We challenge ourselves
to transform human understanding of
the changing Earth and its hazards by
enabling the integration of innovative
technologies, open geodetic observations,
and research, from pole to pole.
UNAVCO, a non-profit university-governed consortium, facilitates geoscience research and education using geodesy.
The last several years have solidified UNAVCO’s role as a model for geodesy community collaboration, diverse applications of geodesy to geosciences, and open data archiving.

We believe that the university consortium is uniquely positioned to advance and support the science community goals articulated here. Since the publication of the predecessor to this plan in 2008, UNAVCO’s membership has swelled to 100 U.S. academic Member institutions, and 71 Associate Members that advance UNAVCO’s purpose on every continent. During the same period, rigorous review by the National Science Foundation has focused on every aspect of UNAVCO management, programmatic success, and the integrity of our business services. These reviews have affirmed our stewardship and strengths as an organization; they have also provided us the opportunity for renewal and optimization of our activities and services.

**A FLOURISHING UNIVERSITY CONSORTIUM**

This plan updates our road map for support of community-driven initiatives that advance geodesy investigations across a growing spectrum of science disciplines. It serves as both a management and communication tool, designed to support community work in ongoing and emerging science areas.

**A VIBRANT SCIENCE COMMUNITY**

Today, as we develop plans to integrate the core activities under a single award, we also take the opportunity to examine the structure and functioning of the facility to provide better integration of services to the community.

**A WORLD-CLASS GEODESY FACILITY**

We face opportunity at every turn: to support EarthScope science as data sets mature; to build on Plate Boundary Observatory capabilities with high-rate, low latency applications and to extend its legacy to new networks in the Caribbean, Africa, and beyond; to advance community interests in expanded LiDAR and InSAR data acquisition; to influence monumentation standards and open data protocols as civic and commercial real-time GPS networks proliferate around the world; to support a burgeoning demand for TLS technology; to improve data access and analysis with web services and cyberinfrastructure; to expand the use of autonomous integrated geodetic networks to new scientific targets, new geographic settings, and new science disciplines; and to bring emerging data sets and technologies to the attention of investigators in many research areas beyond our legacy core competencies. We anticipate that the UNAVCO science community will continue to grow in new directions, fueled by geodesy’s extraordinary observing systems. In a climate that requires efficient and effective use of human and fiscal resources, this landscape of opportunity challenges us to be disciplined, selective, and focused in advancing science through geodesy.

As a community, we must set priority among these opportunities and then measure our progress. The strategic plan provides a foundation for actions, time lines, and specific metrics, to be undertaken through UNAVCO governance, by the investigator community, and by facility staff.

I close with my thanks to the extraordinary community of scientists that make up UNAVCO’s community. Through this plan, we intend to advance our shared mission, and to continue to meet opportunity through excellence in the support of both legacy and emerging science initiatives.
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## STRATEGIC PLANNING COMMITTEE

### 2008

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<tr>
<th>Name</th>
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<tbody>
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<td>Pennsylvania State University; Board Member; Polar Networks Science Committee Member</td>
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<tr>
<td>Simon McClusky</td>
<td>Massachusetts Institute of Technology; Facility Advisory Committee Member</td>
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<td>Charles Meertens</td>
<td>Facility Director, UNAVCO</td>
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<tr>
<td>M. Meghan Miller</td>
<td>President, UNAVCO</td>
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<tr>
<td>Andrew Newman</td>
<td>Georgia Institute of Technology; Education and Outreach Advisory Committee Chair</td>
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<tr>
<td>Susan Owen</td>
<td>Jet Propulsion Laboratory; Board Chair</td>
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<td>David Sandwell</td>
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<tr>
<td>Mark Simons</td>
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<tr>
<td>Shimon Wdowinski</td>
<td>University of Miami; Board Member</td>
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### 2011*

