the Great Lakes. "Great Lakes Student Research Campaign: Engaging Students and Teachers in Authentic Watershed Studies," funded by the University of Toledo, was taught in a hybrid model of local and virtual training and covered sites in Michigan’s Upper and Lower Peninsulas, Ohio, and New York. Participating teachers spent the week-long workshop conducting water quality observations of temperature, dissolved oxygen, transparency, pH, nitrates, phosphates, and macroinvertebrates. Data were entered on the GLOBE website.

Areas of Expertise: In-service professional development (limited), elementary GLOBE, pre-service teachers, GLOBE in undergraduate classrooms, STEM education research, educational technology.

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WYANE RESA

www.globe.gov/web/wayne-county-math-science-center-resa/home

The primary goals of the Wayne RESA Partnership are to train educators and promote the GLOBE program in Wayne County, Michigan and southeast Michigan and to coordinate NASA’s Science Mission Directorate’s AREN Project with the GLOBE program. The AREN Project introduces learners to novel NASA technologies including low-cost instrumented kite-borne platforms called Aeropods to conduct local-scale remote sensing missions and to collect remote in-situ measurements of atmospheric phenomena. AREN also introduces learners to instrumented remote controlled watercraft called ROVERs to conduct water quality investigations remote from shore.

In 2019 and 2020, the AREN project reached 18 states, one US territory, and three countries. The AREN Project team engaged with nearly 14,000 educators, citizen scientists, families, and adult learners through half-, full-, and multi-day events.

With other GLOBE partners, we participated in weekly US watercoolers, the GLOBE Midwest Earth System Science Collaborative and NASA Education Earth Science Projects including Mission Earth, the NASA Earth Science Education Collaborative, and Arctic and Earth SIGns at the University of Alaska.

The Wayne RESA GLOBE US Partner provides support for GLOBE schools that participate in the AREN Project. This support can be used toward the GLOBE International Virtual Science Symposium, Student Research Symposium, or the GLOBE Learning Expedition.

Cooperating Organizations and Funders: Wayne RESA, NASA

Areas of Expertise: In-service professional development, programming for students, elementary GLOBE, pre-service teachers, GLOBE in undergraduate classrooms, engineering, science research, citizen science, informal science.

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INFINITY SCIENCE CENTER

www.visitinfinity.com

INFINITY Science Center received a two-year NOAA BWET grant. As a part of the grant program, ten Mississippi Gulf Coast educators were selected through an application process. In a three-day professional development event in June 2020, the participants were trained in the atmosphere and hydrosphere protocols, use of both GLOBE data and NASA data programs, and classroom research planning. To complete the grant program, all teachers submitted their student research projects to the 2021 International Virtual Science Symposium. INFINITY Science Center continues to provide online and virtual support to the participants, holding Zoom teacher tag-ups to offer guidance and support in GLOBE data analysis and IVSS submissions.

**Funding:** NOAA BWET grant

**Cooperating Organizations:** NOAA

**Areas of Expertise:** In-service professional development, programming for students, elementary GLOBE, citizen science, informal science.

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**Partnership Team Member**
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In 2020, we submitted and revised the study “Teaching Beliefs and Practices of GLOBE Teachers” for publication (Lewis, Ali, & Herron). With the help of US GLOBE Partners, teachers across the nation responded to two questionnaires as part of Dr. Ali’s dissertation. We are eager to share the results with the GLOBE community. Dr. Herron also shared a presentation on “The Implementation and Development of a Summer Program to Help Make Nature Natural for African American Children” on the GLOBE website (nyurl.com/3zs27675) and pre-print on Research Gate. Dr. Herron continues to work with fellow partners in the Southeast Region to host the Student Research Symposium and encourage teachers to participate. Dr. Lewis was featured on NASA’s “Science Is Better Together: 2020 Community Cloud Challenge.” Dr. Buford continues to incorporate GLOBE into the biology methods course, in which pre-service teachers are trained in GLOBE protocols during field study and laboratory sessions. He also works with teachers to encourage GLOBE-based investigations for inclusion in the USM Region I Science and Engineering Fairs and provides numerous outreach events.

Cooperating Organizations: Center for Science and Mathematics Education.

Areas of Expertise: In-service professional development, programming for students, elementary GLOBE, pre-service teachers, education research, science research, citizen science, informal science.
The Leitzel Center New Hampshire GLOBE Partnership works to build a training team of GLOBE teachers and university scientists and graduate students. We work primarily with schools and teachers in New Hampshire, but trainings and support are available to schools in Vermont and Maine as well.

