earthscope PROJECT

2005-2006 Annual Review

April 1, 2005 - March 31, 2006

Approved June 1, 2006
by the Project Director and the members of the
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Notes & Disclaimers

The EarthScope Project Yearly Review is produced as a document of record for the management needs of the EarthScope Office, EarthScope Facilities Executive Committee, EarthScope Operations Group, EarthScope Project advisory committees, and for others who have specifically requested to receive it. It is available on the EarthScope website.

EarthScope uses a variety of tools to track progress and monitor the project. EarthScope tracks schedule and cost (through earned value management), major milestones, activities, technical progress, and data availability. We consider each of these indices a management tool – not a reporting system – to alert us to areas within the project that need attention so corrective actions may be taken if necessary.

The yearly review is designed as self-contained documents that present each of the management tools and allow the reader to assess the extent to which EarthScope is on schedule, on budget, and moving towards its scientific and educational goals. The yearly review summarizes:

- **Activities:** Activities are an important management tool as they allow us to monitor actions taking place and to track the level of effort being devoted to various tasks.
- **Milestones:** Milestones track non-recurring goals that are necessary to complete the project.
- **Technical Progress:** The equivalent stations and drilling depth are tracked by quarter. The equivalent station measures provide a greater degree of granularity than just the reporting of a completed station.
- **Cost Schedule Status Report (CSSR):** The CSSR quantitatively tracks and links together cost and schedule using earned value management. Through the system, deviations from the plan are easily identified, tracked, and corrected. Following NSF's GPRA guidelines, variances from the plan that are under 10% are considered to be on schedule or on budget. Variances equal or greater than 10%, either positive or negative, at WBS task Level 2, are examined in more detail along with a corrective action if necessary.
- **Cost Schedule Performance:** The performance graphs track cost and schedule over time. Any persistent variance, no matter the percentage, is discussed at the quarterly meetings by the EFEC. If it is not clear that the variance will be addressed by the proposed corrective action, it is presented as a project concern.
- **Change Orders and Contingency Usage:** Change requests are welcome at all levels of EarthScope, and a change request form is available on the EarthScope website. Change requests are evaluated through a formal process that weighs scope, schedule, cost, risk, and gain against the project's scientific objectives.
- **Project Concerns and Action Plans:** The project concerns identify major issues that might have a negative effect on the project. The problems are identified through analyzing the current status of the project and are discussed at the EFEC meetings. Like the CSSR variance explanations, the project concerns present action plans and also serve the additional function of providing the view forward.

The EarthScope Project is committed to a responsive and transparent management structure. Our progress reviews are published and posted on the EarthScope Project website. Additional information can be found on the EarthScope Project website (www.earthscope.org) and by directly contacting the EarthScope Project Office (earthscope_info@earthscope.org).

Table of Contents

Status at a Glance

Overall Project Numbers

- 5-year work completed: 43%
- Cumulative overall schedule: 9% behind schedule
- Cumulative overall cost: 5% under budget
- Change orders approved this year: 20

Data Resources Available

- SAFOD:
  - Pilot Hole: seismic data, tilt data, and logging data
  - Main Hole: seismic data from 80-level array, physical samples (Phase 1 and Phase 2), and logging data (Phase 1 and Phase 2)
- GPS stations (293): Alaska (36), Arizona (3), California (146), Colorado (5), Idaho (3), Montana (10), Nevada (5), New York (1), New Mexico (7), Oklahoma (1), Oregon (17), Texas (1), Utah (14), Virginia (1), Washington (34), and Wyoming (9)
- Borehole strainmeter stations (12): British Columbia (4), Oregon (1), and Washington (7)
- Long-baseline laser strainmeter stations (2): California (2)
- ANSS Backbone stations (21): Alaska (1), Arkansas (1), Arizona (1), Colorado (1), Georgia (1), Idaho (1), Michigan (1), Montana (2), Nevada (1), New York (1), Ohio (1), Oklahoma (1), Oregon (1), Texas (2), Utah (1), Virginia (1), Washington (2), and Wyoming (1)
- Transportable Array stations (167):
  - Operating (157): Arizona (12), California (99), Nevada (12), New Mexico (1), Oregon (18), and Washington (15)
  - Decommissioned (10): California (9) and Nevada (1)

Major Accomplishments

- First borehole strainmeters installed
- Akutan successfully completed
- San Andreas Fault Zone crossed
- SAFOD Main Hole completed
- Transportable Array completed in California
- Casing deformation observed in the SAFOD borehole within the fault zone
- First GSN-type station installed
- First geodetic data products released
- EarthScope captures Augustine eruption
- Fault-zone-guided waves observed at depth
- Magnetotelluric plans finalized
- 300 GPS stations installed

Major Concerns

- Access to contingency
- NSF-directed scope changes
- Operations and maintenance funding
- Completing Unimak installation in one season
- Completion of the ANSS by the USGS

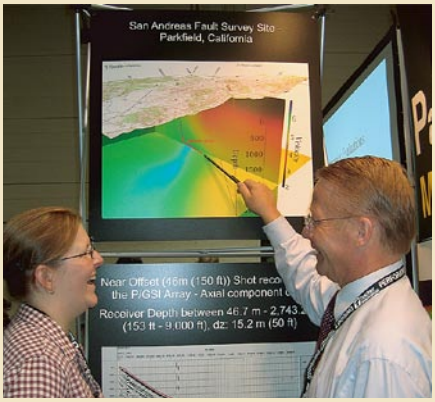
▶ PART I: Activities

HIGHLIGHTS

■ Array Operations Facility Opened

The EarthScope Array Operations Facility opened on April 6, 2005 in Socorro, NM. The facility is responsible for Transportable Array support and Flexible Array system integration, shipping, and maintenance. Taking just over a year to complete, the Array Operations Facility was funded with $1.6 million from New Mexico Tech. The facility consists of an addition to the PASSCAL Instrument Center and includes new office space and a conference center.

EarthScope Array operations facility.



Data from the active-source experiment at the EarthScope SAFOD borehole was presented at the American Association of Petroleum Geologists Annual Meeting.

■ Finalized Phase 2 Drilling Plan

In May 2005, SAFOD completed an active-source seismic-imaging and microseismic experiment to further refine the location of the Phase 2 target earthquakes. The experiment lasted two weeks and used a 4,000 ft, 80-level geophone array provided free-of-charge by Paulsson Geophysical Services. The system is also being considered as a potential prototype for the Stage 3 SAFOD monitoring system. Five 10 lb shots were detonated within 45 m of the SAFOD wellhead and thirteen 80 lb shots at sites within a 5 km radius of the wellhead. The data from these shots and from natural earthquakes recorded on the array were incorporated into the target earthquake location effort that will help determine the directional drilling plan for Phase 2.

■ First Borehole Strainmeter Installed

The first EarthScope borehole strainmeter was installed on June 14, 2005 in Hoko, WA, about 100 miles northwest of Seattle. The instrument was originally scheduled for installation in March, but after detecting unwanted noise during testing, the installation was postponed. The source of the noise was later identified as condensation inside the instrument and was corrected. This station is one of 10 borehole strainmeters (six on the Olympic Peninsula and four on Vancouver Island) being installed to image the periodic slow earthquakes in the Pacific Northwest. By the end of June, three borehole strainmeter installations were completed. Data from the stations will be available through the EarthScope website.

Installing the first EarthScope borehole strainmeter near Hoko, Washington. By the end of June, three borehole strainmeters were completed.

Phase 2 Drilling Begins

In Parkfield, cuttings flowed again to the surface as EarthScope resumed drilling at SAFOD on June 13, 2005. Rig mobilization and pre-drilling activities, including formation fluid sampling and hydraulic fracturing stress measurements, proceeded smoothly and were completed a day ahead of schedule. The first spot coring depth was reached 5 days ahead of schedule, but the drill's top drive failed before any core was cut. The top drive was shipped back to Bakersfield, CA for repairs, resulting in the cessation of drilling operations for the rest of the month. Directional drilling will continue in July and August to a vertical depth of 3.2 km, crossing the San Andreas Fault near the source of the repeating microearthquakes.

On the rig floor at the SAFOD drill site, the Nabors drill crew pull drill pipe out of the well as drilling resumed in June.

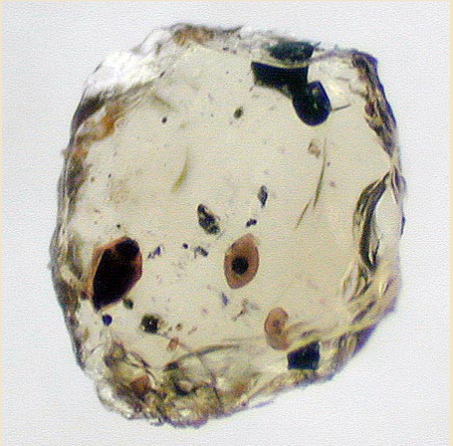
Student interns participated in a 4-day course on seismic station siting in Oregon.

Student Interns Site Stations

Eight student interns honed their GIS skills with EarthScope and Oregon State University in June. After participating in a 4-day training course, the students used their GIS knowledge to locate potential sites for Transportable Array seismic stations and magnetotelluric equipment throughout Oregon. The students gained real-world experience by visiting the potential site locations, performing site reconnaissance, and initiating contact with the landowners. The information they collect will be provided to professional permitters who follow up with the landowners and complete the siting process.

Supporting the Geologic Community

While installing GPS stations on Alaska's Akutan Volcano, the EarthScope Plate Boundary Observatory provided logistical support to a team collecting tephra samples from the volcano. The team is measuring the magma's pre-eruptive gas content, which relates to the physical processes that contribute to the deformation field measured by the GPS stations. "The collaboration shows a ready willingness to include the broader geological community in EarthScope," said Dr. Terry Plank of Boston University.



Olivine crystal (400 microns) with melt inclusions. Such crystals provide evidence for the pre-eruptive volatile content of Akutan.

San Andreas Fault Zone Crossed

A major EarthScope milestone has been reached.
We have successfully drilled across the San Andreas Fault Zone at seismogenic depth, 3.1 km, which corresponds to 50 m past the surface trace of the San Andreas Fault. Preliminary analyses of drilling parameters, cuttings mineralogy, and geophysical logging data suggest that there are several zones which may represent the active traces of the San Andreas Fault at depth. Further detailed analyses are underway.

Drill bits used during Phase 2 drilling through the seismogenic zone of the San Andreas Fault.

Installing station AV10 on Akutan Volcano, AK.

Success at Akutan

The EarthScope crews on the Akutan Volcano, a 1,300-meter-tall composite stratovolcano located in the Aleutian Islands, have successfully installed eight continuous Plate Boundary Observatory GPS stations. Despite difficult weather and a challenging environment, the work was completed one week ahead of schedule and under budget, allowing the crew to begin other Alaska installation and reconnaissance activities early. Akutan is one of the most active volcanoes in the Aleutian Islands, with 30 historic eruptions. It was the site of intense ground deformation caused by shallow dike intrusion in 1996.

Transportable Array Subaward Issued

As EarthScope engineers complete the first 100 Transportable Array stations, a subaward has been issued to Honeywell Technical Services to assist in increasing the station installation rate. Honeywell will provide labor and installation support for Transportable Array seismic stations from September 2005 through September 2007. Honeywell was chosen from five competitive proposals, has worked with EarthScope on other installations, and was unanimously recommended by an IRIS evaluation committee.

Installing a Transportable Array station near Millerton Lake, CA.

EarthScope at SACNAS

EarthScope attended the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference in Denver to discuss the project's status, future deployments, and opportunities for participation. Undergraduate geoscience students from the meeting toured UNAVCO, where they participated in hands-on demonstrations of GPS equipment and learned more about the EarthScope Plate Boundary Observatory and student internships.

C. Meertens demonstrating how GPS equipment operates to students attending the SACNAS National Conference.

Discussing set-up of the sidewall coring tool. Successful firing of the tool resulted in the collection of 52 cores.

SAFOD Sidewall Cores Collected

Samples from the San Andreas Fault Zone were collected from 3 km beneath the surface. After successfully drilling across the San Andreas Fault from the Pacific to the North American Plate, 52 sidewall cores – each up to 1 inch long and 0.75 inches in diameter – were retrieved from multiple depths. The core locations were based on data collected from geophysical logging and cuttings analysis across the fault. After the cores were collected, the borehole was cased with a steel lining to improve hole stability and a 12 ft core was collected out the bottom of the borehole.

Collocated Borehole Strainmeter and GPS

The EarthScope Plate Boundary Observatory has completed the first collocated borehole strainmeter and GPS site. The combination of these two instruments will provide comprehensive coverage of deformation from hundredths of seconds to tens of years at one location. Installed on the Olympic Peninsula, the measurements will provide insight into subduction-related processes and episodic tremor and slip events. About 20 of these collocated sites will be built by the end of the project.

P. Gray attaching the GPS antenna to the borehole strainmeter wellhead.

Understanding the Sierra Nevada

Using EarthScope campaign instrumentation, the Sierra Nevada EarthScope Project is deploying about 40 Flexible Array seismometers to image the lower crust and uppermost mantle under the High Sierra. The experiment is expanding upon the previous discovery that hot, possibly partially molten, mantle rises up under the southern High Sierra, supporting its high elevations. The experiment extends the length of the range to investigate the crustal history and the processes that affect the surface geology.

Orienting a Flexible Array seismometer in the Sierra Nevada EarthScope Project.

Participants work with real data and metadata at the strainmeter workshop. EarthScope is installing over 100 strainmeters in the western US.

Strainmeter Workshop

With the first 7 strainmeters already installed in the Pacific Northwest and Southern California, EarthScope worked with UNAVCO on a short course to introduce new users to strainmeter data. The 2.5-day course provided a comprehensive introduction to the instruments and the opportunity to work with real data and metadata, including viewing and editing raw strainmeter data, detecting power spectra and noise in strainmeter data, and discussing earth-tide theory and tidal analysis. EarthScope strainmeter data will play a central role in observing phenomena that accompany and precede earthquakes and volcanic eruptions.

Seismic Station at Sutter Buttes

With cooperation from the University of California Berkeley, EarthScope recently completed a Transportable Array seismic station near Sutter Buttes, California. Locally known as the “World’s Smallest Mountain Range”, Sutter Buttes is an extinct volcano that erupted 1.60-1.35 million years ago. Data recorded at this station and others will help reveal the structure of the continent beneath the volcano and the Sacramento Valley.

Installing a high-gain antenna at the Transportable Array site near Sutter Buttes, CA.

First ANSS Backbone/GPS Joint Station

EarthScope has installed its first collocated ANSS Backbone seismic station and backbone GPS station in Lake Ozonia, NY. The station, operated by Potsdam College of the State University of New York, is the first of 16 ANSS Backbone sites that will include a GPS monument. The site includes a seismic vault for the seismometer and a shallow-braced GPS monument topped with a choke-ring antenna. The station will serve as a reference for Transportable Array stations as they move across the country and as a reference for geodetic measurements in the western US.

ANSS Backbone/GPS joint station in Lake Ozonia, NY.

J. Evans and S. Hickman washing the last cuttings sample to come out of the borehole.

SAFOD Main Hole Complete

The EarthScope San Andreas Fault Observatory at Depth has completed Phase 2 drilling. Following a successful hydraulic fracture test, the open hole below the 7-inch casing was cemented, signifying the last step in preparing the Main Hole for use as a long-term earthquake observatory. The borehole fluid was then changed to clean water with inhibitors to prevent bacteria growth. The Stage 2 seismometer/accelerometer package is scheduled for installation this fall.

Monitoring of Silent Earthquakes

The first EarthScope campaign experiment to use GPS and seismic equipment is now underway on the Olympic Peninsula. The experiment, Stalking Cascadia Episodic Tremor and Slip with Enhanced GPS and Seismic Arrays, is aimed at capturing the silent earthquakes that occur in the Cascadia subduction zone. The Principal Investigators are using the dense array of GPS and seismic instruments to record high-quality data from these recently discovered earthquakes.

Installing a Flexible Array seismometer on the Olympic Peninsula.

Borehole Strainmeters on Vancouver Island

EarthScope's Plate Boundary Observatory has drilled the first four of ten new boreholes on Vancouver Island. Competent sections of bedrock were found at each site, an important, but difficult, criteria to achieve for strainmeters. Installation of the first instruments will take place over the next couple of weeks. Once complete, the new stations will finish a major strainmeter network targeted at recording the episodic slow slip events occurring in the Cascadia Subduction Zone.

Drilling operations at the first site at the Pacific Geoscience Center on Vancouver Island.

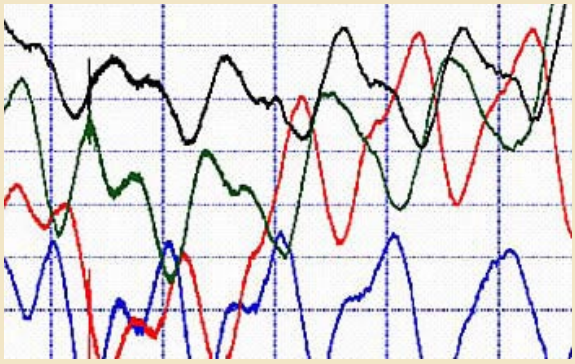
Installing GPS stations in Yellowstone National Park amidst the buffalo.

Yellowstone National Park

EarthScope engineers have installed the first two Plate Boundary Observatory GPS stations in Yellowstone National Park. The stations, along with 25 others to be installed in and around the park, are positioned to measure the interplay between tectonic, seismic, and magmatic processes in the region. The targets include deflation of the Yellowstone Caldera and slip on the active Hebgen Lake Fault.

Strainmeter Data Available

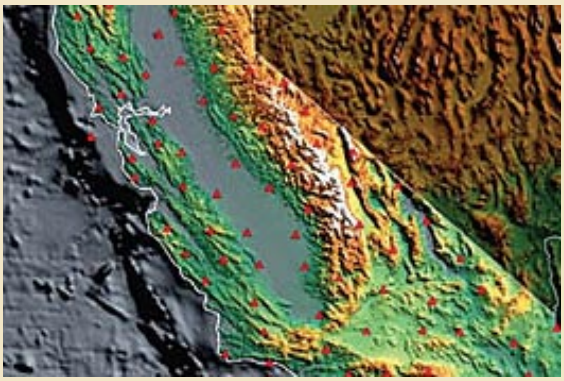
The first data from EarthScope Plate Boundary Observatory strainmeters are now available from the data centers. Stations currently returning data include the borehole strainmeter stations installed in the Olympic Peninsula, the first long-baseline laser strainmeter installed at Durmid Hill along the southern San Andreas Fault, and the nucleus Glendale-Verdugo strainmeter near the Sierra Madre Fault. Additional borehole strainmeter data will be available soon.



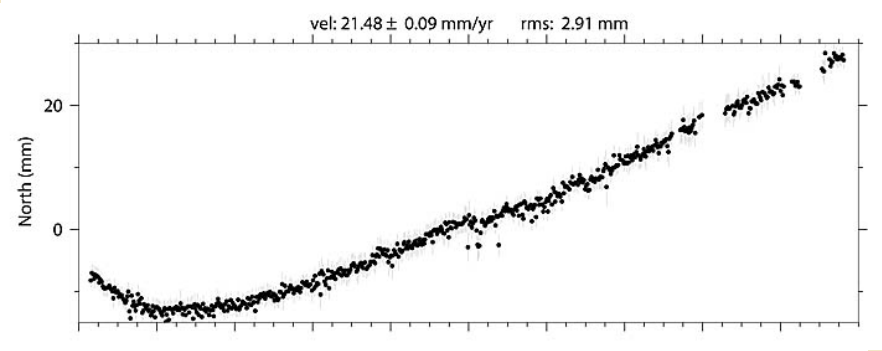
Strainmeter data from Hoko Falls, WA.

Transportable Array Complete in California

EarthScope engineers have successfully completed installing Transportable Array seismic stations in California – the first state completed by the continental array. The stations consist of new stations and pre-existing stations installed by regional network operators. Engineers are continuing to install stations in Oregon and Washington as they work towards completing the array's first footprint before it begins moving eastward. The stations will record local, regional, and teleseismic earthquakes to image the Earth's interior.



California is the first state completed by the EarthScope Transportable Array.



North position time series for GPS station P526 showing postseismic deformation from the December 2003 San Simeon earthquake.

First Geodetic Data Products Available

From GPS solutions to cleaned and scaled strain time series, processed data products are now freely and openly available for EarthScope Plate Boundary Observatory data. The products – derived from geodetic instruments covering the western US and Alaska – span a frequency spectrum ranging from seconds to years. New data sources are being installed daily.

The ANSS Backbone station in Wichita Mountains, OK will aid in structural and mechanical research of the Earth.

First GSN-type Station

The completion of the ANSS Backbone seismic station in the Wichita Mountains, Oklahoma, marks EarthScope's first Global-Seismograph-Network (GSN) -type contribution. GSN-type seismic stations are buried deeper, in more thermally stable vaults, than other ANSS Backbone stations, allowing them to capture the longer period end of the seismic spectrum. These recordings will be used to research whole-Earth structure.

GPS installed at SAFOD

Now that Phase 2 drilling at the San Andreas Fault Observatory at Depth (SAFOD) is complete, monitoring of the San Andreas is underway, not only at seismogenic depth, but also at the surface. With the recent installation of a GPS station about 175 feet from the SAFOD Main Hole, a new data set is available that will complement the data collected in the borehole as it records post-seismic deformation following the September 2004 earthquake in Parkfield, CA.

GPS station at the SAFOD drill site.

Workshop participants discuss the Transportable Array in Tempe, Arizona.

Partnerships with Native Americans

As the EarthScope Transportable Array prepares its eastward journey into Arizona, a workshop was organized by Arizona State University to facilitate permitting and access to Native lands for research activities, and to initiate EarthScope education and outreach partnerships with Native American schools and communities. The workshop brought together representatives and decision-makers from the Navajo, Hopi, Hualapai, and Gila River Nations and included demonstrations of EarthScope stations. The success of the workshop has resulted in prompting the planning of similar workshops for the Pacific Northwest and the Midwest.

Casing Deformation Measured

In the EarthScope SAFOD borehole, deformation has been discovered in the borehole's steel casing by two 40-arm caliper logs. The deformation helps identify the interval believed to contain the active motion of the San Andreas Fault. Other evidence for the fault, such as lower velocity and high porosity, also occur at this location. The second log verified that the most intense deformation occurs within a narrow zone, from a measured depth of 10,830 feet to 10,880 feet. The next 40-arm caliper log will take place in the Spring of 2006. The log will continue to monitor the casing deformation and help establish a deformation rate.

A second 40-arm caliper log confirmed deformation of the borehole casing by the San Andreas Fault.

Thanks to Bob Mueller

EarthScope and UNAVCO extend their sincerest gratitude to Bob Mueller and wish him best on his second retirement. As EarthScope began construction two and a half years ago, UNAVCO enticed Bob out of retirement to lead the EarthScope strainmeter effort. Bob successfully organized the strainmeter operation, trained installation crews, installed strainmeters, and developed installation procedures. As Bob departs, David Mencin has been promoted to lead the strainmeter operations with Michael Hasting overseeing the installations. The EarthScope Plate Boundary Observatory currently has 10 borehole strainmeters installed, with 30 more planned for this year.

Bob Mueller lead the initiation of the EarthScope strainmeter effort.

A. Velasco responding to questions at the AGU EarthScope Listening Session.

EarthScope at AGU

At the American Geophysical Union 2005 Fall Meeting, presentations on EarthScope geodetic and seismic deployments and the education and outreach program were featured everyday. Special technical sessions highlighted emerging results from the EarthScope San Andreas Fault Observatory at Depth. These 'standing room only' sessions were further recognized by AGU through an AGU press conference. The success of the EarthScope Project was also observed at the project's first Listening Session. Attracting over 100 scientists, the session provided an opportunity for direct communication with the EarthScope-user community.

Augustine Erupts

Following months of increased activity, the Augustine Volcano – located about 290 km southwest of Anchorage in the Cook Inlet – erupted several times beginning in mid-January. The EarthScope Plate Boundary Observatory recorded data from permanently installed GPS stations on the volcano before, during, and after the eruption. During the eruptions, EarthScope lost contact with the GPS stations closest to the summit, possibly due to snow cover, a lahar, or the eruptive force. The remaining stations continue to operate and indicate that the deformation is slowing.

EarthScope captured the eruption of the Augustine Volcano.

Stage 2 Installed at SAFOD

The Stage 2 sonde has been installed in the EarthScope San Andreas Fault Observatory at Depth. The sonde, which contains a high-temperature tiltmeter, a 3-component seismometer, and a 3-component accelerometer, is set approximately 900 feet from the San Andreas Fault Zone at a vertical depth of 9,600 feet. Data is currently being stored on site, but will be available through the EarthScope website once the telemetry systems are operational.

Installing the Stage 2 sonde in the Main Hole.

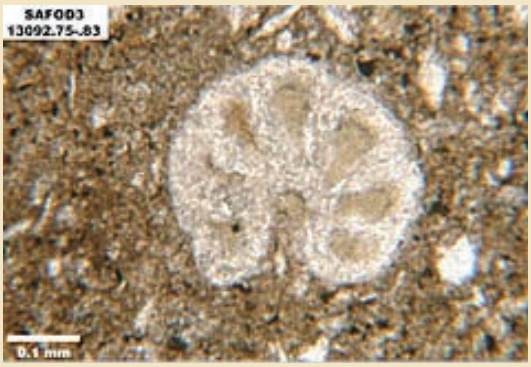
Installing a Transportable Array station at Tolt Reservoir, WA.

Record Data Shipments

In the first two months of 2006, more EarthScope Transportable Array data were shipped (53 GB) from the IRIS Data Management Center than were shipped in all of 2005 (42 GB). The data quantities correlate to over 10 million seismograms in the first two months of 2006, compared to approximately 8 million seismograms in 2005. The increase in data shipments indicates an increased demand for EarthScope data in the Earth science community.

Foraminifera Identify Great Valley

Analyses of spot cores have identified foraminifera associated with the Great Valley Sequence, corroborating other evidence that the EarthScope San Andreas Fault Observatory at Depth Main Hole intersected the Great Valley Sequence on the east side of the San Andreas Fault and not the expected Franciscan Formation. The spot cores were obtained last summer from 3 km beneath the surface at the end of Phase 2 drilling. The foraminifera were deposited around 75 million years ago.



Foraminifera used to identify the Great Valley Sequence on the east side of SAFOD.

300 GPS Stations Installed

The EarthScope Plate Boundary Observatory installed its 300th GPS station near San Ardo, California. GPS stations are now operating in every major western tectonic regime: transform, subduction, extension, volcanic, and backbone. As we reach the halfway point of the project's construction phase, installations of the GPS stations remain on schedule and on budget. Data from the stations include episodic tremor and slip events, volcanic eruptions, and preseismic, coseismic, and post-seismic events.

GPS stations are now operating in every major western tectonic regime.

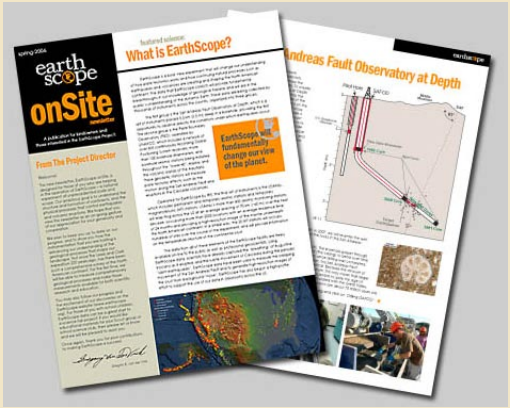
Magnetotelluric instruments will measure electro-magnetic properties at depth.

Magnetotelluric Plan Finalized

EarthScope and the National Science Foundation have finalized the plan for EarthScope magnetotelluric (MT) field deployments. The plan includes 7 permanent MT stations and 20 temporary MT stations, which will be installed for one-month periods within the Transportable Array. After the deployment, the temporary MT stations will move to new locations, eventually covering the continental US. Proposals will be requested soon for an MT pilot project in Oregon.

Premier Issue of *onSite*

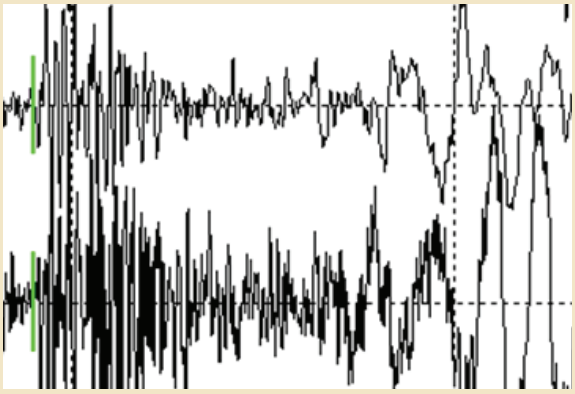
EarthScope announced the release of the premiere issue of *onSite*, a newsletter specifically for landowners hosting EarthScope stations. Published four times a year, the newsletter will focus on keeping landowners up to date on the project's progress and illustrating how the stations are contributing to the project. The first issue concentrates on providing an overview of the different instruments EarthScope is installing.



The EarthScope publication onSite is designed for landowners working with the project.

Fault-zone-guided Waves Observed at Depth

Deep within the EarthScope San Andreas Fault Observatory at Depth, the first direct observation of fault-zone-guided waves at depth within the San Andreas Fault have been made. Acting like an organ pipe tuned to a specific frequency of seismic energy, the waves are from an earthquake 4 km away. The observations indicate that the extensive San Andreas Fault Zone is connected at depth. The recordings will lead to a better understanding of the different physical properties that exist between the fault rock and the surrounding country rock.



Seismograms from the fault-zone-guided waves.

A. Day-Lewis examines core at the workshop.

Strainmeter Coring vs. Logging Meeting

With 8 months of data available from the first 10 EarthScope Plate Boundary Observatory borehole strainmeters, a meeting was held to determine whether the practice of coring a substantial part of every strainmeter borehole is necessary for the purposes of choosing suitable boreholes, choosing installation intervals, and helping to interpret strainmeter data. Findings from the meeting are expected in April.

First Borehole Strainmeters in Oregon

As the Transportable Array moves northward from Oregon to Washington, installation of the borehole strainmeters progresses southward. The first borehole strainmeters have been installed in Oregon to capture the southern extent of the episodic tremor and slip events. Data from the borehole strainmeters installed in Washington, including the time period covering the most recent episodic tremor and slip event, are available through the EarthScope website.

The borehole strainmeter team in Oregon.

Seismic Borehole Drilling Begins in Kansas

Drilling of ANSS Backbone seismic boreholes has begun on the Konza Prairie Reserve, a Long-term Ecological Research Program site in Kansas. Two boreholes are being drilled: a 100m hole to house the main broadband seismometer, and a 30m hole to house a backup seismometer. By installing the seismometers below the surface, noise is reduced, allowing for the detection of smaller, long-period, teleseismic earthquakes. Installation of the instruments is expected in April 2006.

Drilling the seismic vault in Kansas.

Installing the Stage 1 instruments in the Pilot Hole.

Stage 1 Instruments Reinstalled

The Stage 1 instrument package has been reinstalled in the EarthScope San Andreas Fault Observatory at Depth Pilot Hole. The package contains a 3-component seismometer and a 2-component tiltmeter. Earthquakes recorded by the instrumentation will be used to determine the exact locations of the target earthquakes and where the multi-lateral boreholes will be drilled. Drilling of the multi-laterals towards the target earthquakes will begin in the summer of 2007.

Sampling San Andreas Fluids

At the EarthScope San Andreas Fault Observatory at Depth, fluid and gas samples were captured from a measured depth of approximately 9,600 feet to 12,500 feet. By sampling at depth, scientists are able to measure the gas and fluid being emitted by the rock formations surrounding the borehole. The samples also reveal the source of the fluids in the casing. After the location of the source is determined, the fluids in the borehole will be replaced with an inert fluid and an inflatable plug will be inserted near the bottom of the borehole to prevent further contamination from the formation fluids.

Collecting fluid samples from the San Andreas Fault.

Transportable Array Near Crater Lake

Just 79 miles from Crater Lake, an EarthScope Transportable Array station was installed near Umpqua, Oregon. Crater Lake's tectonic location is at the intersection of the Cascade Volcanoes and the Klamath Graben. The seismic data collected at the station will provide insight to the tectonic regime, the shallow magma chamber beneath Crater Lake, and its relationship to regional volcanism.

Verifying installation of a Transportable Array seismometer.

Eric Calais joins the EarthScope Facility Executive Committee.

Welcome Eric, We'll Miss You Paul

The EarthScope Project welcomes Eric Calais, an Associate Professor of Geophysics at Purdue University, to the EarthScope Facility Executive Committee. Eric is replacing Paul Silver as the Plate Boundary Observatory Representative. As Paul departs, the EarthScope community extends their deep appreciation for his enthusiastic support of, and commitment to, the EarthScope Project.

USARRAY INTERNAL SITE REVIEW

A review of USArray was conducted by the EarthScope Facility Executive Committee (EFEC) as part of their Year 2 Quarter 2 meeting at the IRIS Data Management Center in Seattle, WA.

Statement of EFEC

EFEC thanks the IRIS Data Management Center for hosting the quarterly meeting. The IRIS Data Management Center is a state of the art facility that is professionally run, efficient, and a valuable asset to both IRIS and EarthScope.

The EFEC was highly impressed by the strong effort towards completion of the ANSS Backbone, acquisition and field testing of the Flexible Array, and progress towards the installation of new Transportable Array stations in California.

The EFEC continues to be impressed by the quality and level of commitment on the part of the scientists, engineers, administrators, and technicians implementing USArray – both full-time USArray employees and those who split their time between IRIS and EarthScope activities. While the EFEC has concerns about the management structure as specified below, none of these concerns should be interpreted as a criticism of the people implementing USArray.

USArray Management Structure

While IRIS's model is to implement USArray through its pre-existing structures, it must be recognized that USArray funding and activities exceed those of the pre-existing activities. USArray now comprises approximately three-quarters of their budget and will continue to do so for the foreseeable future. The EFEC has severe reservations as to whether IRIS's current model is sustainable. Accordingly, we make the following recommendations.

The EFEC recommends that IRIS re-examine its management approach. In particular, IRIS needs to name a USArray Program Manager at the level of the other IRIS program managers to manage what has now become IRIS's largest program. This position should have overall authority and responsibility for USArray budget and implementation. IRIS staff with full-time responsibilities to USArray should report to this new position. The USArray Program Manager would work with other IRIS program managers in implementing the USArray program, just as current IRIS managers work with each other to implement their programs. For example, just as the PASSCAL Manager works with the Data Management Center Manager on PASSCAL data issues, so the USArray Program Manager would work with the Data Management Center Manager on USArray data issues.

In addition, IRIS needs to establish a USArray Standing Committee, at the level of the other Standing Committees that provides technical and financial oversight. The current USArray Advisory Committee could be modified with new membership and a charge appropriate to this expanded role.

The EFEC notes that the "apparent absence of a comprehensive organizational structure with lines of authority and reporting responsibility clearly defined" were noted as concerns at the last USArray site review.

IRIS Response:

We thank EFEC and NSF for their thoughts about the management structure for USArray. As experience has been gained in the course of IRIS' execution of USArray over the past two years, we recognize that several adjustments to the management structure are warranted. To improve the overall management of USArray project, the IRIS Board of Directors has endorsed the following steps:

Management Reorganization for USArray Overall

- A USArray Project Director (Robert Woolley) has been appointed to act as the primary point-of-contact between USArray, the EarthScope Office, and the other EarthScope components. He will be responsible for all USArray reporting and coordination of USArray planning within the IRIS programs. This dedicated effort should address some of the perceived failings of the current diffuse organizational structure.
- The USArray Advisory Committee will continue to provide high-level oversight of USArray and provide advice to the Board of Directors regarding the way in which the implementation of USArray is supporting the overall science goals of EarthScope.

Management Reorganization for Transportable Array

- A Transportable Array Manager (Robert Busby) has been appointed with responsibility for all budgetary and managerial aspects of the Transportable Array procurement, siting, installation, deployment, and maintenance. The Transportable Array Manager will report to the IRIS President as Principal Investigator for USArray. Additional staffing will be provided to assist in project management and siting aspects for the Transportable Array.
- A Transportable Array Working Group will be established to provide advice to the Transportable Array Manager. This working group will be constituted under and report to the IRIS Coordinating Committee.

Management for Magnetotelluric Element

- A USArray Magnetotelluric Manager (Shane Ingate) will be responsible for coordination of magnetotelluric activities and oversight of the portable magnetotelluric program. The Magnetotelluric Manager will report to the IRIS President as Principal Investigator for USArray.
- A Magnetotelluric Working Group will be established to provide advice to the Magnetotelluric Manager. This working group will be constituted under and report to the IRIS Coordinating Committee. We will explore having this established as a joint working group of IRIS and EMSOC, the electromagnetic consortium.

These improvements in the management of USArray will clarify the lines of authority within USArray and improve the reporting to EarthScope and NSF, while retaining the strong links between USArray and the existing IRIS program structure. USArray is being implemented as a large and complex project that extends across all of the IRIS core programs. This integration between USArray and the core IRIS programs, as clearly presented in the MREFC proposal, was highlighted as a positive aspect of the EarthScope structure in reviews of that proposal. It is designed to maximize integration with the IRIS core programs so as to gain experience, resources, and efficiency and ensure minimum impediment to access data and facilities for researchers. Thus, the ANSS Backbone is managed as part of the GSN program; the Flexible Array is managed as part of the PASSCAL program; data archiving and distribution is handled through the Data Management System; and siting outreach through E&O. Funding for USArray approximately doubles prior NSF funding levels for IRIS, but a very large fraction of this is associated with the Transportable Array element of the project.

The positive comments from the EFEC and NSF on the accomplishments to date of USArray indicate that the integration with the core IRIS programs is working well in most areas. As EFEC and NSF have pointed out, the data management activities, Flexible Array and ANSS Backbone all fit well within the core IRIS programs, and these efforts are well on-track and no significant management issues have been demonstrated. However, in both size and mode of operation, the Transportable Array is the one element of USArray that significantly departs from traditional IRIS activities and programs. The magnetotelluric component, while not a significant part of the overall budget, is also a new area for IRIS. Thus, the primary changes being implemented in USArray management focus on these two areas. An ANSS Backbone Working Group (with joint University and USGS membership) has well-served GSN efforts in deploying the ANSS Backbone, and this serves as a model for the new Transportable Array and Magnetotelluric Working Groups.

Coordination with EarthScope

EFEC feels that coordination between USArray and the other elements of EarthScope can be improved to facilitate cost-savings, scientific opportunity, and to standardize management/reporting practices. To help promote further synergy, the EFEC recommends that those responsible for operational activities (e.g., Kent Anderson and Robert Busby) participate routinely in EarthScope Operations Conference Calls to interact with their counterparts and to improve coordination and communication across EarthScope.

For example, USArray should work with PBO on GPS and seismic collaboration and installation of the approximately 16 collocated sites, so that stations such as Dugway do not slip through the cracks. The EFEC suggests a scheduled semiannual coordination meeting/conference call with USArray ANSS Backbone staff and PBO.

IRIS Response:

USArray will continue to interact with and better document the collaborative activities with other EarthScope components. Upon detailed assessment, it is clear that coordination has actually been much more extensive for the ANSS Backbone and Transportable Array operations than was conveyed in the USArray review. Whenever viable, improved collaboration will be pursued.

The newly designated USArray Project Director will participate in all EarthScope operational activities and coordinate communication between USArray personnel and EarthScope operational personnel. Key operational personnel will continue to be encouraged to participate in weekly EarthScope Operational Conference Calls when available. In particular, key personnel will make special effort to be available for participation in discussion of relevant topics included as agenda items distributed prior to the meetings.

USArray has already organized coordination meetings between USArray ANSS Backbone, PBO, and USGS ANSS staff and will take responsibility for scheduling these, as recommended, on a semi-annual basis.

Commitment of USGS

The lack of a firm commitment on the part of the USGS for the long-term support of the ANSS Backbone stations creates serious uncertainties about the sustainability of these stations. The EFEC recommends that USArray work with the EarthScope Office to encourage the NSF and USGS to work out a clear agreement about how these stations will be maintained, and that this agreement include specific performance goals and reporting requirements.

IRIS Response:

USArray has continued to interact with USGS to secure a stronger commitment for the long-term USGS support of ANSS Backbone stations. The NSF-USGS Memorandum of Understanding indicates an intention by the USGS to request funding to support these activities starting in Fiscal Year 2008, and it is our current understanding that USGS is in the final stages of developing a more specific commitment as part of long-term ANSS plans. IRIS is prepared to work with NSF and EarthScope as necessary to formalize the funding and performance commitments. This may be an appropriate topic for discussion by the Joint ANSS-EarthScope Working Group on Seismic Data Integration, created by the EarthScope Office in 2004, which to our knowledge has not yet met. IRIS is ready to assist NSF in any coordination with the USGS that is desired.

USArray Reporting

The EFEC requests that IRIS confirm that its equivalent station measures accurately reflect its goals and accomplishments each month for a) site reconnaissance, b) permitting, c) site preparation, and d) installation, and are meaningful measures in terms of marking progress towards station installations.