<table>
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<tr>
<th>Name</th>
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<tr>
<td>Richard A. Bennett</td>
<td>University of Arizona; Board Member</td>
</tr>
<tr>
<td>Geoffrey Blewitt</td>
<td>University of Nevada, Reno; Membership Committee</td>
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<td>David Carlson</td>
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<td>Charles DeMets</td>
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<td>William Holt</td>
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<td>Pamela Jansma</td>
<td>University of Texas, Arlington; Board Member</td>
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<td>Ian MacGregor</td>
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<td>Jaime Magliocca</td>
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<td>Matthew Pritchard</td>
<td>Cornell University; Board Member</td>
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<td>Carol Raymond</td>
<td>Jet Propulsion Laboratory; Board Member</td>
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<td>Roy Savoian</td>
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</tr>
<tr>
<td>Shimon Wdowinski</td>
<td>University of Miami; WInSAR; Education and Outreach Advisory Committee</td>
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*In order to bring the strategic planning cycle into alignment with the timing of the core cooperative agreement, the 2008 plan was updated during a 1-day retreat in May, 2011 by the board, committee representatives, and UNAVCO senior managers.*
We challenge ourselves to transform human understanding of the changing Earth and its hazards by enabling the integration of innovative technologies, open geodetic observations, and research, from pole to pole.

In order to advance understanding of Earth processes, two major scientific challenges face UNAVCO’s research and education community:

To understand the dynamic evolution of the lithosphere, cryosphere, hydrosphere, and atmosphere on temporal scales spanning seconds to millennia.

To investigate the processes that control natural hazards, including earthquakes, tsunamis, volcanic eruptions, and long term changes in climate, ice mass, global sea level, and coastal subsidence.

POSITIONING UNAVCO – ADVANCING SCIENCE THROUGH GEODESY

Meeting these challenges will advance discovery of the processes that underlie Earth dynamics. Because of fundamental application to hazards science, dissemination of these advances informs education and decision-making, and carries great economic, political, and societal importance. We aspire to global mapping of the kinematics of the solid Earth and its fluid envelope across the temporal spectrum. This objective can be achieved through application of the most powerful geodetic observational tools available.

UNAVCO commits its energies and resources to achieving these ends in three areas. We will support integrative scientific studies that link kinematics to dynamics, process-based science, and hazards, through the collection and stewardship of long-term geodetic observations. We will establish new collaborations with communities that use geodesy to understand the changing Earth. Further, we will support the development of a new generation of scientists to sustain this work and to return the scientific benefits to society through Education and Outreach.

In pursuit of these science goals, investigators rely on UNAVCO as the world’s premier organization for geodetic data and products. The UNAVCO Facility provides science support through community coordination, field engineering, data services, technology innovation, and instrument testing, acquisition, and deployment. Further, it supports state-of-the-art global geodetic infrastructure that is developed and operated through international collaborations. EarthScope provides integrated geophysical observations that support investigation of the entire temporal spectrum of Earth deformation processes. In particular, the Plate Boundary Observatory (PBO) including GeoEarthScope provides unprecedented geodetic imaging of plate boundary deformation. UNAVCO is committed to enabling efficient testing, adoption, and implementation of rapidly evolving geodetic technologies needed to support cutting edge geodynamics research.

Our long-term success depends on development of a forward-looking, diversified workforce that draws on and cultivates talent across the demographic spectrum of gender and ethnicity, across international boundaries, and across scientific disciplines. The UNAVCO community further relies on the Education and Outreach program to inform the public interest and to support the development of partnerships, collaborations, curricula, and student opportunities.
In order to accomplish our mission of research and education, as a community and science support organization, we hold these values:

- Advancement of community science goals
- Excellence and innovation in science, technology, education, and service
- Open access to data, data products, and scientific exchange
- Data preservation and stewardship for future science and society
- Efficient and effective use of resources
- Strong service ethic and “can do” attitude
- Transparent community governance
- Scientific and professional integrity
- Diversity of scientific, educational, and social perspectives
- Communication of science findings and their relevance to society
Based on its core values, UNAVCO will pursue six strategies to deliver on its mission and vision. This set of strategies is the heart of “Positioning UNAVCO – Advancing Science through Geodesy” and, taken with actions for each strategy, provide the road map to guide UNAVCO in creating its future during the next five years.