Among key activities this year, Jennifer Bourgeault led training at a two-day Collective Science and Student Stewardship Workshop in January on the topics of the carbon cycle and weather. The event was hosted by the Shelburne Farms GLOBE Partnership in Vermont. In spring and summer, we contributed to the Leitzel Center Resources for Teaching STEM Online document circulated to New Hampshire teachers and parents. In June, we participated in a virtual STEAM day at a local elementary school, highlighting GLOBE cloud activities. And in August, we joined the New England Regional Earth System Science (NERESS) Collaborative as part of the GLOBE and Earth System Science (ESS) Collaboratives initiative.

Cooperating Organizations: New Hampshire Project Learning Tree, Project WILD (New Hampshire Fish and Game), Project WET (New Hampshire Department of Environmental Services), the USDA Forest Service, and University of New Hampshire Cooperative Extension, www.facebook.com/BringingNHEETtoEducators

Areas of Expertise: In-service professional development, elementary GLOBE, education research, citizen science.

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The Institute for Earth Observations focuses on the correlation of data and imagery between ground observations and those form space. We developed the Space to Earth: Earth to Space Model (SEES) and instituted that approach in our research and Environmental STEM Center and 250-acre nature park. In January 2020, we began with our usual Cove Caterpillars, a pre-school class with about 50 children, and continued educational programs that in a normal year host more than 6,000 students. Our building and park typically have about 20,000 visitors a year, but when COVID 19 hit in March, both were closed (the building remains closed, the park reopened several weeks later). We created a special page called “GLOBE in the Park” after observing a large increase in park visitors after schools closed. We continue to work with GLOBE Mission Earth (GME) at Medford Memorial School with teacher Vicky Gorman. GME hosted an Earth Systems webinar featuring student projects conducted entirely at home in Spring 2020. This pilot program determined the quality of work during home instruction. We continue to work on incorporating satellites and remote sensing into our research. The A3Sat Project has advanced as a part of the GME Engineering project.

Activities also included the 2020 AMS Annual Meeting, work with the Burlington County Institute of Technology student intern, development of the A3Sat Project Earth System Student Webinar, a GLOBE TREES webinar, NSF grant proposals with Rowan College at Burlington County and Rowan University, establishment of the GLOBE Satellites and Education Team, establishment and incorporation of the New Jersey Presidential Awards for Excellence in Mathematics and Science Teaching Alumni, and creation of the Emerging Environmental STEM Professionals for high school students.

**Funding:** Burlington County Bridge Commission, Palmyra Cove Environmental Education Foundation (PCEEF), GLOBE Mission Earth.

**Areas of Expertise:** In-service professional development, programming for students, GLOBE in undergraduate classrooms, engineering, education research, science research, citizen science, informal science, outreach.

**News Stories:**
For a complete list of presentations and news stories, visit [www.globe.gov/web/palmyra-cove-nature-park/home/publications](http://www.globe.gov/web/palmyra-cove-nature-park/home/publications)


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NEW MEXICO PUBLIC EDUCATION DEPARTMENT

www.globe.gov/web/new-mexico-public-education-department/home/contact-info

Through GME, the Partnership supported five New Mexico schools in 2020. As a result of the COVOD-19 pandemic and the statewide switch to virtual learning, our GLOBE focus turned to STEM learning in the context of data literacy, including the collecting, organizing, visualizing, analyzing, interpreting and sharing of data. Dr. Wall, working with Tracy Ostrom at UC Berkeley, organized a series of online data literacy professional learning opportunities for New Mexico teachers.

Class sets of student toolkits for Atmosphere, Hydrosphere, and Biosphere protocols were made available to teachers in Fall 2020. The toolkits could be sent home with students at their school’s drop-off day. Subject Matter Experts from NASA Langley were included as guests in the Santa Fe Indian School Science Café in Fall 2020.

For a complete list of presentations, visit www.globe.gov/web/new-mexico-public-education-department/home/publications.

Funding: NASA Cooperative Agreement Notice, Fusing GLOBE with NASA Assets to Build Systemic Innovation in STEM Education 2.0.

Cooperating Organizations: In 2020, the Partnership collaborated with the WestEd/UC Berkeley GLOBE Partnership and the other GLOBE Mission Earth (GME) Partners including the University of Toledo, Boston University, and Tennessee State University. The New Mexico GLOBE Partnership works with several other organizations including the Pajarito Environmental Education Center and the New Mexico Wildlife Center.

News Story: Article by Dr. Wall in the Pajarito Environmental Education Center Nature News peecnature.org/new-mexico-spring-weather/.

Areas of Expertise: Supporting teachers and learners in gaining and practicing data literacy skills, creating and supporting opportunities for students to engage in GLOBE protocols and NASA assets, using the GLOBE Observer app to collect student data.

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The Institute’s main focus has been the infusion of GLOBE into classrooms across our region through our ongoing partnerships. The introduction of GLOBE into classrooms has been an outgrowth of the use of GLOBE in our pre-service teacher education program and having the trained pre-service teachers serve as ambassadors of GLOBE in classrooms across our region.