It is EFEC's impression that the equivalent station metric is being implemented by USArray in a way that may be inconsistent with the other EarthScope elements and does not give sufficient weight to progress toward installation in the field. For example, USArray siting and permitting represents only 7% of an equivalent station, while equipment purchase is 51%. For PBO siting and permitting is 40%, and equipment purchase is 10%. The EFEC feels that equivalent stations should accurately represent progress towards permitting and installing stations, rather than merely representing dollars spent (e.g., equipment purchases).

In addition, the EFEC is concerned about the manner in which IRIS appears to be using the change control process. For example, IRIS's practice of not freezing their baseline below Level 2, the baseline that is reported to NSF, reduces transparency and the ability to drill down through the WBS to clearly identify the source of variances. The EFEC recognizes that the agreement reached in the May 4, 2005 meeting will now resolve this issue. In addition, IRIS's change order USArray-011, which took a transfer in excess of the change control threshold and split it into separate transactions below the threshold, violated the spirit of the change control process. IRIS needs to resubmit change order USArray-011 as requested by EarthScope Management, and have that change order pass through the full change order process.

IRIS Response:

Modifications to and strengthening of the baseline budget, milestones, and equivalent station metrics for USArray will be part of materials developed for the NSF Management and Baseline Review to be carried out in September 2005.

IRIS has agreed to adhere to the EarthScope-wide procedures agreed to for change control (May 4, 2005), including freezing the baseline below Level 2 on an annual basis. Change order USArray-011 to fund ANSS Backbone Magnetotelluric has been disapproved. USArray is clarifying its magnetotelluric plans as discussed below and will submit new change orders to implement the plan as necessary.

Performance Measures

USArray needs to formalize objective, quantitative performance goals (e.g., percent data recovery, station up time) for the operations and maintenance of its stations; and how its maintenance strategy is designed to meet those goals. Without such goals, the EFEC does not understand how IRIS has determined the required level of effort to support its O&M activities, nor how IRIS can objectively measure its performance.

IRIS Response:

USArray has worked with EarthScope Office and the other components of EarthScope to establish performance goals. Standard IRIS procedures have now been implemented as part of routine reporting requirements.

USArray Information Specialist

The EFEC is concerned about duplication of effort between the USArray Information Specialist and activities already underway within the EarthScope Office. The EFEC questions whether this position justifies a full-time employee. The EFEC suggests that USArray work with the EarthScope Office to meet USArray needs for outreach to landowners. The information provided to landowners is an opportunity to make the general public more aware of EarthScope overall, rather than to be focused solely on USArray.

IRIS Response:

IRIS is pleased to work with the EarthScope Office to make the general public aware of EarthScope. As part of the re-structuring of overall USArray and Transportable Array management, we will clarify with the EarthScope Office the responsibilities for providing information on activities that can be used for EarthScope outreach and publicity. IRIS E&O will continue to work with EarthScope E&O to integrate broader EarthScope content in activities such as the IRIS museum display, IRIS Educational Affiliates program, IRIS one pagers, IRIS Seismometer in Schools program, and IRIS teacher training.

The primary need for USArray staffing resources in this area, however, is as part of very specific siting and permitting activities for the Transportable Array (see below). IRIS has developed a plan for state-based siting and permitting activities that involves direct interaction with universities and other public entities on a regional basis. Dedicated personnel, familiar with the specific requirements of seismic station siting and working closely with Transportable Array personnel, are required for this task, distinct from general EarthScope outreach to the public.

In response to comments received, the task of communicating adequately with the Transportable Array site owners will be added to the services provided to the Transportable Array by USArray Siting Outreach instead of being performed independently within the Transportable Array organization as presented at the review. In lieu of adding a separate information specialist position within the Transportable Array organization, Siting Outreach staff will be supplemented to provide this needed siting support, while working closely with EarthScope E&O to provide more general materials for EarthScope outreach and reporting.

Magnetotelluric Stations

EFEC is concerned that the magnetotelluric activities of the Transportable Array are poorly defined and the increase in costs are likely to deleteriously impact the other USArray activities. EFEC suggests that USArray adopt an approach to the magnetotelluric installations along the lines of the strainmeters – namely that the funding for magnetotelluric is fenced and that increases in costs are accomplished through reduction in the magnetotelluric activities rather than through obtaining funds from the other parts of EarthScope or USArray activities. Such a strategy should be developed by USArray, presented to the EFEC, and proposed as part of the baseline review process.

IRIS Response:

The magnetotelluric component of USArray will be conducted with a distinction between permanent backbone sites and portable instrumentation. Change orders are in process to clarify the funding for the permanent magnetotelluric stations. Plans are under development to specify the details for implementation of the portable magnetotelluric activities, which will be presented to EFEC and NSF for review.

In particular:

- The 10 magnetotelluric backbone stations will be integrated with the activities of the USArray contributions to the ANSS Backbone network. This effort is being carefully planned and coordinated with the USGS. A siting plan is currently being developed and will be presented to EFEC and NSF for approval.
- The portable magnetotelluric equipment will be used for temporary deployments (18 month) at or near a subset of 10 Transportable Array stations. The 20 additional sets of instrumentation will be deployed for one month at additional Transportable Array stations or other sites, as permitted by the fixed funding level for the magnetotelluric project overall. In all cases, special permitting may be required for the magnetotelluric observations and co-location with Transportable Array sites will not be a requirement. The siting plan will be coordinated with the magnetotelluric community to ensure the optimal scientific return.

We agree that all magnetotelluric operations should be developed within a fenced funding profile. The Magnetotelluric Working Group will provide advice on how these activities should be carried out. Our objective will be to conduct the magnetotelluric effort as defined in the MREFC proposal within the context of funding limitations, scientific guidance from the community, and experienced gained by initial deployment of instrumentation.

Permitting

EFEC still views permitting of Transportable Array stations as a major source of risk to the project. USArray Transportable Array needs a more aggressive permitting plan. The EFEC recommends that USArray acquire permits further in advance and accumulate a large inventory of permits to facilitate site installation planning. For example,

obtaining the permits for all the USArray sites in Nevada would be a useful test case for evaluating the difficulty in obtaining permits.

IRIS Response:

USArray has developed a plan for siting and permitting that is coupled to the schedule and needs of USArray. Because of the shorter duration of installations (< 2 years) and the less stringent constraints on location, USArray has not encountered the same problems with permitting as experienced by PBO. The experience to date has been that permitting requires significant attention and care, but the scheduling of permits far in advance has not been necessary. In fact there are advantages, especially with private landowners, in having a short-time lapse between requesting permission and installation.

USArray has already embarked on three new state-wide permitting exercises – in Nevada, Oregon, and Arizona – and similar activities will soon be initiated in Washington and Idaho. The progress to date in Nevada and Oregon has been very satisfactory. The value of engaging the community in this effort should not be underestimated; participatory efforts are the hallmark of IRIS program successes of the past.

USArray Installation

EFEC is concerned that the installation strategy of two teams of two to install 20 stations per month may not be sustainable. For example, such a plan does not account for difficult installations, staff attrition, loss of key contractors, etc.

The model for having students pick sites is useful for E&O activities; however, the EFEC feels that the magnitude of the job facing USArray requires a more professional approach to permitting and siting. Students or contractors will come with little or no experience in siting, which could result in heterogeneous reconnaissance, permitting, contacting, construction, and installation plan, leading to vastly different levels of station performance.

IRIS Response:

The plan for Transportable Array siting, permitting, site construction, and station installation that was presented to the EFEC at the meeting in Seattle was developed after a careful assessment on the labor efforts required based on a year's experience with Transportable Array operations in California and the Pacific Northwest. The plan is a staged and coordinated approach involving full time USArray staff overseeing separate contractor teams for site construction and installation. The continuity of permanent USArray staff, combined with the flexibility of contractor personnel, was explicitly designed to allow for seasonal and site-specific variations in level of effort. The full complement of personnel involved in Transportable Array installation is not two teams of two – this applies only to the initial stage of installation through EarthScope Year 3. It grows to three teams in Year 4 and four teams in Year 5 and beyond, to support the escalating installation rates needed to meet the deployment schedule identified in the MREFC proposal. Note that this schedule requires installation of 140 stations in Year 3, 160 stations in Year 4, and 200 stations per year thereafter, never reaching a rate of 20 installations per month. In addition, six teams of two people are included in the plan for site construction and installation and 21 FTE's will be supporting siting, permitting, and other logistic support tasks.

The USArray plans for siting and permitting involves a coordinated effort between state-based activities, consultants, and professional USArray staff. The organized engagement of universities, either through students or staff related to regional network operations, is proving to be a very effective method of contacting local agencies, selecting appropriate sites and encouraging broad participation in USArray. This effort involves well-organized planning and training prior to the site selection activities. USArray staff carries out final permitting and review of all sites. At present, all indications are that this strategy is indeed achieving excellent results of professional quality.

SAFOD INTERNAL SITE REVIEW

A review of SAFOD was conducted by the EarthScope Facility Executive Committee (EFEC) as part of their Year 2 Quarter 3 meeting at Stanford University in Stanford, CA.

Statement of EFEC

The EFEC congratulates the SAFOD team for successfully achieving the major accomplishment of drilling through the San Andreas Fault at seismogenic depth (Phase 2). This accomplishment is impressive given the inevitable uncertainties associated with drilling through a plate boundary, and given that the team was able to accomplish this task within 5% of their predicted budget and schedule in an environment where it is common for industry drilling costs to have overruns of 100%. SAFOD skillfully managed the difficulties it encountered.

We are also impressed at how the SAFOD team works so efficiently together with complimentary skill sets and the ability to fill in for each other as needed. In particular, the EarthScope Project Director and the EarthScope Office appreciate the continuous updates and the extent to which SAFOD is transparent both with their accomplishments and the problems that they encounter. SAFOD has made its Advisory Committee meetings, Sample Party meetings, daily progress reports, and drill site open to the Project Director, EarthScope Office, and EFEC.

EFEC commends the SAFOD Principal Investigators (PI) for their active role on issues of concern to the project as a whole, often on topics that are not of primary relevance to SAFOD. The EFEC would also like to acknowledge the contributions of Charley Weiland. Charley has played a significant role in refining the project management of EarthScope overall, taking the lead for EarthScope on such topics as risk analysis, and working with the EarthScope Office to improve reporting metrics.

The EFEC also recognizes the success of SAFOD in leveraging NSF funds with the US Geological Survey (USGS) cooperation, international support (e.g. funding the Pilot Hole), and commercial organizations such as the 80-element, 3-component Paulsson Array.

SAFOD Funding Constraints

The EFEC recognizes that the failure of the top drive for 15 days, being stuck for 4.5 days at 12,300 feet, the high-volume of rain from last year, and the problems with the borehole stability will likely result in cost overruns. As SAFOD makes further plans for 2007 (Phase 3) and the multi-lateral coring, the EFEC strongly encourages SAFOD to develop these plans to fully exploit the scientific potential of the observatory and not pre-emptively reduce scope to meet the current SAFOD budget constraints. The EFEC would like to work with SAFOD in identifying the appropriate balance between scientific return from SAFOD and potential cost overruns. The role of the EFEC is to make decisions that are in the best interest of EarthScope overall. Accordingly, SAFOD should not assume that the only funds accessible are those that were originally budgeted for SAFOD.

Sample Measurements and Analysis

Core measurements and analysis are to be funded by NSF supported proposals through the peer-review process and by the USGS. The SAFOD Advisory Board has recommended to NSF that SAFOD prepare a prioritized list of critical sample measurements. The EFEC strongly supports this recommendation. We request that the USGS provide a list of the measurements and analysis that the USGS plans to undertake and the process and schedule for making those measurements openly available.

SAFOD Response:

At the request of NSF, a prioritized list of critical sample measurements is now being prepared by the SAFOD Advisory Board. The SAFOD Advisory Board is drafting their recommendations starting with a list of critical sample measurements developed by organizers of the NSF-funded SAFOD Sample Analysis Workshop held October 8-9, 2004. NSF funded this

workshop with the express purpose of obtaining advice on sample analyses – to be conducted both in near-real time at the drill site and at a later date as part of PI-driven research projects – that was independent of the SAFOD management team. The Advisory Board will pass a draft of their list on to the SAFOD management team for commentary before delivering their final recommendations to NSF.

NSF felt that having the SAFOD Advisory Board develop this list of critical measurements in consultation with conveners of the October 2004 workshop was needed to avoid any conflict of interest problems that might be associated with the SAFOD management team preparing such a list. Once approved by NSF, this list will be posted on the SAFOD/International Continental Scientific Drilling Program (ICDP) and EarthScope websites. This list will be annotated to indicate which of these investigations are currently being conducted by scientists at the USGS (as requested above), US universities, and other institutions in the US and abroad.

Locations of Target Earthquakes and Multi-lateral Holes

The EFEC is concerned that the locations of earthquakes have not been refined to the level that was previously anticipated. Improved locations will be essential for evaluating the locations of the multi-lateral holes and the long-term monitoring instrumentation packages. While the installation of seismic instrumentation in the drill hole and monitoring through 2007 are assumed to improve the locations, it is not proven that the final earthquake locations will be of sufficient accuracy to insure that the multi-lateral holes penetrate the locations of the target earthquakes.

SAFOD Response:

Determining precise absolute locations of the target earthquakes has proven to be an extremely difficult and challenging research problem due to the strong small-scale velocity heterogeneity within the fault zone. The velocity logs obtained in Phase 2, in particular, reveal very rapid fluctuations in velocity across the fault zone that will need to be incorporated in future forward and inverse models. Recordings of earthquakes in the target zone in December 2004/January 2005 on the Stage 2 sonde and by the Paulsson/Geophysical Services Inc. Array in May 2005 demonstrated the importance of particle motions for constraining absolute locations (they tell us the ray direction). We will redeploy the Stage 2 sonde in January much closer to the target than before to collect these critical data. Additional shots for virtual earthquakes are also planned later in 2006.

Paulsson Array Data

The Paulsson Array data and the evidence it may provide for observing non-volcanic tremor along the San Andreas Fault is one of the exciting early EarthScope results. The EFEC urges SAFOD to work with the IRIS Data Management System to make these data publicly available as quickly as possible, and to work with the EarthScope Office in making the implications of the data broadly known for both scientific and educational purposes.

SAFOD Response:

From April 29 to May 11, 2005, an 80-level 3-component geophone array from Paulsson Geophysical Inc was deployed in the SAFOD Main Hole. With geophone spacing of 50 ft, the array had an aperture of 4,000 ft and was located at depths from 5,047 to 7,754 ft below ground level. The experiment had three phases: a “zero offset” VSP using small explosives at SAFOD, an active-source experiment using 13 large (80lb) shots to create “virtual earthquakes” using the PASO TRES array, and a passive listening phase for the last 10 days of the deployment. All data were recorded on Geode recorders generously provided by Geometrics, Inc., at 0.25 millisecond sampling rate in 16 second long data records in industry standard SEG-2. During the passive recording phase, approximately 85 microearthquakes were recorded with the array. The total data volume produced during the experiment is approximately 3 TB. Through the generous support of the IRIS Data Management Center, all these data are now available to the public as assembled data set “SAFOD-PGD”. The data can be found on the IRIS website http://www.iris.edu/SeismiQuery/assembled.phtml using search terms SAFOD, or the IRIS report number 05-22.

Sample Locations and Inventory

The EarthScope Project Office would like to work with SAFOD to insure that the EarthScope Information System has a comprehensive and authoritative listing of where all SAFOD samples are at any given time.

SAFOD Response:

Such a list already exists and is continuously being updated by the curatorial staff at the Integrated Ocean Drilling Program Gulf Coast Repository, where all the SAFOD samples are being stored. This list has been provided to NSF and EarthScope management, and we would be happy to work with the EarthScope Project Office to facilitate incorporating this list into the EarthScope Information System.

ICDP

Now that SAFOD has completed Phase 2 and the EarthScope Information System has been established, the EarthScope Project Office will work with SAFOD to migrate SAFOD information to the EarthScope Information System.

SAFOD Response:

Scientific drilling projects such as SAFOD involve a wide variety of data that are somewhat unique. The Drilling Information System (DIS) of the International Continental Scientific Drilling Program (ICDP) has, and will continue to provide a critically important resource for the SAFOD project at no cost to EarthScope. The DIS has been the primary mechanism for keeping track of drilling and scientific activities at the site, including a database for all drilling and on-site geologic data (sample descriptions, cuttings and core photographs, etc.) as well as geophysical logging data. Through the DIS, the SAFOD management team has made all of this information freely available to the global scientific community through an easy-to-use web interface that is reached easily from the EarthScope webpage.

As part of the permanent geophysical data center managed by GeoForschungZentrum in Potsdam, Germany, these data (along with those from other ICDP projects) will be stored in perpetuity. A new data information system is being developed by ICDP (a so-called data WebHouse) and all ICDP project data will be moved to this facility. Among the new system capabilities that will be made possible by the WebHouse will be a relational database for all borehole-related geologic and geophysical data. At this time it doesn't seem necessary, or perhaps desirable, to develop other data storage and retrieval systems. However, should appropriate data storage and retrieval systems be developed elsewhere, it should be relatively straightforward to port the data on the ICDP system to a new system.

Announcing Scientific Opportunities

EFEC encourages SAFOD to have a larger and broadly advertised meeting to inform the community on opportunities resulting from the SAFOD experiment, specifically including:

- Samples procedures and opportunities from both spot cores and side-wall cores
- Data availability from Paulsson Array
- Opportunities for use of Pilot Hole
- Limited-time availability of borehole east of the fault zone

SAFOD Response:

There are a variety of mechanisms that will be used to accomplish this. These include presentations at the 2005 national Geological Society of America, Society for Economic Geology, and American Geophysical Union meetings, and similar meetings in the future. In each case, the availability of SAFOD data and the opportunities for research are emphasized. In addition, an article is being prepared for *EOS* that is intended to inform the scientific community about

the status of the SAFOD project as well as the availability of data sets, samples and other opportunities for scientific involvement. Finally, the availability of SAFOD data will be advertised on the EarthScope website.

Equal Data Access

SAFOD needs to make sure (and publicly advertise) that all data and samples are made available on an open and equal access basis with no artificial delay and with no group having advantageous access.

SAFOD Response:

All of the fundamental data collected during the experiment are freely available to the scientific community. They are accessible via the ICDP website (as described above) and a variety of mechanisms are being used to inform the scientific community about these data (also described above).

Side-wall Cores

Strategies to manage the side-wall cores need to be established to optimize their use for the community. The EFEC encourages SAFOD to continue to develop mechanisms for the use of limited core by interested PIs.

SAFOD Response:

The process for handing and distributing the precious SAFOD side-wall cores acquired during Phase 2 is already underway. Scientists from the USGS, working in close collaboration with University scientists, have already photographed, thin sectioned, and created preliminary petrographic descriptions of selected side-wall cores to document their condition and to map out the distribution of potential contamination from cuttings and drilling mud in preparation for the Phase 2 Sample Party to be held December 4, 2005. In accord with the SAFOD Sample Policy recently developed by NSF (in consultation with the SAFOD management team), all requests for side-wall cores will be submitted to the NSF EarthScope Program Manager, who will then decide on the initial distribution of samples. The EarthScope Program Manager will consult with the SAFOD Sample Committee and SAFOD Sample Manager during this process, where appropriate.

NSF/USGS Roles

SAFOD should address the on-going need for clarification on the specific activities, level of effort, and contributions being made by the US Geological Survery for SAFOD operations.

SAFOD Response:

The roles and responsibilities of the US Geological Survey (USGS) and the National Science Foundation (NSF) in matters related to EarthScope are defined in the *Annex on EarthScope to the Memorandum of Understanding between The National Science Foundation and The United States Geological Survey Regarding Cooperation in Development and Support of Research Activities, Facilities, Education and Outreach For the Earth Sciences.* The USGS responsibilities are defined under Section 8.3:

> *8.3 San Andreas Fault Observatory at Depth: Building on more than 15 years of detailed scientific investigations conducted as part of the USGS Parkfield Earthquake Experiment, the USGS is committed to playing key leadership, scientific and technical roles in SAFOD. In particular, USGS cooperation and collaboration in SAFOD will be achieved through the continued support of USGS scientists as SAFOD co-investigators and through the direct involvement of USGS scientists in all aspects of the SAFOD experiment, including laboratory rock mechanics, borehole geophysics, geochemistry, seismic and potential field imaging, earthquake seismology and geologic mapping. The USGS will also collaborate with NSF-funded*

institutions in the long-term operation and maintenance of SAFOD, through installation and routine maintenance of the SAFOD surface facility (building, power, security, etc.) and data telemetry systems by USGS field personnel. This will ensure that the infrastructure necessary to support SAFOD monitoring systems is well maintained and that the resulting data streams are fully integrated into existing long-term USGS monitoring efforts at Parkfield. The USGS will also be responsible for making annual payments on the lease for the SAFOD site, up until the year 2021 when this lease expires.

The USGS meets these obligations through a variety of means and activities.

1. Our full-time employee stationed in Parkfield, Andy Snyder, maintains landowner relations and serves as point of contact for all field activities in the Parkfield region, including SAFOD. He currently spends approximately half of his time working on SAFOD matters or supporting other EarthScope-related needs.

2. USGS explosive handlers and field technicians provided critical assistance for a multiscale, international active-source experiment conducted through SAFOD and across the San Andreas Fault in October/November 2003. USGS explosive technicians also handled all of the controlled source work at SAFOD in 2005. This included all shots for the virtual earthquake experiment of Roecker and Thurber for PASO TRES and zero-offset VSP shots into the Paulsson/GSI Array.

3. The Northern California Seismic Network provides technical support and maintenance to the SAFOD site. Specific activities in 2005 included installation of a new tower and cell phone antenna, replacement of the existing USGS-purchased uninterruptable power supply with a better and larger capacity system, reconstruction of the power back-up generators, and installation of a wideband radio link to the outside world through the telemetry hub at Carr Hill. Over $30,000 was spent for this purpose on hardware alone in 2005.

4. Northern California Seismic Network scientists are also building the seismic data management system for the permanent seismic monitoring system. We plan to install the initial system to transmit decimated seismic data to Menlo Park for use in the Parkfield experiment and California Integrated Seismic Network monitoring operations in January. Over $30,000 was spent on hardware for SAFOD data management in 2005.

5. USGS research scientists were deeply involved in all aspects of SAFOD in 2004 and 2005, most heavily during Phase 1 and 2 drilling operations. Much of this work results in public data sets such as the mineralogical descriptions, photographic, and physical property scans, and reference thin sections of cuttings and core obtained during both Phases. These USGS-developed data sets and sample descriptions provide key input into the Phase 1 Sample Party held in February 2005 and the Phase 2 Sample Party planned for December 2005.

6. The two co-PIs on SAFOD (S. Hickman and W. Ellsworth) are USGS employees, and have been intimately involved in every aspect of SAFOD from its inception back in 1992. The USGS Earthquake Hazards and Deep Continental Studies Programs, in particular, have supported the salaries and other costs involved with participation of Ellsworth and Hickman – along with numerous other USGS employees – in all aspects of SAFOD site characterization, project planning, and implementation. This includes working with other agencies and with potential PIs on the project to develop an integrated science and management plan, funding of site characterization activities along segments of the San Andreas Fault potentially suitable for drilling of the SAFOD borehole, supervising environmental approvals and permitting for SAFOD, and conducting workshops to help develop site characterization activities and borehole monitoring instrumentation for SAFOD. Estimates of the amount of money spent in support of SAFOD site characterization, permitting, planning, workshops, and project management over the past 13 years are in excess of $4 million.

EARTHSCOPE MANAGEMENT INTERNAL SITE REVIEW

A review of EarthScope Management was conducted by the EarthScope Facility Executive Committee (EFEC) as part of their Year 2 Quarter 4 meeting in Washington, DC.

Statement of EFEC

This is the second annual review of the EarthScope Facility Office. As highlighted in the EarthScope Facility Office presentation, there has been significant progress in developing the activities within the EarthScope Facility Office and an impressive array of accomplishments during the past year. The EFEC compliments all EarthScope Facility Office staff on the pivotal role that they have played in ensuring the overall success of EarthScope. They have done an excellent job of developing materials to represent EarthScope and in presenting EarthScope to the scientific community and the public at large.

EarthScope Management Response:

The EarthScope Office appreciates such recognition from the EFEC.

EarthScope Management

The central role of the EarthScope Facility Office in implementing management tools and practices, consolidating the facility reporting, organizing the successful EarthScope National Meeting, initiating the EarthScope education and outreach efforts, and in setting up the EarthScope Information System within the EarthScope website are all applauded by the EFEC.

EarthScope Management Response:

Once again, we thank the EFEC for recognition of these accomplishments.

Management Workload

The EarthScope Facility Office staff is working incredibly hard. The results of this effort are impressive, but we continue to be concerned that the level of effort is not sustainable. To meet the appreciable reporting requirements for EarthScope activities, we acknowledge (and appreciate) the effort associated with amount of information that must be collated, synthesized and presented in a cogent manner. That said, we encourage the EarthScope Facility Office staff to investigate ways to reduce the amount of reporting material being prepared and distributed on a regular basis. There is consequently a need for prioritization in some of the efforts; we encourage the EarthScope Facility Project Director to work with the EFEC to identify the EarthScope Facility Office efforts that are most important to the overall goals of EarthScope.

EarthScope Management Response:

The EarthScope Office staff is working incredibly hard and is deeply committed both to the overall construction and the scientific success of EarthScope. At the time that the management structure was developed, the Large Facility Guide was not available and many of the requirements we now face had not been identified. The staff has been remarkably flexible in adapting to our changing environment, learning new skill sets, and assuming multiple responsibilities. We are limited by a) the lack of a professional cost-schedule manager, b) a single IT professional to handle all of our needs, and c) a management budget that is approximately 40% of what is customary for MREFC Projects. It was our hope that NSF would recognize these critical needs during the review of our O&M proposal and provide the resources to correct these deficiencies. Until then, the Project Director would welcome the EFEC to identify specific efforts that are not required under the terms of the Cooperative Agreement, are not considered essential for the success of the EarthScope Project, or have not been subsequently imposed by NSF.

Management Leadership

We would like to acknowledge the incredible level of effort and dedication that Greg and the entire EarthScope Facility Office staff commit to EarthScope. We are pleased to note that Greg's teaching commitments at Princeton University in the autumn of each year (carried out using his personal vacation time) have had no adverse affect on EarthScope activities. Moreover, we commend the Project Director's efforts to remunerate, and otherwise reward and acknowledge, the EarthScope Facility Office staff for the appreciable work and excellent jobs they are doing.

EarthScope Management Response:

Project Director thanks the EFEC for their recognition. EarthScope is blessed with staff of extraordinary quality and dedication.

Communication with EFEC

There is a need for more effective interaction between the EarthScope Facility Project Director and the EFEC regarding setting project priorities and long-term planning. Although we share responsibility for the decision, the loss of weekly conference calls has led to a weakening of EFEC oversight and problem resolution. It is imperative that Greg as Chair of the EFEC exercise leadership to ensure that EFEC functions effectively as a committee. To accomplish this, the EFEC needs to be well informed of issues affecting each of the facility components so that they can deal with these issues effectively. EFEC would like to see the time during conference calls and quarterly meetings used more efficiently to address major issues affecting the EarthScope facility.

EarthScope Management Response:

The Project Director shares this concern. The reinstatement of the Friday conference calls with NSF, the addition of a second weekly conference for EFEC strategic discussions, the inclusion of EarthScope Operational principals in the EFEC conference call agenda mailings, the scheduling of retreats, and the willingness of EFEC member Paul Silver to work with the Project Director to insure that the interests of the EFEC are addressed in a prioritized manner, are immediate steps that are being undertaken to address this problem. The Project Director will continue to look for other ways of improving communication.

The Project Director notes, however, that communication is inherently a two-way process. In particular, the lack of transparency and communication from USArray makes it difficult for the Project Director to identify the topics of highest priority. Communication would also benefit from a stronger commitment from each of the EarthScope Project elements to keep the EarthScope Office informed of their activities, to participate in the Operations calls and/or communicate with their operational principals, to recommend agenda items for the EFEC weekly conference calls, and to submit questions and discussion topics for the EFEC Quarterly Meetings.

Outreach Materials

The EarthScope publications and web materials, the EarthScope exhibit and presence at meetings, the one-pagers, and similar products are being implemented in a highly professional manner. These materials are serving the EarthScope Facility well and help to engage the Earth Sciences community in the project. EFEC feels that these materials are also helping to promote the value of the Earth Sciences to the public at large.

EarthScope Management Response:

The Project Director appreciates the EFEC's recognition of the value of these products.

EarthScope Project Website

The EFEC was impressed by the capabilities of the EarthScope website and recognizes it as an important outreach and project tracking tool. EFEC does feel there is a need for greater oversight of the EarthScope website development, and a mechanism needs to be found to provide advice on content and technology for future development. Along these lines, the EFEC notes that feedback from ESEC and NSF has helped to establish the current capabilities and that there has been good response to external input thus far. The EFEC should help to define the overall goals for the EarthScope Information System and website, seeking input from ESEC and NSF. It is clear that the original concept of developing a comprehensive IDAS is no longer viable, but the website can provide valuable assistance to the community seeking to learn about the EarthScope facility and to access its products.

EarthScope Management Response:

The EarthScope Project website has benefited from informal input provided by the ESEC, NSF, EFEC members, and users. We would, however, like to create a more formal advisory structure that includes representation of the broad user community that can provide review and advice to the Senior IT engineer, Chris Guillemot. We will be proposing the development of such a group in the near future.

An EarthScope Portal, the development of higher-level data products, integrated data products, data visualization tools, and a cyberinfrastructure that includes ontological management are clearly necessary for EarthScope to be successful in achieving its expected "transformative" impact on Geosciences. We are hopeful that this will be developed through some mechanism in the near future.

Currently, the aspirations of the EarthScope website are to provide critical information on the facility and to provide fundamental information for rudimentary, single-point access of data from the facility as we committed to in the MREFC Proposal. The E&O element of the website is undertaking a more ambitious role of providing integrated data products for non-specialists that are designed for educational purposes.

Education & Outreach

The EFEC was pleased to see the increasing focus of the EarthScope E&O effort, but continues to desire clearer definition of goals and metrics of success for the effort. The E&O effort must build upon unique aspects of the EarthScope facilities and focus on those aspects of EarthScope E&O that are most likely to yield rapid and measurable results. Close interaction with the community, the EarthScope Education and Outreach Steering Committee (EEOSC), and the existing IRIS, SAFOD and UNAVCO E&O efforts are essential to success. In light of the prior history of E&O within EarthScope, we feel that it is critical to the success of the current E&O effort that advice from the EEOSC and others is carefully considered.

EarthScope Management Response:

The EEOSC has now been constituted and is providing strong guidance and oversight of the E&O Program. The concerns of the EFEC are being addressed by the EEOSC.

PBO INTERNAL SITE REVIEW

A review of the Plate Boundary Observatory was conducted by the EarthScope Facility Executive Committee (EFEC) as part of their Year 3 Quarter 1 meeting. The meeting was held at UNAVCO headquarters in Boulder, CO.

Statement of EFEC

PBO has dealt with many difficult circumstances including mandated changes in their siting plan following their Year 2 review, continuous redefinition of GeoEarthScope, and the implementation of new technologies beyond the traditional strengths of UNAVCO, Inc. – specifically the installation of the long-baseline laser strainmeters, borehole strainmeters, LiDAR imagery, geochronology, and InSAR. The EFEC evaluation is that PBO is, by all objective measures, an extraordinary success.

The EFEC applauds PBO and the PBO Steering Committee for actively engaging the EarthScope Office in their decision-making process. EarthScope is fortunate to have PBO as such a strong team player deeply committed to making EarthScope overall a strong success.

The EFEC continues to be impressed with the commitment of the PBO team, the talent and dedication of the PBO employees, and the strong management provided by the PBO Director and project management staff. The enthusiasm, *esprit de corps*, talent, and professionalism of the PBO staff are exemplary.

The EFEC appreciates PBO's commitment to full transparency of its project management process. Strong, unfiltered communications exist between PBO, the EFEC, and the EarthScope Office. A strong commitment to maintaining community input in the PBO decision-making process is demonstrated by engagement of the PBO Standing Committee at all levels of project management.

PBO Response:

UNAVCO appreciates the positive evaluation from the EFEC and the recognition of the challenges that we have encountered. UNAVCO has been fortunate in hiring a large number of very talented and dedicated employees, both the many who work directly on the PBO effort and quite a few others who provide support to the PBO effort. PBO could not happen without the hard work of all of these staff members. UNAVCO responses to specific comments from the EFEC are interleaved with those comments below.

Borehole Strainmeters

EFEC commends PBO for acting on the previous recommendations from the EFEC to consider options for using geophysical logging in lieu of coring. The EFEC is pleased to note the development of a revised installation plan based on the PBO Core/Log/Strain Data Workshop chaired by Evelyn Roeloffs. The EFEC also appreciates Evelyn Roeloffs' efforts in evaluating the costs and benefits of these various options and sharing that information in draft levels with the EarthScope Project Director.

Management Workload

The EFEC encourages PBO to develop further their plans for the deployment of 875 stations that specifies the locations of the stations, the scientific value of those locations, and the long-term O&M costs.

PBO Response:

UNAVCO has asked the PBO Standing Committee for revised priorities for all stations and will pass the committee recommendations to the EFEC along with appropriate budget information.

GeoEarthScope

The EFEC recognizes that GeoEarthscope is now moving towards a clearer structure under the oversight of David Phillips. EFEC appreciates David's commitment to work through the difficult circumstances of balancing the competing scientific desires of various groups and to keep NSF informed of GeoEarthScope plans. The EFEC strongly supports the change for GeoEarthScope from the more random proposal process to a more coordinated approach of a working group structure. The EFEC requests that PBO provide the EFEC with the charge, structure, and membership of the working groups. The EFEC is concerned about the membership of these committees (and the importance of input from representatives from government agencies with similar ongoing activities), to whom they will report, and how PBO will balance the competing recommendations of the three working groups. The recommendations of these committees should be transmitted to the EFEC, and we look forward to working with PBO management to define and realize GeoEarthScope's objectives.

PBO Response:

UNAVCO appreciates EFEC support of the structural and management changes to GeoEarthScope and the EFEC's comments regarding David Phillips' performance. UNAVCO recognizes the EFEC's concerns regarding GeoEarthScope working group membership, reporting, and recommendation issues. UNAVCO considers the EFEC to be an integral part of the GeoEarthScope management effort and the EFEC will be fully appraised as UNAVCO works to appoint and seek recommendations from the working groups based on the guidelines provided by NSF. Specifically, and as requested, UNAVCO will 1) provide the EFEC with the charge, structure, and membership of the GeoEarthScope working groups and 2) transmit working group recommendations to the EFEC. UNAVCO appreciates the EFEC's involvement with and contributions to GeoEarthScope management plans to date and we too look forward to working with the EFEC as this exciting component of EarthScope evolves.

Education and Outreach

The EFEC appreciates the efforts of Susan Eriksson to expand the education and outreach effort for both PBO specifically and EarthScope in general. Coordination of PBO E&O efforts with those of EarthScope overall and the EarthScope E&O Program Manager appear to be strong and synergistic. The EFEC is concerned that all education and outreach efforts remain coordinated and represent EarthScope as a whole. We therefore specifically appreciate and encourage the continuation of UNAVCO's efforts to coordinate their PBO related activities with the EarthScope Education and Outreach Program Manager.

PBO Response:

UNAVCO appreciates the EFEC's positive comments on the gains made in education and outreach for PBO and for EarthScope. UNAVCO is building a greatly expanded E&O program at the same time that EarthScope is growing. Understanding that there is overlap between these two programs and differences in missions and activities is important through these early efforts. UNAVCO will continue to work with the EarthScope Office and IRIS programs to support the EarthScope mission. The EarthScope Office should continue to recognize the importance that the consortia play in the operation and in advancing the mission of EarthScope to the broader geoscience and public communities.

Performance Tracking System

The EFEC is impressed with the amount of information and tools that PBO has developed for tracking and assessing the status and performance of their instrumentation and networks, as well as the data from these networks. The level of detail and the ease of access to this detailed information are providing great value to the scientific community and will continue to do so for years to come.

Website

We appreciate that PBO has used the EarthScope overall "current status" interface developed by Chris Guillemot as an entry point for access to its operational interfaces. We note, however, that PBO added considerable functionality concerning state-of-health, progress, etc. The EFEC requests that PBO identify a specific point-of-contact to work with Chris Guillemot to insure that all of the functionality and content that PBO is developing for its website be accessible through the main EarthScope website, that this be considered a high priority, and that in the future PBO work in closer coordination with the EarthScope IT engineer to avoid duplication of effort.

PBO Response:

We are gratified by the positive response we received after our demonstration of the software tools under development by PBO. The point-of-contact for all such activities has been and remains Greg Anderson. He and his team have worked extensively with Chris Guillemot at the EarthScope Office in making current state-of-health data available via the EarthScope website, and we can provide further automated reports with some additional details for use on the EarthScope website. Chris is always welcome to visit Boulder to discuss any such issues and we will work with him to make those changes that are compatible with PBO's ongoing development, operation, and maintenance of our monitoring systems. Not all functionality or all content, however, available to PBO (and soon EarthScope) internal users can be made available to the general community, as doing so would compromise the operational security of PBO and EarthScope overall. We are happy to work with the rest of EarthScope in determining where that line should be drawn. Also, we would like to note that we do not view PBO development activities for quality control, state-of-health, and data products as a duplication of effort. The EarthScope current status maps are an amalgamation of higher level reporting for the three components and provide a valuable synoptic view, but are not sufficient for the kind of detailed status reporting PBO staff require. Our development is aimed at answering those more detailed needs.

Seismic Data Management

EFEC endorses PBO's plan for handling PBO seismic data including the use of the Antelope software and their overall data collection, quality control, archiving, and distribution strategy. The EFEC urges PBO to review the manpower requirements for the collection and quality control of seismic data. The EFEC also recommends that PBO consider and evaluate the costs associated with acquiring sufficient bandwidth that optimally meets the needs of the user community. The EFEC acknowledges and greatly appreciates Greg Anderson's strong involvement with the EarthScope Data Working Group.

PBO Response:

PBO has evaluated the costs associated with such additional bandwidth and are prepared to present them to the EFEC in hopes that the EFEC can find a source for further funding.

Unimak Island

The EFEC strongly recommends that PBO follow its plan to install the stations in Unimak over two summers, rather than relying on the last summer to install all 16 stations. The EFEC finds the arguments for such a two-summer deployment to be overwhelmingly compelling and will work with PBO to gain NSF approval for this plan. Pending approval of the new EarthScope baseline, the EFEC requests that PBO immediately submit a change order outlining the reasoning and benefits of such a plan, so that the EFEC can provide formal review and approval for submission to NSF.

PBO Response:

PBO has submitted change order PBO-031 as requested.

Long-baseline Laser Strainmeters

Long-baseline laser strainmeter plans for Units 4 and 5 still remain uncertain. EFEC supports the active involvement of the PBO standing committee in helping to prioritize alternative siting options for the installation of these two instruments and provide their recommendations to the EFEC for review and submission to the NSF for approval, should this be viewed as a scope change. In particular, the EFEC requests that PBO re-locate the 4th and 5th strainmeters near Cholame or at some other site likely to produce geophysically significant strain signals.

PBO Response:

The plan is to site Units 4 and 5 in Cholame. We have weekly meetings with the subawardees and they have a siting plan in place. We will keep the PBO Standing Committee, EFEC, and NSF appraised of progress.

ACTIVITY DETAILS

The success of EarthScope requires strong involvement and outreach with the scientific community and the public. The mechanisms for community interfaces include: EarthScope publications; an EarthScope presence at professional meetings through talks, posters, and the EarthScope booth; listening sessions and workshops; a current, comprehensive, and authoritative website; and participation by the EarthScope Project Director in the meetings of the EarthScope Science and Education Committee. Following are listings of these and other management activities for 2005-2006.

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- "Yellowstone depths reveal rock plume." April 8, 2005. L. O'Hanlon, *Discovery News*.
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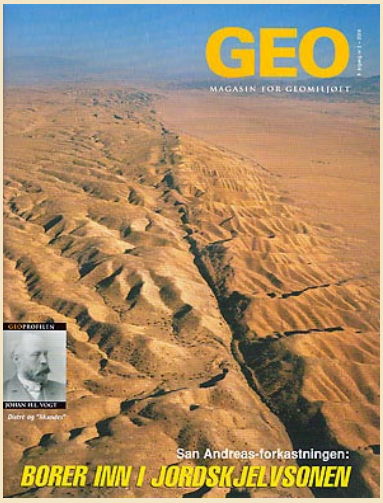
- "Bright idea: Lab's heat-beating device takes serendipity turn for many uses." May 9, 2005. S. Vorenberg, *Albuquerque Tribune*.
- "Engineers say device has multiple uses." May 10, 2005. Associated Press, *San Jose Mercury News*.
- "John DeLaughter Education and Outreach Manager at EarthScope to be featured speaker at the Friday night E3 banquet." June 2005. *Tulsa Geological Society Newsletter*, p. 14.
- "Science and society." June 29, 2005. D. Lemberg and S. Kephart interviewing T. Lay, *World Talk Radio*.