Strategy and Actions

Community & Science
Continue to build the UNAVCO scientific community that uses geodesy by further developing core strengths in solid Earth science, while responding to emerging community needs and enhancing UNAVCO’s visibility at home and abroad

Scientific Diversity
Support expanded use of geodesy and integration of new communities across science disciplines

Support Services
Provide effective and efficient support to the scientific community—through community planning, equipment acquisition and sharing, engineering and data services, and education and outreach activities

Technology
Support innovative application of existing and novel technologies for the investigator community in funded science projects, education, and outreach

Resources
Diversify the resource base in support of the science community

Leadership
Continuously improve the leadership role and effectiveness of UNAVCO management and governance to support future growth

The set of strategies that follows is the heart of “Positioning UNAVCO, Advancing Science through Geodesy” and, taken with actions for each strategy, provide the road map to guide UNAVCO in creating its future during the next five years. Actions are the detailed means to achieve each strategic objective.
The Global Strain Rate Map, determined by GPS, seismic and Quaternary fault slip rates from over 100 international studies, shows motions of rigid plates with respect to North American and other deforming plate boundary zones. Map produced on the Jules Verne Voyager (JVV) from the model of C. Kreemer, W.E. Holt, and A.L. Halines, 2003.
Continue to build the UNAVCO scientific community that uses geodesy by further developing core strengths in solid Earth science, while responding to emerging community needs and enhancing UNAVCO’s visibility at home and abroad.

**Actions Needed**

### Core Strengths and Emerging Needs

01 Build a sustainable community of scientists and educators to convey discoveries in geodesy and their relevance to society.

02 Collaborate with community and partners for systemic impact on geoscience education.

03 Encourage and explore opportunities for international/global applications that build on the Plate Boundary Observatory and EarthScope capabilities.

04 Increase the visibility of relevant NASA funded science.

### Enhance UNAVCO’s Visibility

05 Promote geodesy and community science among stakeholders.

06 Communicate UNAVCO’s research support role and available services within the science community.

07 Increase awareness and visibility of UNAVCO within the international scientific community to support and seed collaboration and the development of global data sets.

---

**UNAVCO**

UNAVCO, originally the University NAVSTAR Consortium, was created to support the application of GPS geodesy to geoscience problems. It was named for the satellites that make up the NAVSTAR Global Positioning System constellation. The National Science Foundation (NSF) funded UNAVCO under the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado. UNAVCO had seven founding member universities.
Strategy Number Two

Jakobshavn Glacier ice flow vectors in the year 2000;
NASA/Goddard Space Flight Center Scientific Visualization Studio
Support expanded use of geodesy and integration of new communities across science disciplines

**Actions Needed**

**01** Strengthen relationships with scientific communities beyond solid Earth science – including atmospheric science and hydrology

**02** Support the neotectonics and paleoseismology communities, building on advances in geodetic imaging

**03** Continue integration and strengthening of InSAR and LiDAR communities

**04** Advance applications of early detection for natural hazards

**05** Establish international partnerships for geodetic research, data management and sharing, and capacity building.

**06** Increase diversity and broader participation in geoscience education and research

---

1991 The promise of atmospheric science applications, improved physical facilities, and the potential for multi-agency international science projects prompted UNAVCO to move to the University Corporation for Atmospheric Research (UCAR).
Linearized strain gauge data from four gauges placed at the Jack Canyon BSM site, showing detection of a small creep event on August 20, 2010. Strainmeters can detect small creep events from a distance of several kilometers. Data image by Kathleen Hodgkinson.
Provide effective and efficient support to the scientific community—through community planning, equipment acquisition and sharing, engineering and data services, and education and outreach activities.