The focus during the 2020 academic year was the use of GLOBE in virtual/remote settings to address the New York State Science Learning Standards (NYSSLS). We had some moderate success using GLOBE Observer to give students a way to continue experiencing science research as scientists would. We expanded our Regional Climate Network, providing GLOBE schools with snow and frost-tube protocols. We continue to partner around our NOAA B-WET grants. Our 2019 NOAA B-WET grant studies water quality in the tributaries of Lake Erie and Lake Ontario. We partnered with GLOBE Mission Earth on a Great Lakes B-WET grant which expanded previous work by comparing sites around Lake Erie with sites from Ohio and Michigan. In summer 2021, we will partner with a Chesapeake Bay Watershed NOAA B-WET incorporating GLOBE protocols and geospatial technologies to assist GLOBE schools in studying the New York State portion of the Chesapeake Bay watershed. IRST involves more than 500 teachers from nearly 200 New York schools.

As we continue to support GLOBE teachers and classrooms, several schools are planning to use the Student Research Symposium model with a local SRS occurring on our campus prior to the IVSS and Regional SRS.

Cooperating Organization: State University of New York at Fredonia

Collaborators: GLOBE Mission Earth, AREN Project, GLOBE Teams Project, GLOBE Satellites and Education Team (G-SET), Dataspire Project, NOAA B-WET.

Areas of Expertise: In-service professional development, elementary GLOBE, pre-service teachers, GLOBE in undergraduate classrooms, engineering, education research, citizen science.

For a complete list of presentations, visit www.globe.gov/web/institute-for-research-in-science-teaching/home/publications

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ELIZABETH CITY STATE UNIVERSITY GLOBE TRAINING SITE

nia.ecsu.edu/globe/

The ECSU site focuses on the teaching and enhanced learning of hydrology and atmospheric protocols. The collaborative partners include IEEE Geoscience and Remote Sensing Society (GRSS), Langley Research Center’s GLOBE Office, and ECSU’s GRSS Chapter. Chapter representatives are actively involved in the organization of GLOBE teacher training events locally and at GRSS annual conferences.

ECSU organized a virtual training session covering atmosphere, biosphere, hydrosphere, and pedosphere for educators in grades 6-12 and informal educators, July 17-18, 2020. Participants were certified as GLOBE-trained teachers upon the completion of both the e-protocol training and in-person (virtual) training. All participants earned IEEE professional development units. Garry Harris, GLOBE Southeast Partner Forum member, and Dr. Linda Hayden, ECSU GLOBE Director, presented during the webinars. Tracy Ostrom, GLOBE Master Trainer in Atmosphere/Biosphere, and Wanda Hathaway, GLOBE Master Trainer in Hydrosphere/Pedosphere, led the training over the two-day training event.

For a list of 2020 publications and presentations visit www.globe.gov/web/elizabeth-city-state-university2/home/publications.

Cooperating Organization: Center of Excellence in Remote Sensing Education and Research (CERSER)

Funding: IEEE-Geoscience and Remote Sensing Society (GRSS Education Committee)

Areas of Expertise: In-service professional development, programming for students, pre-service teachers.

News Stories: GLOBE Virtual Workshop for Teachers, July 17-18, 2020, nia.ecsu.edu/globe/events/200717globe/

Dr. Linda Bailey Hayden, GLOBE partner at Elizabeth City State University, expands the reach of GLOBE to Pacific Islander teachers through a two-day virtual conference, www.globe.gov/web/united-states-of-america/home/news/newsdetail/14718/enabling-our-pacific-islander-teachers-on-the-island-of-hawaii-to-advance-sustainability-through-earth-science

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The GLOBE Bowling Green State University (BGSU) Partnership engaged in teacher professional development, undergraduate student research, and collaborative federal grant development activities to promote GLOBE in the region and beyond.

Our GLOBE partnership works with the Toledo Public School’s ANSAT program (Aerospace & Natural Science Academy of Toledo). Teachers mentor high school student research projects which are presented locally and at the BGSU-sponsored Ohio Junior Science and Humanities Symposium (OJSHS). We provide professional development and GLOBE mentoring to these teachers and students. We support and encourage our students to present GLOBE-related projects at the next Midwestern GLOBE Student Research Symposium or IVSS. BGSU’s Science and Math in ACTION Program is a Choose Ohio First-funded endeavor that prepares middle and high school math and science teachers to excel in best practice instruction. First-year students participate in a three-week summer bridge program with GLOBE as the inquiry in learning mini-course, conducting and presenting a research project focusing on urban heat islands and GLOBE surface and air temperatures. This summer, the ACTION GLOBE projects were completed collaboratively and virtually, with students collecting GLOBE clouds, surface, and air temperature data remotely. The projects were excellent, showing that GLOBE can be done in the COVID remote learning environment. During this upcoming academic year, eight first-year students will complete a research project comparing the air and surface temperatures of campus parking lots (both new and old) and the plantings surrounding the lots. We are also writing a campus sustainability grant to add a native pollinator garden to one of the hottest parking lots on campus.

