



EarthScope
Consortium

ANNUAL REPORT 2024



Statement from Board Chair and CEO

In 2024, the EarthScope Consortium is realizing the potential of an integrated geophysics organization, with new opportunities for collaboration, synergy, and innovation afforded by our increasingly integrated staff and scope of work. We have navigated most of the concrete challenges of a corporate merger, implementing many new business systems, policies, and practices. We have also, sadly, bid farewell to some of the amazing leaders who got EarthScope through our formation and early days.

Our focus this year has been on transitioning systems without interrupting our services and on building a new organizational culture that spans historical silos and divides. We have moved both the NSF SAGE and NSF GAGE data archives onto the cloud; added new data tracking, visualization, and product capabilities; and initiated global partnerships to explore data federations and establish technical best practices. We have completed an initial design effort for scalable, modular, sensor-agnostic power and communication systems for our instrument networks, and started cross-training engineers on seismic and geodetic hardware. We have integrated our internship and training programs to serve a wider range of facility users, and kicked off support for cloud access and training. We have developed new sources of revenue by working with commercial companies and expanding programs for state and federal agencies.

All this change has been simultaneously challenging and inspiring. We believe it has strengthened our organization and has prepared us to offer new capabilities and new services in the next generation of integrated geophysics support.

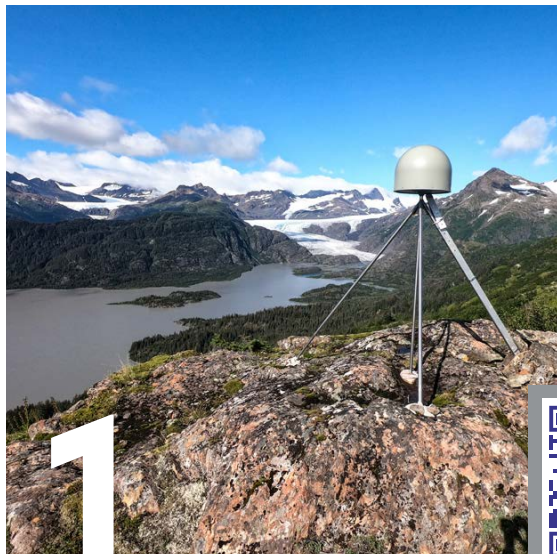
You are all a foundational part of change and improvement! Thanks for your support, perspective, tough questions, and fantastic ideas throughout the past year and in years to come.

With hope and excitement for the future,

— Gareth Funning, Board Chair, and Becks Bendick, Chief Executive Officer



Highlights



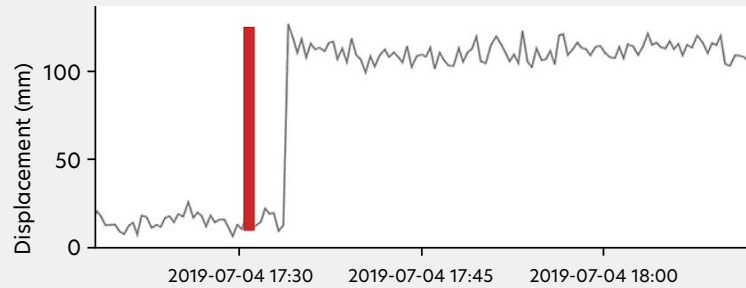
A license structure for users accessing GNSS data for commercial purposes (charging for positions or derived data products) was rolled out during the summer. This structure clearly maintains free and open access for academic, educational, or humanitarian use. The commercial license program provides additional resources to put toward equipment upgrades and other improvements to further our science support mission.



FIND OUT MORE

Summer internship programs served 31 participants, between the EarthScope Student Career Internship Program, Geo-Launchpad, and RESESS. Last year's URISSE internship program (formerly the IRIS REU program) was merged into RESESS this year, consolidating two similar programs.





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A long-running project to integrate GNSS stations into the ShakeAlert Earthquake Early Warning System crossed the finish line in spring, when the United States Geological Survey (USGS) completed testing and added the geodetic algorithm to the operational system. EarthScope is managing the flow of GNSS data into ShakeAlert with all-new cloud architecture—an early milestone for the cloud lift effort.

During the largest, most destructive earthquakes, seismometers near the epicenter can saturate. This can add delay to accurate estimates of the earthquake's magnitude. While GPS sensors aren't useful for earthquakes that are too small or too distant, they don't saturate during large earthquakes. GPS sensors just move farther, providing an immediate indication of the earthquake's magnitude. This provides critical information for delivering alerts to areas estimated to experience strong shaking as quickly as possible.