**Actions Needed**

**Planning**

01. Provide coordination and support for nascent, regionally-focused, community-driven collaborations and initiatives

02. Define the five-year community goals for data services

03. Evaluate the costs and benefits of realignment of services within UNAVCO, such as data, archive and data products

04. Integrate TLS, WinSAR, E&O, and Polar resources into core funding for 2013

**Equipment Acquisition and Equipment Pool**

05. Continue to exploit community leverage for equipment specifications and cost through centrally-negotiated vendor agreements

06. Increase visibility of Terrestrial Laser Scanner and its applications

07. Plan for renewal of UNAVCO receiver pools in the GNSS era

**Support Services**

08. Enhance user support through the Web interface

09. Enhance archive services

10. Continue development and distribution of software tools for data processing and display

11. Identify community needs for Information Technology solutions and seek funding opportunities to support them through Cyberinfrastructure and other sources

12. Provide technical support and seek funding to upgrade monumentation for the global GPS network

13. Work with foreign universities and agencies to establish open data practices

14. Engage in discussions with NASA and others (including UNAVCO community) regarding an enhanced UNAVCO role in space missions

**Education and Outreach**

15. Provide community training for equipment use and data analysis

16. Lead community development of a coherent, modern geodesy curriculum

17. Explore opportunities to develop an equipment pool for undergraduate instructional programs

18. Explicitly address the connection between geodesy fundamentals and scientific advances within Web content and other outreach materials

19. Develop outreach materials that inform policymakers of geodesy findings with societal relevance

---

1995 An equipment grant that funded community institutions to purchase GPS systems provided an unprecedented availability of mobile, high-precision receivers tailored for global geodetic studies. The resulting community projects spanned the globe, and continuous GPS networks began to demonstrate the wealth of time dependent deformation resolved by GPS. Some of these networks went on to become the nucleus of the EarthScope Plate Boundary Observatory.
InSAR and GPS Observations image ground displacements associated with the 1999 Mw 7.1 Hector Mine earthquake, California; M. Simons, Y. Fialko, and L. Rivera, 2002.
Support innovative application of existing and novel technologies for the investigator community in funded science projects, education, and outreach

**Actions Needed**

**Requirements**

01 With users and agencies, define the requirements for and explore implementation of an affordable global telemetry system

02 Develop a plan for integration of new GNSS technologies and InSAR missions to enhance geodetic observations

03 Support national efforts to evaluate deleterious impact of radio interference from encroaching broadband microwave systems

**Integrated Networks and New Techniques**

04 Explore further applications of autonomous sensor networks to geodesy

05 Provide development and testing of receivers, antennas, domes, monuments to assure 1-mm global geodesy as GNSS instrumentation evolves

06 Seek support for expanded geophysical networks that enable community-driven science (e.g. polar networks, hurricane tracking, high-rate and real-time networks)

07 Support development of the next generation NASA observing system with site vector co-location

08 Explore acquisition of a ground based portable radar interferometer

09 Continue to strengthen natural hazard event response capabilities and preparedness

---

**2001** Building on the scientific gains of existing continuous GPS networks, EarthScope was conceived and shaped by the community, and ultimately funded by the National Science Board. In 2002, with the charge of constructing the EarthScope Plate Boundary Observatory, a $100M, five-year community project, UNAVCO, Inc. became an independent, non-profit organization of 23 founding university members. Originally an acronym, the word ‘UNAVCO’ became the official name of the consortium.
Strategy Number Five

EarthScope airborne LiDAR data from the San Andreas Fault, San Francisco Peninsula, overlain on a hillshade from a USGS digital elevation model. Image provided by Chris Crosby, GEON.
Diversify the resource base in support of the science community

**Actions Needed**

01 Cultivate new funding sources in support of UNAVCO’s mission, including federal, foreign, and private sources

02 Work creatively with sponsors in finding support for interdisciplinary initiatives and new science areas

03 Find support for Education and Outreach and other activities that are critical to UNAVCO’s mission

04 Evaluate a pilot project under which UNAVCO participated in commercial activity, while maintaining its core values

05 Explore ways of expanding NASA funding base in support of community science and satellite missions with relevance to geodesy