BGSU faculty engaged in collaborative grant-writing activities, submitting a Department of Education SEED grant entitled Project Prairie Plus (submitted June 2020, not received). The BGSU GLOBE team partnered with the Toledo Zoo and Aquarium and several local school districts. Project Prairie Plus will advance science learning by engaging citizen scientists (grades K-8) in monitoring critical environmental conditions contributing to the health of local school prairies. GLOBE atmosphere, land cover, soil, and hydrology protocols will be employed in the project’s science learning programs. We will re-submit this application to another agency in the near future.

Funding: Choose Ohio First (Science and Math in ACTION Program)

Cooperating Organizations: Xcite Learning


Areas of Expertise: In-service professional development, programming for students, elementary GLOBE, pre-service teachers, GLOBE in undergraduate classrooms

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The Nuhop Center for Experiential Learning works in cooperation with GLOBE Mission Earth and St. Peter’s Elementary School (Mansfield, Ohio) to provide GLOBE training workshops to educators in the greater Richland County area. In 2020, our partnership adapted to the challenges of the COVID pandemic by hosting one of the first virtual/hybrid GLOBE trainings, the 2020 Elementary GLOBE Summer Institute. GLOBE teachers from 2019 returned for additional training in Elementary GLOBE and aerosols. Participants met in-person with PPE and socially distanced, in the field for two mornings to experience hands-on training and resumed training for the remainder of the week via Zoom conferencing. Virtual training included sessions with subject matter experts and focused on using online platforms including Google Classroom and My NASA Data. St. Peter’s Elementary was equipped with a Purple Air air quality sensor in 2020 for use in student investigations of aerosols and has been used by middle school students in their investigations during the 2020-21 school year.

The Google Classroom training environment remains active for participating teachers and trainers to post resources and comments and seek advice from others in the classroom. Several of the past and present participating teachers lead their students in data collection for the GLOBE Mission Earth campaign.

**Cooperating Organizations:** GLOBE Mission Earth, St. Peter’s Elementary School

**Areas of Expertise:** In-service professional development, programming for students, elementary GLOBE, citizen science, informal science.

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The University of Toledo (UT) has engaged more than 470 schools and organizations throughout its history of work with GLOBE. Students from a total of 30 schools entered 6,000 observations in the 2019-2020 school year. GLOBE Mission EARTH (GME) is a collaborative of institutions whose mission is to increase involvement in the GLOBE program.

Twenty GME-UT students presented 10 research projects at the 2020 IVSS. Due to COVID-19, the Student Research Symposia were virtual. In this region’s SRS, 19 students presented nine projects. Fifty students presented eight projects at the GME SATELLITES Student Research Conference. In July 2020, 10 students presented four projects at the virtual GLOBE Annual meeting.

In the summer of 2020, UT joined with GLOBE Partner Susan James in Mansfield, OH to train teachers in Elementary GLOBE Clouds and Aerosols. UT received additional funding from NOAA B-WET for a second year to expand its collaboration in the Great Lakes Region. For the second year, GME-UT produced webinars related to water quality issues in the Great Lakes region. UT, along with Dr. Notaro (University of Wisconsin-Madison) and David Bydlowski (Wayne RESA) lead the efforts of the GLOBE Midwest Collaborative in Earth System Science.

Funding: Cooperative Agreement Notice (CAN) #: NNX16AC54A & NOAA Bay Watershed Education and Training (B-WET) # NA20NOS4290013.

Cooperating Organizations: The University of Toledo, Ohio; WestEd/University of California Berkeley, California; Boston University, Massachusetts; Tennessee State University, Tennessee; NASA Langley Research Center, Virginia; Institute for Earth Observations at Palmyra Cove, New Jersey; The Nuhop Center for Experiential Learning, Ohio; State of New Mexico; Defiance College; Northern Michigan University; State University of New York (SUNY)-Fredonia.

Areas of Expertise: Pre-service, in-service, elementary GLOBE, STEM in GLOBE, GLOBE in undergraduate /graduate classrooms, engineering, science Research, citizen science.

Presentations and other resources: STEM for All Video Showcase: GLOBE Mission EARTH: Inspiring tomorrow’s STEM Professionals, https://videohall.com/p/1762

News Stories: UT prof leads NASA-funded, environmental education program

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U.S. GLOBE WEEKLY WATERCOOLERS

The U.S. GLOBE monthly Watercoolers, virtual learning opportunities for GLOBE teachers and Partners, went to a weekly schedule in 2020 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. There were 32 Watercoolers held in 2020 with presentations by community members and discussions around virtual learning. Over 110 unique users attended the Watercoolers, which average 18 participants a week. Topics included:

- My NASA Data
- WeatherSTEM and GLOBE in the classroom
- GLOBE Diversity, Equity and Inclusion (DEI)
- Data literacy in the classroom
- Focal students as a tool for reflection and planning
- Hybrid professional development

All past Watercoolers can be viewed from the U.S. GLOBE Watercooler YouTube Playlist.