In previous work supported by the USGS, several stations were added to the Network of the Americas to fill in coverage gaps along the Oregon coast for Cascadia subduction zone earthquakes. Additionally, more than 180 stations in the network received upgrades, including improved telemetry and multi-constellation GNSS receivers with onboard Precise Point Positioning corrections, reducing noise in the data and enhancing the ability to measure earthquake displacement in real time. All these instruments are now contributing to the ShakeAlert system.



In June, the Magnetotelluric Array completed its last deployment—a site in Louisiana—successfully filling in the last blank spot in the contiguous United States after 18 years of painting a magnetotelluric picture of the United States from the West Coast to the East Coast. *Photo courtesy Ellen Green/Green Geophysics*



FIND OUT MORE

EarthScope signed a memorandum of understanding with Australia's AuScope and the European Plate Observing System (EPOS) establishing an international collaboration of similar geoscience support organizations. This partnership will facilitate the sharing of information related to technical solutions, effective community support strategies, progress toward interoperability of data systems, and more—all in service of enabling open science.



AuScope



EarthScope
Consortium

EPOS
EUROPEAN PLATE OBSERVING SYSTEM



FIND OUT MORE

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In the past, the NSF SAGE facility award has included subawards to several institutions for defined aspects of the scope of work. At the start of October, two subawards transitioned into EarthScope direct operations, with subaward staff becoming EarthScope employees. This included the Project IDA program at the University of California San Diego, which supported the Global Seismographic Network, and the Seismic Source Facility program at the University of Texas at El Paso.

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A new Cloud On-Ramp project aims to support the community in taking advantage of new data system capabilities as they become available. A series of articles and videos began introducing cloud computing concepts and highlighting community research that illustrates the kind of workflows a fully cloud-optimized data archive will be able to empower.

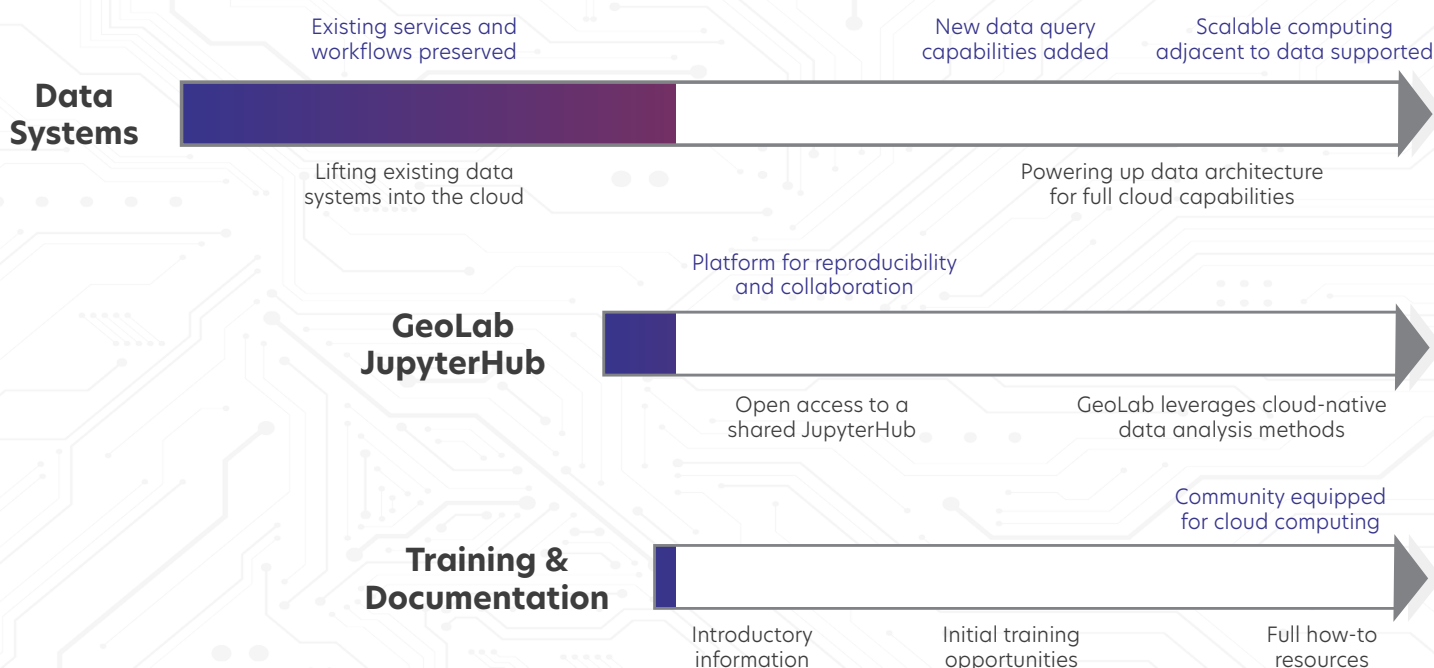
Initial development of the GeoLab notebook hub resulted in a successful pilot demonstration when it was used for the first time by a short course in July. Participants in the MsPASS short course were able to simply log in and run notebooks supplied by the course instructors, eliminating the need for tedious software setup and troubleshooting on each computer. GeoLab will also provide a simple community platform to begin taking advantage of more powerful data processing capabilities.