06 Explore better coordination of national geodetic infrastructure in support of community-driven science

07 Formalize the process for evaluation of new opportunities in alignment with mission and goals, sponsor relations, and organizational capabilities

08 Mine efficiencies with integration of the cooperative agreements

---

**RESOURCES**

2004 The scientific community recognized the importance of broadening participation in the geosciences and articulating the role of science in society to a variety of audiences. A formal Education and Outreach program was founded at UNAVCO.
Map of western U.S. GPS velocity vectors transformed into a common reference frame. Data image by Christjie Puskas.
LEADERSHIP

Continuously improve the leadership role and effectiveness of UNAVCO management and governance to support future growth

Actions Needed

01 Sustain strong and responsive communication with sponsors
02 Cultivate broad use of geodesy across science disciplines
03 Set an international standard for data sharing in the geodesy community
04 Complete revision of the by-laws regarding membership to support expanded activities since inception
05 Ensure efficient, effective management of UNAVCO to meet community and sponsor needs
06 Encourage diversity of science and cultural perspectives in governance
07 Strengthen the case for the relevance of geodesy to hazards science
08 Ensure active and effective governance by the Board of Directors and its advisory structure
09 Work with sponsors to realize oversight and management efficiencies with a single award for core funding

2008 marked the completion of the Plate Boundary Observatory, the world’s most ambitious integrated geodetic observatory to date. Cryospheric sciences became fully integrated into UNAVCO core activities providing a model for serving new sub-disciplines. At the same time, the UNAVCO-supported geodesy toolbox expanded to include InSAR, LiDAR, and TLS.

2011 The UNAVCO community continues its success with support for geodetic infrastructure, engineering and data services, and support for broader impact through education and outreach. Community and international partnerships have enabled international networks: GPS for the Africa Array, and COCONet – a Continuously Operating Caribbean GPS Observational Network. The UNAVCO consortium now comprises 100 member institutions and 71 associate members.
Critical Success Factors are key areas in which UNAVCO must perform well on a consistent basis in order to achieve its mission and vision within fiscal constraints.

Metrics gauge progress on the Critical Success Factors and are linked to the strategies noted in brackets below. These metrics will be linked to specific actions in the implementation plan.

Publication of high impact science that uses UNAVCO resources
  [Community, Scientific Diversity, Support Services, Technology]
  • Number of papers that acknowledge UNAVCO support; number of journals that contain these papers
  • Number of papers with results that rely on UNAVCO resources; number of journals that contain these papers

Funding of research that uses UNAVCO resources
  [Community, Scientific Diversity, Support Services, Technology, Resources]
  • Profile of NSF-supported projects
  • Profile of projects with other sponsors

Diverse involvement in UNAVCO activities and projects
  [Community, Scientific Diversity, Leadership]
  • Composition of UNAVCO community members attending meetings, workshops and short courses
  • Number and diversity of journals represented in the publication database
  • Degree and research profile (Carnegie classification) and minority-serving status of member institutions
  • Profile of Associate Membership

Archive for data preservation, stewardship, and open access
  [Support Services, Technology]
  • Volume of products in and out of the archive by data type
  • Number of GPS stations in the archive
  • Number of unique users and domains by technique
  • Number of software downloads
CRITICAL SUCCESS FACTORS AND METRICS

Community use of state-of-the-art geodetic technology
[Support Services, Technology]
- Number and diversity of users drawing on the equipment pool
- Sufficiency of the equipment pool to meet investigator demand
- Community equipment acquisition
- Community use of the Knowledge Base

Community involvement in and use of Education and Outreach programs and products
[Community, Scientific Diversity, Support Services, Technology, Resources]
- Workshop and short course participation
- Number of interns each year
- Web site use
- Number of principal investigator projects that include Education and Outreach resources