STUDENT RESEARCH SYMPOSIA (SRS)

In the spring of 2020, the SRS leadership team decided to cancel the 2020 Student Research Symposia due to the COVID-19 pandemic. Instead, the team developed a virtual discussion board on the GLOBE website where teams could post their investigations to be reviewed by experts. This preserved the student/reviewer interchange that participants value.

There were 31 projects submitted representing 12 schools from eight states, 12 teachers, and 63 students. Almost half of those projects were also submitted to the International Virtual Science Symposium earlier in the spring.

The SRS leadership recruited STEM professionals to review student projects through the GLOBE Partnership listserv and their own networks. The 32 STEM professional reviewers included PhD, Masters students, and faculty from the University of New Hampshire, USDA Forest Service scientists, and faculty and graduate students from GLOBE Partnership institutions.

Read the full 2020 SRS story here! 2020 SRS Projects can be viewed by going to the GLOBE Student Research Reports page, and Filtering by the Year 2020, and “U.S. Student Research Symposia (SRS)”.

There were three Student Research Symposia videos produced to support future recruitment of student and teacher teams. Two of the films are experience films from the Southwest and Northeast & Mid-Atlantic SRS and one highlights the impacts of the events overall. The film from the Northeast & Mid-Atlantic was entered into the STEM for All Showcase in May 2020 where a robust discussion developed about the events.

VIEW THE FILMS HERE:
SRS Impact Film: https://youtu.be/YZWzGgMQ7Mw
Northeast/Mid-Atlantic Experience Film: https://youtu.be/Pe_iHivKArc
Southwest Experience Film: https://youtu.be/V8lzsFyJErw

FALL NORTH AMERICAN REGIONAL MEETING:

The GLOBE Implementation Office (GIO) held the North American Regional Meeting (NARM) 100% virtually this year from 19 – 22 October 2020. Partners, sponsors, Regional Coordination Offices, and GIO staff from across the United States and Canada registered for this event – 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. Responses to the event have been extremely positive! Attendees noted their appreciation for the carefully planned agenda, relevant topics on the theme of data literacy, and excellent speakers who presented at the event.
GLOBE was an important resource in helping the South Dakota Discovery Center pivot to more virtual offerings in 2020. In the early days of the pandemic, we offered daily live streams called “Be an Explorer” with GLOBE and other resources to help us explore our backyards. One daycare that watched every day said that the children, even the toddlers, ran to the window when it was time to make cloud observations.

GLOBE is normally an anchor in our summer professional development and this year was not an exception. We piloted a remote field session for teachers to create place-based data using iNaturalist and GLOBE for their students to explore how energy moves through organisms, how land and water interact, and how to observe change over time using GLOBE protocols. This was an ambitious project that we are going to tailor downwards, focusing just on change over time.

Finally, GLOBE helped us bring our water festival online. We facilitate two activities to learn about water using both Discoveries at Willow Creek and All About Earth. GLOBE made 2020 a better year for all of us.

The Partnership continues to support teachers by providing mini-grants to purchase supplies so their students can do research.

**Funding:** 319 Information and Education Project, funding from the US EPA Region 8 via the South Dakota Department of Environment and Natural Resources

**Areas of Expertise:** In-service professional development, programming for students, elementary GLOBE, citizen science.

**Partnership Coordinator**
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THE UNIVERSITY OF TENNESSEE AT CHATTANOOGA

www.globe.gov/web/university-of-tennessee-at-chattanooga-partner

Funding: Tennessee Space Grant Consortium

Areas of Expertise: In-service professional development, elementary GLOBE, pre-service teachers, education research, mathematics education, science education.

Publications: www.globe.gov/web/university-of-tennessee-at-chattanooga-partner/home/publications

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The primary activity of the Texas STEM Coalition is working with schools statewide to expand student research and project-based learning. Each year, the Texas STEM Coalition hosts the annual Texas STEM Conference and GLOBE-related sessions were highlighted and well-attended. In 2020, the coalition was the lead partner for the upcoming Southwest Student Research Symposium that was to be held in Austin. That activity is on hold due to the pandemic. T-STEM is supporting schools in ESC Region 13 in submitting projects to upcoming Student Research Symposia.

**Funding:** Self-supported.

**Cooperating Organizations:** University of Texas Medical Branch, Galveston, Texas; University of Texas at Tyler, Ingenuity Center; University of Texas at Austin, UTeach Institute; Educational Service Center Region 13, STEM Center, Austin, Texas; Educational Service Center Region 1, STEM Center, Edinburg, Texas.