FIND OUT MORE

This project can be visualized as a set of parallel progress bars, with work occurring on cloud data systems at the same time as resources are being developed to help the community get the most out of those improved systems. New tools are loading!

CLOUD ON-RAMP CONSTRUCTION



7,495

Seismic, GPS, and MT sensors supplied
for 125 PI experiments

498

NOTA engineer field
maintenance visits

By the Numbers

October 2023–September 2024

>1,600

Technical course and
workshop participants

>3.6 million

YouTube and TikTok
video views

>215 terabytes

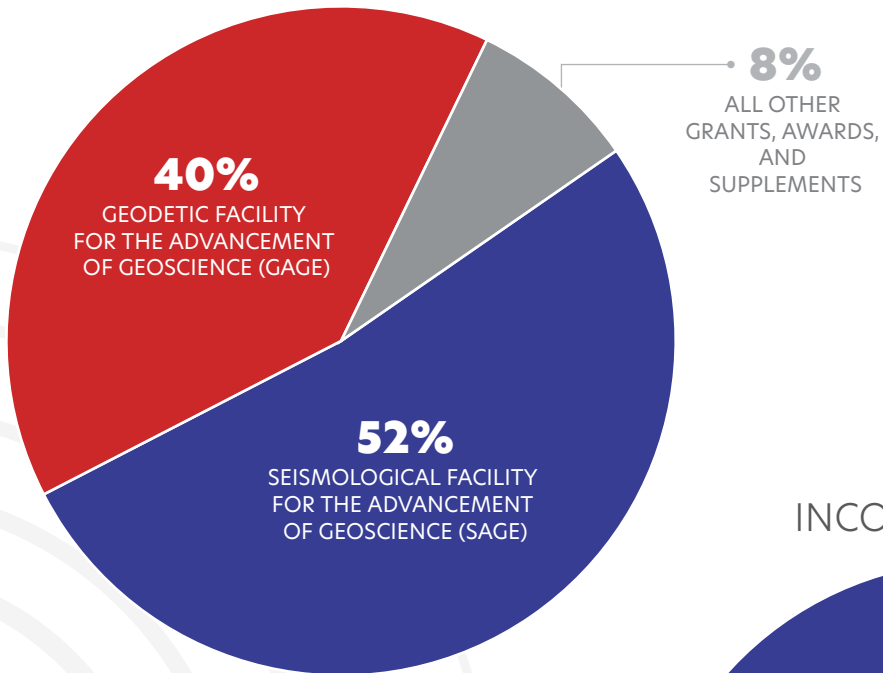
New geophysical data archived

58

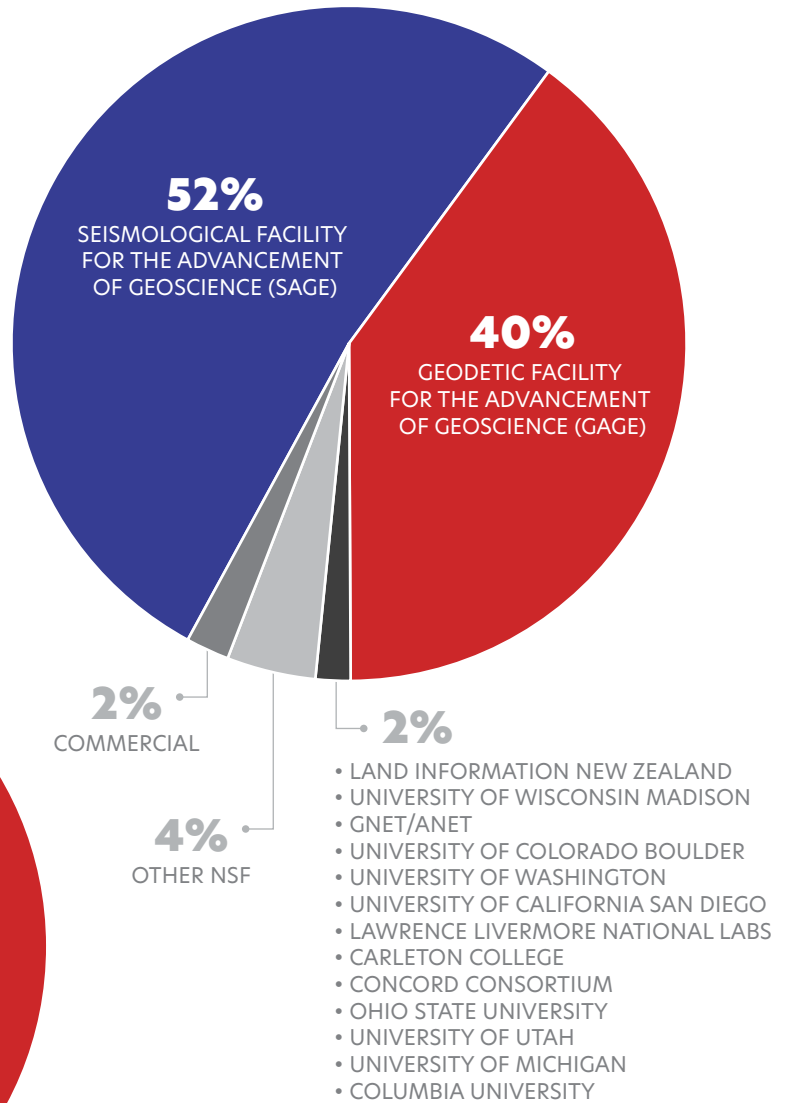
New staff onboard

Financials

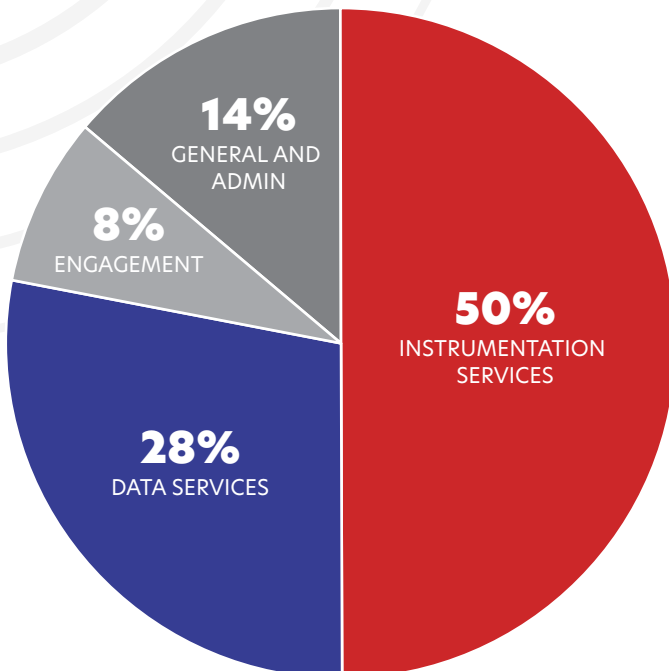
INCOME BY AWARD



INCOME BY SOURCE



EXPENDITURES BY PURPOSE





2,564

**VOLUNTEER
HOURS**

Members of the Board and Advisory Committees volunteered a combined 2,564 hours of their time meeting between October 2023 and September 2024.

Community Contributions

Please consider volunteering for the Board or Advisory Committees to serve as a liaison to the EarthScope and the NSF GAGE and SAGE facility user community. Visit our website for nomination information.

EarthScope Board of Directors

Gareth Funning (Chair), University of California, Riverside
Beatrice Magnani (Vice Chair), Southern Methodist University
Paul Winberry (Treasurer), Central Washington University
Zachary Eilon (Secretary), University of California, Santa Barbara
Lara Wagner (Chair Emeritus), Carnegie Institution for Science
Ruth Aronoff, Furman University
Kristel Chanard, Institut de Physique du Globe de Paris
Colleen Dalton, Brown University
Paul Lundgren, Jet Propulsion Laboratory/Caltech
Andrew Newman, Georgia Tech
Frederik Simons, Princeton University
Tonie van Dam, University of Utah

Advisory Committees

INTEGRATION AND INNOVATION ADVISORY COMMITTEE

The IIAC investigates possible new strategic opportunities for EarthScope Consortium on topics such as emerging applications and technologies, leading practices in science support, and/or new or major revenue source.