Sustainability/viability of the funding sources
[Community, Resources, Leadership]
- Profile of funding sources and amounts
- Optimization of indirect cost rates for effective and efficient management

A well-functioning corporation with informed community governance
[Community, Leadership]
- Attendance at the annual business meeting
- Election participation by member representatives
- Composition and balance of the Board of Directors and governance committees
- Governance committee attendance and regular reporting to the Board of Directors
- Board of Directors’ training and assessment; management performance review
- Sponsor, community, and employee satisfaction
- Audit outcomes and findings; federal compliance
Appalachian State University
Baylor University
Boise State University
California Institute of Technology
California State University – Fullerton
California State University – Stanislaus
Carnegie Institution of Washington (F)
Central Washington University (F)
Colorado School of Mines
Columbia University
Cornell University
Dartmouth College
Georgia Institute of Technology
Grand Valley State University
Hamilton College
Harvard University (F)
Howard University
Humboldt State University
Idaho State University
Indiana University (F)
Jet Propulsion Laboratory (F)
Lamar University
Los Alamos National Laboratory
Louisiana State University
Macalester College
Massachusetts Institute of Technology (F)
Michigan Technological University
Missouri State University
New Mexico Institute of Mining and Technology
New Mexico State University
New York University
North Carolina State University
Northwestern University (F)
Ohio State University
Oklahoma State University
Pennsylvania State University
Portland State University
Princeton University
Purdue University
Rensselaer Polytechnic Institute (F)
Saint Olaf College
Smithsonian Astrophysical Observatory (F)
Southern Methodist University
Stanford University (F)
State University of New York – Stony Brook (F)
Texas A&M University – Corpus Christi
The College of New Jersey
University Corporation for Atmospheric Research
University of Alabama
University Of Alaska Fairbanks (F)
University of Arizona
University of Arkansas (F)
University of California – Berkeley (F)
University of California – Davis
University of California – Irvine
University of California – Los Angeles
University of California – Riverside
University of California – San Diego (F)
University of California – Santa Cruz
University of Chicago
University of Colorado (F)
University of Hawaii
University of Houston
University of Idaho (F)
University of Illinois – Urbana-Champaign
University of Kansas
University of Kentucky
University of Maine
University of Maryland – College Park
University of Memphis (F)
University of Miami (F)
University of Michigan
University of Minnesota
University of Missouri – Columbia (F)
University of Montana
University of Nevada – Las Vegas
University of Nevada – Reno (F)
University of New Hampshire
University of Oklahoma
University of Oregon
University of Puerto Rico – Mayaguez
University of Rhode Island
University of Rochester
University of South Carolina
University of South Florida
University of Southern California
University of Southern Mississippi
University of Texas – Austin (F)
University of Texas – Dallas
University of Texas – El Paso
University of Texas – Arlington
University of Utah (F)
University of Washington
University of Wisconsin – Madison
University of Wisconsin – Milwaukee
University of Wyoming
Utah State University
Virginia Polytechnic Institute State University
Woods Hole Oceanographic Institution
Yale University