**Areas of Expertise:** In-service professional development, elementary GLOBE.


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UNIVERSITY OF TEXAS AT TYLER GLOBE PARTNERSHIP

www.uttyler.edu/globe/

The University of Texas at Tyler Partnership supports the GLOBE program in East Texas. The partnership focuses on the following activities: GLOBE training for preservice teachers—one workshop per semester; GLOBE training for in-service teachers—on request; Student Research Symposium (SRS) support for schools—annually; professional development programs at conferences; technical assistance for GLOBE schools across Texas; planning for the Southwest Student Research Symposium.

The partnership provides two preservice workshops a year. In-service workshops are offered at the request of school districts. The partnership supports GLOBE activities at the three UT Tyler University Academy laboratory schools located in East Texas. It has supported teachers and students at the UT Tyler University Academies in Longview, Tyler, and Palestine to attend the annual Southwest SRS and provided technical assistance and mentoring. We were scheduled to Co-Host Southwest Student Research Symposium, which was postponed due to COVID. The partnership continues to engage in international collaborations between East Texas Schools and Schools in Argentina and Peru.

For a complete list of presentations and publications, please visit www.globe.gov/web/the-university-of-texas-at-tyler/home/publications.

Funding: Roosth Endowment, University of Texas at Tyler.

Cooperating Organizations: University of Texas at Tyler, Ingenuity Center at UT Tyler, UT Tyler University Academy-Tyler, UT Tyler University Academy–Palestine, UT Tyler University Academy-Longview.

Areas of Expertise: In-service professional development, pre-service teacher development, GLOBE in undergraduate classrooms, GLOBE in language classrooms—content-based language learning through STEM; elementary GLOBE, education research.

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At the start of 2020, we launched into our first GLOBE gathering and had a fun and productive two-day Collective Science and Student Stewardship Workshop on the Carbon Cycle and Weather. We were fortunate to have funding from the New Hampshire Charitable Foundation's Wellborn Ecology Fund to support this work and the wonderful expertise of Jen Bourgeault (UNH, U.S. GLOBE Country Coordinator) and Alicia Carlson (UNH extension).

Like so many others, we had to re-think our professional development offerings in 2020. After a strong start to our GLOBE program in January, we needed to cancel the rest of our 2020 in-person workshops. However, with the support of our organizational and school partners, we were able to collaboratively figure out how to reorient and re-organize ourselves to work through some of the pandemic's challenges and re-consider what mattered most for our students during this time of crisis.

Like so many others, we focused on student and teacher mental health; building community, especially with those in marginalized situations; sharing new online technologies and pedagogical strategies; and connecting students with place. We conducted a series of workshops Taking eLearning Outside and published School's Outdoors: Place-based Education (PBE) Responds to COVID-19 and Beyond and The Five Vow(e)ls of Learning Outside the Classroom to help teachers get students outside, in healthy spaces, and connecting with their environment, even if the students are learning remotely.

This work helped to set us up for our next series of GLOBE workshops, starting on March 3, 2021. They will include both online and in-person sessions. In-person sessions, which include practicing the Carbon Cycle protocols and a Climate Change Interpretation Hike, will be conducted at Marsh-Billings-Rockefeller National Historical Park which has one of the longest running forest management programs in the country. The in-person session will also be capped at 11 people and will abide by COVID-19 safety protocols.

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Kerri McAllister
In response to the COVID pandemic, the NASA Langley team pivoted to virtual resources and connections for families and educators, connecting with formal and informal GLOBE audiences of all ages. With the GLOBE Cloud Family Guide, families were given tools to aid in the discovery and observation of clouds using journal prompts, guiding questions with answers, NASA scientist connections, and videos demonstrating hands-on, home-based GLOBE learning activities. Members of our team participated as SMEs for panel discussions, classroom connections, science cafes, educator professional development, and camp interview experiences. To provide both synchronous and asynchronous learning, our team offered live connections and pre-recorded connections. Two in-person GLOBE Cloud trainings with school districts were shifted to a virtual platform using eTraining modules in a hybrid training format. The GLOBE Goes to Camp Pilot continued to be a resource for summer camps sharing GLOBE Clouds, Trees, Air Quality, and Surface Temperature learning experiences.

Other 2020 activities included: a GLOBE Citizen Science presentation during the American Camp Association Conference; elementary GLOBE training for the Ohio State Department of Education; GLOBE cloud presentations for South Carolina and Florida teachers, the CERES meeting, and first graders in Los Angeles, California; an SME connection with first graders in Kansas, a GLOBE Citizen Science presentation to the Girl Scout Council of Greater New York; “Mapping Your GLOBE Data with ESRI ArcGIS” for the GLOBE International Virtual Science Symposium; and GLOBE Training for Portsmouth school district.