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- "Earthquake fault drill hits milestone." August 3, 2005. D. Kazak, *Palo Alto Online News*.
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- "Inside an earthquake: Geologists penetrate fault zone 2 miles down." August 4, 2005. R. Britt, *Live Science*.
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- "Underground 'observatory' in US to study earthquakes." August 5, 2005. *Deccan Herald*.
- "San Andreas earthquake observatory achieves milestone as drillers penetrate the active fault zone." August 6, 2005. *Red NOVA News*.
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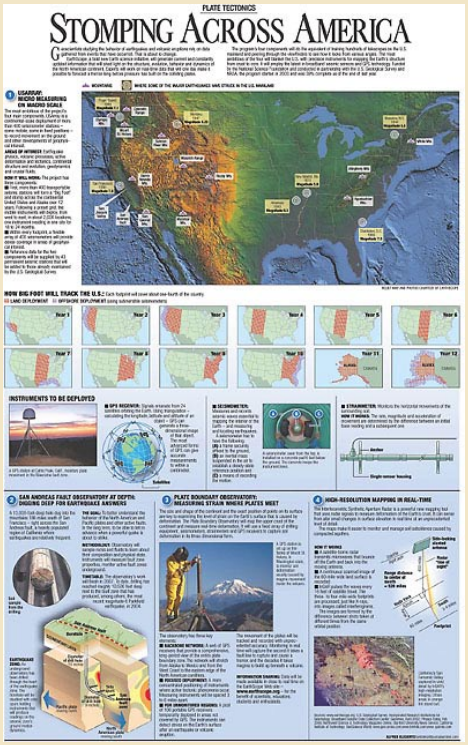
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- "Drilling project finds fault." August 12, 2005. K. Hansen, *Geotimes*.
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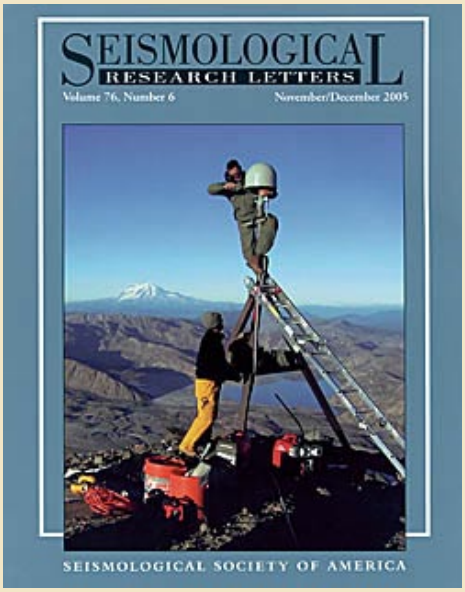

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- "Seismic sensor placed at Hualapai Mountain Park." February 16, 2006. S. Reynolds, *Today's News-Herald* (Lake Havasu City, AZ).
- "Instruments on Alaska's Augustine Volcano provide new insights into volcanic processes." February 19, 2006. *Science Daily*.
- "Stomping across America." February 27, 2006. A. Elicierto, *Milwaukee Journal Sentinel*.
- "Borer gjennom jordskjelvsonen." March 2006. H. Carstens, *Geo Magasin for Geomiljoet* (Norwegian), p. 14.
- "Hualapai Mountain Park get seismic." March 15, 2006. *KNAU*. G. Ferris Kohl.
- "Bigfoot arrives in Arizona." Spring 2006. L. Abbott and T. Cook, *Arizona Geology*, p1.

Presentations and Talks:

- Stanford Earth Sciences Advisory Board (Palo Alto, CA): "Testing fundamental theories of earthquakes and faulting: The San Andreas Observatory at Depth." April 7, 2005. M. Zoback.
- The State of National Geodetic Survey (Riverside, CA): "The State of PBO." April 7, 2005. M Jackson and C. Walls.
- MARGINS Steering Committee Meeting (Arlington, VA): "EarthScope directions and priorities." April 11, 2005. G. van der Vink.
- Peninsula Geological Society (Palo Alto, CA): "Testing fundamental theories of earthquakes and faulting: The San Andreas Observatory at Depth." April 12, 2005. M. Zoback.

R. Ketcham and N. Boness discuss the upcoming SAFOD Sample Party at the EarthScope Exhibit Booth at GSA.

- Tulsa Geological Society (Tulsa, OK): "EarthScope: A national undertaking of unprecedented scale and scientific ambition." April 12, 2005. G. van der Vink.
- Caltrans Central Region Headquarters (Stockton, CA): "The EarthScope Project and PBO installations." April 12, 2005. B. Coyle and C. Jarvis.
- UNAVCO Education and Outreach Board of Directors (Boulder, CO): "Status of the Plate Boundary Observatory project." April 14, 2005. M. Jackson.
- Scripps Institute of Oceanography (San Diego, CA): "Testing fundamental theories of earthquakes and faulting: The San Andreas Observatory at Depth." April 15, 2005. M. Zoback.
- The USGS SAFOD Discussion Group (Menlo Park, CA): "Constraints on near fault lithology and structure from magnetic data." April 19, 2005. D. McPhee.

Heads of the EarthScope SAFOD science team respond to questions at an AGU press conference.

- European Geophysical Union (Vienna, Austria): "EarthScope progress and opportunities." April 27, 2005. G. van der Vink and W. Prescott.
- European Geosciences Union (Vienna, Austria): "International access to the US Plate Boundary Observatory." April 27, 2005. W. Prescott and M. Jackson.
- Seismological Society of America Annual Meeting (Lake Tahoe, CA): "USArray: Construction of a large distributed seismological facility." April 28, 2005. S. Ingate, T. Ahern, R. Butler, J. Fowler, and J. Taber.
- Vashon School District (Vashon Island, WA): "The Plate Boundary Observatory permitting." April 28, 2005. K. Hafner.
- USGS Seminar (Menlo Park, CA): "Scaling properties and mechanisms of stress heterogeneity in the San Andreas Fault Observatory at Depth (SAFOD), Parkfield, CA." May 5, 2005. A. Day-Lewis.
- San Louis Obispo Caltrans Central Region (San Louis Obispo, CA): "PBO component of EarthScope." May 11, 2005. B. Coyle, C. Walls, and F. Blume.
- Semi-annual California Spatial Reference Center Meeting (San Francisco, CA): "Progress of PBO." May 17, 2005. B. Coyle.
- Alaska GPS User's Group Meeting (Anchorage, AK): "State of PBO." May 18-19, 2005. B. Pauk.
- USGS Seminar (Menlo Park, CA): "Seasonal seismicity in Parkfield, with possible implications for the role of fluids in faulting." May 31, 2005. L. Christiansen.
- Education, energy, environment Conference (Tulsa, OK): "Education, Energy, Environment, and EarthScope." June 3, 2005. J. DeLaugher.
- UNAVCO/IRIS Joint Meeting (June 9-11, 2005; Stevenson, WA):
  - "The changing face of the UNAVCO facility equipment pool." C. Kurnik.
  - "Data generation and data flow." C. Guillemot.
  - "EarthScope activity within the IRIS DMS." T. Ahern.
  - "EarthScope outreach: Engaging interest in a national project." C. Meth.
  - "EarthScope: USArray." S. Ingate, T. Ahern, K. Anderson, J. Fowler, B. Busby, and G. Levy.
  - "GPS installation progress in the Pacific Northwest region of the Plate Boundary Observatory." K. Hafner, P. Gray, and K. Austin.
  - "A national undertaking of unprecedented scale and scientific ambition." G. van der Vink.

  - "PBO component of EarthScope: A construction and data management update." M. Jackson.
  - "The PBO: Data management status and plans." G. Anderson, K. Hodgkinson, M. Jackson, E. Lee, E. Persson, W. Prescott, and J. Wright.
  - "PBO facility construction: Borehole strainmeter network status." M. Hasting, R. Mueller, W. Johnson, and P. Gibicar.
  - "PBO Nucleus project." F. Blume.
  - "Reporting and presentation of EarthScope facilities information on EarthScope website." C. Hennet.
  - "Web Services at the DMC." T. Ahern and L. Kamb.

A crowd gathers around the SAFOD poster session at the American Geophysical Union 2005 Fall Meeting.

- US Geological Survey Meeting (Pasadena, CA): "SoCal PBO strainmeter and GPS operations and plan." July 27, 2005. C. Walls.
- EarthScope Science and Education Committee Meeting (Reno, NV):
  - "EarthScope - Building the brand." July 26, 2005. J. DeLaughter.
  - "EarthScope - Reaching out to industry." July 26, 2005. J. DeLaughter.
  - "EarthScope education and outreach: Quo vadis?" July 26, 2005. J. DeLaughter.
  - "EarthScope National Meeting." July 26, 2005. C. Meth and P. Raymond.
  - "The EarthScope Project website." July 26, 2005. C. Guillemot.
  - "EarthScope Project update." July 27, 2005. G. van der Vink.
- Summer 2005 EFEC Meeting (Stanford, CA): "EarthScope Education and Outreach: Plans and path forward." September 1, 2005. J. DeLaughter.
- Southern California Earthquake Center Annual Meeting (Palm Springs, CA). September 11-14, 2005:
  - "PBO Nucleus: Integration of the existing GPS networks in the western US." F. Blume and N. Feldl.
  - "GPS installation progress in the Southern California Region of the Plate Boundary Observatory." C. Walls.
  - "The B4 Project: Scanning the San Andreas and San Jacinto Fault Zones." K. Hudnut and D. Phillips.
- National Geodetic Survey Continuously Operating Reference Station Users Forum (Long Beach, CA): "PBO GPS update." September 13, 2005. G. Anderson.
- University of Colorado Geological Sciences Colloquium (Boulder, CO): "PBO component of EarthScope: A construction and data management update." September 14, 2005. M. Jackson.
- North Atlantic Treaty Organization-Advanced Research Workshops (Sophia, Bulgaria): "The IRIS Consortium: Community-based facilities and data management for seismology." September 14, 2005. S. Ingate.
- EarthScope in the Northern Rockies Workshop (Bozeman, MT):
  - "EarthScope Project update." September 16, 2005. G. van der Vink (presented by J. DeLaughter).
  - "EarthScope Education and Outreach: National program, local scale." September 16, 2005. J. DeLaughter.
  - "PBO campaign equipment demonstration." September 16-19, 2005. C. Meertens and D. Phillips.
  - "PBO geodetic instruction: Principles, data access and applications." September 17, 2005. C. Meertens.
- Geological Society of Washington (Washington, DC): "EarthScope: Progress and opportunities." September 28, 2005. G. van der Vink.

- Project Science Workshop (Aspen, CO): "EarthScope: Management of a distributed facility." October 5, 2005. G. van der Vink.
- Project Science Workshop (Aspen, CO): "PBO lessons learned – 24 months later." October 5, 2005. B. Stephanus.
- UNAVCO Education and Outreach Committee Meeting (Boulder, CO): "EarthScope education and outreach: On our way to success." October 5, 2005. J. DeLaughter.
- Stanford University Oral Defense (Palo Alto, CA): "Physical properties and multi-scale seismic anisotropy of the crust surrounding the San Andreas Fault near Parkfield, CA." October 11, 2005. N. Boness.
- Shell Petroleum Bellaire Research Center Seminar (Houston, TX): "Testing fundamental theories of earthquakes and faulting: The San Andreas Observatory at Depth." October 13, 2005. M. Zoback.
- Geological Society of America Annual Meeting (Salt Lake City, UT): Geology and EarthScope. October 16, 2005:
  - "The San Andreas Fault Observatory at Depth: Status report and key opportunities for geologic and geophysical studies of the mechanics of faulting." S. Hickman, M. Zoback, and W. Ellsworth.
  - "Geotraverse: An integrated geologic framework for EarthScope's USArray." B. van der Pluijm and B. Tikoff.
  - "The Montana Geoscience Data Project: A pre-EarthScope resource in four dimensions for integrating research and education." F. Petrik, D. Mogk, D. Snyder, and L. Smith.
  - "The Sierra Nevada EarthScope Project: Motivations, status, and early results." C. Jones, G. Zandt, T. Owens, and H. Gilbert.
  - "Lithosphere delamination and small-scale convection beneath California imaged with high-resolution Rayleigh wave tomography." D. Forsyth and Y. Yang.
  - "Characteristics of the Sierra Nevada frontal fault zone and adjacent tectonogeomorphic domains associated with propagation of the Pac-NA plate boundary." A. Jayko.
  - "Evolution of the western US Walker Lane and East California shear zone: Insights from geodynamic Modeling." D. Harry.
  - "Heterogeneity in the middle and deep continental crust: Insights from isobarically-cooled terranes." M. Williams, K. Karlstrom, K. Mahan, and G. Dumond.
  - "Lithologic heterogeneity, mechanical anisotropy and the formation of deep crustal shear zones in Fiordland, New Zealand." D. King, K. Klepeis, G. Gehrels, and A. Goldstein.
  - "U-Pb zircon geochronology of crustal xenoliths confirms presence of Archean basement beneath the central and eastern Snake River Plain." D. Wolf, W. Leeman, and J. Vervoort.
  - "Interaction of tectonic and igneous processes at the west-trending volcanic belts of the Great Basin." J. Bartley and R. Bruhn.
  - "Subduction and rift-related silicate-carbonatite metasomatism beneath the Colorado Plateau-Rio Grand Rift transistion recorded in the Rio Puerco xenoliths, New Mexico." G. Perkins, C. Porreca, J. Selverstone, Z. Sharp, and K. Samuels.
  - "Seismotectonics and stress field of the Teton fault and interactions with the Yellowstone volcanic plateau from earthquake and fault-slip data." B. White, R. Smith, C. Puskas, I. Wong, and A. Sylvester.
  - "Age, setting, and reactivation of the Grizzly Creek shear zone: Tectonic implications of a newly recognized brittle/plastic thrust in central Colorado." C. Shaw, J. Allen, F. Ferri, M. Ganak, A. Graves, A. Johnson, S. Lyman, and J. Ofsa.

Looking at thin sections from the SAFOD core during the SAFOD Sample Party.

- "Baja-BC at last: Terrane collision in western Idaho and the role of wet mantel lithosphere." S. Giorgis, B. Tikoff, and W. McClelland.

- Geological Society of America Annual Meeting (Salt Lake City, UT): "Earth Science Week: Bringing together the geoscience and education communities for an international outreach event." October 16, 2005. C. Martinez, A. Benbow, and A. Martin
- Geological Society of America Annual Meeting (Salt Lake City, UT): "$^{40}Ar/^{39}Ar$ detrital mineral thermochronology in active fluvial systems." October 17, 2005. K. Hodges, K. Ruhl, and C. Wobus.
- Geological Society of America Annual Meeting (Salt Lake City, UT). October 18, 2005.
  - "Thermal history of the SAFOD Pilot and Main Holes at Parkfield, CA, constrained with fission track and (U-Th)/He Thermochronometry." A. Blythe, R. Burgmann, and M. D'Alessio.
  - "Putting it all together: Exhumation histories from a formal combination of heat flow and a suite of thermochronometers." M. D'Alessio and C. Williams.
  - "Geoscience education in the national parks: Trail of Time at Grand Canyon and EarthScope in the parks." K. Karlstrom, L. Crossey, and M. Williams.
  - "The ups and downs of continental intraplate evolution: A digital information system for the Western Pangaea Project." W. Snyder, R. Keller, C. Kluth, and G. Soreghan.
  - "The Plate Boundary Observatory: Siting and permitting with the National Park Service." C. Jarvis and K. Bohnenstiehl.
- Meeting with delegates from the China Earthquake Administration. (Washington, DC): "EarthScope: An unprecedented undertaking for Geosciences." October 24, 2005. C. Hennet.
- Trimble Dimensions Conference (Las Vegas, NV): "Status of PBO commercial users community and opportunity to work with PBO." October 24, 2005. D. Mencin.
- IRIS Education and Outreach Meeting (Socorro, NM): "EarthScope education and outreach: On our way to success." October 25, 2005. J. DeLaughter.
- Los Angeles Basin Earthquake Hazards Workshop (Pasadena, CA): "Plate Boundary Observatory Southern California update." October 27, 2005. C. Walls.
- EarthScope Science and Education Committee Meeting (Washington, DC):
  - "EarthScope National Meeting update." October 27, 2005. C. Meth, P. Raymond, and R. Morris.
  - "EarthScope Science and Education Committee update." October 27, 2005. G. van der Vink.
  - "EarthScope education and outreach: On our way to success." October 27, 2005. J. DeLaughter and A. Velasco.
  - "EarthScope website update." October 28, 2005. C. Guillemot.
- Board on Earth Sciences and Resources (Santa Fe, NM): "Monitoring the state of complex earth system services: Strategies and problems." November 4, 2005. G. van der Vink.
- Yellowstone Volcano Observatory Planning Meeting (Salt Lake City, UT): "PBO update." November 9, 2005. S. Borenstein and K. Feaux.
- Encroachment Permit Engineers Management Meeting (Sacramento, CA): "The Plate Boundary Observatory: Permits/exceptions." November 9, 2005. B.Coyle.
- Yucaipa Rock and Mineral Club (Yucaipa, CA): "Instrumenting the Plate Boundary." November 10, 2005. C. Walls.

PBO GPS station P050 located near Whitlash, Montana.

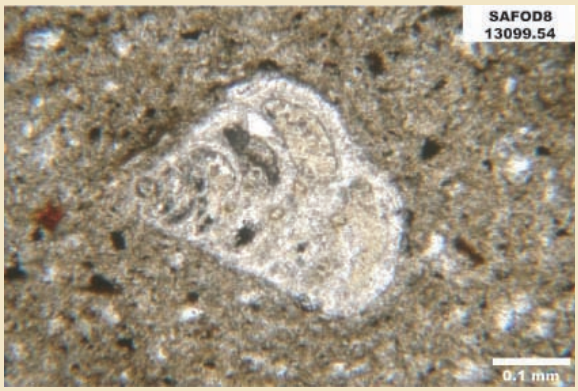
- GeoForschungZentrum (Potsdam, Germany): "Scientific drilling into the San Andreas Fault." November 10, 2005. M. Zoback.
- Istituto Nazionale di Geofisica e Vulcanologia (Rome, Italy): "Testing fundamental questions of earthquakes and faulting through scientific drilling into the San Andreas Fault." November 11, 2005. M. Zoback.
- PASSCAL Instrument Center staff presentation (Socorro, NM): "The Plate Boundary Observatory: Purpose, progress, and plans." November 15, 2005. G. Anderson.
- EFEC Quarterly Meeting (Washington, DC): "EarthScope education and outreach: On our way to success." November 16, 2005. J. DeLaughter and A. Velasco.
- Native American Perspective and Preferences Bearing on EarthScope Deployments in the Southwest Workshop (Tempe, AZ): "EarthScope education and outreach: National program, local scale." November 17, 2005. J. DeLaughter.
- University of Southern California (Los Angeles, CA): "The SAFOD experiment: Testing fundamental questions of earthquakes and faulting through scientific drilling." November 22, 2005. M. Zoback.
- American Geophysical Union 2005 Fall Meeting (San Francisco, CA): Integrating Education & Outreach with Large-Scale Experiments. December 5, 2005:
  - "Chasing earthquakes at focal depth: Personal perspective from 3.6 km depth." Y. Barak, I. Reches, and Z. Reches.
  - "Site reconnaissance for the EarthScope/USArray Transportable Seismic Array. " B. Anderson, P. Anderson, J. Bauer, M. Bernard, M. Meyers, M. Moore, S. Potter, C. Rios, A. Trehu, B. Zennaro, R. Busby, S. Helbock, D. Lippert, M. Mecurio, and M. Ruckdeschel
  - "Expedition EarthScope: A television film and DVD." D. Prose and D. LaMacchia.
  - "Education and outreach for EarthScope's USArray." G. Levy and J. Taber.
  - "NOAA educational programs and opportunities." N. Jackson.
  - "Outreach to Hispanic/Latino communities with a Spanish-language version of the EarthScope website." A. Lopez, S. Stein, and J. DeLaughter.
  - "EarthScope education and outreach: Exploiting the synergies." J. DeLaughter.
  - "Hundreds of cruises, thousands of people, endless discoveries - Education and outreach in the Integrated Ocean Drilling Program." L. Peart, M. Niemitz, S. Boa, J. Corsiglia, A. Klaus, K. Petronotis, and G. Iturrino.
  - "Science writer-at-sea: A new InterRidge education outreach project joining scientists and future journalists." K. Kusek, K. Freitag, and C. Devey.
  - "Linking the GLOBE program with NASA and NSF large-scale experiments." P. Filmer.
  - "Project SPECTRA! A new program focusing on science, math, and engineering in middle schools and high school." K. Becker, E. CoBabe-Ammann, and M. Triplett.
  - "Increasing geoscience literacy and public support for the EarthScope national science initiative through informal education." J. Aubele.
  - "Great Earthquakes and Tsunami Day for teachers on the leading edge: Geologic hazards and links to EarthScope in a field-based program." R. Butler, E. Bishop, C. Ault, B. Magura, C. Hedeen, D. Connor, T. Southworth-Neumeyer, and R. Conrey.
  - "Plate Boundary Observatory infrastructure and data products in education and outreach." S. Eriksson, K. Barbour, and E. Lee.

Pacific Northwest GPS station P436 located in Dungeness, WA.

- American Geophysical Union 2005 Fall Meeting (San Francisco, CA): The San Andreas Fault Observatory at Depth (SAFOD). December 6, 2005:
  - "Preliminary observations of stress and fluid pressure in and near the San Andreas Fault at depth in the SAFOD boreholes." M. Zoback and S. Hickman.
  - "Upper-crustal reflectivity of the central California Coast Range near the San Andreas Fault Observatory at Depth (SAFOD), USA." T. Ryberg, G. Fuis, K. Bauer, J. Hole, and F. Bleibinhaus.
  - "Testing new empirical relations between elastic wavespeeds in the Earth's crust using SAFOD Main Hole logs." T. Brocher.
  - "Borehole array observations of non-volcanic tremor at SAFOD." W. Ellsworth, J. Luetgert, and D. Oppenheimer.
  - "The branching pattern of low-velocity structure on the San Andreas Fault near the SAFOD site at Parkfield from fault-zone guided waves." M. Alvarez, Y. Li, P. Malin, E. Cochran, and J. Vidale.
  - "Seismic reflection and diffraction imaging of the San Andreas Fault at SAFOD." F. Bleibinhaus, J. Hole, and T. Ryberg.
  - "Application of Fresnel-volume-migration to the SAFOD 2003 data set." S. Buske.
  - "Lithologic characterization of the deep portion of the SAFOD drillhole." J. Evans, D. Moore, D. Kirschner, and J. Solum.
  - "Structural and lithologic characterization of the SAFOD Pilot Hole and Phase 1 Main Hole." D. Barton, K. Bradbury, J. Solum, and J. Evans.
  - "Elemental and stable isotope chemistry of cuttings and core samples from SAFOD drill hole." D. Kirschner, J. Evans, J. Chester, F. Chester, J. Solum, and D. Moore.
  - "Helium isotope measurements on matrix fluids from the SAFOD drillcore." M. Stute, T. Torgersen, G. Winckler, and P. Schlosser.
  - "Mesoscale structure and lithology of the SAFOD Phase I and II core samples." R. Almeida, J. Chester, F. Chester, D. Kirschner, T. Waller, and D. Moore.
  - "The clay mineralogy of fracture coatings observed in mudrock cuttings from the SAFOD borehole." Schleicher, L. Warr, and B. van der Pluijm.
  - "Phyllosilicate mineral assemblages, elemental compositions, and microstructures from the SAFOD Main Hole." B. van der Pluijm, A. Schleicher, J. Solum, S. Tourscher, and L. Warr.
  - "The San Andreas Fault at SAFOD: Seismic imaging and borehole comparisons." R. Catchings, M. Rymer, and M. Goldman.
  - "Accessing SAFOD data products: Downhole measurements, physical samples, and long-term monitoring." C. Weiland, M. Zoback, S. Hickman, and W. Ellsworth.
  - "Overview of SAFOD Phases 1 and 2: Drilling, sampling, and measurements in the San Andreas Fault Zone at seismogenic depth." M. Zoback, S. Hickman, and W. Ellsworth.
  - "Real-time fluid and gas monitoring during drilling of the SAFOD Main Hole in Parkfield, CA." T. Wiersberg and J. Erzinger.
  - "P-wave and S-wave imaging from drill bit seismic data at SAFOD." S. Taylor, D. Miller, J. Haldorsen, R. Coates, P. Malin, and E. Shalev.
  - "Structure and composition of the San Andreas Fault Zone at Parkfield: Initial results from SAFOD Phases 1 and 2." S. Hickman, M. Zoback, and W. Ellsworth.

Supplies of corrugated plastic pipe and other materials for constructing Transportable Array seismic stations at the Nevada Terrawatt Facility.

- "Heat flow studies in the SAFOD Main Hole." C. Williams, M. D'Alessio, F. Grubb, and S. Galanis."
- "Chemical and isotopic composition of water and gases from the SAFOD wells: Implications to the dynamics of the San Andreas Fault at Parkfield, California." J. Thordsen, W. Evans, Y. Kharaka, B. Kennedy, and M. van Soest.
- "Mineralogy of the SAFOD Main Hole: Detailed characterization of fault and country rocks." J. Solum, S. Hickman, D. Lockner, and D. Moore.
- "Source and significance of the sedimentary rocks in the SAFOD borehole: Preliminary analysis." S. Draper, N. Boness, and J. Evans.
- "Strength of the San Andreas Fault Zone: Insight from SAFOD cuttings and core." S. Tembe, D. Lockner, J. Solum, C. Morrow, T. Wong, and D. Moore.



Benthic foraminifera Gaudryina laevigata *used to identify the Great Valley Sequence on the East side of the San Andreas Fault.*

- "Refined images of the crust around the SAFOD drill site derived from combined active and passive seismic experiment data." S. Roecker, C. Thurber, A. Shuler, Y. Liu, H. Zhang, and L. Powell.
- "San Andreas Fault branching at SAFOD from fault-guided wave mapping and P-wave tomography." P. Malin and E. Shalev.
- "Earthquake source parameters of repeating microearthquakes at Parkfield, CA, determined using the SAFOD Pilot Hole seismic array." K. Imanishi and W. Ellsworth.
- "Spectral analysis of localized stress variations, the spatial distribution of faults, and the scaling of physical properties near the San Andreas Fault." A. Day-Lewis, M. Zoback, and S. Hickman.
- "A borehole fiber-optic strainmeter." M. Zumberge.
- "A simultaneous imaging method of multiple scattering modes for detecting a fault-zone heterogeneous structure of the San Andreas Fault, Parkfield, California." T. Taira, P. Silver, F. Niu, and R. Nadeau.
- "Seismic evidence for rock damage and healing on the San Andreas Fault associated with the 2004 M6 Parkfield Earthquake." Y. Li, J. Vidale, P. Chen, E. Cochran, and T. Burdette.
- "Crack damage in core samples from the San Andreas and Nojima Faults." D. Lockner, C. Morrow, and D. Moore.
- "Lithologic characterization of the deep portion of the SAFOD Drillhole." J. Evans, D. Moore, D. Kirschner, and J. Solum.
- "Fault zone structure of Middle Mountain, Central California." M. Thayer and J. Arrowsmith.
- "Shear velocity anisotropy in and near the San Andreas Fault: Implications for mapping stress orientations." N. Boness and M. Zoback.
- "Imaging the deep roots of the San Andreas Fault zone with magnetotelluric measurements." M. Becken, O. Ritter, S. Park and M. Weber.
- "Observing the San Andreas Fault at Depth." W. Ellsworth, S. Hickman, M. Zoback, E. Davis, L. Gee, R. Huggins, R. Krug, C. Lippus, P. Malin, D. Neuhauser, B. Paulsson, E. Shalev, B. Vajapeyam, C. Weiland, and M. Zumberge.
- "Characterization of the San Andreas Fault at Parkfield using a massive 3D VSP." J. Chavarria, A. Goertz, M. Karrenbach, P. Milligan, and B. Paulsson.

- American Geophysical Union 2005 Fall Meeting (San Francisco, CA): The Plate Boundary Observatory and Crustal Deformation. December 6, 2005:

- "PBO facility construction: GPS network status." K. Feaux, M. Jackson, G. Anderson, D. Mencin, B. Pauk, K. Hafner, B. Coyle, C. Walls, B. Friesen, and S. Borenstein.
- "Plate Boundary Observatory GPS data analysis." T. Herring, R. King, S. McClusky, M. Murray, M. Santillan, T. Melbourne, and G. Anderson.
- "GPS installation progress in the Southern California Region of the Plate Boundary Observatory." C. Walls, E. Arnitz, S. Bick, S. Lawrence, K. Feaux, and M. Jackson.
- "The Plate Boundary Observatory: Data management progress and highlights." G. Anderson, K. Hodgkinson, M. Jackson, and J. Wright.
- "First results from PBO strainmeters on the Olympic Peninsula and Vancouver Island, Canada." K. Hodgkinson, G. Anderson, T. Dittmann, M. Gladwin, M. Hasting, W. Johnson, M. Mee, B. Mueller, S. Venator, and J. Wright.
- "Update on Plate Boundary Observatory (PBO) activities in the PNW Region." K. Hafner, P. Gray, and K. Austin.
- "Support of EarthScope GPS campaigns at the UNAVCO Facility." F. Blume and N. Feldl.
- "GPS installation progress in the Northern California Region of the Plate Boundary Observatory." B. Coyle, A. Basset, M. Enders, T. Williams, K. Feaux, and M. Jackson.
- "The EarthScope Plate Boundary Observatory Akutan Alaskan Volcano network installation." B. Pauk, M. Jackson, D. Mencin, J. Power, W. Gallaher, A. Basset, K. Kore, Z. Hargraves, and T. Peterson.

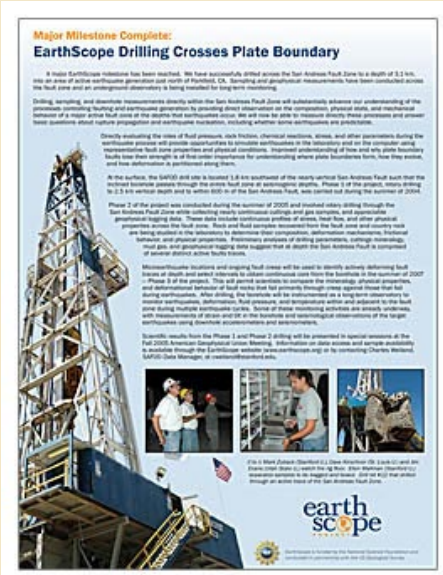
- American Geophysical Union 2005 Fall Meeting (San Francisco, CA). Various sessions. December 6, 2005:
  - "Tutorial: The EarthScope investigation of continental processes." E. Humphreys.
  - "GeoEarthScope Project support at UNAVCO." D. Phillips, W. Prescott, C. Meertens, M. Jackson, and S. Eriksson.
  - "Small-scale convection and anisotropy in the mantle beneath Southern California from high-resolution Rayleigh Wave tomography." D. Forsyth and Y. Yang.
  - "GEON developments for searching, accessing, and visualizing distributed data." C. Meertens, D. Seber, C. Baru, and M. Wright.
- American Geophysical Union 2005 Fall Meeting (San Francisco, CA). Various sessions. December 7, 2005:
  - "California surface wave tomography from ambient seismic noise: Tracking the progress of the USArray Transportable Network." M. Moschetti, M. Ritzwoller, and N. Shapiro.
  - "Developing a methodology for observing stress-induced temporal variations in travel time: A progress report." P. Silver, F. Niu, T. Daley, and E. Majer.
  - "Guided seismic waves: Possible diagnostics for hot plumes in the mantle." J. Evans, B. Julian, and G. Foulger.
  - "EarthScope/USArray Transportable Seismic Array spans California." R. Busby, M. Avarez, and R. Wooley.
  - "The EarthScope USArray Array Network Facility (ANF): Metadata, network, and data monitoring, quality assurance during the second year of operations." J. Eakins, F. Vernon, V. Martynov, R. Newman, T. Cox, K. Lindquist, A. Hindley, and S. Foley.
  - "New continuous timeseries data at the Northern California Earthquake Data Center." D. Neuhauser, L. Dietz, S. Zuzlewski, W. Kohler, L. Gee, D. Oppenheimer, and B. Romanowicz.

Leonard Johnson (NSF) and Li Li (China National Earthquake Infrastructure Service) discussing EarthScope in Washington, DC.

- American Geophysical Union 2005 Fall Meeting (San Francisco, CA). Various sessions. December 8, 2005.
  - "Moho structure of the Central Sierra Nevada from an EarthScope Flex Array deployment." S. Burdick, G. Zandt, H. Gilbert, C. Jones, and T. Owens.
  - "Variational data assimilation for short-term dynamical processes in Earth." K. Tandon, G. Egbert, and G. Lyzenga.
- American Geophysical Union 2005 Fall Meeting (San Francisco, CA). Various sessions. December 9, 2005:
  - "The Yellowstone Hotspot and related plume: Volcano-tectonics, tomography, kinematics, dynamics and mantle flow." M. Jordan, R. Smith, C. Puskas, J. Farrell, and G. Waite.
  - "Determining Rocky Mountain front seismicity: A Colorado case study." C. Viviano, G. Monsalve, A. Sheehan, and G. Bensen.
  - "Ultra-low frequency electromagnetic monitoring of earthquakes in the San Francisco Bay area: Initial results of an EarthScope PBO project." S. Bijoor, J. Glen, D. McPhee, and S. Klemperer.
  - "Broadband Array analysis of the 2005 episodic tremor and slip event in Northern Cascadia." A. Wech, K. Creager, W. McCausland, A. Frassetto, A. Qamar, S. DeRosier, J. Carmichael, S. Malone, and D. Johnson.
  - "Stalking the September 2005 Cascadia episodic tremor and slip event: Results from a dense GPS deployment." D. Johnson, K. Creager, A. Wech, R. Bennett, F. Blume, and N. Feldl.
  - "Teleseismic travel times, the Isabella anomaly, and the missing Moho, from the Sierra Nevada EarthScope experiment." A. Thomas, C. Jones, H. Reeg, H. Gilbert, G. Zandt, and T. Owens.
  - "Sierra Nevada Earthscope Project: Constraints on the Sierran seismic structure from regional waveform modeling." K. Byerly, J. Julia, T. Owens, H. Gilbert, G. Zandt, and C. Jones.
  - "Receiver function analysis of the upper mantle beneath Northern California." S. Brown and H. Gurrola.
  - "Observations of deep intra-plate earthquakes along the western foothills of the Sierra Nevada." H. Gilbert, O. Hurd, C. Jones, T. Owens, and G. Zandt.
  - "Surface deformation associated with the 2004-2005 eruption of Mount St. Helens." M. Lisowski, D. Dzurisin, E. Iwatsubo, and R. LaHusen.
  - "A multidisciplinary investigation of Rio Grande Rift deformation." A. Lowry, A. Sheehan, M. Roy, E. Jones, and S. Nerem.
  - "Sandbox Tectonics as a teaching tool." J. DeLaughter.
  - "Ground Deformation Associated with the 2004-2005 Dome-Building Eruption of Mount St. Helens, Washington." D. Dzurisin, M. Lisowski, S. Schilling, R. LaHusen, D. Sherrod, E. Iwatsubo, A. Diefenbach, and S. Thompson.
- Tulsa Desk and Derrick Club (Tulsa, OK): "What EarthScope has learned from the oil and gas industry." January 11, 2006. J. DeLaughter.
- National Science Foundation, Division of Earth Science, Program Officers Meeting (Arlington, VA): "GeoEarthScope." January 12, 2006. D. Phillips.
- UANVCO Brown Bag Lecture Series (Boulder, CO): "PBO operations and data management software tools." January 12, 2006. S. Borenstein.
- Inland California Surveyors Association Monthly Meeting (Riverside, CA): "Network status of PBO in Southern California." January 19, 2006. C. Walls.

K. Oliver installing a VSAT system at the Transportable Array station in Valley Falls, Oregon.

- Renaissance Colloquium (New York, NY): "EarthScope: Exploring the structure and evolution of the North American Continent." January 31, 2006. G. van der Vink.
- Berkeley Teacher Institute (Berkeley, CA): "Scientific drilling into the San Andreas Fault." February 3, 2006. M. Zoback.
- Milton Dobrin Memorial Lecture (Houston, TX): "Scientific drilling into the San Andreas Fault" February 6, 2006. M. Zoback.
- Bundesamt fur Kartographie und Geodasie Symposium on Streaming Global Navigation Satellite System Data via Internet (Frankfurt, Germany): "EarthScope Plate Boundary Observatory GPS Network Status and Plans." February 7, 2006. G. Anderson.
- Alaska Surveyors and Mapping Conference (Anchorage, AK): "PBO Alaska Overview." February 15, 2006. B. Pauk.
- Exxon/Mobil Research Club Meeting (Annandale, NJ): "The San Andreas Fault Observatory at Depth: Answering fundamental questions about the physics of earthquakes through drilling." February 16, 2006. S. Hickman.
- Pacific Northwest Geodetic Array Meeting (Eugene, OR): "PBO Nucleus Network Status in the Pacific Northwest" and "Memorial for Dan Johnson." February 18, 2006. F. Blume.


Major Milestone Complete:
EarthScope Drilling Crosses Plate Boundary
earth scope

- Pacific Northwest Geodetic Array Meeting (Eugene, OR): "Update on PBO activities in the Pacific Northwest region." February 18-19, 2006. K. Hafner.
- Stanford Parents Weekend (Stanford, CA): "Scientific drilling into the San Andreas Fault." February 19, 2006. M. Zoback.
- Chignik Lagoon Native Corporation Board Meeting (Anchorage, AK): "PBO Alaska overview." February 23, 2006. B. Pauk.
- Collaborative Wireless Infrastructure Workshop (Los Angeles, CA): "Exploring the structure and evolution of North America." February 28, 2006. G. van der Vink and C. Hennet.
- PBO Operations Annual Meeting (March 1, 2006; Salt Lake City, UT):
  - "PBO operations update." March 1, 2006. K. Feaux.
  - "PBO Nucleus Project and integration into PBO." F. Blume.
  - "PBO data management update." G. Anderson.
  - "PBO Basin and Range and Rocky Mountain Region update." B. Friesen.
  - "Progress in the Pacific Northwest Region." K. Austin and K. Hafner.
- PBO Extension Working Group Meeting (Reno, NV): "PBO Basin and Range and Rocky Mountain Region Update." March 3, 2006. B. Friesen.
- German Geophysical Society Meeting (Bremen, Germany): "Scientific drilling into the San Andreas Fault." March 6, 2006. M. Zoback.
- Scientific Earthquake Studies Advisory Committee (Reston, VA): "Update on EarthScope facility." March 6, 2006. G. van der Vink.
- IRIS Data Management System Standing Committee Meeting (Salt Lake City, UT): "Plate Boundary Observatory data management system overview." March 10, 2006. G. Anderson.
- California Land Surveyors Association Annual Meeting (Reno, NV): "EarthScope Project and the Plate Boundary Observatory." March 13, 2006. B. Coyle.
- California Land Surveyors Association Annual Meeting (Reno, NV): "California PBO: A Construction Update." March 13, 2006. C. Walls.

- UNAVCO 2006 Science Workshop (Denver, CO): March 14-16, 2006.
  - "PBO borehole strainmeter recordings of the September 2005 Cascadia episodic transient slip event: Conversion to actual rock strain." E. Roeloffs and K. Hodgkinson.
  - "The first EarthScope National Meeting." C. Meth, G. van der Vink, K. Karlstrom, R. Carlson, R. Aster, and P. Raymond.
  - "The EarthScope Information System." C. Guillemot and C. Hennet.
  - "PBO communication instrument planning using web-based line of sight/viewshed analysis application." T. Reynolds, M. Holms, and M. Ruckdeschel.
  - "GPS installation progress in the Northern California Region of the Plate Boundary Observatory." B. Coyle, A. Basset, T. William, M. Eenders, K. Feaux, and M. Jackson.
  - "The Plate Boundary Observatory strainmeter program; installation progress and first observations." K. Hodgkinson, G. Anderson, T. Dittmann, M. Hasting, W. Johnson, D. Mencin, B. Mueller, S. Venator, and J. Wright.
  - "Web-based services: Combined and validated GPS data products and data browsing tools." S. Kedar, Y. Bock, F. Webb, D. Dong, B. Newport, P. Jamason, M. Scharber, S. Owen, L. Prawirodirdjo, P. Fang, R. Chang, G. Wadsworth, S. Stark, R. Granat, and D. Argus.
  - "The Plate Boundary Observatory: Data management progress and highlights." G. Anderson, K. Feaux, and M. Jackson.
  - "PBO facility construction: Borehole strainmeter network status." M. Hasting, D. Mencin, W. Johnson, T. Dittmann, S. Venator, and B. Mueller.
  - "The EarthScope Plate Boundary Observatory Akutan Alaskan volcano network installation and Alaska GPS installation and reconnaissance progress." B. Pauk, M. Jackson, D. Mencin, J. Power, W. Gallaher, A. Basset, K. Kore, Z. Hargraves, and T. Peterson.
  - "PBO facility construction: GPS network status." K. Feaux, M. Jackson, G. Anderson, D. Mencin, B. Pauk, K. Hafner, B. Coyle, C. Walls, B. Friesen, and S. Borenstein.
  - "Update on Plate Boundary Observatory activities in the PNW region." K. Hafner, K. Austin, P. Gray, and K. Fengler.
  - "Optimal siting of geophysical instruments using GIS-based suitability analysis." M. Mercurio, T. Reynolds, and F. Fieper.
  - "Overview of GPS data and products archiving activities and UNAVCO Boulder." F. Boler, L. Estey, D. Maggert, C. Stolte, J. Davis, and M. Beldyk.
  - "The UNAVCO web presence: Current development and future plans." J. Riley, J. Matykiewicz, S. Eriksson, F. Boler, and S. Fisher.
  - "Creating complementary educations and outreach programs: UNAVCO and EarthScope." J. DeLaughter
  - "PBO Nucleus education and outreach: Project update and a call to the geodetic community." B. Walker.
  - "EarthScope communications: Engaging interest in a national project." C. Meth.
  - "Voyager: Improving an online tool for Earth science exploration and education." S. Wier, M. Weingroff, S. Eriksson, L. Estey, and C. Meertens.