(F) = Founding Member
UNAVCO ASSOCIATE MEMBERS

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Alliance for Sustainable Energy, LLC / National Renewable Energy Laboratory, USA
Bulgarian Academy of Sciences
Central Geological Survey Ministry of Economic Affairs, Taiwan
Centre National de la Recherche Scientifique, France
Centro de Investigación Científica y de Educación Superior de Ensenada, Mexico
Curtin University, Australia
Delft University of Technology, Netherlands
Earth System Research Laboratory / National Oceanic and Atmospheric Administration, USA
Escuela Politecnica Nacional, Ecuador
European Center for Geodynamics and Seismology, Luxembourg
GeoforschungsZentrum Potsdam, Germany
Geological Survey of Canada
Geophysical Service of Russian Academy of Sciences
Global Hydrology and Climate Center, USA
GNS Science, New Zealand
Harris Galveston Subsidence District, USA
Hartebeesthoek Radio Astronomy Observatory, South Africa
Icelandic Meteorological Office
Idaho National Laboratory
Instituto Colombiano de Geología y Minería – Geological Survey, Columbia
Institute for Space Sciences, Spain
Instituto de Geofísica, Mexico
Instituto Nacional de Pesquisas Espaciais, Brazil
Istituto Nazionale Oceanografia Geofisica Sperimentale, Italy
Istituto Nazionale di Geofisica e Vulcanologia, Italy
Ludwig-Maximilians Universität, Germany
Observatório Nacional, Ministério de Ciência e Tecnologia, Brazil
Montserrat Volcano Observatory, West Indies
Nanyang Technological University, Singapore
National Space Institute, Denmark
Natural Resources Canada
Norwegian Polar Institute
Patras University, Greece
Proudman Oceanographic Laboratory, U.K.
Royal Museum for Central Africa, Belgium
San Fernando Naval Observatory, Spain
Simon Fraser University, Canada
Southern California Earthquake Center, USA
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Scientific and Technical Research Council of Turkey, Marmara Research Center
U.S. Geological Survey, Cascade Volcano Observatory, USA
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Front Cover: Volcanic gas emitted by fumaroles on Mt. Erebus create iconic ice towers as steam escapes though the vents immediately freezes when it comes into contact with the cold air. Researchers study the ice towers, the caves located beneath them, and the volcanic gases emitted to further characterize the volcano’s gaseous emissions. Image provided by Marianne Okal.

Inside Front Cover: Filtered LiDAR data reveal ‘bare Earth’ surface beneath vegetation along the San Andreas fault in the Santa Cruz Mountains, California; LiDAR data acquired as part of the EarthScope project and images prepared by the National Center for Airborne Laser Mapping (NCALM).

Table of Contents Spread: InSAR interferogram shows ground motion associated with the 26 December 2003 earthquake at Bam in Iran; data processed by Politecnico di Milano; image from ESA website by Polimi/Poliba.

Inside Back Cover: Iceberg frozen in the sea ice of McMurdo Sound, Antarctica. Photo by Joe Pettit.

Back Cover: Mount Shishaldin, on the Unimak Island in the Aleutian Islands chain of Alaska. Image provided by UNAVCO staff.

COMMUNITY TOOLBOX

GGOS Global Geodetic Observing System — the global network of ground based geodetic stations that provide key infrastructure for all high precision studies by observing the Earth’s shape, gravity field, and rotation, and their variation with time

GPS Global Positioning System — a geodetic technique that relies on satellites for positioning and yields precise measurement of earth and ice deformation, as well as imaging of the atmosphere

GNSS Global Navigation Satellite Systems — the general term for satellite navigation systems that provide geospatial positioning with global coverage, such as GPS, the European Galileo, and the Russian GLONASS system

InSAR Interferometric Synthetic Aperture Radar — a technique that differences pairs of radar images to map deforming zones such as faults, volcanoes, glaciers, and aquifers or oil fields

LiDAR Light Detection and Ranging — airborne laser imaging that provides exquisitely-detailed topographic data sets and reveals topography through vegetation

TLS Terrestrial Laser Scanner — ground-based LiDAR, in which the instrument is mounted on a tripod rather than an airplane, providing very high-resolution imaging of smaller areas

Borehole Geophysics and Strainmeters

Borehole Strainmeter — measures the change in shape of a borehole at approximately 250 m depth with sensitivity at the scale of one ten-millionth of a human hair

Long Baseline Laser Strainmeter — optically detects very small changes in baseline length across a 500 m baseline above the ground and close to a fault

Seismometer — measures ground deformation at very high frequencies with great sensitivity and is colocated with a borehole strainmeter in the Plate Boundary Observatory

Tiltmeter — measures the changing inclination of the Earth’s surface over time at the micro-radian scale
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