Funding: NASA

Cooperating Organizations: GLOBE Mission Earth, NESEC

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UNIVERSITY OF WISCONSIN - MADISON

The Wisconsin GLOBE partners’ three-year project supported by the Baldwin Foundation has been extended through December of 2021 to accommodate pandemic related challenges to working directly with schools. The August 2018 GLOBE training workshop in Butternut, Wisconsin encompassed all basic GLOBE protocols and enabled the school’s participation in the NSF-sponsored CHEESEHEAD research project in Summer 2019 through Spring 2021. Despite schools going on-line across the state in spring of 2020, the GLOBE trained Butternut K-12 students and their teachers were able to continue to collect atmospheric and phenology data throughout the spring and fall 2020 semesters (online) as well as spring of 2021.

In the third year of the Baldwin Project, which is now planned for summer and/or fall of 2021, the Wisconsin GLOBE partners will train teachers in Door County Wisconsin.

Other activities include a NASA Citizen Scientist proposal (December 2020) to monitor Great Lakes snowfall and a proposal to NSF (January 2021) to support GLOBE training for educators and community members in Beloit, Wisconsin in partnership with Beloit College, the Beloit Unified School District, and the Welty Environmental Center.

The Wisconsin GLOBE team received media attention in 2019 from Door County Pulse (“Taking GLOBE to Wisconsin classrooms”) and the Nelson Institute In Common Newsletter (“Baldwin grant: UW-Madison Baldwin Wisconsin Idea Endowment brings climate change research to communities and classrooms across the state”.

The Midwest GLOBE collaborative is planning a virtual Student Research Symposium for May 2021.

Funding: Ira and Ineva Baldwin Foundation (Wisconsin Ideas Program); National Science Foundation CHEESEHEAD (Chequamegon Heterogeneous Ecosystem Energy-balance Study Enabled by a High-density Extensive Array of Detectors) Project; the Baldwin Foundation.

Cooperating Organizations: Nelson Institute for Environmental Studies, Center for Climatic Research, University of Wisconsin-Madison; Midwest GLOBE Collaborative.

Areas of Expertise: In-service professional development, science research, citizen science, informal science.

Presentations: For a full list of Presentations, visit www.globe.gov/web/space-science-and-engineering-center/home/publications.

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SCIENCE ACTION CLUB

calacademy.org/sac

Designed for youth in grades 5–8, Science Action Club (SAC) is a global out-of-school time program that inspires youth to explore and connect with nature while achieving essential science, technology, engineering, and math (STEM) learning goals. Through dynamic curricula that integrate high-energy games and hands-on activities with citizen science investigations, the program ignites curiosity, fosters workforce development skills, and builds STEM identity among the next generation of environmental stewards, in-person or virtually.

SAC’s Cloud Quest unit explores the impact of clouds on weather and climate. Through games and projects, youth investigate local sky conditions, document their discoveries with GLOBE Observer, explore environmental issues, and design strategies to protect our planet. From Anchorage, Alaska, to A Coruña, Spain, more than 63,000 children and educators have participated in SAC since 2011.

SAC features high quality staff training and science kits that make it easy for out-of-school time educators to lead citizen science experiences with confidence and skill. Each kit includes: 12 activities and bonus resources for 60-90 minute club sessions, science tools and supplies for 20 youth in grades 5-8 for various learning environments, interactive, self-paced, online training for program staff members, and options for customized trainings.

Science Action Club is committed to providing equitable access to high-quality science and nature learning experiences for all youth. Our pay-what-you-can pricing model ensures that organizations of all sizes and budgets can use SAC to inspire curiosity and build STEM identity.

**Funding:** Pisces Foundation, Simons Foundation

**Cooperating Organizations:** California School-Age Consortium

**Areas of Expertise:** In-service professional development, programming for students, citizen science, informal science.

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GLOBE AND EARTH SYSTEM SCIENCE (ESS) COLLABORATIVES

Purpose
In early 2020, teams of Earth System Science (ESS) Providers and GLOBE partners were recruited to develop and implement a plan for sustaining collaboratives in each of the six GLOBE regions with the potential for one or more teams to cross these regions. This work is based on a model from Colorado which has an Earth System Science Collaborative Network that brings together a variety of stakeholders from different sectors that work together to benefit ESS in Colorado. Six additional collaboratives were formed in the following regions: California, the Midwest, New York, New England, and two cross-regional teams in the Southeast.