Prior to the EarthScope in the Rockies Workshop participants enjoyed a field trip to the Madison and Jefferson River valleys.

  - "Use of InSAR to guide GPS reconnaissance in the southern California region of the Plate Boundary Observatory." C. Walls, G. Bawden, E. Arnitz, S. Bick, S. Lawrence, R. Bierma, K. Feaux, and M. Jackson.
  - "GeoEarthScope: Aerial and satellite imagery and geochronology." D. Phillips, W. Prescott, M. Jackson, and C. Meertens.
  - "PBO operations update." K. Feaux.
- UNAVCO Science Workshop, Special Interest Groups (Denver, CO):
  - GeoEarthScope overview. March 15, 2006. D. Phillips.
  - "Plate Boundary Observatory data management system overview." March 16, 2006. G. Anderson
  - "PBO borehole strainmeters." March 16, 2006. K. Hodgkinson.
  - Facility engineering overview. March 16, 2006. F. Blume.
- US Geological Survey Seminar (Reston VA): "San Andreas Fault Observatory at Depth: Answering fundamental questions about faulting and earthquakes through drilling." March 16, 2005. S. Hickman.
- NSF EarthScope Northern California LiDAR Workshop (Marshall, CA):
  - "GeoEarthScope: Aerial and satellite imagery and geochronology." March 16-19, 2006. M. Jackson, C. Meertens, D. Phillips, and W. Prescott.
  - "GeoEarthScope overview and LiDAR acquisition plan." March 17, 2006. D. Phillips.
- Anchorage Chapter of the International Right-of-way Association Meeting (Anchorage, AK): "Plate Boundary Observatory: Alaska." March 22, 2006. K. Kore.
- Shell Exploration and Production (Rijswijk, The Netherlands): "Exploring the structure and evolution of North America." March 23, 2006, G. van der Vink.

EarthScope Outreach:

- EarthScope featured at Dolores Gonzales Elementary School Career Day (April 28, 2005).
- Siting outreach subaward granted to Arizona State University. Principal Investigators: S. Semken and M. Fouch.
- Discussed EarthScope with students at the University of Colorado Boulder (April 13, 2005).
- Discussed EarthScope at Los Alamos High School Career Day (May 12, 2005; Los Alamos, NM).
- Hired 3 Student Field Assistants for summer internships at PBO Regional Offices.
- Created the website and community web log for the magnetotelluric instrumentation.
- Hosted a visit to the SAFOD drill site by International Continental Scientific Drilling Program Assembly of Governors.
- EarthScope Exhibit Booth at the American Association of Petroleum Geologist Annual Conference (June 19-22, 2005; Calgary, AB).
- Held USArray intern training course for siting Transportable Array seismic stations and magnetotelluric equipment throughout Oregon. The course was run by R. Busby and A. Trehu, with presentations by M. Mercurio and M. Ruckdeschel from IAGT, A. Schulz from Oregon State University, and G. Levy from IRIS.
- Provided tour of the EarthScope SAFOD site to:
  - Peninsula Geological Society (May 14-15, 2005).

Proud landowner in California waters his newborn GPS station.

  - Integrated Ocean Drilling Project members (July 18, 2005).
  - Gamma photo agency and Winton-Dupont Productions (July 13-15, 2005).
  - Global Net Productions (July 20, 2005).
  - University of California, Santa Barbara students (November 11, 2005)
- Began work on educational signs for GPS sites at schools in Pe Ell, WA and Wahkiakum, WA.
- Held the first UNAVCO Strainmeter Workshop (July 13-15, 2005; Boulder, CO). The workshop was led by E. Roeloffs, D. Agnew, and K. Hodgkinson.
- Provided logistical support for Transportable Array siting activities at Oregon State University and University of Nevada Contractors.

Participants at the Waveform Quality Control Workshop at New Mexico Tech in Socorro, NM.

- Contributed 16,000 career flyers to the American Geological Institutes' Earth Science Week Kits.
- Aided in graduate research involving use of simulation software in education.
- Hosted 50 geoscience undergraduate students attending the Society for the Advancement of Native Americans and Chicanos in Science National Conference for a tour of UNAVCO, including demonstrations on GPS equipment and PBO student internships.
- Distributed EarthScope material at Celebra le Ciencia in Albuquerque, NM on September 13, 2005.
- Continued USArray Siting Outreach Project at Arizona State University. Established contacts with tribal-college and K-12 educators on the Navajo Nation, worked with a Native-lands siting and cultural expert, and began developing place-based introductory curriculum and online materials related to EarthScope.
- Distributed EarthScope material at the New Mexico Museum of Natural History Teacher Training in Albuquerque, NM on September 28, 2005.
- Began discussion with Gabbs School in Gabbs, AZ about hosting a Transportable Array station.
- Maryland Science Center:
  - Named J. DeLaughter "Science Person of the Month" for the Body, Space, and Terralink Exhibit.
  - Distributed flyers and career information to ~300 students and teachers during Earth Science Week.
- Alameda Sons in Retirement Meeting (Alameda, CA): "Earthquakes then and now." October 25, 2005. C. Weiland.
- Co-hosted a reception with GEON at the Geological Society of America Annual Meeting (October 17, 2005; Salt Lake City, UT).
- EarthScope Exhibit Booth at the Geological Society of American Annual Meeting (October 16-19, 2005). Supported a Ph.D. student from Stanford University and a M.S. student from Utah State University to attend the meeting and assist with the exhibit booth.
- Produced "Y2Q3 Update" to update the scientific community on the current status of the EarthScope Project.
- Produced one-pager "Major milestone complete: EarthScope drilling crosses plate boundary" to update scientific community on current status of SAFOD.
- Produced one-pager on GeoEarthScope.
- Began discussions to install a GPS monument at a high school in Bellingham, WA.
- Participated in the Native American Perspective and Preferences Bearing on EarthScope Deployments in the Southwest Workshop in Tempe, AZ.

- Submitted a session proposal for the Association of Science and Technology Centers Annual Meeting. Session title will be "EarthScope: Creating a National Program on a Local Scale".
- SAFOD Phase 2 Sample Party (December 4, 2005; Menlo Park, CA). The Phase 2 spot core, cuttings, and sidewall cores were presented to over 45 scientists from the US and abroad, along with preliminary petrographic, mineralogic and structural analyses of these samples. Attended by: N. Boness, S. Draper, B. Ellsworth, S. Hickman, S. Phillips-Moskowitz, G. van der Vink, C. Weiland, and M. Zoback.
- EarthScope Exhibit Booth at the American Geophysical Union 2005 Fall Meeting (December 5-9, 2005; San Francisco, CA).
- PBO Northern California Regional Office Open House (December 7, 2005; Richmond, CA).
- EarthScope Project Town Hall Meeting (December 8, 2005; San Francisco, CA).
- Completed charge and mission statement of the EarthScope Education and Outreach Steering Committee.
- Planned for education and outreach activities related to the Nucleus Network.

Driller J. Dobbs takes a moment to read the cover article about SAFOD in AAPG Explorer.

- Began outreach in Yuma, Arizona, for potential summer internships.
- Discussed installing a Transportable Array seismic station at a school on the Gila River reservation.
- Hosted a discussion at Stanford Parents Weekend on EarthScope SAFOD.
- Planned and taught 2.5 day workshop on GPS surveying and processing (February 28-March 2, 2006; Socorro, NM). The class was attended by 20 students, faculty, and surveyors from New Mexico Tech, University of Texas El Paso, and the New Mexico Bureau of Mines and Geology. Topics included static and surveying and post-processing using Topcon software packages.
- Conducted four classes on earthquakes and tsunamis at Sombre del Norte Elementary School in Albuquerque, NM on February 2, 2006.
- Conducted seven classes on earthquakes and tsunamis at Carter Middle School in Albuquerque, NM on February 7, 2006.
- Meeting with David Wolfe School and Richard Gordon School (February 9, 2006; Bellingham, WA) to discuss possible locations for P440. Attended by: P. Gray, B. Degnin, and C. Alves.
- EarthScope Exhibit Booth at the American Association for the Advancement of Science Annual Meeting (February 16-20, 2006; St. Louis, MO).
- Discussed installing a GPS station in Bellingham, WA.
- Defined parameters for the Museum Lite displays to be located at Transportable Array sites.
- Discussed use of EarthScope data with members of NASA/NSF Global Learning and Observations to Benefit the Environment (GLOBE) program.
- Produced Y3Q1 Update to update the scientific community on the current status of the EarthScope Project.
- Presented information on EarthScope to 30 educators working in the Four Corners area as part of the Sixth Annual Colorado Plateau Bioregional Outdoor Education Workshop.
- Assisted in development of the new Yellowstone Visitor Center (March 2, 2006; Washington, DC) Attended by: J. Taber, S. Eriksson, C. Bossert, A. Medalie, M. Biddle, and J. DeLaughter.
- Distributed information on EarthScope to participants of the IRIS/SSA Distinguished Lecture presentation by S. Stein at the New Mexico Museum of Natural History and Science (Albuquerque, NM; March 7, 2006).
- Distributed information on EarthScope to participants of the 2006 National American Indian Science and Engineering Fair (Albuquerque, NM; March 24, 2006).
- Released the first issue of *onSite*, a newsletter for landowners hosting EarthScope stations.

Meetings:

- PBO Data Products Working Group annual meeting (April 4, 2005; teleconference) to review PBO data products plans and progress. Attended by: G. Anderson, D. Agnew, F. Boler, J. Davis, J. Freymueller, E. Hearn, T. Herring, and J. Langbein.
- Meeting with Orcas Island Airport (April 5, 2005; Eastsound, WA) to select GPS installation location. Attended by: A. Diefenbach and B. VonTobel.
- Meeting with Paulsson Geophysical, Lawrence Berkeley Labs, and Geometrics (April 6, 2005; teleconference).
- PBO Nucleus Data Planning Meeting (April 6, 2005; Boulder, CO) to discuss status and plans for incorporating data from Nucleus stations into standard PBO data flow. Attended by: G. Anderson, F. Blume, F. Boler, L. Estey, D. Maggert, E. Persson, C. Stolte, and J. Wright.
- IRIS Coordination Committee/Board of Directors Meeting (April 6-8, 2005; Socorro, NM). Discussions included USArray baseline costs and Flexible Array instrument use policies.
- Meeting with IRIS Data Management Center (April 7, 2005; Socorro, NM) to discuss strainmeter SEED issues. Attended by: K. Hodgkinson and T. Ahern.
- USGS/GEON Meeting (April 8, 2005; Reston, VA). Attended by: C. Hennet and C. Guillemot.
- MARGINS Steering Committee Meeting (April 11, 2005; Arlington, VA). Attended by: G. van der Vink and C. Hennet.
- Meeting with Ely District Bureau of Land Management (April 11, 2005; Ely, NV). Attended by: B. Friesen.
- Meeting with IAGT to discuss progress and future projects with EarthScope (April 11-12, 2005; Washington, DC).
- Meeting with Caltrans District 10 (April 12, 2005; Stockton, CA) to discuss installing GPS monuments. Attended by: B. Coyle and C. Jarvis.
- Status of the strainmeter delivery schedule meeting (April 13, 2005; Boulder, CO). Attended by: M. Jackson, B. Stephanus, R. Mueller, M. Hasting, D. Wilson, and K. Barbour.
- Meeting with IRIS PASSCAL Instrument Center to discuss collocation of PBO equipment at the facility (April 13, 2005; teleconference). Attended by: G. Anderson and B. Beaudoin.
- Meeting with Sandia National Laboratory (April 14, 2005; teleconference). Attended by: S. Hickman, W. Ellsworth, M. Zoback, C. Weiland, S. Kuzsmaul, and R. Norman.
- Meeting the City of Kotzebue (April 14, 2005; Kotzebue, AK) to discuss locating a GPS monument. Attended by: B. Pauk and D. Matthews.
- Meeting with University of California Berkeley to discuss PBO strainmeter archiving budget and activities (April 15, 2005; teleconference). Attended by: G. Anderson, B. Stephanus, L. Gee, and D. Neuhauser.
- DLESE Data Service Workshop (April 18-19, 2005; Breckenridge, CO). EarthScope group worked on earth exploration tool kit using PBO data. Attended by: S. Eriksson and L. Estey.
- Meeting with Paulsson Geophysical, Geometrics, and USGS (April 19, 2005; San Jose, CA). Attended by: L. Baker, S. Hickman, W. Kohler, C. Weiland, C Lippis, P. Milligan, and A. Goertz.

J. Anderson spreading concrete for the ANSS Backbone slab in Dagmar, Montana.

- Information technology conference call with NSF's independent cost reviewer for the EarthScope Operations and Maintenance Proposal (April 20, 2005; teleconference). Attended by: C. Hennet, C. Guillemot, C. Meth, T. Ahern, C. Weiland, G. Anderson, and LMI staff.
- Meeting with Sandia National Laboratories (April 21, 2005; teleconference). Attended by: S. Hickman, C. Weiland, S. Kuzsmaul, and R. Norman.
- Meeting with the Alaska Department of Transportation Central Region office (April 21, 2005; Anchorage, AK) to discuss location of a GPS station. Attended by: B. Pauk, C. Jarvis, and J. Lopez.
- UNAVCO Education and Outreach Board Meeting (April 21-22, 2005; Boulder, CO). Attended by: W. Prescott, S. Eriksson, C. Meertens, M. Jackson, L. Estey, and J. Riley.
- Meeting with Array Network Facility (April 26, 2005; La Jolla, CA). Attended by: M. Hasting, G. Anderson, and F. Vernon.
- Meeting with University of California San Diego to discuss long-baseline laser strainmeter data products, processing, and staffing (April 26, 2005; La Jolla, CA). Attended by: G. Anderson, D. Agnew, and F. Wyatt.
- Meeting with University of California San Diego to discuss borehole seismic data flow and processing (April 26, 2005; La Jolla, CA). Attended by: G. Anderson, M. Hasting, J. Eakins, and F. Vernon.

Lowering an STS2 sensor into the vault at Transportable Array site N02 in Big Bar, CA.

- European Geophysical Union Meeting (April 26-28; Vienna, Austria). Attended by: G. van der Vink, W. Prescott, and N. Boness.
- Seismological Society of America Annual Meeting (April 27-29 2005; Lake Tahoe, CA).
- Meeting with NSF Special O&M Panel (May 3, 2005; Arlington, VA). Attended by: G. van der Vink, D. Simpson, W. Prescott, C. Weiland, R. Woolley, B. Stephanus, M. Jackson, and C. Meth.
- Meeting with NSF Division of Contracts and Complex Agreements (May 3, 2005; Arlington, VA). Attended by: C. Weiland, R. Woolley, and J. Villapando.
- Meeting with Hughes (May 3, 2005; Raymond and Mossyrock, WA) to troubleshoot VSAT systems. Attended by: K. Hafner, P. Gray, K. Austin, K. Taylor, and Trey Young.
- Meeting with Department of Energy and Battelle (May 3, 2005; teleconference) regarding safety issues at Hanford, WA, potential site of GPS station P449. Attended by: P. Gray.
- Meeting with the Pit River Tribes regarding Medicine Lake sites (May 3, 2005; Burney, CA). Tribes agreed to give PBO three permits in "disturbed areas" and discussed permitting two additional sites within the caldera. Attended by: B. Coyle and K. Bohnenstiehl.
- Meeting with Sandia National Laboratories (May 4, 2005; teleconference). Attended by: M. Zoback, W. Ellsworth, and S. Kuzsmaul.
- Meeting with Lassen National Monument (May 4, 2005; Lassen, CA) to discuss potential GPS locations in the Monument. PBO will return in September to meet again and do the reconnaissance. Attended by: B. Coyle, K. Bohnenstiehl, and L. Johnson.
- Meeting with University of California San Diego (May 6, 2005; teleconference) to discuss long-baseline laser strainmeter data flow, processing, and archiving. Attended by: G. Anderson, K. Hodgkinson, E. Persson, J. Wright, D. Agnew, and F. Wyatt.
- Guidelines for Sensor Testing Workshop (May 9-10, 2005; Albuquerque, NM). Discuss standardized tests and reporting of tests on seismic instrumentation, including EarthScope instruments. Attendance included

representatives from academia, various government organizations, and national and international sensor manufacturers.

- Congressional Visits Day (May 10-11, 2005; Washington, DC). Attended by: C. Meth, M. Jackson, G. Anderson, E. Lee, D. Mencin, and E. Persson.
- EFEC Retreat (May 11-12, 2005; Paso Robles, CA). Attended by: G. van der Vink, M. Zoback, S. Hickman, P. Silver, W. Prescott, D. Simpson, and T. Lay.
- Meeting to discuss UPSeis Project (May 12, 2005; Washington, DC). Attended by: J. DeLaughter and W. Pennington.
- Meeting with Sandia National Laboratories (May 13, 2005; teleconference). Attended by: M. Zoback, W. Ellsworth, S. Hickman, C. Weiland, S. Kuzsmaul, and R. Norman.
- VALVE Software Demonstration (May 13, 2005; Boulder, CO). Demonstrations of the VALVE software, a USGS data integration, manipulation, and display system. Attended by: M. Jackson, G. Anderson, D. Mencin, E. Persson, J. Wright, and P. Cervelli.
- Meeting with University of California San Diego (May 13, 2005; teleconference) to discuss long-baseline laser strainmeter data flow, processing, and archiving. Attended by: G. Anderson, K. Hodgkinson, E. Persson, J. Wright, D. Agnew, and F. Wyatt.
- Meeting with Winnemucca Bureau of Land Management (May 16, 2005; Winnemucca, NV). Attended by: B. Friesen.
- Meeting with Geospace Engineering (GERI) (May 17, 2005, Houston, TX). Attended by: W. Ellsworth, M. Zoback, and GERI representatives.
- Meeting with the US Army Corps of Engineers (May 17, 2005; Portland, Oregon) regarding a installation of a GPS monument at Willow Creek Dam (P447). Attended by: K. Hafner, J. Nicholson, K. Whitman, C. Bondurant, and Dan Hoekstra.
- Meeting to discuss strainmeter metadata and data flow issues (May 17, 2005; teleconference). Attended by: K. Hodgkinson, E. Persson, and J. Wright.
- Meeting with Schlumberger (May 18, 2005; Houston, TX). Attended by: M. Zoback and N. Boness.
- EFEC Quarterly Meeting and USArray Site Review (May 18-19, 2005; Seattle, WA). Attended by: EFEC, S. Ingate, J. Fowler, R. Woolley, K. Anderson, J. Taber, T. Ahern, M. Jackson, G. Anderson, B. Stephanus, C. Hennet, C. Meth, K. Shedlock, J. Whitcomb, and J. Fowler.
- Meeting with Pinnacle Systems (May 19, 2005; San Francisco, CA). Attended by: M. Zoback.
- Meeting with Napa County officials (May 19, 2005; Napa, CA) to finalize the location for P263 and to discuss possible locations for P202. Attended by: A. Basset.
- Meeting with Redwood National Park (May 19, 2005; Redwood, CA) to discuss the permitting two GPS stations in the park. Attended by: T. Williams, V. Ozaki, T. Hofstra, and C. Heppe.
- Southern California Earthquake Center (SCEC) Workshop on the Reference Earthquakes Digital Library (May 20, 2005; Menlo Park, CA). Meeting to discuss standards for metadata required to archive seismic, geodetic, and other models of select earthquakes as part of the SCEC Reference Earthquakes Digital Library project. Attended by: G. Anderson.
- Meeting with University of California Berkeley (May 20, 2005; Menlo Park, CA) to discuss Berkeley PBO strainmeter archiving and GPS Analysis Center activities. Attended by: G. Anderson, L. Gee, and M.

Construction of Transportable Array site SO5C in Merced, CA.

Murray.

- Meeting to discuss lithologic model for SAFOD (May 23, 2005; Stanford, CA). Attended by: S. Hickman, J. Solum, N. Boness, D. Moore, M. Rymer, S. Graham, C. Weiland, and M. Zoback.
- Meeting with JASON Foundation (May 23, 2005; Boston, MA) to discuss EarthScope as a future voyage. Attended by: J. DeLaugher.
- Meeting with Schlumberger (May 24, 2005; Bakersfield, CA). Attended by: S. Hickman, J. Solum, and N. Boness.
- Meeting with ThermaSource Inc. (May 26, 2005; Stanford, CA). Attended by: L. Capuano, S. Hickman, C. Weiland, and M. Zoback.
- Meeting with the Joint Oceanographic Institutions (June 5, 2005; Washington, DC) to discuss managing an MREFC project. Attended by: G. van der Vink and C. Hennet.
- Meeting with National Research Council (June 5, 2005; Washington, DC). Attended by: G. van der Vink and the National Research Council Committee on Seismology and Geodynamics.

GPS station AC20, near Girdwood Junction, Alaska, will record subduction-related deformation on the Kenai Peninsula.

- Meeting with Pit River Tribal Council (June 6, 2005; Burney, CA) to discuss the revised Medicine Lake GPS station proposal. Attended by: T. Williams, 12 tribal members, and the Tribal Mediator.
- Permitting Panel Meeting (June 6-7, 2005; Stevenson, WA). Attended by: D. Miller, S. Powers, T. Burdette, D. Davis, B. Busby, N. Niemi, and K. Cato. Attended by: W. Prescott, M. Jackson, K. Feaux, K. Bohnenstiehl, D. Mencin, C. Walls, E. Arnitz, B. Mueller, K. Hafner, M. Hasting, B. Coyle, B. Friesen, S. Borenstein, C. Jarvis, and K. Barbour.
- EarthScope National Meeting site visit (June 7, 2005; Monterrey, CA). Attended by: G. van der Vink, C. Meth, and P. Sheatsley.
- Blue Ribbon Permitting Panel Meeting (June 7-8, 2005; Stevenson, WA). Attended by: D. Miller, T. Burdette, B. Busby, K. Cato, A. Davis, N. Niemi, and S. Powers.
- PBO Operations Summer Meeting (June 8, 2005; Stevenson, WA). Attended by: K. Feaux, M. Jackson, B. Stephanus, D. Mencin, M. Hasting, C. Walls, B. Coyle, K. Bohnenstiehl, C. Walls, E. Arnitz, K. Hafner, P. Gray, K. Austin, K. Kore, B. Friesen, and S. Borenstein.
- PBO GPS Data Analysis Working Group Meeting (June 8, 2005; Stevenson, WA). First meeting of the Data Analysis Working Group, the community working group that advises PBO on GPS analysis methods and standards. Attended by: J. Davis, E. Calais, T. Dixon, D. Dong, G. Sella, W. Prescott, M. Jackson, and G. Anderson.
- EarthScope Performance Measures Subcommittee meeting (June 9, 2005; Stevenson, WA). Discussed performance measures to be used during the MREFC phase of the project. Attended by: C. Hennet, G. van der Vink, C. Meth, G. Anderson, B. Stephanus, T. Ahern, and C. Trabant.
- UNAVCO/IRIS 2005 Joint Workshop (Stevenson, WA; 9-11 June 2005). Scientific and technical conference for UNAVCO and IRIS activities. Attended by: EFEC, EarthScope Operations, and NSF.
- Meeting University of California Berkeley (June 10, 2005; Stevenson, WA) to discuss strainmeter metadata issues and GPS Analysis Center status and plans. Attended by: G. Anderson, D. Neuhauser, and M. Murray.
- Meeting to discuss Antelope use and other operational issues with the Array Network Facility (June 10, 2005; Stevenson, WA). Attended by: T. Ahern, C. Trabant, R. Busby, M. Alvarez, J. Fowler, F. Vernon, J. Eakins, and D. Harvey.
- Meeting to discuss UNAVCO/IRIS Letter of Agreement for strainmeter data archiving (June 11, 2005; Stevenson, WA). Attended by: G. Anderson, T. Ahern, R. Benson, and C. Trabant.

- Meeting to discuss GPS Level 2 data product generation and archiving (June 11, 2005; Stevenson, WA). Attended by: G. Anderson, F. Boler, L. Estey, C. Stolte, T. Herring, R. King, T. Melbourne, M. Santillan, and M. Murray.
- Meeting to discuss CALYPSO project data flow and archiving models (June 11, 2005; Stevenson, WA). Attended by: G. Anderson and G. Mattioli.
- Meeting with the Washington State Department of Natural Resources (June 13, 2005; Sedro-Woolley, WA) to discuss issues regarding a GPS installation at the Darrington Airport. Attended by: K. Hafner, S. Kurowski, K. Ray, K. Iverson, and S. Reeder.
- Meeting with Redwood National Park (June 14, 2005; Redwood, CA) for maintenance and to discuss option for station P316. Attended by: T. Williams and T. Henkleman.
- Meeting with Yellowstone National Park geologist and archeologist (June 14, 2005; Yellowstone, WY) to visit three sites for resource approval. Attended by: S. Borenstein.
- Meeting with National Park Service (June 16, 2005; Washington, DC). Attended by: J. DeLaughter, C. Meth, and J. Geniac.
- Meeting with Joshua Tree National Park (June 16, 2005; Joshua Tree National Park, CA) to discuss reconnaissance and permitting in wilderness areas for 3 sites. Attended by: C. Walls and L. Sabala.
- American Association of Petroleum Geologist Annual Conference (June 19-22, 2005; Calgary, AB). Attended by: J. DeLaughter and C. Meth.
- Meeting with the Modoc Forest Service and the Pit River Tribes (June 20, 2005; Alturas, CA) regarding Medicine Lake sites. The Tribes agreed to support our request for 5 permits in disturbed areas, 3 sites within the Caldera and 2 sites outside of it. The permits will be issued as soon as the Forest Service receives letters confirmation from the Pit River and Klamath Tribes. Attended by: K. Bohnenstiehl.
- ORION Executive Steering Committee (June 28, 2005; Denver, CO). Attended by: G. van der Vink.
- Meeting to discuss magnetotelluric and GPS at ANSS Backbone sites (June 30, 2005, Golden, CO). Attended by K. Anderson, A. Schultz, F. Blume, J. Normandeau, J. McCarthy, H. Benz, R. Buland, J. Love, A. Leeds, and C. Hutt.
- Meeting with HDR Consulting (July 1, 2005; Denver, CO) to discuss the status of task orders and estimated funding needs for the remainder of the year and receive status update on all HDR Consulting activities. Attended by: K. Bohnenstiehl and C. Jarvis.
- Meeting with US Geological Survey personnel (July 1, 2005; Golden, CO) to discuss shared use of US Geological Survey VSAT's for NetRS data transmission over US Geological Survey VSAT system at collocated GPS Nucleus and USArray stations. Attended by: F. Blume and J. Normandeau.
- Akutan Communications Systems Meeting (July 5, 2005; teleconference). Attended by: G. Anderson, D. Mencin, and J. Wright.
- Quality control procedures meeting (Albuquerque, NM; July 6-7, 2005) at the Albuquerque Seismological Laboratory. Attended by: T. Storm, V. Payton, H. Bolton, C. Trabant, M. Templeton, and T. Ahern.
- Meeting with from California Department of Transportation District 10 Surveys Office (July 14, 2005; Stockton, CA) to discuss relocating permitted location for P259. Attended by: M. Enders and A. Steen.
- Meeting on monitoring instrumentation (July 20, 2005; Parkfield, CA). Attended by: M. Zoback, W. Ellsworth, P. Malin, and B. Prevdel.

Deep-drilled-braced GPS station P427 located in Oregon.

- Meeting with Sierra Pacific Industries (July 15, 2005; Eureka, CA) to acquire a land access entry permit for reconnaissance. Attended by: T. Williams and B. Blackwell.
- Network State of Health Monitoring System Meeting (July 15, 2005; Boulder, CO). Attended by: G. Anderson, D. Mencin, E. Persson, and J. Wright.
- Meeting with Trimble (July 18, 2005; Boulder, CO) to discuss Trimble's plan to retrofit, repair, or replace all the NetRS receivers impacted by the latest hardware problem. Attended by: M. Jackson, D. Wilson, D. Newcomer, and B. Fosburgh.
- SAFOD site visit and Education and Outreach meeting (July 20, 2005, Parkfield, CA). Attended by: G. van der Vink, J. DeLaughter, C. Hennet, M. Zoback, W. Ellsworth, and C. Weiland.
- Meeting with Glacier National Park Service (July 20, 2005; West Glacier, MT) to discuss placing a PBO GPS site in the park. Attended by: K. Bohnenstiehl, J. Potter, and T. Carolin.
- Meeting to discuss monthly and quarterly reporting requirements (July 22, 2005; Washington, DC). Attended by: K. Shedlock, C. Hennet, and C. Meth.
- Pinnacle Technology meeting (July 25, 2005; San Francisco, CA) to discuss preliminary tiltmeter data and general product design. Attended by: W. Ellsworth, C. Weiland, B. Prevedel, R Krug, and E. Samson
- Meeting to discuss data processing and telemetry for GERI data (July 25, 2005, Menlo Park, CA). Attended by: W. Ellsworth, L. Baker, L Dietz, D. Oppenheimer, C. Weiland, D. Neuhauser, L. Gee, and P. Malin
- Meeting to discuss long-baseline laser strainmeter data flow, data processing, and archiving (July 25, 2005; Teleconference). Attended by: G. Anderson, D. Agnew, and F. Wyatt.
- Array Network Facility operations meeting (San Diego, CA; July 26, 2005) to discuss data flow between the Array Network Facility and the IRIS Data Management Center. Attended by: C. Trabant, P. Johnson, and F. Vernon.
- ESEC Meeting (July 26-27, 2005; Reno, NV). Attended by: G. van der Vink, C. Hennet, C. Meth, C. Guillemot, K. Shedlock, R. Rudnick, A. Meltzer, J. Price, C. Teyssier, W. Thatcher, D. Bercovici, and K. Karlstrom.
- Meeting with Washington State Department of Transportation surveyors (July 26, 2005; Ellensburg, WA). Attended by: K. Austin.
- Meeting to discuss licensing issues for Boulder Real Time Technologies' Antelope software (July 28, 2005; Socorro, NM). Attended by: G. Anderson and J. Fowler.
- Education and Outreach meeting with NSF (June 28, 2005; Arlington, VA). Attended by: J. DeLaughter and NSF EAR Program Officers.
- Meeting with Trimble (July 29, 2005; Boulder, CO). Attended by: M. Jackson, J. Hamilton, and B. Fosburgh.
- Meeting with Congressional staff members in response to request for a briefing (August 1, 2005; Washington, DC). Attended by: G. van der Vink.
- Meeting with GTSM Technologies (August 3, 2005; teleconference). Attended by: G. Anderson, K. Barbour, M. Hasting, M. Jackson, D. Wilson, M. Gladwin, and M. Mee.
- Meeting with Alaska Department of Natural Resources and Alaska National Park Service (August 5, 2005; Anchorage, AK). Attended by: C. Jarvis.
- Seismic data handling meeting (August 15, 2005, Berkeley, CA). Attended by: C. Weiland, L. Gee, and D. Neuhauser.
- Meeting with the Alaska Department of Transportation (August 16, 2005; Anchorage, AK) to discuss GPS installations at the Dillingham and King Salmon Airports. Attended by: B. Pauk, K. Kore, and B. Thomas.

L. Smith, PBO Summer Student Assistant, siting a station near Anchorage, Alaska.

S. Hickman watches closely as real-time data from the hydraulic fracture test at SAFOD are displayed in the monitoring truck.

- Meeting with California State Parks Superintendent of Silverado Sector (August 18, 2005; Sonoma, CA) to discuss GPS siting possibilities in California State Parks. Attended by: B. Coyle and J. Crossman.
- Meeting to discuss quality control procedures at the National Earthquake Information Center (Golden, CO; August 19, 2005). Attended by: J. McCarthy, H. Benz, H. Bolton, L. Pratt, C. Trabant, M. Templeton, and T. Ahern.
- Meeting with the Alaska Department of Transportation (August 23, 2005; teleconference) to discuss locating GPS monuments at Alaska Department of Transportation managed airports. Attended by: B. Pauk, O. Adams, R. Norton, and P. Lewis.
- International Workshop on the Utilization of Seismographic Networks within the Global Earth Observation System of Systems (August 23-24, 2005; Washington, DC). Attended by: G. Anderson, T. Ahern, and C. Meth.
- Meeting to discuss GPS data analysis plans and the use of GPS data in EarthScope Education and Outreach (August 25, 2005; Washington, DC). Attended by: G. Anderson and J. DeLaughter.
- Meeting with the National Science Foundation (Washington, DC; August 25, 2005). Attended by: T. Ahern.
- Meeting to prepare for NSF EarthScope Baseline Review (August 29, 2005; Stanford, CA). Attended by: J. DeLaughter, C. Hennet, M. Jackson, C. Meth, T. Owens, W. Prescott, C. Shin, D. Simpson, B. Stephanus, G. van der Vink, C. Weiland, R. Woolley, and M. Zoback.
- Meeting with the San Francisco Exploratorium (August 29, 2005; San Francisco, CA) to discus coordinating outreach activities and developing a traveling exhibit. Attended by: J. DeLaughter, M. Miller, and E. Muller.
- EFEC 3rd Quarterly Meeting and SAFOD Site Review (August 31-September 1, 2005; Stanford, CA). Attended by: T. Ahern, J. DeLaughter, W. Ellsworth, C. Hennet, S. Hickman, C. Meth, T. Owens, W. Prescott, K. Shedlock, C. Shin, P. Silver, D. Simpson, B. Stephanus, G. van der Vink, C. Weiland, J. Whitcomb, M. Zoback, R. Woolley, M. Jackson, N. Boness, and A. Day-Lewis.
- Meeting with US Geological Survey (September 1, 2005; Pasadena, CA) to discuss the San Andreas Airborne Laser Swath Mapping project. Attended by: K. Hudnut D. Phillips, D. Raleigh, W. Shindle, and A. Borsa.
- Meeting with California Institute of Technology (September 1, 2005; Pasadena, CA) to discuss InSAR data acquisition for GeoEarthScope and WInSAR activities. Attended by: M. Simons, D. Phillips, D. Raleigh, and W. Shindle.
- Meeting with US Geological Survey (September 1, 2005; Golden, CO) to finalize plan to establish virtual private networks, which will allow Nucleus, USArray, and other UNAVCO projects to operate NetRS through US Geological Survey operated VSAT communications. Attended by: F. Blume, S. Smith, D. Ketchum, S. Seidel, and N. McClain.
- Meeting to discuss Akutan communications systems (September 1, 2005; teleconference). Attended by: G. Anderson, K. Feaux, M. Jackson, and D. Mencin.
- Meeting with Stanford University (September 2, 2005; Stanford, CA) to discuss InSAR data acquisition for GeoEarthScope projects. Attended by: H. Zebker, D. Phillips, and W. Prescott.
- PBO Standing Committee Meeting (September 2, 2005; teleconference). Attended by: PBO Standing Committee members, W. Prescott, M. Jackson, G. Anderson, and J. Schires.
- Meeting with representatives of the Valley of the Moon Water District (September 6, 2005; Napa, CA) to finalize permit request for a GPS station. Attended by: A. Basset.
- Meeting with California Department of Transportation District 2 Department of Encroachment Permitting (September 9, 2005; Redding, CA) to answer questions regarding PBO and to discuss the final location of a GPS station. Attended by: S. Barnes, D. Putnam, and B. Coyle.

F. Blume and N. Feldl install campaign GPS station 23OL in Olympic National Park.

- EarthScope Education and Outreach Steering Committee Meeting (September 12-13, 2005; Washington, DC) to develop the education and outreach strategy. Attended by: J. DeLaughter, S. Eriksson, J. Geniac, P. Grew, J. Hopkins, N. Neely, J. Taber, and A. Velasco.
- Meeting to coordinate and plan Nucleus and real-time upgrades in Southern California (September 13, 2005; Palm Springs, CA). Attended by: W. Prescott, F. Blume, N. Feldl, C. Walls, Y. Bock, C. Whitaker, K. Stark, A. Aspiotes, D. Delisimunovic, D. Barseghian, and N. King.
- Meeting to discuss progress and plans on long-baseline laser strainmeter data products (September 14, 2005; La Jolla, CA). Attended by: F. Wyatt and G. Anderson.
- Meeting with Hollister Hills Off-Road Vehicle Park (September 15, 2005; Hollister, CA) to discuss location of a GPS station in the park. Attented by: M. Enders.
- Meeting to resolve data resend issues from Transportable Array (September 15, 2005; teleconference). Attended by: J. Fowler, R. Busby, T. Ahern, C. Trabant, and R. Benson.
- EarthScope in the Northern Rockies Workshop (September 15-20, 2005; Bozeman, MT). Attended by: J. DeLaughter, C. Meertens, and D. Phillips.
- Meeting with Yellowstone Ecological Research Center/Hyperspectives Office (September 18, 2005; Bozeman, MT) to discuss airborne LiDAR and other remote sensing activities throughout the Yellowstone area. Attended by: R. Crabtree, D. Phillips, C. Meertens, S. Hager, and I. Fairweather.
- GPS data products meeting (September 19, 2005; teleconference) to discuss final plans for archiving and distributing GPS products. Attended by: G. Anderson, F. Bolder, L. Estey, and T. Herring.
- Meeting with the Spatial Reference Center of Washington (September 20, 2005; Wenatchee, WA) to discuss several potential GPS site in the Pacific Northwest. Attended by K. Austin, K. Iverson, L. Schuman, S. Reeder, and G. Shrock.
- NSF EarthScope Baseline Review (September 20-22, 2005; Boulder, CO). Attended by: T. Ahern, K. Anderson, G. Anderson, W. Ellsworth, K. Feaux, J. Fowler, C. Hennet, S. Hickman, M. Jackson, R. Morris, W. Prescott, C. Shin, P. Silver, D. Simpson, B. Stephanus, G. van der Vink, C. Weiland, R. Woolley, C. Weiland, B. Prevedel, E. Davis, J. Montgomery, N. Lipinsky, E. Samson, and C. Wright.
- Coalition for Earth Science Education Workshop (September 23-24, 2005; Greenbelt, MD). Attended by: J. DeLaughter and G. Levy.
- Meeting with the Institute for the Application of Geospatial Technology (September 26, 2005; Boulder, CO) regarding services and software products available to support GeoEarthScope activities. Attended by: D. Phillips, C. Meertens, F. Pieper, and T. Reynolds.
- Meeting with Cultural Resource Contractors (September 26, 2005; Reno, NV) to discuss the cultural resource surveys to be performed on Nevada Bureau of Land Management land. Attended by: B. Friesen and B. Kautz.
- Permitting semi-annual meeting and new hire training (September 26-28, 2005; Boulder, CO) to review permitting policies and procedures. Attended by: K. Bohnenstiehl, C. Jarvis, R. Lewman, A. Walker, S. Bick, K. Fengler, B. O'Neill, D. Miller, and L. Zimmerman.
- Meeting with Shasta-Trinity National Forest (September 27, 2005; McCloud, CA) for preliminary discussions on how to best proceed with permitting sites in Shasta-Trinity National Forest. Attended by: B. Coyle.
- Global Seismic Network Standing Committee meeting (September 27-28, 2005; Washington, DC). Attended by: K. Anderson, R. Butler, L. Wen, P. Earle, J. Park, E. Garnero, C. Ammon, X. Song, R. Dietrick, M. Ritzwoller, J. Tromp, C. Shin, R. Sobel, and R. Woolley.