Marine Denolle (Chair), University of Washington

Rick Aster, Colorado State University

Roland Burgmann, University of California, Berkeley

Chunli Dai, University of Florida

Ronni Grapenthin, University of Alaska Fairbanks

Heiner Igel, Ludwig-Maximilians-Universität München

Harriet Lau, Brown University

Nate Lindsey, FiberSense

Eileen Martin, Colorado School of Mines

Kristel Chanard (Board Liaison), Institut de Physique du Globe de Paris

DATA PRODUCTS AND SERVICES ADVISORY COMMITTEE

The DPSAC advises on data and metadata distribution, standards, and quality for all geophysical data and data products in EarthScope Consortium's Data Services.

Angelyn Moore (Chair), Jet Propulsion Laboratory/Caltech

Brendan Crowell, Ohio State University

Frossie Economou, LSST (Vera C Rubin Observatory)

Mike Floyd, Massachusetts Institute of Technology

Noel Jackson, University of Kansas

Ved Lekić, University of Maryland

Eric Lindsey, University of New Mexico

Natalia Ruppert, Alaska Earthquake Center, University of Alaska Fairbanks

Zack Spica, University of Michigan

Paul Lundgren (Board Liaison), Jet Propulsion Laboratory/Caltech

ENGAGEMENT ACTIVITIES ADVISORY COMMITTEE

The EAC advises the EarthScope Consortium Staff and Board of Directors on education, workforce development, outreach, community engagement, inclusion, and representation.

Mike Brudzinski (Chair), Miami University of Ohio

Shannon Graham, The College of New Jersey

Aditya Kar, Fort Valley State University

Andrew Katumwehe, Midwestern State University

Franz Meyer, Alaska Satellite Facility, University of Alaska Fairbanks

Susan Owen, Jet Propulsion Laboratory/Caltech

German Prieto, Departamento de Geociencias Universidad Nacional de Colombia

Liam Toney, United States Geological Survey

Michael Wyession, Washington University

Andy Newman (Board Liaison), Georgia Tech

NETWORK INSTRUMENTATION ADVISORY COMMITTEE

The NIAC sets priorities for all aspects of network technology, including, but not limited to, instrumentation for geophysical measurements, geographic network configuration, communications, and power.

Bill Hammond (Chair), University of Nevada, Reno

John Galetzka (Secretary), National Geodetic Survey

Andy Barbour, United States Geological Survey

Ebru Bozdağ, Colorado School of Mines

John Braun, University Corporation for Atmospheric Research

Sigrun Hreinsdóttir, GNS Science

Meredith Nettles, Lamont-Doherty Earth Observatory of Columbia University

Justin Rubinstein, United States Geological Survey

Carl Tape (Liaison to the GSNAC), University of Alaska Fairbanks

Colleen Dalton (Board Liaison), Brown University

GLOBAL SEISMOGRAPHIC NETWORK ADVISORY COMMITTEE

The GSNAC advises the NSF SAGE facility and the USGS on policies to deploy and operate the GSN, to ensure its integrity and long-term viability, to rapidly disseminate data collected by the GSN, and to coordinate GSN linkages with other networks around the world.

Carl Tape (Chair), University of Alaska Fairbanks

Caroline Beghein, University of California, Los Angeles

Ebru Bozdağ, Colorado School of Mines

Andrew Schaeffer, Natural Resources Canada

Cecily Wolfe, United States Geological Survey

William Yeck, United States Geological Survey

Frederik Simons (Board Liaison), Princeton University

PI INSTRUMENTATION ADVISORY COMMITTEE

The PIAC sets priorities and identifies leading practices for project instrumentation, including emerging sensor technologies and applications.

Samantha Hansen (Chair), University of Alabama

Emily Brodsky, University of California, Santa Cruz

Ben Brooks, United States Geological Survey

Rob Evans, Woods Hole Oceanographic Institution

Heather Ford, University of California, Riverside

Yuning Fu, Bowling Green State University

Demian Gomez, The Ohio State University

Mong-Han Huang, University of Maryland

Shawn Wei, Michigan State University

Lara Wagner (Board Liaison), Carnegie Institution for Science





earthscope.org

EarthScope Consortium is a global community of hundreds of employees and tens of thousands of scientists, scholars, and educators. Our goal is to advance human understanding of Earth and its physical systems by democratizing access to geophysical observations and practices.



**GAGE
SAGE**



Operated by **EarthScope
Consortium**