Who Makes up the Collaborative Teams?
- Formal and informal providers in Earth System Science (ESS) from:
  - K-12 schools
  - Community colleges
  - Universities
  - Minority serving institutions
  - Informal science learning centers
  - Nonprofit education organizations
  - Regional GLOBE representative
  - Active GLOBE Partners in a region

For more information, please see the GLOBE ESS Webpage: https://www.globe.gov/web/united-states-of-america/home/ess-collaborative

The GLOBE ESS Collaborative project is supported by the National Science Foundation, Division of Atmospheric and Geospace Sciences (AGS), # 2011518
CA STRONG ESS COLLABORATIVE

www.globe.gov/es/web/united-states-of-america/home/ess-collaborative/pacificteam

The CA Strong collaborative work includes:

- Working together to host the 2021 GLOBE+ Virtual Student Symposium. The symposium will provide a venue for students to present their projects to STEM professionals.
- The Elkhorn Slough National Estuarine Research Reserve (NERR) is working with the SF Bay NERR to initiate teacher outreach programs and GLOBE training.
- The LAUSD OOEE is reaching out the CA Strong collaborative on locations and themes for student videos or “field trips” on unique outdoor experiences. The OOEE is also contacting its network of teachers to participate in the G+VSS and receive GLOBE training from NASA JPL, Elkhorn Slough NERR or WestEd/UCB GLOBE partnerships.
- The Solar System Ambassadors are working with WestEd/UC Berkeley to provide subject matter experts to virtual classrooms.


Cooperating Organization: The Earth System Science Collaborative, CA Strong, is a collection of GLOBE partnerships and public organizations that focus on research and student engagement in science. Members of the collaborative are:

- National Aeronautics Space Agency Jet Propulsion Labs (NASA JPL) of Pasadena, CA (includes Solar System Ambassadors)
- Los Angeles Unified School District Office of Outdoor Environmental Education of Los Angeles, CA
- Elkhorn Slough National Estuarine Research Reserve (NERR), Watsonville, CA
- San Francisco Bay NERR, San Francisco, CA
- WestEd/UC Berkeley of Alameda, CA. (a GLOBE partnership since 2011)

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GLOBE MIDWEST EARTH SYSTEM SCIENCE (ESS) COLLABORATIVE

www.globe.gov/web/united-states-of-america/home/ess-collaborative/midwest-team

Our vision is to expand and strengthen GLOBE interactions among citizens and schools/districts in the Midwest United States. Our organization provides opportunities for team-based, student-led GLOBE based scientific research projects and collaborative events; provides a regional focus that fosters multi-school/locale interactions, increases the number/participation of GLOBE schools, teachers, citizens, and partnerships; and increases the input of quality GLOBE data.

**Funding:** NASA, Baldwin Wisconsin Idea Endowment Grant, YLACES.

**Cooperating Organizations:** GLOBE, Mission EARTH, AREN Project, University of Toledo, University of Wisconsin – Madison, Wayne RESA.

**Areas of Expertise:** In-service professional development, programming for students.

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The members of the New England Regional Earth Systems Science (NERESS) Collaborative are dedicated to supporting environmental stewardship through science education in schools and universities, and through promotion of science citizenship in urban and rural communities. This group places extra focus on the vitally important area of climate change. As a working group, NERESS will draw upon science education materials and subject matter experts from GLOBE, NASA, NOAA, and other federal and state agencies, such as the U.S. Forestry and Parks Service. We provide the science resources for students, teachers, and citizens of all ages. Specifically, we support science education and science citizenship in communities of low economic standing to support their efforts in correcting systemic environmental inequities.

Our objectives are: share resources between the founding members of NERESS; incorporate and adapt GLOBE, NASA, NOAA, and other science and science education resources in an increased number of school districts and informal science education venues; and support community action by students and citizens in communities that are predominantly of low socioeconomic status to advocate for positive changes in the quality of their environment.

As a collaborative, we will recruit and welcome all regional organizations to assist us in our planning and outreach.

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NEW YORK STATE ESS COLLABORATIVE

https://www.globe.gov/web/united-states-of-america/home/ess-collaborative/mid-atlantic-team

The NYS ESS Collaborative develops a regional approach to the integration of ESS in partnership with Dr. Michael Jabot, US GLOBE Partner at the State University of New York at Fredonia in the Institute for Research in Science Teaching.

Dr. Janell Rey is the Director of Workplace Development for the E2CC BOCES. These regional programs across Western New York State focus on career and technical education as well as early high school/college programs with pathways. Her work encompasses adult education programs preparing students to enter the workforce or upgrade their professional skills.

Mary Ronan is an environmental educator for the New York State Department of Environmental Conservation at Reinstein Woods Nature Preserve in Depew, New York. Mary assists educators in implementing classroom programming and stewardship projects to support environmental education programs with special focus on meaningful watershed educational experience. Through this program, participants receive extensive professional development in watershed education using GLOBE protocols.

Dr. David Henry is Professor of Education at Buffalo State College and is the regional director of the New York State Master Teacher Program. This program oversees the professional development of STEM Master Teachers across Western New York and supports the expansion of professional development of teachers using the incredible talent of the Master Teacher network.
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