- Program for Array Seismic Studies of the Continental Lithosphere Standing Committee meeting (September 27-28, 2005; San Diego, CA). The committee recommended that purchase of Flexible Array satellite communications equipment be postponed until equipment better suited for a portable environment are identified. Attended by: D. James, M. Fouch, R. Busby, J. Fowler, B. Beaudoin, M. Alvarez, D. Simpson, F. Vernon, J. Hole, W. Walter, C. Zelt, R. Aster, S. Harder, C. Knapp, W. Stephenson, and S. Rondenary.
- Association of American State Geologists meeting (September 28, 2005; Washington, DC). Attended by: J. Taber and J. DeLaughter.
- Meeting to resolve data resend issues from Transportable Array (September 29, 2005; teleconference). Attended by: J. Fowler, R. Busby, T. Ahern, C. Trabant, and R. Benson.
- GeoRes Data Recorder Overview Meeting (September 29, 2005; Menlo Park, CA). Attended by: C. Weiland, L. Dietz, W. Kohler, and E. Shalev.
- Society for the Advancement of Chicanos and Native Americans in Science National Conference (September 29-October 1, 2005; Denver, CO). Attended by: J. DeLaughter, G. Levy, M. Hubenthal, and A. López.
- Quality Assessment Meeting (September 15-16, 2005; Albuquerque, NM) to compare USArray quality assessment information with the Albuquerque Seismic Laboratory. Attended by: M. Templeton and Albuquerque Seismic Laboratory staff.
- Project Science Workshop (October 2-6, 2005; Aspen, CO). Attended by: G. van der Vink, B. Stephanus, K. Feaux, and K. Anderson.
- Plate Boundary Observatory Steering Committee (October 3, 2005; teleconference). Attended by: G. Beroza, K. Bohnenstiehl, B. Holt, M. Jackson, M. Lisowski, S. Owen, W. Prescott, E. Roeloffs, and P. Segall.
- Meeting with the Institute for the Application of Geospatial Technology (October 3, 2005; teleconference) to discuss services and software products to support GeoEarthScope activities. Attended by: F. Boler, C. Meertens, D. Phillips, T. Reynolds, and F. Pieper.
- UNAVCO Education and Outreach Committee Meeting (October 5-6, 2005; Boulder, CO). Attended by: J. DeLaughter, S. Eriksson, and J. Taber.
- Meeting with GTSM Technologies (October 6, 2005; teleconference) to discuss borehole strainmeter status. Attended by: G. Anderson, M. Hasting, K. Hodgkinson, M. Jackson, B. Stephanus, D. Wilson, M. Gladwin, and M. Mee.
- Stage 1 and Stage 2 Monitoring Instrumentation Review Meeting. (October 12, 2005; Stanford, CA). Attended by: P. Malin, M. Zoback, S. Hickman, W. Ellsworth, and C. Weiland.
- Meeting with Sebastiani Vineyards (October 12, 2005; Sonoma, CA) to discuss the possibility of locating a GPS station on the property. Attended by: B. Coyle.
- Management "hand-off" meeting with Barrett Friesen (October 13-18, 2005; Boulder, CO) to discuss the status of Basin and Range and Rocky Mountain regions. Attended by: K. Bohnenstiehl S. Borentstein, K. Feaux, and M. Jackson.
- SAFOD Core Handling Policy (October 14, 2005; teleconference). Attended by: K. Shedlock, S. Hickman, W. Ellsworth, G. van der Vink, and C. Weiland.
- Geological Society of America Annual Meeting (October 16-19, 2005; Salt Lake City, UT). Attended by: C. Meth, J. DeLaughter, N. Boness, S. Draper, G. Levy, C. Jarvis, and K. Barbour.
- Meeting with the Cascade Volcano Observatory (October 19, 2005; Vancouver, WA) to discuss alternate telemetry paths for the southern Mt. St. Helens stations. Attended by: K. Feaux and D. Mencin.

The installation crew poses with the landowner at GPS station P003 located in Mohawk Valley, California.

- IRIS Data Management System Committee meeting (October 19-20, 2005; Albuquerque, NM). Discussed seismic data from PBO and SAFOD. Attended by: C. Guillemot, C. Hennet, T. Ahern, and M. Francissen.
- Meeting with Applied Geomechanics (October 20, 2005; Stanford, CA) to review tiltmeter technology. Attended by: M. Zoback, S. Hickman, W. Ellsworth, C. Weiland, D. Bleakly, and G Holzhausen.
- Meeting with HDR and State of Utah Trust Lands Department (October 20, 2005; Salt Lake City, UT) to discuss permitting and archeological survey issues. Attended by: B. Friesen, C. Jarvis, L. Lutz-Zimmerman, and G. Bagley.
- Meeting with National Center for Airborne Laser Mapping (October 21, 2005; Boulder, CO) to discuss LiDAR issues and potential collaborations. Attended by: R. Kelz, C. Meertens, D. Phillips, W. Prescott, and B. Carter.
- Meeting with delegates from the China Earthquake Administration. (October 24, 2005; Washington, DC). Attended by: C. Hennet, L. Johnson, and C. Meth.
- California US Forest Service Site Meeting (October 24, 2005; Mare Island, CA). Discussed obtaining a categorical exclusion under the 5 acre rule for Mt. Shasta Wilderness sites. Attended by: S. Bick, K. Bohnenstiehl, B. Coyle, R. Faust, B. Hawkins, D. Hill, S. Irons, S. Lawrence, D. Miller, and C. Walls.
- Meeting with Alaska Native Science Commission (October 25, 2005; Anchorage, AK) to introduce PBO and assist in getting information to native associations in many remote villages for planned GPS stations. Attended by: B. Pauk, K. Kore, and P. Cochran.
- IRIS Education and Outreach Meeting (October 25-26, 2005; Socorro, NM). Attended by: J. DeLaughter, J. Taber, and G. Levy.
- Alaska Volcano Observatory Meeting (October 26, 2005; Anchorage, AK) to discuss data options for the Amchitka GPS station, from which data is currently flowing over the US Geological Survey Nanometrics VSAT that feeds in to the Alaska Tsunami Warning Center's Nanometrics. Attended by: B. Pauk and K. Kore.
- Meeting to discuss PBO seismic data (October 27, 2005; videoconference) to discuss PBO seismic data. Attended by: G. Anderson and T. Ahern.
- Data flow control systems status update meeting (October 28, 2005; Boulder, CO). Attended by: G. Anderson, J. Matykiewicz, and E. Persson.
- EarthScope Science and Education Committee Meeting (October 28-29, 2005; Washington, DC). Attended by: D. Bercovici, J. DeLaughter, C. Guillemot, B. Hacker, C. Hennet, S. Ingate, K. Karlstrom, K. Kelly, A. Meltzer, C. Meth, D. Mogk, R. Morris, W. Prescott, J. Price, P. Raymond, R. Rudnick, K. Shedlock, C. Teyssier, W. Thatcher, G. van der Vink, A. Velasco, L. Patino, R. Woolley, and P. Yilmaz.
- Meeting with San Mateo County Community College District (October 31, 2005; San Mateo, CA) to discuss the permit application process and finalize the proposed location of a GPS station on their property. Attended by: B. Coyle and L. Hand.
- Meeting with University of Idaho and the Idaho Geological Survey (November 1, 2005; Moscow, ID) to discuss possible site locations for GPS stations P024 and P023. Attended by: K. Austin, J. Oldow, and R. Lewis.
- Meeting with New Mexico Tech (November 2, 2005; teleconference) to discuss transition plan for GPS Analysis Center. Attended by: G. Anderson and M. Murray.
- Meeting with Glass Mountain Lightweight Aggregate (November 2, 2005; Tionesta, CA) to discuss hosting a GPS station at Medicine Lake. Attended by: K. Bohnenstiehl, T. Perez, and N. Hyydigenn.
- Meeting with the Institute for the Application of Geospatial Technology (November 3, 2005; Boulder, CO) to discuss PBO mapping needs. Attended by: G. Anderson, S. Borenstein, M. Jackson, E. Persson,

M. Alvarez aligning the antennae at the Transportable Array station in Ingram Canyon, CA.

F. Pieper, D. Piwinski, and T. Reynolds.

- Monitoring instrumentation planning meeting (November 4, 2005; San Francisco, CA). Attended by: M. Zoback, S. Hickman, W. Ellsworth, C. Weiland, B. Prevedel, E. Samson, E. Davis, and R. Krug.
- PBO Standing Committee (November 7, 2005; teleconference). Attended by: G. Anderson, M. Jackson, J. Schires, and members of the committee.
- Pinnacle Tiltmeter Mechanical and Electrical Engineering Review (November 8, 2005; San Francisco, CA). Attended by: B. Prevedel, C. Weiland, E. Davis, and E. Samson.
- California Department of Transportation Statewide Meeting for Permit Engineers (November 9, 2005; Sacramento, CA). Attended by: B. Coyle and C. Walls.
- Yellowstone Volcano Observatory planning meeting (November 9, 2005; Salt Lake City, UT). Attended by: S. Borenstein, B. Friesen, and K. Feaux.
- Meeting with the PASSCAL Instrument Center (November 14, 2005; Socorro, NM) to discuss collocation of PBO and USArray computer equipment. Attended by: G. Anderson, S. Smith, B. Beaudoin, L. Carothers, and S. Azevedo.
- Meeting with Baker City (November 15, 2005; Baker City, OR) regarding possible airport locations for GPS station P394. Attended by: K. Fengler and T. Collins.

GPS station P145 near Fern Point, NV, camouflaged to more closely blend in with the environment.

- Meeting with the Washington State Department of Transportation, Oregon Department of Transportation, and California Department of Transportation (November 15, 2005; Portland, OR) to discuss permitting approaches, RTK systems, and requirements for finalizing permits for GPS stations P063 and P427. Attended by: K. Hafner.
- EFEC Quarterly Meeting and EarthScope Office Site Review (November 16-17, 2005; Washington; DC). Attended by: R. DeGroot, J. DeLaughter, C. Guillemot, C. Hennet, S. Hickman, M. Jackson, K. Kelly, T. Lay, C. Meth, R. Morris, L. Patino, W. Prescott, P. Raymond, B. Schultz, K. Shedlock, C. Shin, P. Silver, D. Simpson, B. Stephanus, G. van der Vink, C. Weiland, J. Whitcomb, R. Woolley, H. Zimmerman, and M. Zoback.
- Workshop for Native American Perspective and Preferences Bearing on EarthScope Deployments in the Southwest (November 17-18, 2005; Tempe, AZ). Attended by: J. DeLaughter, D. Elvrum, S. Eriksson, R. Evans, M. Fouch, E. Garnero, D. Gatewood, S. Helbock, D. Lippert, R. Maldonado, M. Martin, P. Nakai, S. Semken, D. Skeets, J. Taber, A. Taylor, J. Tschopp, and P. Zah.
- Magmatic Systems Working Group Annual Meeting (November 17-18, 2005; Boulder, CO). Attended by: K. Bohnenstiehl, K. Feaux, B. Friesen, M. Hasting, M. Jackson, D. Mencin, and members of the Magmatic Systems Working Group.
- Meeting with National Park Service (November 21, 2005; Washington, DC) to discuss increasing interest in EarthScope among National Park Science Supervisors. Attended by: L. Murdock, J. DeLaughter, and C. Meth.
- Station Status Meeting (November 22, 2005; Boulder, CO) to coordinate stations to be added to data flow system and status of those already in the system. Attended by: G. Anderson, W. Gallaher, E. Persson, and D. Torrez.
- Meeting with the University of California, Berkeley (November 23, 2005; teleconference) to resolve remaining issues with budgeting for Year 3 strainmeter archiving activities. Attended by: G. Anderson, B. Stephanus, D. Wilson, and D. Neuhauser.
- FRINGE 2005 Workshop (November 26-December 1, 2005; Frascati, Italy). Attended by: W. Prescott and D. Phillips.
- Meeting with CB Services (November 29, 2005; Washington, DC) to discuss development of the Yellowstone National Park Visitor Centers. Attended by: C. Bossert and J. DeLaughter.

- Meeting with European Space Agency (November 29, 2005; Frascati, Italy) to discuss EarthScope and tentative plans to acquire InSAR data from the European Space Agency. Attended by: W. Prescott and D. Phillips.
- USArray Advisory Committee Meeting (December 3-4, 2005; San Francisco, CA). The re-scope of magnetotelluric instrumentation in accord with NSF/EFEC recommendations was presented. It was not accepted by NSF due to a miscommunication of the details of the NSF/EFEC recommendation. The intent of the recommendation was clarified. Attended by: USArray Advisory Committee Members, T. Ahern, D. Simpson, R. Woolley, J. Taber, S. Ingate, S. Park., C. Hennet, C. Meth, and G. van der Vink.

Constructing a surface seismic vault for the ANSS Backbone station near Lake Ozonia, NY.

- EarthScope Education and Outreach Steering Committee Quarterly Meeting (December 3-4, 2005; San Francisco, CA). Approved charge and mission statement. Began developing a strategic plan for the Education and Outreach Program. Attended by: A. Velasco, L. Lutz-Ryan, D. Kilb, P. Grew, J. Hopkins, J. Aubele, N. Neely, S. Stockman, S. Eriksson, J. Taber, J. DeLaughter, K. Shedlock, L. Patino, J. Huntoon, C. Meth, and C. Hennet.
- SAFOD Phase 2 Sample Party (December 4, 2005; Menlo Park, CA). Attended by: N. Boness, S. Draper, B. Ellsworth, S. Hickman, S. Phillips-Moskowitz, G. van der Vink, C. Weiland, and M. Zoback.
- American Geophysical Union 2005 Fall Meeting (December 5-9, 2005; San Francisco, CA). Attended by: EFEC and EarthScope Operations Members.
- Meeting with NSF to discuss EarthScope magnetotelluric instrumentation (December 5, 2005, San Francisco, CA). Attended by: R. Woolley, K. Anderson, S. Ingate, and K. Shedlock.
- Meeting to plan an exhibit for the Yellowstone National Park Vistor Center (December 6, 2005; San Francisco, CA). Attended by: B. Smith, J. Taber, S. Eriksson, P. Grew, J. DeLaughter, and J. Hopkins.
- National Association of Geoscience Teachers Meeting (December 6, 2005; San Francisco, CA). Discussed ways of improving earth science education in the United States. Attended by: J. DeLaughter.
- EarthScope Magnetotellurics Working Group Meeting (December 6, 2005, San Francisco, CA) to discuss the outcome of the USArray Advisory Committee meeting with NSF and develop a strategy for the re-scope of EarthScope magnetotelluric instrumentation. Attended by: G. van der Vink, C Hennett, S. Ingate, A. Schultz, J. Love, D. Livelybrooks, M. Unsworth, K. Mickus, G. Egbert, P. Wannamaker, R. Evans, S. Park, and T. Ahern.
- Meeting with Topcon representatives T. Morris, D. Young and S. Briggs (December 6, 2005; San Francisco, CA) to discuss issues relating to GB-1000 hardware, firmware, and user interface improvements. Action plan was developed for timely delivery of desired changes and improved communication procedures between Topcon and UNAVCO. Attended by: F. Blume, S. Fisher, M. Jackson, and D. Wilson.
- WInSAR Steering Committee Meeting (December 6, 2005; San Francisco, CA). Discussed management activities, including the search for a new host institution. Attended by: W. Prescott, C. Meertens, D. Phillips, and WInSAR membership.
- National Center for Airborne Laser Mapping Steering Committee meeting (December 6, 2005; San Francisco, CA). Meeting to discuss management activities and to hear presentations from National Center for Airborne Laser Mapping members. Attended by: W. Prescott, D. Phillips, and National Center for Airborne Laser Mapping membership.
- ANSS Backbone Data Flow Issues Meeting (December 6, 2005, San Francisco, CA). Attended by: H. Bolton, C. Trabant, M. Templeton, T. Ahern, H. Benz, and L. Gee.
- Meeting with the Southern California Earthquake Center (December 7, 2005; San Francisco, CA) to discuss ways of integrating EarthScope results with their educational materials. Attended by: M. Benthien, R. de Groot, and J. DeLaughter.

- Meeting to finalize modifications to PBO strainmeter data archiving (December 7, 2005; San Francisco, CA). Attended by: G. Anderson, K. Hodgkinson, J. Wright, T. Ahern, C. Trabant, and D. Neuhauser.
- ElectroMagnetic Studies of the Continents (EMSOC) Annual Meeting (December 7, 2005; San Francisco, CA). EMSOC agreed to the EarthScope magnetotelluric re-scope agreed that the EarthScope Magnetotelluric Working Group should be a joint IRIS-EMSOC group. Attended by: S. Ingate and K. Anderson.
- EarthScope Magnetotelluric Working Group (December 7, 2005; San Francisco, CA) to finalize details of EarthScope magnetotelluric re-scope as approved by ElectroMagnetic Studies of the Continents. Attended by: S. Ingate, A. Schultz, D. Livelybrooks, K. Mickus, G. Egbert, P. Wannamaker, and S. Park.
- Meeting with GTSM Technologies (December 7-8, 2005; San Francisco, CA) to discuss borehole strainmeter data processing techniques. Attended by: K. Hodgkinson, M. Gladwin, and M. Mee.
- Meeting to discuss a USArray newsletter to aid in siting and instrument installation efforts (December 8, 2005; San Francisco, CA). Attended by: J. Taber, B. Busby, and J. DeLaughter.
- Meeting with IAGT to discuss IRIS, UNAVCO, and EarthScope E&O visualization needs (December 8, 2005; San Francisco, CA). Attended by: F. Pieper, J. Taber, S. Eriksson, and J. DeLaughter.
- EarthScope Town Hall Meeting (December 8, 2005; San Francisco, CA). Open forum. Attended by: EFEC, EarthScope Operations Members, M. Leinen, K. Shedlock, EarthScope Town Hall, and the broad EarthScope community.
- Data Working Group meeting to discuss seismic data (December 8, 2005; San Francisco, CA). Attended by: C. Hennet, T. Ahern, C. Weiland, and G. Anderson.
- Transportable Array Working Group meeting (December 8, 2005; San Francisco, CA). Attended by: G. Pavlis, M. Fouch, J. Collins, E. Hauksson, S. van der Lee, M. Ritzwoller, H. Gilbert, D. Simpson, R. Woolley, T. Ahern, C. Trabant, J. Fowler, B. Beaudoin, J. Taber, S. Ingate, and G. van der Vink.
- Meeting with South Slough National Estuarine Research Reserve (December 8, 2005; Charleston, OR) to discuss a site for GPS station P364. Attended by: K. Fengler and J. Bragg.
- GeoEarthScope Management Meeting (December 8, 2005; San Francisco, CA). Topics included proposed changes to GeoEarthScope support scheme and data acquisition plan. Attended by: K. Shedlock, G. van der Vink, P. Silver, W. Prescott, M. Jackson, C. Meertens, and D. Phillips.
- Meeting with Berkeley Geochronolgoy Center (December 8, 2005; San Francisco, CA) to discuss potential geochronology projects and support options. Attended by: W. Prescott, D. Phillips, and W. Sharp.
- Meeting between EarthScope Magnetotelluric Working Group and NSF to discuss EarthScope magnetotelluric instrumentation (December 8, 2005; San Francisco, CA). A plan was developed to iterate on the re-scope prior to formal submission via the change order process. Attended by: S. Ingate, S. Park, and K. Shedlock.
- PBO GPS Data Analysis Working Group (December 8, 2005; teleconference) to discuss progress and plans for the coming year. Attended by: G. Anderson, E. Calais, J. Davis, D. Dong, J. Freymueller, T. Herring, T. Melbourne, M. Murray, and G. Sella.
- Meeting with Rio Grande Rift Project (December 8, 2005; San Francisco, CA) to discuss permitting, siting, equipment design and testing, and data management-planning. Attended by: D. Phillips, A. Sheehan, A. Lowry, S. Nerem, and M. Roy.
- Meeting with the Alaska State Department of Transportation Aviation Leasing Group (December 13, 2005; Anchorage, AK) to discuss installations of GPS stations AC24 King Salmon, AC38 Old Harbor, and AB14 Dillingham. Attended by: K. Bohnenstiehl, K. Kore, and K. Walker.
- Meeting to discuss SAFOD strain data (December 14, 2005; teleconference). Attended by: C. Weiland, M. Zumberger, and G. Anderson.

Completed GPS station near the baseball field at Humboldt State University.

- Meeting with the United States Air Force 611 Civil Engineering Battalion (December 14, 2005; Anchorage, AK) to discuss permitting and reconnaissance requests at two Air Force properties for AC60 Shemya, and AB23 Sparrevohn Air Force Base. Attended by: K. Bohnenstiehl, K. Kore, B. Pauk, and R. Beachler.
- Meeting with McClintock and Associates (December 15, 2005; Eagle River, AK) to discuss permitting of GPS station AB01 with a native corporation. Outcome was positive; it will take three months to get a permit. Attended by: K. Bohnenstiehl, K. Walker, and S. McClintock.
- Meeting with delegates of the Navajo Nation Education Committee and Resources Committee (December 15, 2005; Tempe, AZ). Attended by: S. Semken, M. Fouch, L. Jack, L. Noble, and L. Wagner.
- Meeting with the Global Learning and Observations to Benefit the Environment (December 16, 2005; Washington, DC) to discover how the program has changed and what opportunities exist for EarthScope. Attended by: J. DeLaughter.
- Meeting to discuss handling of data from the fiber-optic laser strainmeter installed in SAFOD Main Hole (December 16, 2005; teleconference). Attended by: G. Anderson, C. Weiland, and M. Zumberge.
- Meeting with the Alaska Volcano Observatory and the Alaska Tsunami Warning Center (December 20, 2005; Palmer, AK) to discuss strategies to instrument the Augustine Volcano with pressure sensors that could tie in the existing communication telemetry paths. Attended by: B. Pauk.
- EarthScope Magnetotelluric Working Group Meeting to finalize budget for magnetotelluric re-scope (December 20, 2006; teleconference). Attended by: EarthScope Magnetotelluric Working Group and S. Ingate.
- Teleconference with HDR Consulting (December 21, 2005; Boulder, CO) regarding Mt. St. Helens strainmeters. Attended by: M. Jackson, K. Bohnenstiehl, K. Fengler, K. Hafner, W. Johnson, D. Mencin, D. Miller, and K. McKinnon.
- Meeting with Darrington Airport (December 28, 2005; Darrington, WA) to finalize the GPS location for GPS station P442 for the permit. Attended by: K. Fengler and J. Hale.
- Meeting to present the re-scope of mangnetotelluric instrumentation and budget (December 28, 2005; Washington, DC). Attended by: S. Ingate, R. Woolley, and G. van der Vink.
- Stage 1 and Stage 2 deployment preparation meeting (January 3, 2006; teleconference). Attended by: M. Zoback, S. Hickman, W. Ellsworth, P. Malin, C. Weiland, and E. Shalev.
- Yellowstone Visitor Center Meeting (January 3, 2006; Washington, DC) to discuss how to aid Yellowstone Visitor Center development. Attended by: J. Taber, S. Eriksson, and J. DeLaughter.
- Meeting Bodega Head Marine Reserve (January 6, 2006; Bodega Bay, CA) to discuss locating a GPS station on the reserve. Attended by: B. Coyle and C. Luke.
- Meeting Boulder Real-Time Technologies (January 9, 2006; Boulder, CO) to discuss Antelope licensing and use for handling PBO seismic data. Attended by: G. Anderson, M. Hasting, D. Harvey, and D. Mencin.
- NASA's Earth-Sun System Technology Office, LiDAR Community Forum (January 10, 2006; Washington, DC). Attended by: D. Phillips.
- Meeting with the American Association of Petroleum Geologists (January 11, 2006; Tulsa, OK) to discuss synergies between education and outreach programs. Attended by: J. Blankenship and J. DeLaughter.
- Tulsa Desk and Derrick Club (January 11, 2006; Tulsa, OK). Attended by: J. DeLaughter.
- Meeting with National Science Foundation (January 12, 2006; Washington, DC) regarding various UNAVCO activities, including GeoEarthScope and LiDAR. Attended by: D. Phillips, W. Prescott, and D. Wilson.

S. Christman adds thermal and environmental protection around the ELFS (Eagle Lake, CA) vault. The vault could not be completely buried due to a thin soil layer (0.7 m) over very hard basalt basement.

- Meeting with Joint Oceanographic Institutions (January 13, 2006; Washington, DC). Attended by: J. DeLaughter.
- Meeting with National Science Foundation to receive comments on the September 2005 Baseline Review (January 13, 2006; Arlington, VA). Attended by: K. Shedlock, W. Prescott, P. Silver, D. Simpson, T. Lay, S. Hickman, M. Zoback, and G. van der Vink.
- Meeting with Garfield County Commissioners (January 16, 2006; Glenwood Springs, CO) to discuss GPS station P031. Attended by: F. Jenkins and M. Stephens.
- Meeting to discuss network status and new stations on Augustine Volcano (January 17, 2006; teleconference). Attended by: G. Anderson, K. Feaux, M. Jackson, D. Mencin, B. Pauk, J. Paskievitch, and J. Freymueller.

Southern CA crew installing GPS station P618 at CSU's Desert Research Center.

- Meeting with EMC and Unisys (January 17, 2006; Boulder, CO) to discuss failure of UNAVCO'S EMC CX500 RAID system. Attended by: G. Anderson and S. Smith.
- Meeting to discuss advantages of an EarthScope-wide newsletter for landowners (January 17, 2006; Washington, DC). Attended by: S. Eriksson, K. Barbour, J. Taber, P. Dorr, and J. DeLaughter.
- Meeting with the Joint Oceanographic Institutions (January 17, 2006; Washington, DC) to explore plans for a joint proposal to the National Science Foundation's GEO-Teach program. Attended by: L. Peart and J. DeLaughter.
- Array Network Facility and IRIS Data Management Center Meeting (January 17, 2006; Seattle, WA). Attended by: C. Trabant, P. Johnson, M. Templeton, and R. Benson.
- EarthScope Magnetotellurics Working Group meeting (January 17, 2006; teleconference) to discuss both the transportable and backbone pilot projects, as well as an magnetotelluric course to be given prior to the 2006 IRIS Workshop. Attended by: S. Ingate, D. Livelybrooks, P. Wannamaker, M. Unsworth, K. Mickus, S. Park, and G. Egbert.
- Meeting with Institute for the Application of Geospatial Technology (January 18, 2006; Boulder, CO) to discuss a LiDAR special interest group at the 2006 UNAVCO Science Meeting. Attended by: C. Meertens, D. Phillips, T. Reynolds, and D. Piwinski.
- Meeting with the California Department of Transportation (January 18, 2006; teleconference) to discuss real-time feeds from PBO GPS stations installed on California Department of Transportation land. Attended by: K. Bohnenstiehl, B. Coyle, K. Feaux, M. Jackson, and C. Walls, and D. Davis.
- International Institute for Applied Systems Analysis meeting (January 19, 2006; Washington, DC). Attended by: G. van der Vink
- Meeting with Mt. St. Helens Geologic Monument (January 19, 2006; Vancouver, WA) to visit the Mt. St. Helens Geologic Monument and identify nine sites for four strainmeters that are acceptable. Permitting and installation are expected in the Summer of 2006. Attended by: M. Hasting, D. Mencin, and M. Dowd.
- Meeting with the Whipple Observatory (January 19, 2006; Amado, AZ) to discuss GPS station P001. Attended by: F. Jenkins and K. Erdman-Myres.
- Meeting with the Forearc Group siting committee (January 19, 2006; Ellensburg, WA) to discuss proposed site moves in the Pacific Northwest. Attended by: K. Hafner and T. Melbourne.
- IRIS Board of Directors Meeting (January 19-20, 2006, Washington, DC). Attended by: D. Simpson, R. Willemann, S. Ingate, R. Woolley, C. Shin, J. Taber, T. Lay, C. Ammon, G. Beroza, K. Fisher, D. Okaya, T. Owens, A. Sheehan, B. Stump, A. Trehu, A. Dziewonski, A. Lerner-Lam, M. Wysession, T. Ahern, M. Alvarez, R. Busby, R. Butler, P. Dorr, J. Fowler, R. Sobel, and G. van der Vink.

- Meeting with the Albuquerque Seismological Laboratory (January 20, 2006, Albuquerque, NM) to discuss locating a backbone magnetotelluric station at the laboratory. Attended by: A. Schultz.
- Meeting with National Science Foundation to present Change Order USArray-015 (January 20, 2006, Washington, DC). Attended by: K. Shedlock, G. van der Vink, and S. Ingate.
- Meeting to discuss Stage 1 and Stage 2 deployment status (January 23, 2006; teleconference). Attended by: M. Zoback, S. Hickman, W. Ellsworth, P. Malin, C. Weiland, and E. Shalev.
- Meeting with Grand Canyon National Park (January 23, 2006; Grand Canyon National Park, AZ) to discuss GPS station P008. Attended by: F. Jenkins and E. Gdula.
- PBO Core/Log/Strain Workshop (January 23-24, 2006; Boulder, CO). Attended by: G. Anderson, M. Hasting, K. Hodgkinson, M. Jackson, D. Mencin, B. Mueller, W. Prescott, A. Day-Lewis, and E. Roeloffs.
- Meeting to discuss long-baseline laser strainmeters (January 24, 2006; Boulder, CO). Attended by: M. Jackson, W. Prescott, B. Stephanus, P. Silver, G. van der Vink, F. Wyatt, and D. Agnew.
- Meeting with the National Park Service (January 24, 2006; Anchorage, AK) to discuss special use permits to do reconnaissance at sites for GPS installations in both Denali and Katmai National Parks. Attended by: K. Bohnenstiehl, K. Kore, D. Miller, and B. Pauk.
- Meeting with real-estate and refuge managers from the US Fish and Wildlife Service (January 24, 2006; Anchorage, AK) to discuss special-use permits to perform reconnaissance for GPS sites destined for Unimak Island. Attended by: K. Bohnenstiehl, K. Kore, D. Miller, and B. Pauk.
- Meeting with the US Geological Survey (January 25, 2006; teleconference) to discuss GeoEarthScope and applications of InSAR imagery to PBO GPS site selections. Attended by: D. Phillips, C. Walls, and G. Bawden.
- Stage 3 prototype planning meeting (January 25, 2006; San Francisco, CA). Attended by: M. Zoback, S. Hickman, W. Ellsworth, B. Prevedel, C. Weiland, E. Davis, and E. Samson.
- Meeting regarding InSAR activities at UNAVCO in response to an announcement that WInSAR Consortium will be moving to UNAVCO (January 26, 2006; Boulder, CO). Attended by: F. Boler, C. Meertens, D. Phillips, and W. Prescott.
- Stage 2 subaward and Stage 3 prototype planning meeting (January 27, 2006; Menlo Park, CA). Attended by: M. Zoback, S. Hickman, W. Ellsworth, C. Weiland, and B. Prevedel.
- Meeting with University of California, Berkeley (January 30, 2006; Berkeley, CA) to discuss strain data archiving and seismic data handling issues. Attended by: G. Anderson and D. Neuhauser.
- Meeting with the Joint Oceanographic Institutions and Consortium for Oceanographic Research and Education (January 30, 2006; Washington, DC) to explore plans for a joint proposal to National Science Foundation's GEO-Teach program. Attended by: L. Peart, S. Cook, and J. DeLaughter.
- Meeting with the Renaissance Colloquium (January 31, 2006; New York, NY). Attended by: G. van der Vink.
- JASON Foundation Breakfast (February 1, 2006; Washington, DC) to discover new JASON management format. Attended by: J. DeLaughter.
- Meeting with the Oregon Department of Transportation (February 1, 2006; Salem, OR) to discuss access to internet connections at GPS sites. Attended by: K. Austin and R. Singh.
- Meeting with the University of California San Diego/California Spatial Reference Center and staff from the California Department of Transportation (February 2, 2006: San Diego, CA) to discuss final details for California Department of Transportation equipment to be installed at PBO stations. Attended by: B. Coyle, G. Offield, and A. Enwright.

Location GPS site P369 on the Wildlife Safari in Winston, OR.

- National Science Foundation Global Learning and Observations to Benefit the Environment Information Meeting (February 2, 2006; Washington, DC) to explore needs of GLOBE request-for-proposals. Attended by: J. DeLaughter.
- Transportable Array Working Group Meeting (February 2, 2006; teleconference) to discuss data products and data access methods, capacity assessment, and how to demonstrate the capability of the Transportable Array. Attended by: T. Ahern, M. Alvarez, B. Beaudoin, R. Busby, J. Collins, P. Dorr, H. Gilbert, E. Hauksson, S. Ingate, G. Pavlis, M. Ritzwoller, J.Taber, F. Vernon, and R. Woolley.
- National Science Foundation Accounting Meeting (February 2, 2006; Washington, DC) to review budgets. Attended by: J. DeLaughter and L. Patino.

J. Solum and S. Tembe collect cuttings during coring at a depth of 13,091 ft.

- EarthScope Magnetotellurics Working Group Meeting (February 2, 2006; teleconference) to discuss ring-core availability, the Oregon-pilot experiment, system design for northern-state deployments during winter, siting outreach 1-pagers, and to refine the baseline. Attended by: S. Ingate, P. Wannamaker, M. Unsworth, K. Mickus, S. Park, R. Evans, and A. Schultz.
- Integrated Geologic Framework for EarthScope's USArray Workshop (February 3-5, 2006; St. Louis, MO). Attended by: D. Phillips, J. DeLaughter, D. Simpson, K. Shedlock, and G. van der Vink.
- Phase 2 Data Analysis Meeting (February 6, 2006; Stanford, CA). Attended by: S. Draper, L. Thompson, S. Hickman, and N. Boness.
- EarthScope *onSite* Newsletter Meeting (February 7, 2006; teleconference). Attended by: P. Dorr, K. Barbour, and J. DeLaughter.
- Meeting with the National Geodetic Survey (February 8, 2006; Boulder, CO) regarding PBO status in Colorado and siting of Rio Grande Rift stations. Attended by: F. Blume, K. Bohnenstiehl, and P. Fromhertz.
- IRIS Quality Control Roundtable (February 8-10, 2006, Socorro, NM). Focused on knowledge sharing of seismic data problems to develop tools and procedures for more effective and standardized quality analysis procedures. Attended by: T. Ahern, R. Benson, C. Trabant, P. Johnson, M. Templeton, J. Fowler, N. Barstow, P. Davis, V. Peyton, K. Anderson, L. Sandoval, R. Busby, T. Cox, H. Bolton, L. Gee, B. Beaudoin, E. Gutierrez, L. Astiz, C. Pfeifer, and K. Hodgkinson.
- IRIS Seismic Data Quality Assurance Workshop (February 9-10, 2006; Socorro, NM). Attended by: K. Hodgkinson.
- Meeting to discuss EarthScope Baseline (February 13, 2006; Boulder, CO). Attended by: EFEC and K. Shedlock.
- EFEC Quarterly Meeting and PBO Site Review (February 14-15, 2006; Boulder, CO). Attended by: EFEC, EarthScope Operations, Kaye Shedlock, and Lina Patino.
- Meeting with the Alaska Department of Transportation (February 15, 2006; Anchorage, AK) to finalize plans for GPS station AC24 in King Salmon and to discuss another potential location at the Dillingham airport. Attended by: K. Kore and B. Thomas.
- American Association for the Advancement of Science Annual Meeting (February 16-20, 2006; St. Louis, MO). Attended by: J. DeLaughter
- Meeting with Mt. St. Helens (February 19, 2006; Vancouver, WA) to discuss strainmeter monument permits. Attended by: M. Hasting, D. Mencin, M. Dowd, and P. Frenzen.
- Pacific Northwest Geodetic Array Annual Investigators Meeting (February 18-19, 2006; Eugene, OR). Attended by: F. Blume and K. Hafner.

- Meeting with the Earthquake Research Institute and the Japan Agency for Marine–Earth Science and Technology (February 21-24, 2006; Washington, DC) to discuss IRIS and EarthScope activities. Attended by: Y. Nishio, N. Hirata, M. Shinohara, D. Simpson, R. Willemann, D. Lambert, W. Leith, B. Beaudoin, R. Aster, J. Fowler, and M. Alvarez.
- Meeting with the US Coast Guard (February 22, 2006; North Bend, OR) to describe EarthScope and discuss possible station locations. Attended by: K. Hafner and L. Ahlin
- Meeting with Cape Arago State Park (February 22, 2006; Coos Bay, OR) regarding permitting a GPS site. Attended by: K. Hafner and L. Becker.
- Meeting with Aleut Corporation (February 23, 2006; Anchorage, AK) to discuss proposal and permit request for a GPS station Adak Island. Attended by: K. Walker and D. Jensen.
- Phase 3 Drilling Operations Planning Meeting (February 24, 2006; Stanford, CA). Attended by: L. Capuano, N. Boness, M. Zoback, and C. Weiland.
- Meeting with High Speed Networks at Mendocino County Office of Education (February 24, 2006; teleconference) to discuss gaining access to the K-12 high speed internet-2 network. Attended by: K. Bohnenstiehl, B. Coyle, M. McCallum, C. Walls, and D. Johnson.
- Collaborative Wireless Infrastructure Workshop (February 28 – March 1, 2006; Los Angeles, CA). Attended by: C. Hennet and G. van der Vink.

The 80-level, 240 component Paulsson array being used to record shots (for velocity control and target earthquake locations) and recording microearth-quakes at the EarthScope SAFOD Drill Site.

- PBO Operations Annual Meeting (March 1-2, 2006; Salt Lake City, UT). Attended by: G. Anderson, E. Arnitz, K. Austin, A. Basset, F. Blume, K. Bohnenstiehl, S. Borenstein, B. Coyle, K. Feaux, B. Friesen, W. Gallaher, K. Hafner, K. Kore, J. Matykiewicz, D. Mencin, J. Owen, B. Stephanus, J. Symank, and C. Walls.
- Meeting with Bohannan-Huston, Inc. (March 2, 2006; Boulder, CO) regarding potential LiDAR acquisition services for GeoEarthScope. Attended by: S. Fisher, C. Meertens, D. Phillips, and B. Matthews.
- PBO Extension Working Group Annual Meeting (March 3, 2006; Reno, NV). Attended by: R. Bennett, G. Blewitt, K. Bohnenstiehl, B. Coyle, B. Friesen, W. Hammond, M. Jackson, L. Laurens, W. Thatcher, C. Walls, and B. Wernicke.
- Scientific Earthquake Studies Advisory Committee (March 6, 2006; Reston, VA). Attended by: G. van der Vink.
- Meeting with the US Coast Guard (March 6, 2006; Oakland, CA) to discuss the possibility of locating GPS stations on US Coast Guard property. Attended by: K. Bohnenstiehl, B. Coyle, K. Hudnut, and B. Freitas.
- IRIS Global Seismographic Network Standing Committee (March 7-8, 2006, Washington, DC). Attended by: R. Butler, K. Anderson, J. Derr, and L. Gee.
- EarthScope Magnetotellurics Working Group Meeting (March 9, 2006; teleconferece) to finalize the Oregon Pilot Project technical request for proposals, to provide scientific justification for the project, and to discuss a possible joint venture with University of California Los Angeles magnetospheric physicists. Attended by: S. Ingate, G. Ekbert, M. Unsworth, K. Mickus, S. Park, R. Evans, and A. Schultz.
- Meeting with Boulder Real-Time Technologies (March 9, 2006; Boulder, CO) to discuss PBO seismic data handling using Antelope. Attended by: G. Anderson, M. Jackson, D. Mencin, and D. Harvey.
- Meeting to discuss long-baseline laser strainmeters (March 9, 2006; Boulder, CO). Attended by: M. Jackson, B. Stephanus, D. Agnew, and F. Wyatt.
- IRIS Data Management System Standing Committee Meeting (March 10, 2006; Salt Lake City, UT). Attended by: G. Anderson.
- Spring EarthScope Education and Outreach Steering Committee Meeting (March 10, 2006; Washington, DC) to review education and outreach program progress. Attended by: S. Eriksson, J. Hopkins, N. Neely, S. Semken, and J. DeLaughter.

- California Land Survey Association Annual Meeting (March 10-13, 2006; Reno, NV). Attended by: B. Coyle and C. Walls.
- IRIS Data Management System Standing Committee Meeting (March 10-11, 2006, Salt Lake, UT) discussed plans for the management of the EarthScope seismic data at the IRIS Data Management Center and plans for an offsite hot-backup system for the Data Management Center. Attended by: T. Ahern, D. Wiens, H. Bolton, P. Earl, S. van der Lee, P. Davis, M. Flanagan, J. Hole, B. Beaudoin, K. Koper, E. Brodsky, M. Francissen, and G. Anderson.
- UNAVCO Education and Outreach Steering Committee Meeting (March 13, 2006; Denver, CO). Attended by: S. Eriksson, M. Hamburger, E. Calais, E. Petit, J. Cano, J. Murray, J. Taber, K. Schramm, M. Willis, R. Pandya, R. Walker, R. Low, and J. DeLaughter.
- USArray Advisory Committee Meeting (March 13, 2006; teleconference). Attended by: T. Ahern, M. Bostock, A. Dziewonski, M. Gurnis, S. Ingate, R. Kind, T. Lay, T. Plank, P. Raymond, K. Shedlock, D. Simpson, G. Thompson, and R. Woolley.
- Site visit to Cablenet (March 14, 2006; Centennial, CO) to discuss back-panel designs. Attended by: B. Johns and C. Kurnik.
- UNAVCO 2006 Science Workshop (March 14-16, 2006; Denver, CO). Attended by: EarthScope Operations Group, W. Prescott, K. Shedlock, G. van der Vink, and J. Whitcomb.
- Meeting to discuss common data formats for EarthScope and REASoN/MOSES projects (March 16, 2006; Denver, CO). Attended by: G. Anderson, W. Prescott, T. Herring, B. King, S. Kedar, F. Webb, and Y. Bock.
- NSF EarthScope Northern California LiDAR Workshop (March 16-19, 2006; Marshall, CA). Attended by: D. Phillips and PBO operations.
- Meeting to discuss reconnaissance and permitting within the California Transverse Ranges (March 21, 2006; Los Padres US Forest, CA). Attended by: S. Bick, S. Lawrence, and V. Collins.
- Geoscience Education and Public Outreach Network Meeting (March 22-24, 2006; Boulder, CO) to explore common needs of education and outreach programs. Attended by: K. Barbour, S. Eriksson, J. Taber, J. DeLaughter, and B. Busby.
- EarthScope Magnetotellurics Working Group Meeting (March 23, 2006; teleconference) to finalize magnetotelluric systems order and experiments. Attended by: S. Ingate, P. Wannamaker, D. Livelybrooks, G. Ekbert, M. Unsworth, S. Park, R. Evans, and A. Schultz.
- Ocean Research and Integrated Observatory Network Design and Implementation Meeting (March 26-30, 2006; Boulder, CO) to discuss role of education and outreach programs in MREFC programs. Attended by: J. DeLaughter.
- Phase 3 Coring Planning Meeting (March 27, 2006; Palo Alto, CA). Attended by: M. Zoback, S. Hickman, L. Capuano, J. Hanson, and C. Weiland.
- Meeting with UNAVCO Archive Group (March 27, 2006; Boulder, CO) regarding archive requirements and strategies for GeoEarthScope LiDAR data. Attended by: F. Boler, J. Braucher, and D. Phillips.
- SAFOD Seismic Data Workshop (March 30, 2006; Bergen, Norway). Attended by: W. Ellsworth, P. Malin, and V. Oye.
- Site review of PBO Analysis Center (March 28, 2006; Cambridge, MA). Attended by: G. Anderson, T. Herring, B. King, and S. McClusky.
- Meeting to discuss methods for orienting borehole strainmeters *in situ* using seismic waves from teleseismographs (March 31, 2006; La Jolla, CA). Attended by: G. Anderson. and G. Laske.

Installing GPS station AB51 in Petersburg, AK.

Management Activities:

- Submitted Operations and Maintenance Addendum to NSF on April 25, 2005.
- Drafted Operation and Maintenance performance measures for reporting progress to NSF.
- Hired EarthScope Education and Outreach Manager, USArray Data Control Analyst, USArray Quality Control Analyst, PBO Rocky Mountain Field Engineer II, two PBO Alaska Field Engineers positions, PBO Summer Field Assistant for the Pacific Northwest Region, a part-time PBO Permitting Assistant for Alaska, the Nucleus/EarthScope Campaign Project Engineer, and the PBO Summer Student Assistant for the Alaska Region.

J. Anderson and J. Fox setting the McMillan Vault enclosure at ACSO (Alum Creek State Park, OH).

- Temporarily relocated:
  - PBO Rocky Mountain Regional Engineer and Field Engineer to Bozeman, MT for the summer to assist in reconnaissance, permitting activities, and installing 12 GPS monuments in Montana, Wyoming, and Idaho.
  - PBO shipping and receiving staff to Alaska to assist with equipment transporting logistics and arranging gear for the upcoming Akutan installations.
  - PBO engineers to Alaska to assist with instrumentation activities, including a trip to Kodiak for reconnaissance and installations.
- Hughes VSAT training (May 2, 2005; Vancouver, WA). Attended by: K. Hafner, P. Gray, and K. Austin.
- Four PBO employees completed a Bear Awareness and Aggressive Animal Firearm training course to prepare for Alaska fieldwork.
- Six-month PBO internal budget and schedule reviews:
  - Southern California Regional Office: May 3-4, 2005; Riverside, CA.
  - Pacific Northwest Regional Office: May 10-22, 2005, Ellensburg, WA.
  - Northern California Regional Office: May 25-26, 2005; Richmond, CA.
- Meeting of the EarthScope Contingency and Risk Team (May 4, 2005, Washington, DC). Attended by: C. Weiland, B. Stephanus, R. Woolley, C. Hennet, and C. Meth. Reviewed EarthScope contingency use and change order procedures. Began process of clarifying rules for use and creating common procedures for management reserve use.
- Respond to questions from NSF's independent cost reviewer on the Operations & Maintenance Proposal.
- PBO software demonstrations (May 12, 2005; Washington, DC). Demonstrations of the PBO Document Management System, Digital Image Management System, and Operational Database and Interface for the EarthScope Office and IRIS.
- Submitted Annual Report to National Science Foundation.
- Finalized Statement of Work for Caltech/BARGEN subaward with B. Wernicke and N. Niemi, and initiated Contracts and Grants process to initiate funding.
- After NSF approval was obtained, sent the request for proposal for Transportable Array installation to eight bidders who had identified themselves in an earlier request for expressions of interest. Proposals are due early July 2005.
- Finalized format for reporting performance metrics.
- Meeting with Drilling, Coring, and Safety Technical Panel (June 15, 2005; Paso Robles, CA) to review plans

for Phase 2 drilling, including wellbore stability, safety concerns as we drill through the fault zone, and target strategies with regards to Phase 3 coring. Attended by: M. Zoback, S. Hickman, C. Weiland, N. Boness, A Day-Lewis, S. Tembe, R. Ewy, M. Utt, L. Wohlgemuth, B. Wundes, A. Bartley, L. Capuano, and J. Hanson.

- Meeting of the SAFOD Advisory Board (June 29, 2005; Paso Robles, CA) to review all aspect of SAFOD, including management, drilling, instrumentation, and data and sample handling. The meeting resulted in two letters to EFEC/NSF with regards to sample handling strategy and the operations and maintenance program. Attended by: M. Zoback, S. Hickman, W. Ellsworth, C. Weiland, L. Capuano, R. Hyndman, M. Bahorich, R. Emmerman, P.J. Fox, A. McGarr, J. Rice, and T.F. Wong.
- Received response from NSF concerning the 2005 Operations and Maintenance Proposal (September 1, 2005).
- Several PBO Field Engineers spent time in Alaska to perform reconnaissance and installation activities on the Aleutian chain.
- Hired PBO Permitting Assistant for California, Nevada, and Northern California; PBO Permitting Assistant for Alaska; PBO Warehouse Technician; PBO Student Field Assistant; PBO Pacific Northwest Permitting Assistant II; PBO Java Software Developer; PBO Permitting Assistant for Northern and Southern California regions; and PBO Software Engineering Manager.
- Working to implement recommendations of the Permitting Panel and working with panel chair to revise the report at UNAVCO Board's request.
- Submitted plan for Pacific Northwest warehouse modifications to the Ellensburg, WA, Development Group. The changes were approved and bids are being requested from contractors.
- Improved internal method for tracking strainmeter status.
- PBO field engineers attended a gun safety training course in preparation for assisting with Alaska installs.
- Prepared for NSF EarthScope Baseline Review.
- Formalizing loan process to address the selling of GPS receivers between projects.
- Established an e-mail list to facilitate station quality information exchange between the IRIS Data Management Center and the United States Geological Service.
- Submitted proposal to host WInSAR consortium at UNAVCO. Prepared by: W. Prescott and D. Phillips.
- Awarded contract for solar panel mount to Precision Machine and Design in Gunbarrel, CO. Working with D. Wilson and Trimble to get NetRS PBO able to use for swaps at down sites.
- Developed maintenance plan for Akutan Volcano, Alaska.
- Hired Transportable Array Permit Coordinator, Southern California Field Engineer I, Alaska PBO Permitting Assistant, USArray Project Associate, and Transportable Array Construction Lead.
- Completed the Government Property Report for NSF.
- The Transportable Array installation team received satellite installation training at the PASSCAL Instrument Center in New Mexico.
- Demonstrated PBO Document and Digital Imagery Management Systems for the UNAVCO staff.
- Continued discussion about handling of PBO and SAFOD seismic data.
- Finalized Year 3 work plan and Years 4 and 5 preview for PBO data management activities.
- Developed detailed bill of material for strainmeters.
- Solicited competitive bids for constructing Transportable Array stations in Nevada. Only two non-responsive bids were received, likely because of the brief turnaround time. A revised competitive solicitation will be issued.

Drilling for Utica Cal Trans GPS station P547 in Southern CA.

- Reconnaissance and installation activities were carried out in the Northern and Southern California regions with the assistance of personnel from Alaska and Rocky Mountain regional offices.
- Formed EarthScope Magnetotelluric Working Group to advise on USArray on magnetotelluric installations.
- Drafted Statement of Work for Bay Area Regional Deformation Network subaward.
- Completed detailed analysis of proposed restructuring of SCIGN subaward budget for Year 2 of Nucleus project.
- Held training session on POI and SQL methods for inserting stations into PBO data flow system. Attended by G. Anderson, S. Borenstein, J. Matykiewicz, E. Persson, D. Torrez, and J. Wright.
- Coordinated release of Request of Letters of Interest in handling PBO seismic data.
- Developed regional resource deployment schedule, including Augustine and Akutan projects, for December and January.
- Received a five station installation request from the PBO Magmatics System Committee in response to the recent increased seismic activity and flank deformation detected on the Augustine Volcano.
- Submitted Year 1 Annual Progress Report to NSF for Nucleus Network.
- Identified, with NSF, four tentative GeoEarthScope working groups. Charged and populated the working groups with strawman membership lists. The working group lists and charters were delivered to K. Shedlock, G. van der Vink, and P. Silver on December 16, 2005 for review. As of end of December, the InSAR and LiDAR target groups have been tentatively approved but the Geochronology target group and the acquisition group needs revision.
- Completed EarthScope Project Logo Usage Guide.
- Developed 3-year plan and budget for GeoEarthScope.
- Hired PBO System Administrator Assistant, two PBO Pacific Northwest Strainmeter Field Engineers, two PBO Northern California Field Engineers, two Transportable Array Station Specialists, and two Transportable Array Reconnaissance Specialist.
- Planned for Augustine Volcano emergency response. The proposed Augustine response and installation of five new PBO GPS sites on Augustine volcano has been delayed, due to safety and access concerns.
- Released SAFOD Advisory Board preferences on funding priorities.
- Trained staff for set up and programming of the new larger VSAT dish destined for Akutan Volcano.
- Continued development of GeoEarthScope working groups.
- Developed GeoEarthScope special interest group session for 2006 UNAVCO Science Meeting.
- Initiated communications regarding applications of InSAR imagery to PBO sites.
- WInSAR Consortium announced decision to move to UNAVCO. This move will likely cause some overlap between GeoEarthSocpe InSAR activities and WInSAR activities at UNAVCO.
- Managed Desert Tortoise surveys in Mohave National Park.
- Developed regional resource deployment schedule for January and February 2006.
- Submitted Change Order USArray-015, which describes the rescope of the magnetotelluric plan to fit within the 2003 MREFC budget.
- Prepared next iteration of project baseline under direction of the National Science Foundation.
- Developed installation and operations and maintenance budget for proposed relocation of 23 sites.

Cable and conduit are laid below ground to connect the enclosure with the GPS monument.

- Pacific Northwest GPS and Strainmeter personnel moved to the additional office space procured in Ellensburg, Washington.
- Finalized new GeoEarthScope imagery and geochronology acquisition plans.
- Finalized and populated GeoEarthScope LiDAR, InSAR, and geochronology working group charters.
- Issued request for quotations to construct Transportable Array stations in Oregon (second round) on March 15.
- The Transportable Array Coordinating Office siting coordinator resigned and recruitment for a replacement is underway.
- Finalized revised Central Washington University PBO subaward.
- Received final budget for University of California Berkeley strainmeter archive subaward renewal.
- Finalized subawards with Massachusetts Institute of Technology, New Mexico Tech, and Central Washington University for Nucleus processing.
- Finalized statement of work for Socorro Data Center.
- EFEC Conference Calls:
  - April 15, 2005: Discussed Operations and Maintenance Proposal Panel Review Meeting and Facility Response/Addendum to LMI draft.
  - April 22, 2005: Discussed Operations and Maintenance Proposal Panel Review Meeting and Facility Response/Addendum to LMI draft.
  - May 6, 2005: Discussed with K. Shedlock how to improve reporting to better meet NSF's needs.
  - May 27, 2005: Discussed responses to the second draft of NSF's independent cost review of the O&M Proposal.
  - June 3, 2005: Discussed Operations and Maintenance Proposal, Management and Baseline Review, and volcanic GPS sites.
  - June 24, 2005: Discussed Annual Report, volcanic GPS sites, and Operations and Maintenance Proposal.
  - July 1, 2005: Discussed NSF site visits, ESEC meeting, and NSF EarthScope Baseline Review.
  - July 8, 2005: NSF discussed reporting with EFEC.
  - July 15, 2005: Discussed NSF decision on GPS magmatic sites and NSF discussed reporting with the EFEC.
  - July 22, 2005: Discussed new NSF reporting requirements.
  - July 29, 2005: Discussed new NSF reporting requirements and potential SAFOD media day.
  - August 5, 2005: Discussed preparations for the NSF EarthScope Baseline Review and NSF new reporting requirements.
  - August 26, 2005: Discussed upcoming quarterly meeting and NSF EarthScope Baseline Review.
  - September 9, 2005: Discussed preparations for NSF EarthScope Baseline Review.
  - September 16, 2005: Approved new procedures for EFEC conference calls.
  - November 21, 2005: Discussed agenda for the EFEC Quarterly Meeting and EarthScope Project Management Site Review
  - November 25, 2005: No quorum. Informational call only.
  - December 16, 2005: Discussed Baseline Meeting (January 13, 2006) with NSF and adding an additional weekly EFEC conference call.

Installing deep drill GPS requires continual adjustments to the rig and bit while it drills 30 ft below ground.

- December 23, 2005: Discussed current status of EarthScope Project and Baseline Meeting (January 13, 2006) with NSF.
- January 6, 2006: Discussed upcoming baseline meeting at NSF and upcoming change order requesting NSF-held contingency for SAFOD.
- February 3, 2006: Discussed current status of the EarthScope Project and prepared for the February 13 meeting with NSF.
- February 10, 2006: Discussed current status of the EarthScope Project and prepared for the February 13 meeting with NSF.
- February 24, 2006: Discussed next iteration of the baseline.
- March 3, 2006: Discussed current status of the EarthScope Project and the next iteration of the baseline.
- March 10, 2006: Discussed current status of the EarthScope Project and the next iteration of the baseline.
- March 24, 2006: Discussed current status of EarthScope and the new baseline.

- EarthScope Operations Conference Calls:
  - April 13, 2005: Discussed current status of EarthScope and preparations for upcoming meetings (Panel Review, USArray Site Review, IRIS/UNAVCO Joint Meeting).
  - April 20, 2005: Discussed current status of EarthScope and use of contingency.
  - May 11, 2005: Discussed current status of EarthScope and use of contingency.
  - May 25, 2005: Discussed current status of EarthScope, the Annual Report for NSF, and NSF's new contingency system.
  - June 1, 2005: Discussed current status of EarthScope, Management and Baseline Review, and reporting.
  - June 15, 2005: Discussed current status of EarthScope and Operations and Maintenance Proposal.
  - June 22, 2005: Discussed current status of EarthScope.
  - July 6, 2005: Discussed current status of EarthScope, reporting to NSF, and the NSF EarthScope Baseline Review.
  - July 13, 2005: Discussed current status of EarthScope, reporting to NSF, EarthScope Information System, and the NSF EarthScope Baseline Review.
  - July 28, 2005: Discussed new NSF monthly reporting requirements.
  - August 10, 2005: Discussed current status of project and preparations for NSF EarthScope Baseline Review.
  - August 24, 2005: Discussed current status of project, NSF reporting requirements, and preparations for the NSF EarthScope Baseline Review.
  - September 6, 2005: Discussed current status of project and preparations for NSF EarthScope Baseline Review.
  - September 14, 2005: Discussed current status of project and preparations for NSF EarthScope Baseline Review.
  - September 28, 2005: Discussed current status of project and upcoming schedule.
  - October 12, 2005: Discussed current status of the EarthScope Project, recent meetings, and upcoming schedule.

J. Fowler adjusts the solar array at O04C (Chester, CA).

- October 19, 2005: Discussed current status of the EarthScope Project and the upcoming EFEC and ESEC meetings.
- October 26, 2005: Discussed operational updates, concerns, and upcoming activities.
- November 9, 2005: Discussed current status of the EarthScope Project and NSF-held contingency.
- November 23, 2005: Discussed current status of the EarthScope Project, reviewed quarterly meeting results, and discussed plans for American Geophysical Union Fall Meeting.
- November 30, 2005: Discussed current status of the EarthScope Project.
- December 14, 2005: Discussed current status of the EarthScope Project.

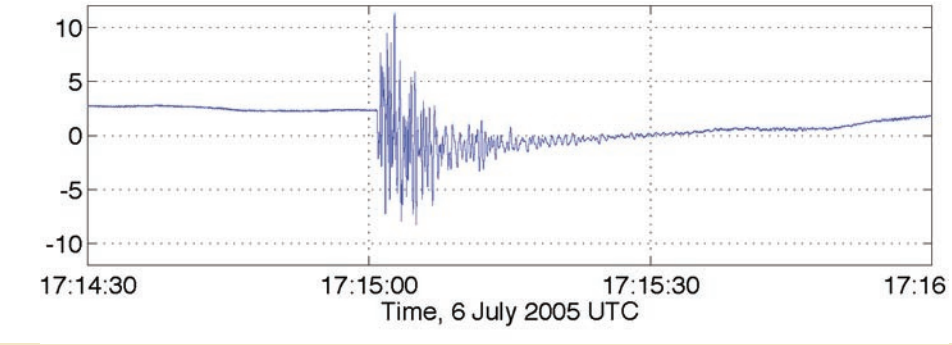
PBO GPS installation at False Pass in Alaska.

- January 4, 2006: Discussed current status of EarthScope.
- January 11, 2006: Discussed current status of EarthScope.
- January 18, 2006: Discussed current status of EarthScope and outcome of NSF Baseline Review.
- January 25, 2006: Discussed current status of EarthScope and preparation for baseline iteration meeting with NSF.
- February 1, 2006: Discussed current status of the EarthScope Project and prepared for the February 13 meeting with NSF.
- February 8, 2006: Discussed current status of the EarthScope Project and prepared for the February 13 meeting with NSF.
- February 22, 2006: Discussed current status of the EarthScope Project and next iteration of the baseline, including timeline and budgets.
- March 8, 2006: Discussed current status of the EarthScope Project and the next iteration of the baseline.

- EarthScope Data Working Group Conference Call:
  - October 25, 2005: Discussed PBO and SAFOD seismic data.

Data Management Activities:

- Began responsibility for downloading data from five PBO Nucleus stations. Devised detailed plan with UNAVCO Facility Data Management to transition archiving of Nucleus data from the Facility to PBO.
- Finalized Massachusetts Institute of Technology Analysis Center Coordinator and Central Washington University Analysis Center subawards.
- Finalized Berkeley Analysis Center budget request and subaward.
- Finalized UNAVCO Facility funding.
- Finalized strain data archiving letter of agreement between UNAVCO and IRIS.
- Installed and tested GTSM Technologies software on the PBO server and wrote documentation describing PBO requirements for datalogger response information.
- Began development of an information display system to display waveforms and other quality control information at the IRIS Data Management Center.
- Worked with SuomiNet and NOAA on data flow issues relating to upgrades and PBO data transition of common Nucleus/SuomiNet stations.



Recording from the SAFOD 855 m fiber-optic strainmeter during M 2.8 Parkfield earthquake.

- SAFOD Pilot Hole logging data posted online.
- Finalized charter and membership for the PBO GPS Data Analysis Working Group.
- Began developing backup plans in case of loss of PBO Analysis Centers.
- Finalized details of strainmeter data handling and processing.
- Converted several Nucleus stations to PBO-style data flow.
- Released software that generates reports of archived Transportable Array network data.
- Completed basic query functions of the Unified Product Distribution System at the IRIS Data Management System. This includes a Web Service-based QueryServer and a stand-alone Java client.
- Started SAFOD daily reports using the drilling information system from International Continental Scientific Drilling Program.
- Released SAFOD Phase 1 Main Hole logging data online.
- Began downloading 24 PBO Nucleus stations.
- Programmed eight Mount St. Helens response stations to return 15-sec data hourly.
- Began recording six PBO core stations and one PBO Nucleus station at 5-samples/second. These data are not being archived, but are being downloaded in test mode.
- Developed schedule for Data Management Information Technology activities through the end of Year 2.
- Received final budget and subaward documents from University of California Berkeley for strainmeter archiving subaward.
- Began initial tracking of ANSS Backbone data quality. Identified several issues that have been reported and are being addressed.
- Conducted a pilot project at the Array Network Facility to establish data flow from seismic sensors at PBO borehole strainmeter sites.
- Installed PBO redundant data backup system at the IRIS Data Management Center.
- Continued development of Uniform Product Distribution System at the IRIS Data Management Center.
- Examined preliminary data from the tiltmeter on the Stage 1 sonde to assess data quality.
- Established a methodology for converting and compressing raw data from the Pilot Hole into miniSEED for the time interval around the September 2004 Parkfield event.
- Began tests of downloading GPS data at 5 samples/second.
- Worked to convert several Nucleus stations to PBO-style data flow.
- Finalized plan for development and release of PBO Operational Database and Interface version 1.6.2 and 1.7.

At the SAFOD drill site, A. Bartley performs a routine measurement of the drilling mud properties.

- Started routine Albuquerque Seismological Laboratory-style quality control on the ANSS Backbone stations by incorporating quality control procedures used on other USArray data sets.
- Delivered seismic data from the Stage 2 sonde and Duke University Pilot Hole Array, delivered to the Northern California Earthquake Data Center for processing.
- Achieved full operation of the Augustine network after a maintenance trip in August 2005.
- Started discussion with REASoN group on common GPS XML format.
- Decommissioned Caltech station in Lake Elsinore, CA (BCC) and replaced it with the newly constructed station at Murieta, CA (MUR). Data from this new station has not yet been transferred to the IRIS Data Management Center.
- Began receiving strainmeter data in SEED format from the borehole and long-baseline laser strainmeters.
- Developed archive report mechanisms for strain data.
- Added support to the Uniformed Product Distribution System for optional metadata fields, optional client-side product validation, database extension, and name space-aware product processing.
- Corrected data flow problems from ANSS Backbone and Transportable Array stations.
- Delivered all seismic data collected in the SAFOD Pilot Hole and Main Hole to the Northern California Earthquake Data Center for archiving.
- Processed photography and conducted preliminary petrographic descriptions on the 52 sidewall cores and 12-ft-long spot core.
- Released GPS Level 2 products on September 30, 2005.
- Released strainmeter Level 2 products on September 30, 2005.
- Developed GPS analysis statements of work for Nucleus data.
- Developed automated scripts to track PBO strain data archiving and user request processing.
- Implemented SeisNetWatch real-time monitoring system to monitor seismic station health based on the latest arriving data.
- Phase 2 mud log and well completion diagrams uploaded to International Continental Scientific Drilling Program website.
- Continued investigation and evaluation of data management and interface systems in preparation for the GeoEarthScope archive.
- Maintenance is planned for the downed Mt. St. Helens' GPS stations, all which communicate through the southern communications system.
- Discussed alternative methods for handling PBO seismic data. Tentative plans determined.
- Planned details on data flow software control panel graphical user interface.
- Began receiving data from Flexible Array stations for the PASO-TRES experiment. Back filling of data from the beginning of the current experiment (October 2004) is in progress.
- Received data from the Flexible Array Cascadia Tremor Array experiment.
- Posted Stage 1 tilt data logging on International Continental Scientific Drilling Program website.
- Worked on new GPS products archiving scheme and managed various issues related to borehole strainmeter data flow and archiving.
- Continued resolving Year 3+ University of California Berkeley strainmeter archiving subaward budgeting issues.
- Worked on various Nucleus data issues and coordinated additions of several Nucleus stations to the PBO data flow system.

- Continued interactions with Airborne Laser Swath Mapping community regarding data processing and management for GeoEarthScope.
- Compiled meta-data and coordinated archiving of data from EarthScope-supported Cascadia Episodic Tremor and Slip campaign. Data were delivered to co-principal investigator R. Bennett for immediate analysis on November 5, 2005.
- Finalized firewall hardware purchase and administrative issues relating to the establishment of VPN between UNAVCO and the US Geological Survey Golden, which will allow operation of 21 Nucleus and USArray GPS stations through US Geological Survey VSAT network. US Geological Survey is currently testing and configuring the system.
- Released submit and query client applications and a running archive server for the IRIS Data Management Center's Uniform Product Distribution System. This release is for system testing and evaluation purposes and exposes the entire planned query feature set. Queries to the archive are by product type and can contain filter constraints for any of the identified metadata fields. This is a testing- and evaluation-only release, and, as such, the user interface is not in its final form.
- Core photos posted to International Continental Scientific Drilling Program website.
- Switched the Augustine Volcano network to hourly downloads, though daily files are still being collected on the receivers as a backup.
- Finalized transition plans for moving the GPS Analysis Center from the University of California, Berkeley to New Mexico Tech.
- Resolved several outstanding issues and worked on issued related to strainmeter data flow and archiving.
- Investigated data anomalies at Nucleus Network stations.
- ANSS Backbone station code LOZ (Lake Ozonia, NY) was changed to LONY.
- The IRIS Data Management Center's Uniform Product Distribution System team focused on developing a simple web browser interface into the archive.
- IRIS analyzed the marginal costs for managing the PBO and SAFOD seismic data. These cost estimates were submitted to the EFEC for review.
- Reconfigured SAFOD data hut.
- Configured on-site server, on-site datalogger.
- Recorded SAFOD seismic data.
- Transmitted SAFOD tiltmeter data via VPN and collected into weekly files.
- Lost Stage 2 seismic instrument telemetry.
- Completed micropaleontology analysis on SAFOD Phase 2 spot core (4.0 km measured depth).
- Continued to receive all data from Mt. St. Helens.
- Switched to hourly downloads of Augustine Volcano stations and nearby stations (AC27, AC59, ATW2, AV01, AV02, and AV21).
- Retrieved data from the Akutan Volcano network. Verified that all receivers are operating and the network is operating.
- Worked with US Geological Survey to deliver data from Backbone stations DGMT (Dagmar, MT), EGMT (Eagleton, MT) and SRU (San Rafael Swell, UT) to the IRIS Data Management Center since EarthScope related upgrades.
- Began delivery of additional state-of-health (mass position) channels from CalTech adopted Transportable Array stations to the IRIS Data Management Center.

Crews prepare to start the drilling for the Northern California GPS station P267, located at an airport in Dixon.

- Received data from final servicing of the Cascadia Tremor Array 2005 Flexible Array experiment at the IRIS Data Management Center.
- Continued development of the Uniform Product Distribution System including a deployment of the permanent archive and a web browser query interface.
- Completed all backlog ANSS Backbone quality control from May 2005.
- Began seismic event data flow from SAFOD to the Northern California Seismic Network.
- Posted helicorder and spectrograms from SAFOD realtime seismic data.
- Installed the 300th GPS station.
- Installed one station on Augustine Volcano.
- Activated 5-sps data collection on several northern California stations in response to request from G. Bawden.

Pumping cement into the long legs of a deep drill GPS station in Northern Wasatch County, Utah.

- Developed two new utilities that automatically feed information from the IRIS Data Management Center to interested data users so that a user's computer always contains the most recent information about stations.
- Archived all data from the PBO Seismic Network. New data from the PBO Seismic Network continues to arrive in real-time from the Array Network Facility.
- Completed web browser-based interface for the Uniform Product Distribution System. The archive currently has over 250,000 hypocenter products, 21,000 Harvard Centroid Moment Tensor products, 450 XML Farm Products, and 100 strain data products.
- Enlisted a contract software developer to extend an existing application. The new iteration will be available in the next two months and should be complete by September 2006.
- Physical samples (side wall core, spot core, cuttings) delivered to Gulf Coast Repository in College Station, Texas.
- Inventory report of physical samples added to the International Continental Scientific Drilling Program website.
- Received approval from NSF on PBO seismic data management plan.
- Completed review of strainmeter data holdings.
- Finalized arrangements with University of California San Diego on handling PBO seismic data flow until PBO seismic data handling system is fully operational.
- Installed Antelope on PBO systems and began downloading data from six PBO seismic stations.
- Released PBO station homepages on March 13, 2006. Users now have direct access to time series plots for all stations whose data have been analyzed by PBO.
- Completed site review of Analysis Center Coordinator.
- Completed major revision of the GPS data flow software system. The new system has about a 90% reduction in the CPU power required, and about a 95% reduction in bandwidth required to keep up with data from a typical station.
- Serviced 2.5 times more data in the first months of 2006 than all of 2005.
- Implemented capabilities to track the amount of data received and the amount of data shipped by virtual networks.
- Prepared Uniform Product Distribution System for beta testing by outside users.
- Work continues on the product archive and focused on providing support for "common metadata" fields that can be queried across all products and support for mapable product- and source-id required fields. The system has been renamed the Searchable Product Archive and Distribution Engine (SPADE).

Instrumentation Activities:

- Modified GeoTek Multi-Spectral Core Logger owned by the USGS to create full circumferential digital images of Phase 2 SAFOD core.
- Performed MSIP sonic log in cased hole (April 10, 2005). The acquisition and processing of the log were contributed by Schlumberger.
- Completed 6 month fluid build-up test in the SAFOD Main Hole. Approximately 200 ft of formation water entered the hole and it was mixed with a long column of high pH, higher salinity, muddy KCl coring fluid from the Phase 1 drilling. Several different samples were obtained that contain high concentrations of dissolved formation gasses, which geochemists at the USGS and elsewhere will analyze for chemical and isotopic composition.
- Began an active/passive seismic experiment to refine drilling target locations, by deploying a 4,000 foot, 80-level seismic array provided free-of-charge by Paulsson Geophysical Services into the Main Hole. During the three-day installation, five small charges were detonated for calibration and testing of the data systems (April 23-25, 2005).
- Partially recovered the 32-level seismic array from Pilot Hole (April 19-21, 2005).
- Official opening of the Array Operations Facility building (April 7, 2005; Socorro, NM).
- ECS (chemical log) and IBC (cement bond log) cased hole logs in the Main Hole (April 16-17, 2005).
- Continued testing multiple sets of instrumentation in realistic test vault environments at the Albuquerque Seismological Laboratory.
- Submitted permit packages for all Bureau of Land Management Nevada sites. California and Nevada BLM Cost Recovery Agreements are signed and funded.
- Alaska summer GPS deployment plan continues to be reviewed and reworked based on new directives from NSF and changes in the Alaska regional staff.
- Finalized Statement of Work and initiated subaward for University of California San Diego Glendale Strainmeter.
- Drafted Statement of Work for Caltech/BARGEN subaward.
- Coordinated and approved Tucson Basin Subsidence project using surplus Nucleus receivers from upgraded SCIGN stations.
- Started the pilot contract for Transportable Array installation. The contractor (Honeywell) now provides one full-time person and two additional personnel for a week at a time to conduct station installations.
- Initiated the contract for the Transportable Array Coordinating Office. The office will provide coordination for the various permitting, reconnaissance, installation, and construction efforts of the Transportable Array.
- Testing continued on the new Texan instruments. These tests indicate that the instruments do meet specification and production runs should start in May.
- Installed Stage 1 monitoring sonde in the Pilot Hole with a 3-component geophone and 2-component tiltmeter. This sonde appears to be operating well and is now being fully interfaced with the surface recording system.
- Began mobilization of the Phase 2 drill rig to the SAFOD drill site.
- Completed laboratory testing of the SAFOD fiber optic strainmeter.

Campaign seismometer deployed to record the episodic earthquakes in the Pacific Northwest.

- Deployed Paulsson Geophysical Services 80-level geophone array in SAFOD to record surface shots and natural earthquakes.
- Conducted intensive effort to refine location for SAFOD target earthquake using surface and downhole recordings of shots and nearby earthquakes.
- Prepared for borehole strainmeter installations.
- Assessed telemetry options and likely monument replacements at several PBO Nucleus Stations in the Parkfield and Carr Hill area.
- Continued negotiations with the US Geological Survey, the Bureau of Indian Affairs, and the Navajo Nation for a Right of Way for station NNAZ (Navajo Nation, AZ). Investigated alternate sites at Mesa Verde National Park.
- Prepared for Alaska installation season: travel, logistics, equipment, purchasing, transportation, helicopter contracts, supplies, etc.
- Prepared for six ANSS Backbone installations and 7 site/noise surveys.
- Prepared, with NSF, the Request for Proposals for the Transportable Array installation contract. The RFP was finalized and distributed to pre-qualified vendors for bidding.

ANSS Backbone station in Hailey, ID after 4 feet of snow.

- Prepared Transportable Array subawards:
  - Arizona Statue University: Site selection and permitting in Arizona.
  - University of Nevada, Reno: Reconnaissance and site specialist services.
  - Oregon State University: Reconnaissance.
- Completed testing magnetotelluric systems in Deep Springs Valley, CA. Initial problems included: no software provided by a manufacturer to upload data, and failure of a magnetometer in another system. Data collected during this experiment are being evaluated by S. Park of University of California Riverside.
- Installed and tested SAFOD Stage 2 laser strainmeter data system.
- Began SAFOD Phase 2 drilling operations.
- Attempted SAFOD Core Run 1 at 11,271 ft. There was no recovery because of top drive failure.
- Performed fluid sampling for formation fluids and gases in SAFOD open-hole interval 10,010 to 10,065 ft.
- Performed minifrac test in the Main Hole at depth of 10,010 to 10,065 ft.
- Installed the first three PBO borehole strainmeters.
- Began installing GPS stations on Akutan Volcano in Alaska.
- Moved the repeater for the southern Mt. St. Helens stations on June 9, 2005 to a permanent location. A Rohn tower was installed, along with solar panels and a battery enclosure. The stations were back on-line the next day.
- Continued coordination and development of the PBO Nucleus network integration in Yellowstone and Nevada.
- Continued planning for 13 GPS station upgrades near Parkfield, CA, including participation in USGS permit procurement.
- Completed first order of 400 Reftek Texan data recorders for the Flexible Array. Reftek shipped Texans to the Array Operations Center at the rate of 50-80 units/week.
- Began testing of the new Texan interface hardware and software.
- Conducted site survey at ANSS Backbone station at Grayling, MI, but the noise survey was limited to 36 hours because the Q330 baler went into lockout. The noise survey may have to be repeated.

- Installed new Transportable Array and CERI vaults at Albuquerque for evaluation.
- Received top drive from a 7-day repair in Bakersfield, CA for a broken gear box. One day later, the electric motor on the top drive also needed to be repaired.
- Recovered drill pipe from 12,181 feet where it was stuck.
- Recorded first earthquake on the Stage 2 fiber-optic strainmeter installed behind the casing in the Main Hole and Stage 1 seismometer and tiltmeter in the Pilot Hole. This was a M 2.8 event on the San Andreas Fault in the target zone.
- Completed eight GPS installations on Akutan Volcano on time and under budget.
- Prepared maps for reconnaissance on Pavlov, Okmok, and Unimak islands.
- Coordinated final issuance of permits and insurance for Pavlov, Okmok, and Unimak islands.
- Prioritized NetRS shipments from Trimble with NASA.
- Received all Year 2 GPS equipment except for receivers and communication systems for each region.
- Continued upgrades of Nucleus stations.
- Completed transition of all upgraded Nucleus stations to PBO data flow system, excepting 4 SuomiNet stations.
- Conducted extensive testing of Nucleus NetRS stock and determined 100% failure rate of field and shelf units when exposed to heat. Problem was isolated as faulty compact flash card. Identified a solution and presented it to Trimble.
- Received equipment from University of Oregon and arranged for archiving of data from Oregon Coast 2005 campaign.
- Continued laboratory testing of Texans and ancillary up-load and down-load systems so that the system will be ready for the field tests in August.
- Completed upgrades of ANSS Backbone stations in Blacksburg, VA; Hailey, ID; and Wild Horse Valley, OR. Blacksburg, VA will still receive a GPS monument.
- Fully instrumented the test vaults at the Albuquerque Seismological Laboratory. Preliminary data indicates that the Center for Earthquake Research and Information vault is best under all conditions. The new Transportable Array vault, cemented only at the base, is less noisy in windy conditions than the identical vault cemented all the way to the surface. The McMillan vault has almost the same response, but is noisier in the wind (especially in the high frequency band).
- Visited the ANSS Backbone on the Navajo Nation with the Bureau of Indian Affairs to determine what they would require before a Right of Way could be granted.
- Ordered 10 Adam Ethernet switches, borehole seismometer cable and wire rope, and grounding equipment and consumables.
- SAFOD passed through the San Andreas Fault Zone.
- Completed open-hole logging of the SAFOD Main Hole.
- Returned 52 sidewall cores from depths of 10,120 feet to 12,970 feet.
- Cased and cemented SAFOD Main Hole.
- Spot core at bottom of hole returns 12 ft of core.
- Completed mini-frac test in SAFOD Main Hole.
- Completed repairs on the Stage 2 sonde.
- Completed GPS maintenance on Augustine Volcano.

GPS station P563, part of the San Andreas Mega Cluster, in Buttonwillow, CA.

- Issued request-for-proposals for Nevada and Utah cultural surveys. Kautz Environments was the winning bidder. Work will commence on or around September 5, 2005.
- Issued request-for-proposals for botanical and cultural surveys at Mt. St. Helens. Winner to be selected by September 1, 2005.
- Continued to coordinate all Trimble returned materials authorizations. Sent 164 to Trimble, with 93 returned to UNAVCO.
- Found an acceptable replacement for the PBO solar panels, the General Electric GEPV-72. It is a 72-watt panel with the exact physical dimensions of the Shell SQ80. The 3-watt difference (the Shell SQ80 was rated at 75-watts) is not an issue.
- Worked with Trimble to get a certification sent with each receiver. The test records are stored digitally on each receiver. Trimble will be sending their test procedures to UNAVCO.

Digging a trench for GPS station P611 located in Mojave National Preserve near Baker, CA.

- Continued upgrades to Nucleus Network stations, including replacing failed NetRS receivers, improving communications, repairing existing station configurations.
- Prepared for September upgrades in SCIGN, BARGEN, PANGA, and BARD networks of the Nucleus Network.
- Assisted Idaho National Laboratory with planning, hardware purchases, and data analysis of eastern Idaho permanent GPS network.
- Continued development of new receiver firmware capabilities with Topcon.
- Opened the Terawatt facility, a University of Nevada storage and assembly point for the Transportable Array in Nevada, for assembly and distribution of seismic equipment throughout the west.
- Completed field tests of the new Texans. They performed well with the exception of battery life.
- Completed magnetotelluric field evaluation analysis. The evaluation committee has prepared and submitted their recommendations. Final equipment selection and the procurement process will begin in the next 2 months.
- Resolved apparent discrepancies in the STS-2 inventory.
- Continued permitting the ANSS Backbone site on the Navajo Nation (NNAZ), including discussions with Bureau of Land Management on survey issues.
- Removed Stage 1 sonde for maintenance and to allow an NSF-funded experiment to proceed with cross-borehole seismic experiment.
- Demobilized drill rig from SAFOD site.
- Attempted ultrasonic casing shape log SAFOD Main Hole.
- Completed GPS maintenance on Akutan Volcano, Alaska.
- Involved Northern California Regional Office in maintenance support of LIDAR survey.
- Requested and reissued insurance certificates for over 120 sites during the month of September. New insurance expiration date is October 1, 2006.
- Completed Mt. St. Helens cultural surveys. Still waiting on botanical surveys.
- Began Nevada Bureau of Land Management cultural surveys.
- Completed Utah state lands cultural resource surveys.
- Finalized statement of work for Pacific Northwest Geodetic Array subaward with principal investigator T. Melbourne, and initiated funding and drafted Bay Area Regional Deformation Array statement of work with Principal Investigator M. Murray.

- Coordinated Pacific Northwest Geodetic Array data flow with investigators of episodic tremor and slip to ensure timely data analysis.
- Coordinated transfer of 26 Basin and Range Geodetic Network permits from Caltech to UNAVCO. Effort will be ongoing involving K. Mahan and N. Niemi from Caltech, and R. Lewman and K. Bohnenstiehl from PBO.
- Conducted lab and field testing for cellular hardware that will be used at Nucleus and PBO stations.
- Supported Episodic Tremor and Slip Cascadia Campaign and Mt. St. Helens, and concluded Coachella Valley Subsidence.
- Continued discussion with Topcon regarding hardware and firmware improvements to GB-1000 systems, upgrades to existing units, and impending purchase of 50 new systems in FY2006.
- Continued GeoEarthScope community interaction to promote awareness of GeoEarthScope support at UNAVCO.
- Awarded Transportable Array Installation Service contract to Honeywell. The contract is to supply two-teams-of-two to support 10 installs per month in Year 3 and to support 17 installs per month in Year 4.

Installing the custom GPS monument at the ANSS Backbone site in Blacksburg, VA.

- Completed quality control analysis of ANSS Backbone stations from August 1, 2005 through September 31, 2005.
- Installed first collocated ANSS Backbone/GPS station Lake Ozonia, NY.
- Worked with the US Geological Survey in Golden, CO to integrate Global Seismographic Network-style 12-channel system data and Global Positioning System data into the Data Collection Center
- Received five Guralp CMG-3TB seismometers with data cable sets, two Very Small Aperture Terminal systems
- Began discussion to collocate an ANSS Backbone station (as a replacement for Octopus Mountain, WA) at the strainmeter borehole location near Sequim, WA.
- Changed ANSS Backbone installation plan at EYMN (Ely, MN) from a borehole installation to a Global Seismic Network-type vault installation.
- Changed ANSS Backbone installation plan at GOGA (Godfrey, GA) from a Global Seismic Network-type vault installation to a borehole installation.
- Replaced station OMM (Mammoth Lakes, CA) was replaced with station GASB (Alder Springs, CA) after the tunnel at OMM collapsed.
- Conducted two 40-arm caliper logs in SAFOD Main Hole.
- Completed GPS maintenance on Mt. St. Helens Volcano. Replaced six of the seven NetRS units. Radio antenna cables were also replaced and new connectors for the choke-ring antennas were installed. Working on renewing Mt. St. Helens temporary use permit for seven GPS sites constructed on the volcano.
- Replaced all non-functioning NetRS units in the Pacific Northwest region; they are now collecting data. Continued replacing NetRS units in the Northern California region.
- Prepared a revised proposal for the Klamath Tribes in relation to the five Medicine Lake sites.
- Obtained a business license to conduct business in the State of Utah to comply with requirements for permitting a site with Salt Lake City. Obtained a corporate resolution authorizing UNAVCO to enter into agreements with the State of Alaska.
- Continued to manage Nevada cultural resource surveys. Issues continue to arise regarding fencing requirements with the Bureau of Land Management.

- Issued a contract to prepare Death Valley Environmental Assessments for six sites.
- Elevated concern regarding slow response of California Bureau of Land Management Environmental Assessment to Washington, DC.
- Completed archeological surveys for the first round of permit applications to the State of Utah Trust Lands Department. Artifacts found at two sites. It was, however, possible to slightly move the site to avoid archeologically sensitive areas.
- Changed GPS solar panel mount design to address security issue.
- Continued GPS campaign support for the Rio Grande Rift campaign (permitting, siting, and equipment design).
- Continued discussion with Topcon regarding hardware and firmware improvements on GB-1000 systems, upgrades to existing units and impending purchase of 50 new systems in FY 2006. Tested and accepted new controller board firmware version 3.00 for GB-1000 receiver. Coordinated hardware upgrades for memory expansion of the remainder of existing GB-1000 stock (17 units).
- Coordinated retrieval of 30 episodic tremor and slip campaign GPS systems.
- Methods were developed that allow IRIS to determine the volume of data archived for a specific virtual network.
- Replaced the adopted Caltech Transportable Array station at Bear Country Club, CA (BCC) with the station at Lake Elsinore, CA (MUR).
- Replaced the damaged station at Old Mommoth Mine, CA (OMM; adopted from the University of Nevada – Reno) with the Caltech station at Mammoth Lakes, CA (MLAC).
- Completed all Transportable Array installations in California.
- Completed replacement of the faulty chips discovered during the test of the short-period data acquisition systems (Texans).
- Performed noise surveys at potential ANSS Backbone sites.
- Conducted temperature log conducted of the SAFOD main borehole with the US Geological Survey.
- SAFOD boreholes used for Lawrence Berkeley Laboratory/Carnegie Institution of Washington cross-borehole seismic experiment.
- Continued investigation of Mesa Verde, Colorado, site as alternate for NNAZ (Navajo Nation, Arizona). Surveyed noise at MVCO (Mesa Verde, CO). Continued negotiation with the Mesa Verde National Park Research Director for the best site with utility power and no archeological impact. Museum Lite display planned for the heavily-trafficked visitor center. Costs and time constraints on NNAZ make that site less feasible in the time remaining.
- Continued testing of KS54000 and CMG-3TB instruments.
- Received most of the remaining GPS equipment needed for the ANSS Backbone.
- Continued maintenance activities and NetRS receiver exchanges in the Northern and Southern California regions with the assistance of Rocky Mountain, Alaska and Facility personnel.
- Continued coordination of Trimble return materials authorizations for NetRS with compact flash issue.
- Continued upgrades of the Nucleus stations from the Southern California Integrated GPS Network, Basin and Range Geodetic Network, Eastern Basin-Range and Yellowstone Hotspot GPS Network, and Pacific Northwest Geodetic Array.
- Investigated hardware and receiver firmware failures from the Episodic Tremor and Slip Campaign Experiment. Problems were found with solar panels and GB-1000 receivers.

PBO student assistant working on the Shores strainmeter site.

Northern CA GPS station P228: Del Valle, East Bay Regional Parks.

They have been returned to manufacturers for further analysis.

- Continued discussion with Topcon regarding hardware and firmware improvements to GB-1000 systems, upgrades to existing units, and impending purchase of 50 new systems in FY 2006. Meeting planned between key UNAVCO and Topcon personnel in December.
- Continued planning for BLA (Blacksburg, VA) GPS installation on the abandoned borehole casing.
- Continued coordination with GOGA (Godfrey, GA) and KSU1 (Kansas State Univ, KS) drillers, January drilling expected. Continued searches for appropriate drillers for EROS Data Center, SD, and Alum Creek State Park, OH.
- Installed new satellite telemetry systems by Wild Blue at four Transportable Array stations. Following installation, all four ceased operation. The cause was diagnosed, and all four were restored to operation. Experience with Wild Blue systems so far has been favorable.
- Ordered 500 active-source data acquisition systems (Texans) for the Flexible Array.
- Stage 1 and Stage 2 instruments completed laboratory tests.
- Performed gyroscopic logging in SAFOD Main Hole on December 1, 2005.
- Installed a new CISCO router at the Vancouver facility and reestablished the southern Mount St. Helens repeater.
- Worked with US Geologic Survey to explore possibility of collocating PBO coastal sites with stations for tsunami warning.
- Continued to work various political avenues toward getting resolution on the Modoc National Forest sites. Currently US Geological Survey geologists are withholding a new geologic map of the forest until we get our permits.
- Completed ordering parts for Augustine Volcano response. Installs to begin late January 2006.
- Began shipping CDMA modems with dynamic IP's. Proxicast is experiencing difficulty getting static IP's from Verizon. Dynamic IP's can be changed to static remotely when they are available from Verizon. Operations are continuing as usual.
- Began testing of GSM modem capabilities in Proxicast Cingular-supported unit for use in GPS stations.
- Submitted purchase request for 50 GB-1000 receivers and 4 RTK systems, completing purchase options in modified contract dated June 23, 2005, completing EarthScope campaign equipment purchases. Ancillary hardware will be purchased in Q1 2006.
- Provided four Tech2000 antenna masts to Augustine Volcano emergency response request from J. Freymueller of the University of Alaska.
- Planned for future Cascadia campaign activity and continued analysis of past episodic tremor and slip event.
- Continued interaction with F. Amelung and European Space Agency regarding InSAR data acquisition.
- Continued interaction with Airborne Laser Swath Mapping community regarding data processing and management.
- Ordered and received new, higher-capacity DC-DC converters, required for the Q330 HR installations.
- Rain in Oregon and California hampered efforts to install Transportable Array stations and caused many communications outages and some site flooding. The installation team spent significant time restoring stations to operation, detracting from installing new stations.
- Placed orders for 20 EarthScope magnetotelluric systems from Narod Geophysics.

- Enlarged instrument deployment A-frame to a 15ft clearance above the SAFOD wellhead.
- Installed Stage 1 monitoring package the SAFOD Pilot Hole on January 13, 2006.
- Installed Stage 2 seismic monitoring package in SAFOD Main Hole on January 14, 2006.
- Delineated Stage 3 prototype functional specifications.
- Issued purchase order for high temperature tiltmeter for use in Stage 3.
- Lost contact with three stations (AV03, AV04, and AV05) due to eruptions of the Augustine Volcano. Added one station (AV21). It is believed stations AV03 and AV05 have been completely destroyed by the Augustine eruption and station AV04 is still intact, but simply not operating.
- Continued to work with contracts at the US Geological Survey Menlo Park to resolve issues with Shasta-Trinity and Modoc Forest permits.
- Began reconnaissance and permitting of Rio Grande rift sites.
- Continued upgrades to the Nucleus Network.
- Received 50 Topcon GB-1000 systems and 4 RTK supplements ordered in December, completing the UNAVCO/Topcon purchase agreement.
- Preliminary arrangements made to provide 6 campaign systems to EarthScope-funded 2006 collaborative Cascadia Episodic Tremor and Slip project.
- Continued dialog with Topcon management regarding outstanding hardware, software, and training issues.
- Planned with facility engineering group of Topcon RTK training in Socorro, New Mexico for New Mexico Tech Earth Sciences Department.
- Discussed and clarified of PBO data policy as it applies to past and future EarthScope GPS campaigns.
- Continued upgrades of the ANSS Backbone.
- Due to very wet weather in Oregon and California. Experienced 20 communications outages and 4 water intrusions (but not flooding).
- Moved construction and installation crews to Nevada to work on 16 sites before moving on to Arizona.
- Station 42 of the Sierra Nevada EarthScope Project experiment was stolen in January. The equipment taken includes the sensor, data acquisition system, GPS clock and solar power system. The appropriate local authorities were notified.
- Planned for two new Flexible Array experiments this summer.
- Received a loan from J. Booker of University of Washington for 2 Narod Intelligent Magnetotelluric Systems to enable ambient noise studies and vault-design planning for the backbone magnetotelluric array.
- Received approval from the Electromagnetic Studies of Continents (EMSOC) for lending 10 Narod Intelligent Magnetotelluric Systems for the pilot Transportable Magnetotelluric project in Oregon.
- Adopted the leases on 3 telephone lines to Carr's Hill, California, a held by the US Geological Survey. The telephone lines are for a backbone magnetotelluric station's main electrode lines that will be installed there. This action mitigated the set-up fee that would be required if the lease on the lines were abandoned.
- Retrieved Stage 2 instrument package on February 2, 2006.
- Redeployed Stage 2 instrument package (MH008) on February 3, 2006.

GPS station P112 located in Northern Wasatch County, Utah.

- Retrieved Stage 2 instrument package on February 16, 2006.
- Revised Year 3 GPS operations budget.
- Facilitated purchase of new vehicles for Pacific Northwest and Northern California regions.
- Continued to work with contacts at US Geological Survey Menlo Park to resolve issues with Shasta-Trinity and Modoc Forest permits.
- Began drilling strainmeter boreholes in two places simultaneously.
- Submitted an amendment to the SF-299 Modoc National Forest application to further reduce the number of sites from 5 to 3. Final site decisions to be made by early March.
- Received approval for Yellowstone National Park permit renewal.
- Finalized configuration of US Geological Survey/UNAVCO Private Network, which is ready for use by all EarthScope GPS stations collocated with National Seismographic Network and Global Seismographic Network seismic stations.

Maintenance on Nucleus station CPBN.

- Coordinated closing of accounting and activities of NSF MREFC project "Support for Western US Existing Networks".
- Received 16 GB-1000 receivers from Topcon having been upgraded for memory configuration and repaired for heat-related display failures. Further hardware failure resolution outstanding on 4 units still at Topcon factory.
- Tested two KS54000 seismometers. Three are now ready to install.
- Tested a Guralp seismometer. It is ready to install. Testing continues on one other Guralp.
- Completed failure analysis on Stage 2 instrumentation package.
- Conducted temperature log of the main SAFOD borehole with the US Geological Survey (March 14, 2006).
- Conducted fluid sampling of the main SAFOD borehole with the US Geological Survey (March 16, 2006).
- Conducted 40-arm caliper log of the main SAFOD borehole with Schlumberger (March 20, 2006).
- Performed upgrade on the central valley data communications to radio telemetry.
- Completed Bureau of Land Management reconnaissance trips for the Southern California region.
- Completed NetRS compact flash replacements completed.
- Provided input on an enclosure armor production prototype being fabricated by Precision Design and Machine.
- Outfitted annex warehouse for strainmeters.
- Finalized strainmeter enclosure design and approved first article.
- Began drilling in the Anza network.
- Worked to finalize maps for the Mt. St. Helens final proposal.
- Need to move 3 sites in the Shasta-Trinity National Forest.
- Completed GPS Surveying and Processing using Topcon GB-1000 Hardware seminar in Socorro: February 28, 2006 – March 2, 2006.
- Support for PI-funded GeoEarthScope projects continues.
- Received a second F350 truck and outfitted it with the new trailer. There are now two complete installation vehicles and independent sets of tools and equipment.
- Prefabricated five new McMillan vaults.

- Tested two more KS-54000s and one Guralp CMG-3TB.
- Received 40 short-period sensors, 40 high-resolution data acquisition systems, 100 Texans, 106 instrument enclosure systems, and 30 power distribution systems.
- Continued quality problems with Guralp sensors. Guralp has adopted a new test technique that should enable them to identify defective sensors before they are shipped.
- Planning a joint managnetotelluric/Transportable Array experiment.
- Planning a pilot magnetotelluric project in Oregon.

GPS station P563, part of the San Andreas Mega Cluster, in Buttonwillow, CA.

PART II: Performance Measures

MANAGEMENT STRUCTURE

EarthScope's goal is to explore the structure and dynamics of the North American continent at multiple scales – that of a fault (SAFOD), a plate boundary (PBO), and a continent (USArray). At each scale, instrumentation networks are being deployed to collect the various data sets – core samples, GPS, strainmeter, and seismic – resulting in a series of parallel subtasks:

SAFOD: San Andreas Fault Observatory at Depth

- Construct a multi-level, multi-component observatory to closely monitor at depth repeating microearthquakes on the San Andreas Fault
- Measure directly the physical state under which micro-earthquakes occur
- Recover rock and fluid samples from the active fault zone and surrounding crust

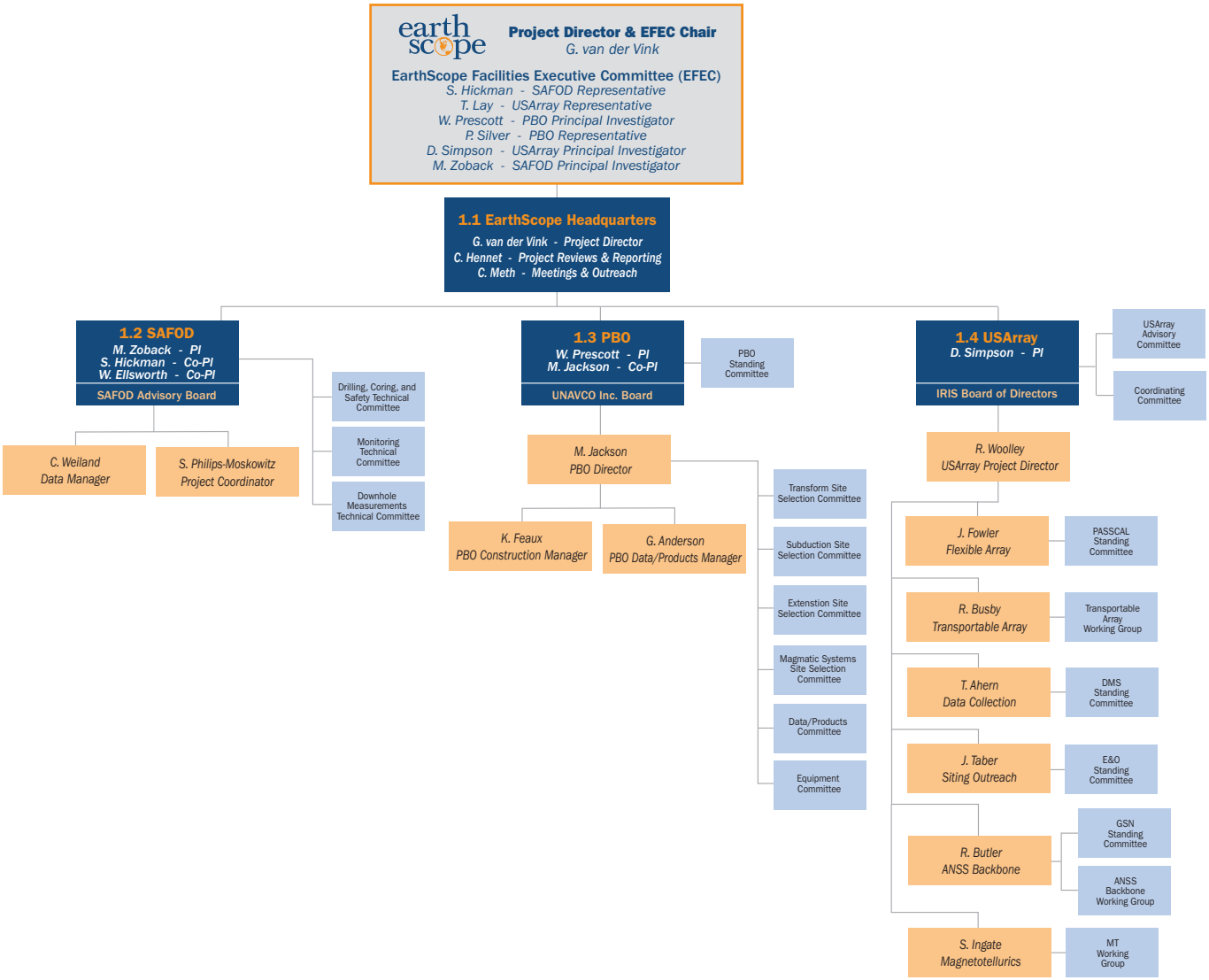
PBO: Plate Boundary Observatory of geodetic sensors

- Network of 100 Backbone GPS stations
- Network of 775 Permanent GPS stations
- Network of 175 Borehole strainmeters and seismometers
- Pool of 100 campaign GPS instruments
- GeoEarthScope – Geochronology & Images

USArray: Seismic arrays across the continent

- Network of 39 ANSS Backbone Network stations
- Network of 400 Transportable Array stations
- Pool of 2,400 campaign seismic instruments

EarthScope subtasks are implemented either through well-established and organized consortia that are experienced in deploying and operating networks of instruments, or, in the case of scientific drilling, through an academic and governmental partnership that has a strong history of collaboration. Representatives from each of the organizations compose the EarthScope Facility Executive Committee (EFEC). All members of the EFEC bear responsibility and are accountable for all aspects of the EarthScope Project. The Project Director is the chair of the EFEC and has overall management authority for the project including responsibility for budget development, construction, and operation. Within the EarthScope management structure are various committees that serve in advisory and oversight roles, as well as change control boards. They help insure that EarthScope maintains its strong community interfaces and transparency.

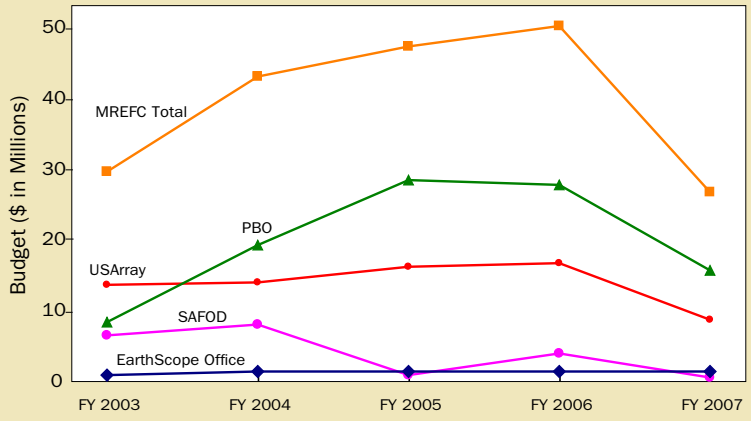


The EarthScope Project work is organized through the multi-level Work Breakdown Structure (WBS). It provides a clear breakout of scope, schedule, and actual costs. The first tier of the WBS (1 EarthScope) is referred to as Level 1, the second tier (1.1 EarthScope Management, 1.2 SAFOD, etc.) is referred to as Level 2, the third tier (1.1.1 EarthScope Management, 1.1.2 Project Reviews & Reporting, etc.) as Level 3, and so forth through the framework. The following box shows the EarthScope WBS through Level 4, although for most tasks there are multiple levels well beyond Level 4.

Level 3 tasks match the existing management structure of each organization with the scientific goals of each project. By structuring the activities in this manner, individuals responsible for each Level 3 task are identifiable from within each EarthScope management component.

Individuals	Level 3 Task
EarthScope Management	
G. van der Vink	1.1.1 EarthScope Management
C. Hennet	1.1.2 Project Reviews & Reporting
C. Meth	1.1.3 Meetings & Outreach
SAFOD	
M. Zoback	1.2.1 SAFOD Management
M. Zoback	1.2.2 Drilling and Downhole Measurements
W. Ellsworth	1.2.3 Instrumentation
S. Hickman	1.2.4 Data Products and Sample Handling
PBO	
M. Jackson	1.3.1 PBO Management
B. Stephanus	1.3.2 Long-baseline Laser Strainmeters
M. Jackson	1.3.3 Procurement
C. Kurnik	1.3.4 System Fabrication, Test, & Campaign
K. Feaux	1.3.5 Operations
G. Anderson	1.3.6 Data & Data Products
D. Phillips	1.3.7 GeoEarthScope
B. Stephanus	1.3.8 Project Support
USArray	
R. Woolley	1.4.1 USArray Management
R. Butler	1.4.2 ANSS Backbone
R. Busby	1.4.3 Transportable Array
J. Fowler	1.4.4 Flexible Array
T. Ahern	1.4.5 Data Management
J. Taber	1.4.6 Siting Outreach

EarthScope uses Earned Value Management (EVM) for managing the project and reporting to the National Science Foundation. The backbone of the structure is a baseline schedule, budget, and earned value system that is used to evaluate project progress.



Project funding for the construction phase of EarthScope. The expected operational lifespan of EarthScope is 15 years after construction is complete in Fiscal Year 2007

MILESTONE PROGRESS REPORT

Milestones track non-recurring system set-up goals and the production goals that are necessary to complete the project. Milestones are organized by quarter and WBS level to measure progress against the PEP (submitted to NSF on November 30, 2003; comment pending). The milestone list does not reflect changes to the schedule that have been approved through the change control process.

Year 1 Milestones

Quarter 1 (9/1/03 – 12/31/03)		Completed?
1.1	Project Director, Analyst, and Administrator hired	Yes
1.1	Project Execution Plan submitted for review	Yes
1.2	Stage 1 SAFOD monitoring subcontract awarded.	Yes
1.2	Phase 1 Drilling subcontract signed	Yes
1.2	SAFOD Advisory Board and Technical Panels named	Yes
1.2	SAFOD Data Manager hired	Yes
1.3	Critical PBO staff hired	Yes
1.3	PS purchase decision finalized	Yes
1.3	Rocky Mountain Regional Office established	Yes
1.3	Preliminary Design Review (PDR) of Permanent GPS Station equipment completed	Yes
1.4	Acquire hardware for IRIS DMC increased capacity	Yes
1.4	Issue award for Array Operations Facility	Yes
1.4	Issue award to USGS/ASL	Yes
1.4	6.7 equivalent ANSS Backbone stations installed	Yes

Quarter 2 (1/1/04 – 3/31/04)		Completed?
1.1	PBO site review completed by EFEC	Yes
1.1	First Quarter FY03/04 Report submitted (3/1/2004)	Yes
1.2	Construction of SAFOD Stage 1 monitoring instrumentation initiated	Yes
1.2	Subcontract for SAFOD Stage 2 monitoring instrumentation issued	Yes
1.3	PBO Archive subawards signed	Yes
1.3	RFP for PBO Processing Center released	Yes
1.3	RFP for PBO strainmeter released	Yes
1.3	Southern and Northern California Regional Office established	Yes
1.3	Critical Design Review (CDR) of Permanent GPS Station equipment completed	Yes
1.3	PDR of Borehole strainmeter equipment and procedures completed	Yes
1.4	Issue Award for Array Network Facility	Yes
1.4	Cooperative regional network stations data begins flowing to the DMC.	Yes
1.4	9 equivalent ANSS Backbone stations	Yes

Quarter 3 (4/1/04 – 6/30/04)		Completed?
1.1	USArray site reviewed by EFEC	Yes
1.1	Second Quarter FY03/04 Report and Annual Report submitted (6/1/2004)	Yes
1.2	Phase 1 drilling of SAFOD Main Hole initiated	Yes
1.2	Construction of Stage 2 monitoring instrumentation initiated	Yes
1.3	PBO Processing Center subawards established	Yes
1.3	PBO strainmeter subawards established	Yes
1.3	Pacific Northwest, Basin and Range and Alaska Regional Office established	Yes
1.3	CDR of Borehole strainmeter equipment procedures completed	Yes
1.3	40 equivalent Permanent GPS Stations, 3 equivalent Borehole Strainmeters	Yes
1.4	Array Network Facility and Data Management Center communications tested.	Yes
1.4	10.6 ANSS Backbone stations	Yes

Quarter 4 (7/1/04 – 9/31/04)		Completed?
1.1	SAFOD site reviewed by EFEC	Yes
1.1	Third Quarter FY03/04 Report submitted (9/10/2004)	Yes
1.2	Phase 1 drilling and related downhole activities completed	Yes
1.2	Stage 2 monitoring instrumentation deployed	Yes
1.2	Stage 1 monitoring system in SAFOD Pilot Hole deployed	Yes
1.3	PDR of PBO data archiving and Data solutions components completed	Yes
1.3	90 equivalent Permanent GPS Stations, 6 equivalent Borehole Strainmeters, 1 equivalent Long Baseline Strainmeter installed, and 28 equivalent Campaign GPS installations completed	Yes
1.4	DCN to ANF and DCN to DMC communications tests complete	Yes
1.4	13.8 equivalent ANSS Backbone stations, 28 equivalent Transportable Array stations, 240 Flexible Array equipment available	Yes

Year 2 Milestones

Quarter 1 (10/1/04 –12/31/04)		Completed?
1.1	EarthScope Office site reviewed by EFEC	Yes
1.1	Fourth Quarter FY03/04 Report submitted (12/1/2004)	Yes
1.3	CDR of PBO data archiving and data solutions components completed	Yes
1.3	143 equivalent Permanent GPS Stations, 12 equivalent Borehole Strainmeters, 1.5 equivalent Long Baseline Strainmeters installed, and 28 equivalent Campaign installations completed	Yes
1.4	21.4 equivalent ANSS Backbone stations, 36 equivalent Transportable Array stations, 480 Flexible Array equipment available	Yes

Quarter 2 (1/1/05 – 3/31/05)		Completed?
1.1	PBO site reviewed by EFEC	Yes
1.1	First Quarter FY04/05 Report submitted (3/1/05)	Yes
1.2	Contract for Stage 3 monitoring system signed	No
	STATUS: We plan to meet with Pinnacle Technologies on May 8th to complete the contract details.	
1.2	Samples and data distributed	Yes
1.2	Subcontract for Phase 2 drilling and related services signed	Yes
1.3	195 equivalent Permanent GPS Stations, 18 equivalent Borehole Strainmeters, 2.0 equivalent Long Baseline Strainmeters installed, 28 equivalent campaign installations completed	Yes
1.4	Award for Transportable Array Contractor issued	Yes
1.4	23.1 equivalent ANSS Backbone stations, 48 equivalent Transportable Array stations, 480 Flexible Array equipment available	Yes

Quarter 3 (4/1/05 – 6/30/05)		Completed?
1.1	USArray site reviewed by EFEC	Yes
1.1	Second Quarter FY04/05 Report and Annual Report (4/1/04 – 3/31/05) submitted (6/1/05)	Yes
1.2	Construction of Stage 3 prototype monitoring system initiated	No
	STATUS: The milestone calling for initiating of construction on the Stage 3 prototype monitoring system remains incomplete. Some of the parts from the Stage 2 system, which are already in hand, will be used in Stage 3. Also, many technical challenges encountered during the Stage 2 monitoring program directly feed into design and implementation of instrumentation for the Stage 3 monitoring program. Construction of the Stage 3 prototype will start as soon as the contract is signed in May 2006.	
1.2	Phase 2 drilling of SAFOD Main Hole initiated	Yes
1.3	PBO data Archiving and Data Solutions components fully functioning	Yes
1.3	248 equivalent Permanent GPS Stations, 24 equivalent Borehole Strainmeter, 2.5 equivalent Long Baseline Strainmeters installed, 28 equivalent campaign installations completed	Yes
1.4	25 equivalent ANSS Backbone stations, 60 equivalent Transportable Array stations, 600 Flexible Array equipment available	Yes

Quarter 4 (7/1/05 – 9/31/05)		Completed?
1.1	SAFOD site reviewed by EFEC	Yes
1.1	Third Quarter FY04/05 Report submitted (9/10/05)	Yes
1.2	Phase 2 drilling of SAFOD Main Hole main hole and related downhole measurements completed	Yes
1.3	300 equivalent Permanent GPS Stations, 30 equivalent Borehole Strainmeters, 3 equivalent Long Baseline Strainmeters installed, 100 equivalent campaign GPS installed	No
	STATUS: All deliverable goals have been met with the exception of the long-baseline laser strainmeters. Currently the University of California San Diego has completed 2.6 equivalent stations (one complete station and partial completion of two additional stations). This meets the current revised baseline that will be implemented in April 2006.	
1.4	28.9 equivalent ANSS Backbone stations, 80 equivalent Transportable Array stations, 720 Flexible Array equipment available	No
	STATUS: The ANSS Backbone installations are behind (currently 27.5 equivalent stations complete). A majority of the schedule variance is due to delayed work in the Albuquerque Seismological Laboratory subaward and the completion of boreholes. The Albuquerque Seismological Laboratory is deploying a second installation team to significantly improve the pace of installations and recover the schedule delay. The other parts of this milestone were met prior to the end of Year 2 Quarter 4. There are currently 161.4	

Year 3 Milestones

Quarter 1 (10/1/05–12/31/05)		Completed?
1.1	EarthScope Office site reviewed by EFEC	Yes
1.1	Fourth Quarter FY04/05 Report submitted (12/1/2005)	Yes
1.2	Prototype Stage 3 monitoring system deployed	No
	STATUS: The milestone calling for deploying the Stage 3 monitoring system remains incomplete. We plan to meet with Pinnacle Technologies on May 8th to complete the schedule details. Meanwhile, Stage 2 is deployed in the Main Hole and recording data.	
1.2	CDR of PBO data archiving and data solutions components completed	Yes
1.2	Gyroscopic well survey and azimuthal casing bond log carried out	Yes
1.2	Phase 2 samples distributed	Yes
1.3	360 equivalent Permanent GPS Stations, 48 equivalent Borehole Strainmeter installations, 3.5 equivalent Long Baseline Strainmeter installations	No
	STATUS: All deliverable goals have been met with the exception of the strainmeters. Currently the University of California San Diego has completed 2.6 equivalent long-baseline laser strainmeter stations (one complete station and partial completion of two additional stations). There are 44 equivalent borehole strainmeters have completed. These both meet the current revised baseline that will be implemented in April 2006.	
1.4	32.8 equivalent ANSS Backbone stations, 104 equivalent Transportable Array stations, 960 Flexible Array equipment available	No
	STATUS: The ANSS Backbone installations are behind (currently 27.5 equivalent stations complete). A majority of the schedule variance is due to delayed work in the Albuquerque Seismological Laboratory subaward and the completion of boreholes. The Albuquerque Seismological Laboratory is deploying a second installation team to significantly improve the pace of installations and recover the schedule delay. The Transportable Array part of this milestone was met prior to the end of Year 3 Quarter 1 and the Flexible Array part was met in Year 3 Quarter 2. There are currently 161.4 Transportable Array equivalent stations and 1005 Flexible Array systems.	

Quarter 2 (1/1/06–3/31/06)		Completed?
1.1	PBO Site reviewed by EFEC	Yes
1.1	First Quarter FY05/06 Report submitted (3/1/06)	Yes
1.3	420 equivalent Permanent GPS Stations, 65 equivalent Borehole Strainmeter installations, 4.0 equivalent Long Baseline Strainmeter installations	No
	STATUS: All deliverable goals have been met with the exception of the strainmeters. Currently the University of California San Diego has completed 2.6 equivalent long-baseline laser strainmeter stations (one complete station and partial completion of two additional stations). There are 44 equivalent borehole strainmeters completed. These both meet the current revised baseline that will be implemented in April 2006.	
1.4	35.5 equivalent ANSS Backbone stations, 140 equivalent Transportable Array stations, 960 Flexible Array equipment available	No
	STATUS: The ANSS Backbone installations are behind (currently 27.5 equivalent stations complete). A majority of the schedule variance is due to delayed work in the Albuquerque Seismological Laboratory subaward and the completion of boreholes. The Albuquerque Seismological Laboratory is deploying a second installation team to significantly improve the pace of installations and recover the schedule delay. The other parts of this milestone have been met as there are currently 161.4 Transportable Array equivalent stations and 1005 Flexible Array systems.	

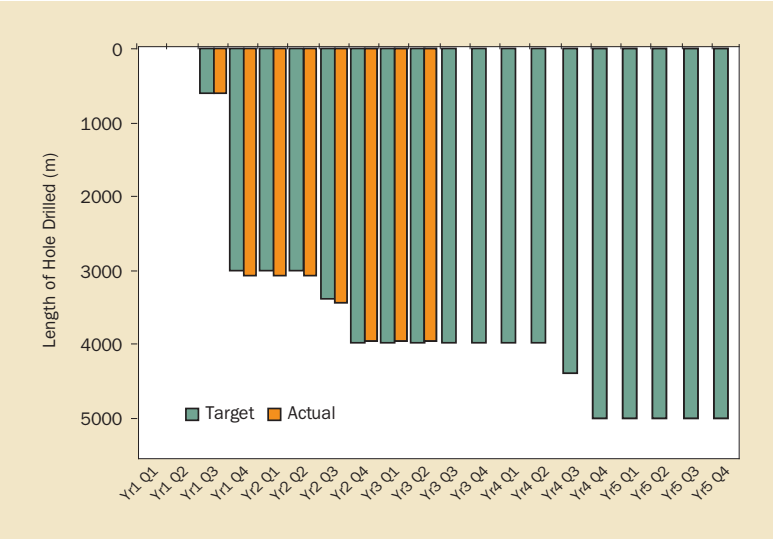
TECHNICAL PROGRESS

EarthScope measures progress in two ways: For the San Andreas Fault Observatory at Depth, progress is measured against depth drilled and timelines for the three phases of drilling and three stages of monitoring in the hole. For the geodetic and seismic stations, progress is measured in terms of the total number of steps in station installation (termed "equivalent stations").

Drilling

The complete set of SAFOD drilling phases and monitoring stages are defined as follows: Phase 1: Drilling Main Hole. Phase 2: Drilling through the fault zone. Phase 3: Coring into the region of active earthquakes. Stage 1: Monitoring in the Pilot Hole with a retrievable string of 3-component seismometers. Stage 2: Strain monitoring outside the casing and seismic monitoring within the casing. Stage 3: Monitoring in active earthquake zone with seismic and pore pressure instrumentation.

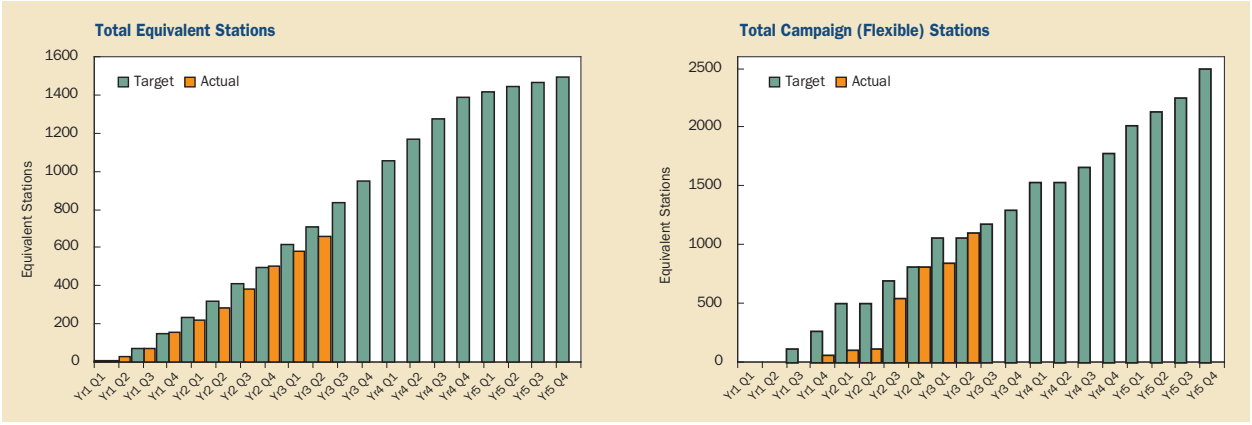
To track drilling progress, Target Lengths are provided by quarter. They represent the goal for the end of quarter. The Actual Length is the length of the borehole at the end of the quarter. Phase 2 drilling was completed in the 4th quarter of Year 2 with a measured depth of 3,987 meters. Drilling will resume in 2007.



Equivalent Stations

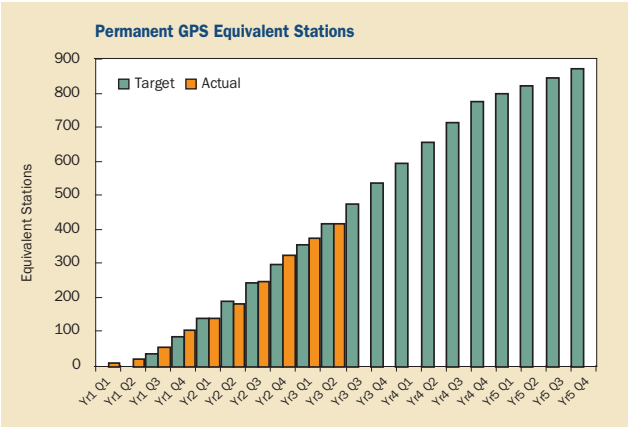
Installation of the geodetic and seismic stations involve several steps – procurement, assembly, permitting, site selection, installation, etc. The uncertainty and difficulty with each of these steps is highly site dependent. The EarthScope management system assesses progress at a greater degree of granularity than simply the completion of a station. Credit is given for each of the major elements so that technical progress can be more accurately measured. For example, if 90% of the activities for a specific EarthScope station are completed, the earned value for that station is credited at that time as 0.9 equivalent stations, rather than showing the station as simply incomplete until the remaining 10% is finished. Through such an "earned credit" measurement, we can monitor progress at a higher resolution than if we simply relied on the count of completed installations.

Over the course of the project, EarthScope will install 1,494 stations across the country. The stations will include permanent GPS stations, borehole strainmeter stations, long-baseline strainmeter stations, ANSS Backbone seismic stations, and Transportable Array seismic stations. In addition, EarthScope will purchase 2,500 campaign GPS and seismic instruments, which will be available for temporary deployments and individual research experiments. EarthScope has completed the quarter with 658 equivalent stations and 1,105 campaign stations.



Permanent GPS Stations

Permanent GPS stations measure ground movement on time scales of days to decades and over large spatial scales. They are used to cover long-period transients such as those associated with viscoelastic relaxation following an earthquake, decadal estimates of strain accumulation, plate motion, and spatial variations. Installation plans call for the deployment of 875 permanent GPS stations over five years. At the end of the quarter, 423 equivalent stations were installed, 3 more than the end of quarter target. Reconnaissance and permits accepted are higher than expected.

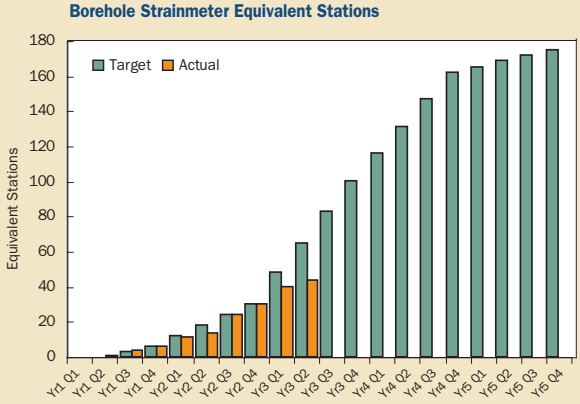


Permanent GPS Stations

Metrics	Installation Progress Target	Installation Progress Actual	Equivalent Stations % of Station	Equivalent Stations Target	Equivalent Stations Actual
Equipment procurement and assembly	422	314	10%	42.2	31.4
Siting	870	865	5%	43.5	43.3
Reconnaissance	607	687	10%	60.7	68.7
Permit submitted	575	661	10%	57.5	66.1
Permit accepted	362	383	15%	54.3	57.5
Monument installation	326	314	20%	65.2	62.8
Equipment installation	326	314	15%	48.9	47.1
Site commissioning	326	312	5%	16.3	15.6
Data flow	314	304	5%	15.7	15.2
Product generation	314	304	5%	15.7	15.2
Total Number of Equivalent Stations			100%	420.0	422.8

Borehole Strainmeters

Borehole strainmeters recover short-term transient deformation and phenomena with periods ranging from seconds to months. They play a central role in observing phenomena that accompany and precede earthquakes and volcanic eruptions. As listed in the Project Execution Plan, installation plans call for the deployment of 175 borehole strainmeters over five years. At the end of the quarter 44 equivalent stations were completed, which is consistent with the schedule presented at the NSF EarthScope Baseline Review (September 2005).

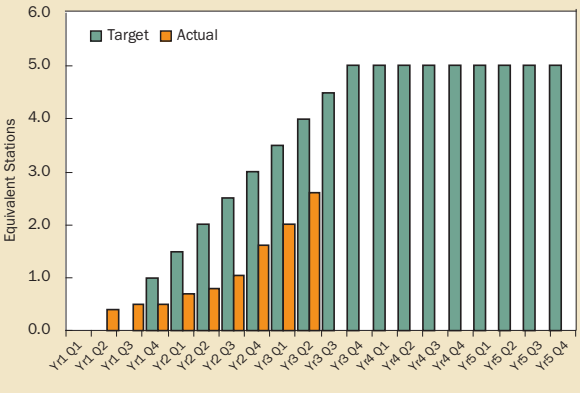


Borehole Strainmeter Stations

Metrics	Installation Progress Target	Installation Progress Actual	Equivalent Stations % of Station	Equivalent Stations Target	Equivalent Stations Actual
Equipment procurement and assembly	45	14	5%	2.3	0.7
Equipment testing and QA	45	14	5%	2.3	0.7
Siting	150	132	5%	7.5	6.6
Reconnaissance	125	119	10%	12.5	11.9
Permit submitted	100	83	10%	10.0	8.3
Permit accepted	70	52	15%	10.5	7.8
Drilling borehole	40	21	20%	8.0	4.2
Equipment installation	40	14	15%	6.0	2.1
Site commissioning	40	12	5%	2.0	0.6
Data flow	40	11	5%	2.0	0.6
Product generation	40	11	5%	2.0	0.6
Total Number of Equivalent Stations			100%	65.0	44.0

Long-baseline Laser Strainmeters

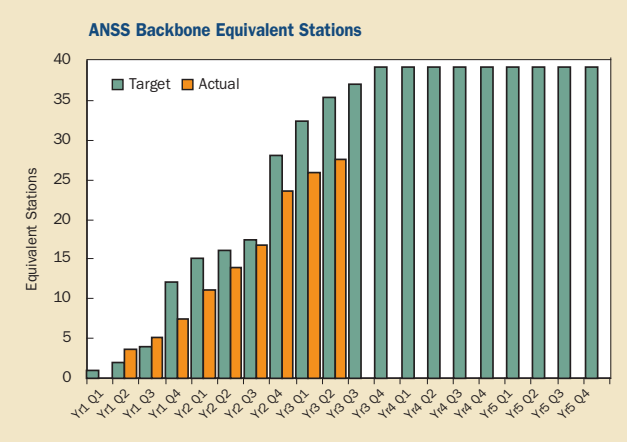
Long-baseline laser strainmeter instruments have the high resolution of the borehole strainmeters combined with the long-term stability of GPS measurements. A few instruments will be used in carefully chosen locations to provide complementary information to both the borehole and GPS systems. Installation plans call for the deployment of 5 long-baseline strainmeters over three years. At the end of the quarter, 2.6 equivalent stations were installed. Personnel shortages, procurement, and permitting continue to delay the next two units. UNAVCO presented a revised deployment plan at the NSF EarthScope Baseline Review (September 2005), revising the time phasing to a 4-year installation schedule.



Long-baseline Laser Strainmeter Stations					
Metrics	**Installation Progress**		**Equivalent Stations**		
	Target	**Actual**	**% of Station**	**Target**	**Actual**
Reconnaissance	5	3	10%	0.5	0.3
Equipment procurement and assembly	5	1	10%	0.5	0.1
Siting	5	5	5%	0.3	0.3
Permit submitted	5	3	10%	0.5	0.3
Permit accepted	5	3	15%	0.8	0.5
Equipment assembly on site	3	3	5%	0.2	0.2
Strainmeter anchoring	3	3	15%	0.5	0.5
Equipment installation	3	3	15%	0.5	0.5
Site commissioning	3	1	5%	0.2	0.1
Data flow	3	1	5%	0.2	0.1
Product generation	3	1	5%	0.2	0.1
Total Number of Equivalent Stations			100%	4.0	2.6

ANSS Backbone

The ANSS Backbone is a partnership between EarthScope and the US Geological Survey. It will consist of a 100 permanent stations that will serve as the permanent reference network for the Transportable Array. The EarthScope contribution to the ANSS Backbone will consist of 13 Global Seismographic Network-quality seismic stations and 26 National Seismic Network-quality seismic stations as an integrated resource both for EarthScope science and for seismic monitoring. Installation plans call for the deployment or upgrade of these 39 stations over three years. Progress towards installation of the ANSS Backbone stations is behind schedule with 28 equivalent stations installed. The delay is primarily due to the USGS Albuquerque Seismological Laboratory being behind schedule and a delay in the award of major civil works contracts.

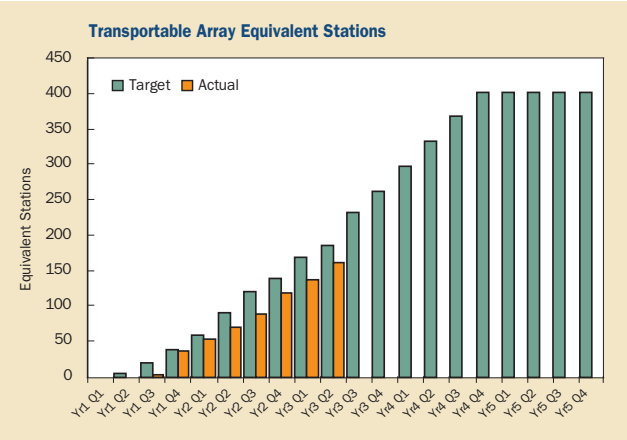


ANSS Backbone Stations*					
Metrics	**Installation Progress**		**Equivalent Stations**		
	Target	**Actual**	**% of Station**	**Target**	**Actual**
Procurement	38	36	27%	10.2	9.7
Siting	38	27	20%	7.7	5.3
Civil works	38	14	4%	1.5	0.6
Equipment	39	39	12%	4.7	4.7
Installation	30	20	30%	9.1	5.9
Communications	21	10	3%	0.6	0.3
Certification	35	24	4%	1.4	0.9
Total Number of Equivalent Stations			100%	35.2	27.5

**Equivalent station metrics have been changed from those in the PEP v.2 with provisional permission from NSF (Change Order USArray-008).*

Transportable Array

The Transportable Array will consist of 400 broadband seismic stations, deployed in a grid with a station spacing of ~70 kilometers. The array will advance across the country in a roll-along fashion, stopping at each location for a period of ~18 months. Installation plans call for the deployment of 400 broadband stations by the fourth quarter of Year 4. Different types of Transportable Array stations exist, such as new stations and pre-existing stations installed by regional network operators, which may or may not require different levels of hardware and software upgrades to meet Transportable Array standards. The Transportable Array remains behind schedule with 161 of 185 equivalent Transportable Array stations accomplished. Construction/installation remains behind schedule.



Transportable Array Stations*

Metrics	Installation Progress Target	Installation Progress Actual	Equivalent Stations % of Station	Equivalent Stations Target	Equivalent Stations Actual
Equipment	208	176	51%	106.1	89.8
Siting/Permitting	227	219	7%	15.9	15.3
Construction/Installation	121	106	23%	27.8	24.3
Data flow/Other	187	169	19%	35.5	32.0
Total Number of Equivalent Stations			100%	185.4	161.4

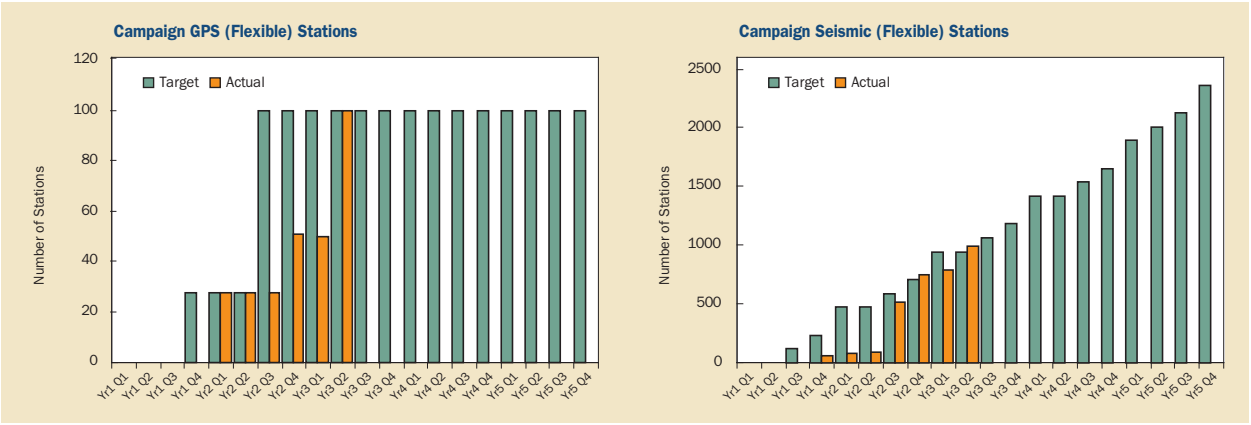
**Equivalent station metrics have been changed from those in the PEP v.2 with provisional permission from NSF (Change Order USArray-009).*

Campaign (Flexible) Stations

Campaign (flexible) stations will be provided for temporary deployments across the US. A pool of 100 portable GPS receivers will be available for rapid response to earthquakes and aftershock recordings, while a pool of 2,400 seismic stations will be available for earthquake studies and short-term active source experiments. Procurement plans called for a total of 100 flexible GPS receivers available by the third quarter of Year 2, but procurement of the TopCon GPS receivers is being held off while the systems are being evaluated. For the seismic stations, 2,400 are scheduled to be available by the fourth quarter of Year 5. Procurement of Flexible Array campaign seismic stations is slightly behind schedule with 1,005 seismic stations.

Campaign (Flexible) Stations

Metrics	Procurement Progress Target	Procurement Progress Actual
GPS campaign (flexible) stations	100	100
Seismic campaign (flexible) stations	960	1,005



Completed Stations

Stations are considered complete when all the work for that station has been accomplished. The number of completed stations at the end of the 2nd Quarter is 820, which includes 314 permanent GPS stations, 14 borehole strainmeter stations, 3 long-baseline laser strainmeter, 21 ANSS Backbone stations, and 160 Transportable Array stations (96 new and 64 shared).

Total Number of Complete Stations	
Permanent GPS Stations	314
Borehole Strainmeter Stations	14
Long-baseline Laser Strainmeter Stations	3
ANSS Backbone Stations	21
Transportable Array Stations	160
New Transportable Array Stations	96
Shared Transportable Array Stations	64
Campaign GPS Stations	100
Campaign Seismic Stations	1,005

COST SCHEDULE STATUS REPORT

The Cost Schedule Report communicates the actual progress of a project while taking into account the work complete, the time taken, and the costs incurred to complete that work. It measures progress of these elements in monetary terms and is based on the project's work breakdown structure. Schedule and cost variances of 10% or greater for Level 1, 2, and 3 tasks are explained in detail along with a proposal for remedial action if necessary in the variance reports on the following pages.

At the end of Quarter 2 Year 3, EarthScope is on schedule and on budget with 43% of the 5-year work completed.

Schedule Variances:

- **EarthScope Management** is on schedule at Level 2. At Level 3, the variance for task 1.1.2 Project Reviews and Reporting further decreased over this quarter to 16% or $33,000 behind schedule. This variance is primarily due to changes in meeting schedules.
- **SAFOD** is reporting no schedule variances at Level 2 or Level 3.
- **PBO** is on schedule at Level 2. At Level 3 two schedule variances are reported. Task 1.3.5 Facility Construction reports a negative schedule variance of 21% or $3,035,000 driven by a suspension of any new monthly earned value. The earned value system has changed to a revised baseline that will be reported against beginning in April 2006. Task 1.3.7 GeoEarthScope remains 88% or $880,000 behind schedule while the detailed scope of work is being defined with NSF.
- **USArray** is currently 14% or ($4,645,000) behind schedule at Level 2. At Level 3, this variance is primarily driven by three tasks. Task 1.4.2 ANSS Backbone Stations is currently 14% or $828,000 behind schedule because of delays in civil work contracts. Task 1.4.3 Transportable Array Stations is 13% or $1,918,000 behind schedule; this variance, however, does not accurately reflect the status of the Transportable Array. A new time-phase budget will be in effect April 1, 2006. Task 1.4.4 Flexible Array is 21% or $1,870,000 behind schedule because equipment purchase has been delayed.

Cost Variances:

- **EarthScope Management** is on budget at Level 2. At Level 3 one cost variance has been reported. Task 1.1.3 Meetings and Outreach is 12 % or $39,000 below budget due to a lighter than anticipated winter travel schedule.
- **SAFOD** is reporting no cost variance at Level 2 or Level 3.
- **PBO** is on budget at Level 2. At Level 3, the cost underrun is mainly driven by two variances. Task 1.3.5 Facility Construction is 15% or 1,692,000 over budget. This variance is driven by a suspension of any new monthly earned value. The earned value system has changed to a revised baseline that will be implemented beginning in April 2006. Task 1.3.6 Data and Data Products is 26% or $646,000 under budget. This variance is driven by delays in tasks GPS Analysis Centers, Analysis Center Coordinator, and Archive Billings.
- **USArray** is 10% or $3,054,000 under budget at Level 2. At Level 3, this variance is driven by two tasks. Task 1.4.1 Management is 12% or $336,000 under budget because total program expenditures have been less than budgeted. Task 1.4.2 ANSS Backbone Stations remains 19% or $952,000 under budget largely because power system and GPS receiver costs are lower than originally estimated.

Cost Schedule Status Report for WBS Level 1, 2, and 3 Activities

(based on budgets and activies for Year 1 through Year 5)

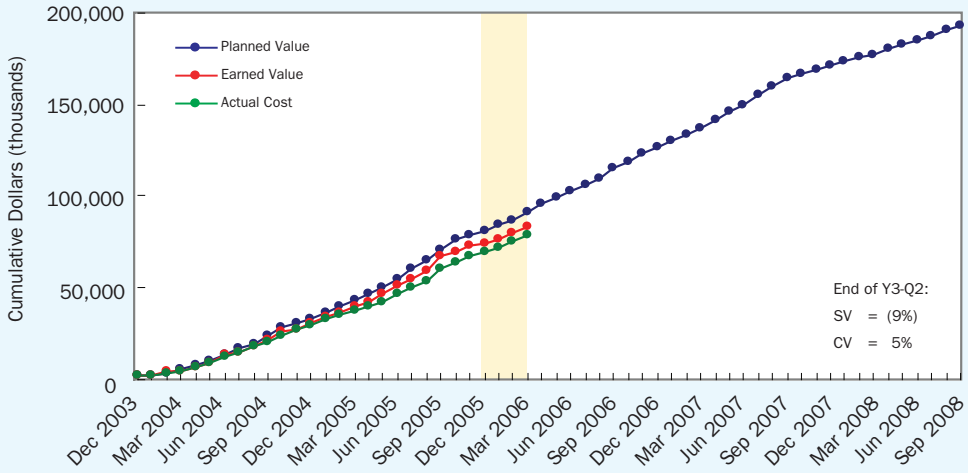
WBS Element	Work Complete (% of 5 Years)	Cumulative $ (thousands) September 2003 - March 2006 PV (BCWS)	EV (BCWP)	AC (ACWP)	SV	SV % of PV	SPI	CV	CV% of EV	CPI	$ (thousands) for 5 Years BAC	EAC	Var.
EarthScope Management (WBS Element 1.1)													
1.1.1 EarthScope Management	49%	$2,710	$2,710	$2,685	$0	0%	1.00	$25	1%	1.01	$5,584	$5,584	$0
1.1.2 Project Reviews & Reporting	41%	$204	$171	$183	($33)	(16%)	0.84	($13)	(7%)	0.93	$411	$411	$0
1.1.3 Meetings & Outreach	57%	$325	$325	$286	$0	0%	1.00	$39	12%	1.14	$567	$567	$0
Subtotal 1.1	49%	$3,239	$3,206	$3,155	($33)	(1%)	0.99	$52	2%	1.02	$6,563	$6,563	$0
Contingency/Management Reserve											$164	$164	$0
Total EarthScope Management											$6,727	$6,727	$0
SAFOD (WBS Element 1.2)													
1.2.1 Management	45%	$858	$821	$758	($37)	(4%)	0.96	$63	8%	1.08	$1,816	$1,816	$0
1.2.2 Drilling and Downhole Measurement	86%	$13,118	$13,118	$13,119	$0	0%	1.00	($1)	0%	1.00	$15,339	$15,339	$0
1.2.3 Instrumentation	60%	$1,378	$1,350	$1,361	($28)	(2%)	0.98	($11)	(1%)	0.99	$2,244	$2,244	$0
1.2.4 Data Products & Sample Handling	45%	$398	$398	$396	$1	0%	1.00	$3	1%	1.01	$879	$879	$0
Subtotal 1.2	77%	$15,751	$15,686	$15,633	($64)	0%	1.00	$54	0%	1.00	$20,278	$20,278	$0
Contingency/Management Reserve											$548	$548	$0
Total SAFOD											$20,826	$20,826	$0
Plate Boundary Observatory (WBS Element 1.3)													
1.3.1 Program Management	49%	$2,675	$2,673	$2,370	($2)	0%	1.00	$302	11%	1.13	$5,466	$5,466	$0
1.3.2 Long-baseline Laser Strainmeters	43%	$1,148	$1,059	$1,095	($89)	(8%)	0.92	($36)	(3%)	0.97	$2,453	$2,453	$0
1.3.3 Procurement	48%	$13,713	$14,742	$13,244	$1,029	8%	1.08	$1,498	10%	1.11	$30,717	$30,717	$0
1.3.4 Fab/Test/Campaign	35%	$894	$894	$742	$0	0%	1.00	$151	17%	1.20	$2,529	$2,529	$0
1.3.5 Facility construction	26%	$14,256	$11,221	$12,913	($3,035)	(21%)	0.79	($1,692)	(15%)	0.87	$43,449	$43,449	$0
1.3.6 Data & Data Products	40%	$2,582	$2,511	$1,866	($70)	(3%)	0.97	$646	26%	1.35	$6,234	$6,234	$0
1.3.7 GeoEarthScope	2%	$997	$117	$87	($880)	(88%)	0.12	$30	26%	1.35	$5,000	$5,000	$0
1.3.8 Project Support	52%	$1,456	$1,456	$1,445	$0	0%	1.00	$11	1%	1.01	$2,783	$2,783	$0
Subtotal 1.3	35%	$37,720	$34,673	$33,763	($3,047)	(8%)	0.92	$910	3%	1.03	$98,632	$98,632	$0
Contingency/Management Reserve											$1,012	$1,012	$0
Total PBO											$99,644	$99,644	$0
USArray (WBS Element 1.4)													
1.4.1 Management	60%	$2,754	$2,747	$2,411	($7)	0%	1.00	$336	12%	1.14	$4,570	$4,570	$0
1.4.2 ANSS Backbone Stations	78%	$5,723	$4,895	$3,943	($828)	(14%)	0.86	$952	19%	1.24	$6,245	$6,245	$0
1.4.3 Transportable Array Stations	38%	$14,873	$12,955	$11,868	($1,918)	(13%)	0.87	$1,086	8%	1.09	$34,366	$34,366	$0
1.4.4 Flexible Array Stations	40%	$9,109	$7,240	$6,553	($1,870)	(21%)	0.79	$686	9%	1.10	$18,202	$18,202	$0
1.4.5 Data Management	66%	$1,596	$1,591	$1,600	($5)	0%	1.00	($9)	(1%)	0.99	$2,419	$2,419	$0
1.4.6 Siting Outreach	27%	$137	$120	$117	($17)	(12%)	0.88	$3	2%	1.03	$452	$452	$0
Subtotal 1.4	45%	$34,193	$29,548	$26,493	($4,645)	(14%)	0.86	$3,054	10%	1.12	$66,254	$66,254	$0
Contingency/Management Reserve											$3,316	$3,316	$0
Total USArray											$69,570	$69,570	$0
Subtotal EarthScope (WBS Element 1)													
Subtotal EarthScope	43%	$90,903	$83,113	$79,044	($7,790)	(9%)	0.91	$4,069	5%	1.05	$191,727	$191,727	$0

LEGEND:
% work complete = PV / BAC
PV (BCWS) = Planned Value (Budgeted Cost of Work Scheduled)
EV (BCWP) = Earned Value (Budgeted Cost of Work Performed)
AC (ACWP) = Actual Cost (Actual Cost of Work Performed)
SV = Schedule Variance = (Earned Value – Planned Value)
SV % of PV = (Earned Value – Planned Value) / Planned Value
SPI = Schedule Performance Index = Earned Value/Planned Value
CV = Cost Variance = (Earned Value – Actual Cost)
CV % of EV = (Earned Value – Actual Cost) / Earned Value
CPI = Cost Performance Index = Earned Value/Actual Cost
BAC = Budgeted at Completion
(baseline budget plus any approved budget revisions)
EAC = Estimated at Completion
Var. = Variance = (Budgeted at Completion – Estimated at Completion)

** SV% and CV% equal or greater than 10% are explained in the variance explanations on the following pages.*

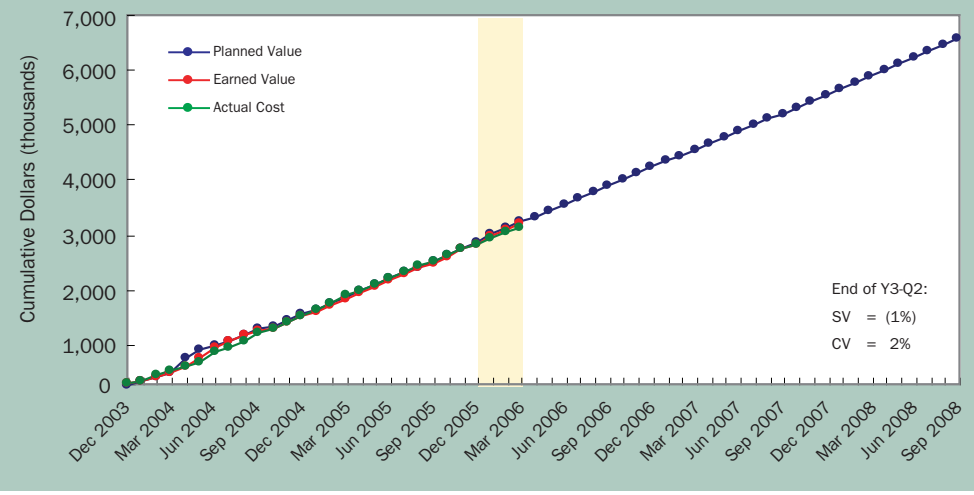
1 Overall, EarthScope is 9% ($7,790,000) behind schedule, but under budget by 5% ($4,069,000) for the work performed. The principal contributions to the negative schedule variance are the tasks 1.3.5 Facility Construction, 1.4.2 ANSS Backbone Stations, and 1.4.3 Transportable Array Stations, which are examined in detail below.

1 EarthScope (Level 1)

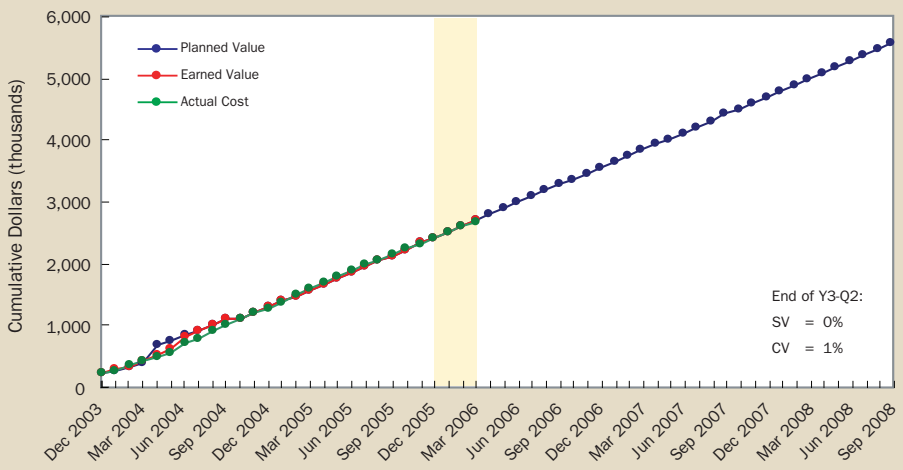


1.1 EarthScope Management remained on schedule and on budget throughout the quarter. Variances greater than 10% are reported at Level 3 for 1.1.2 Project Reviews and Reports, and 1.1.3 Meetings and Outreach.

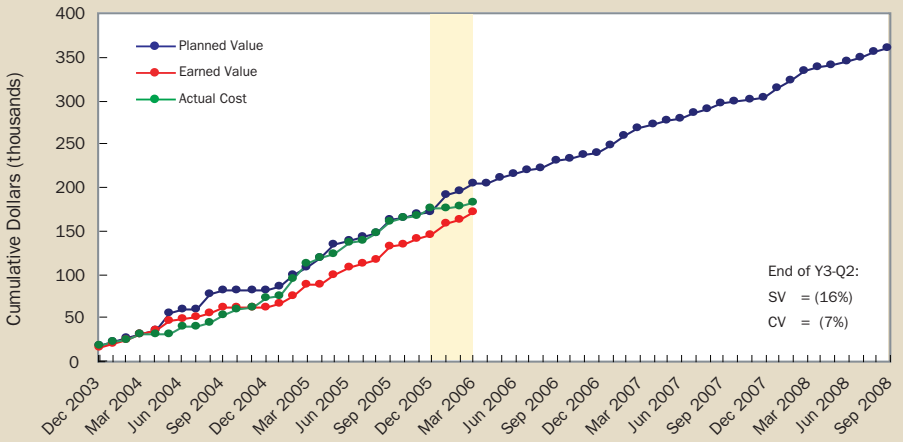
1.1 Management (Level 2)



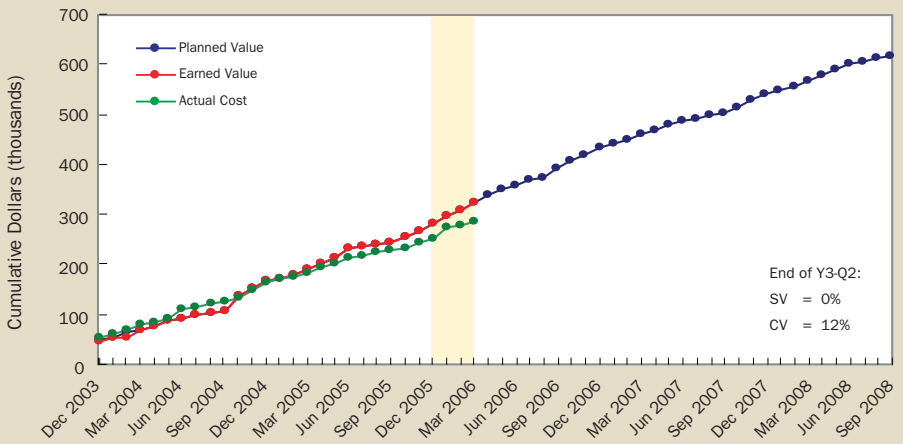
1.1.1 EarthScope Management (Level 3)



1.1.2 Project Reviews & Reporting (Level 3)



1.1.3 Meetings & Outreach (Level 3)



▶ *Variance Report:* 1.1.2 Project Reviews & Reporting

SV: (16%) or ($33,000)

- **Reason:** The schedule variance is primarily due to changes in committee meeting schedules.
- **Other Affected Tasks:** None.
- **Corrective Action:** Funding has been adjusted in the Year 3 budget to account for the revised schedule.
- **Predicted Recovery Time:** It is anticipated that a slowly decreasing Schedule Variance will be carried through to the end of the MREFC.

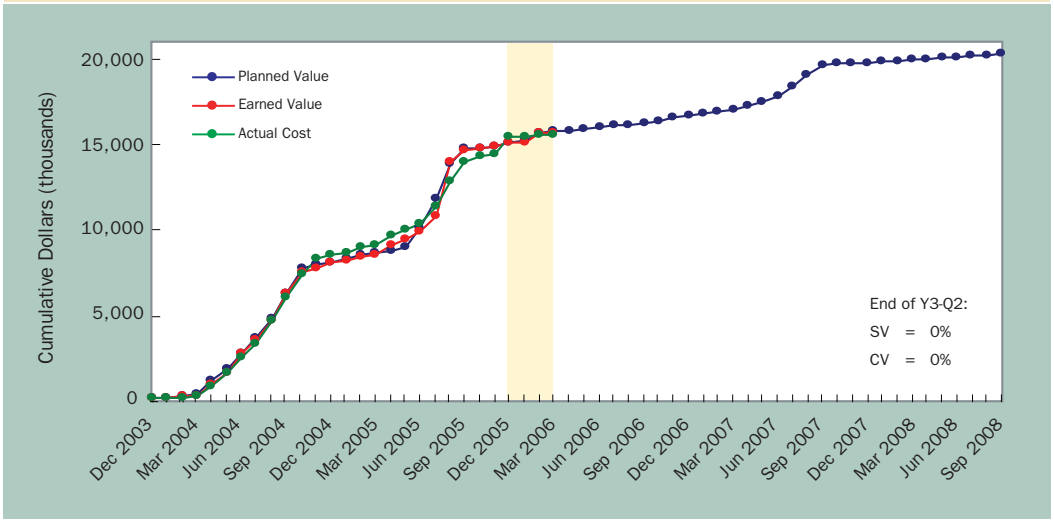
▶ *Variance Report:* 1.1.3 Meetings and Outreach

CV: 12% or $38,840

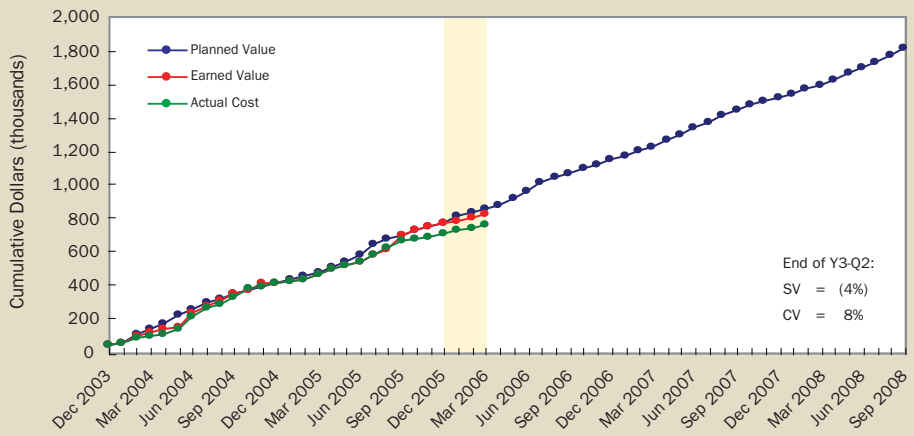
- **Reason:** The cost variance is primarily due to a less active than normal winter travel schedule.
- **Other Affected Tasks:** None.
- **Corrective Action:** None.
- **Predicted Recovery Time:** A more active than normal spring travel schedule is planned. We expected the cost variance to be reduced over the next few months.

1.2 SAFOD continues to remain on schedule and on budget.

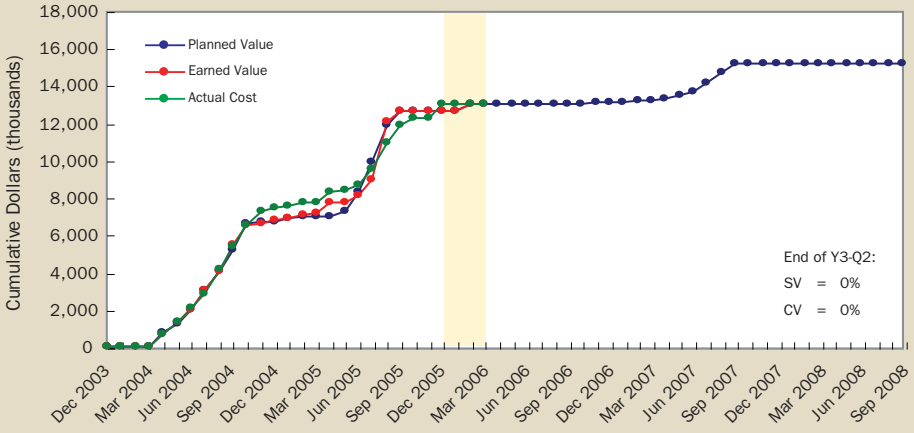
1.2 SAFOD (Level 2)



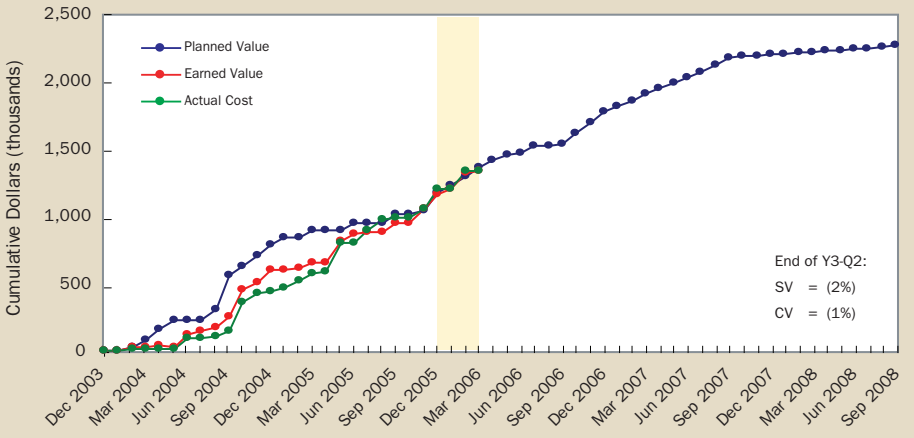
1.2.1 SAFOD Management (Level 3)



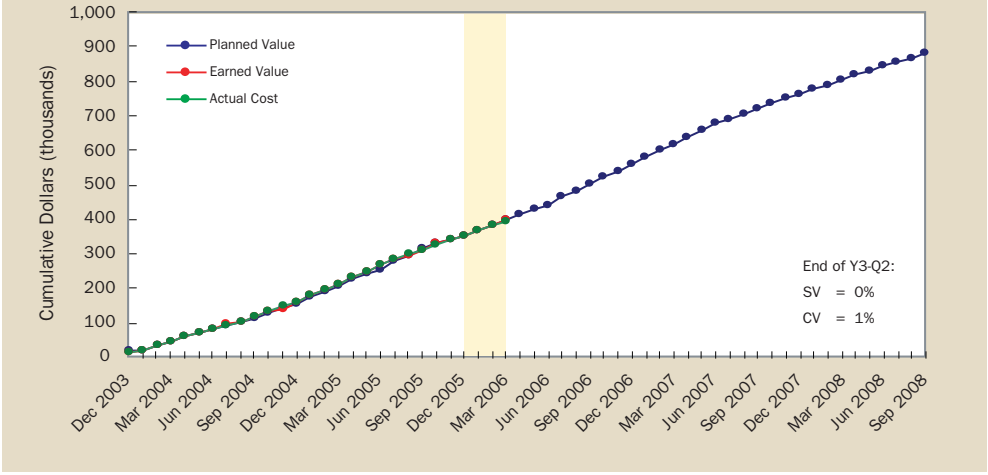
1.2.2 Drilling & Downhole Measurement (Level 3)



1.2.3 Instrumentation (Level 3)

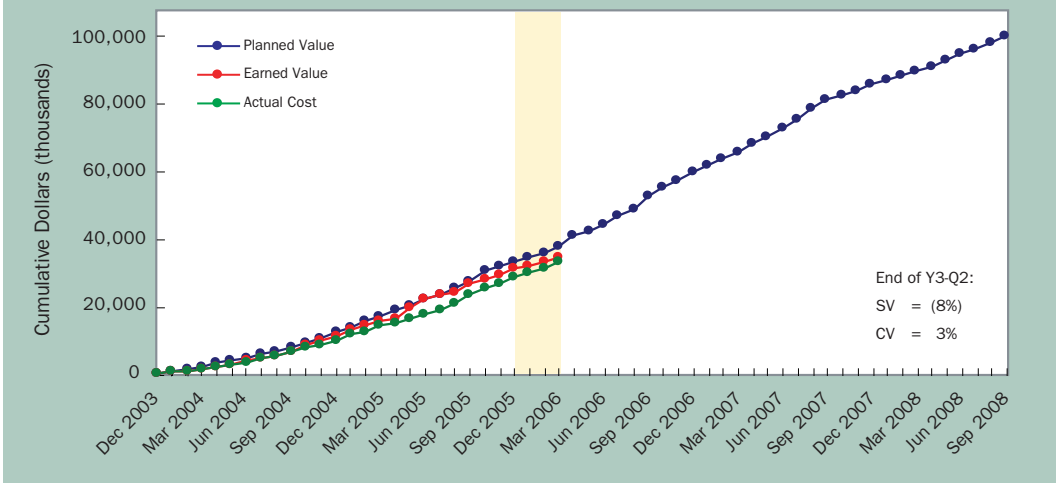


1.2.4 Data Products & Sample Handling (Level 3)

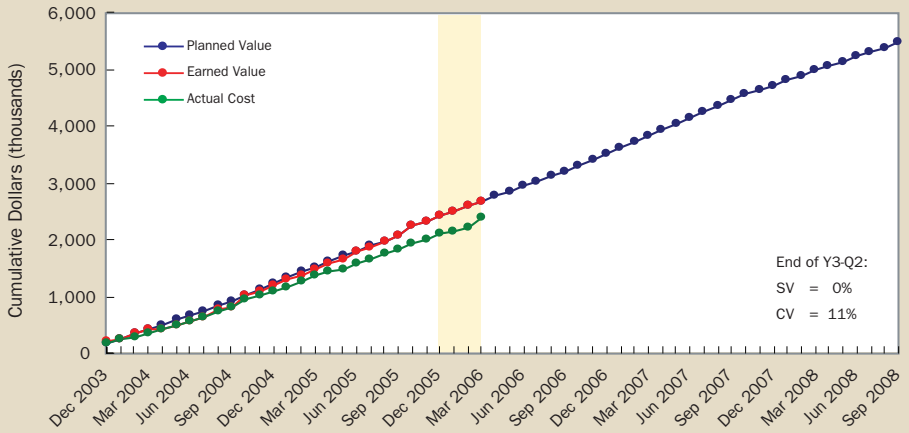


1.3 The Plate Boundary Observatory (PBO) is 8% ($3,047,000) behind schedule. The schedule variance is increasing due to the suspension of any new earned value in task 1.3.5 Facility Construction which is explained in the variance report.

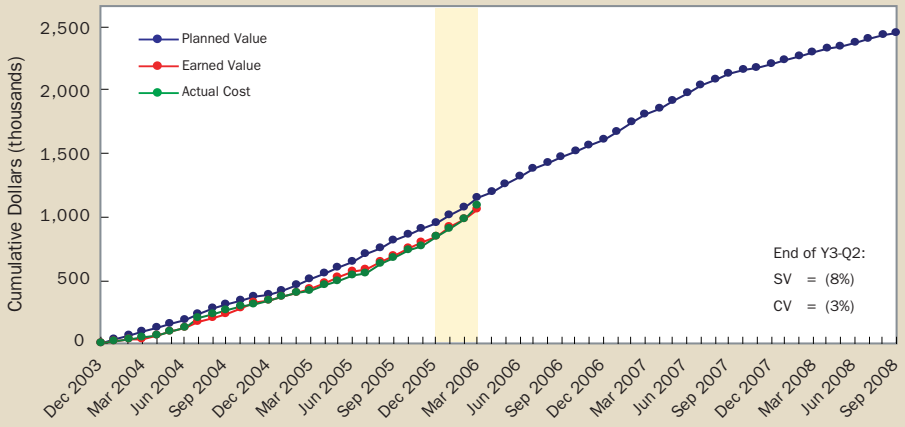
1.3 PBO (Level 2)



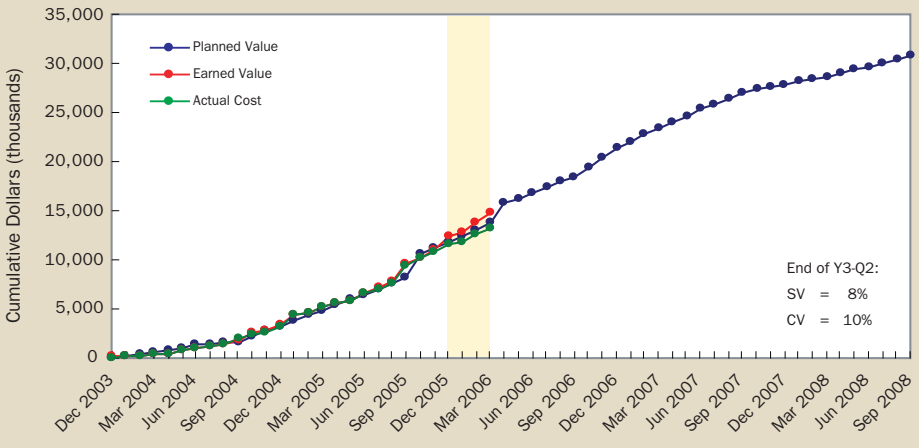
1.3.1 PBO Program Management (Level 3)



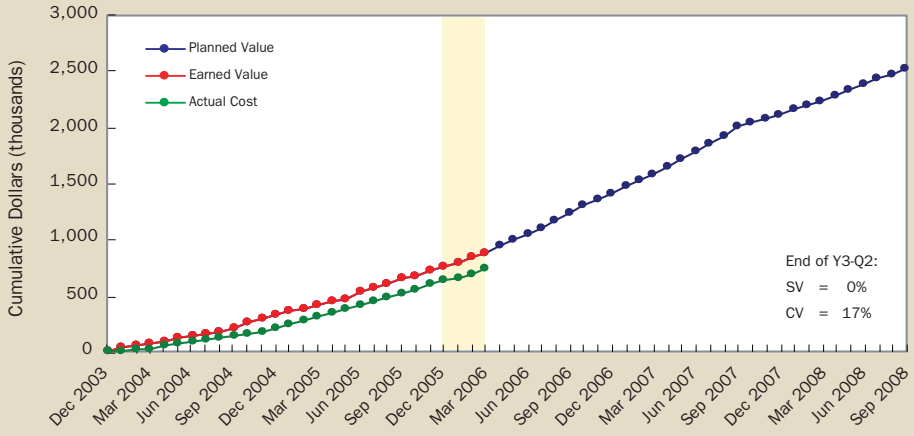
1.3.2 Long-baseline Laser Strainmeters (Level 3)



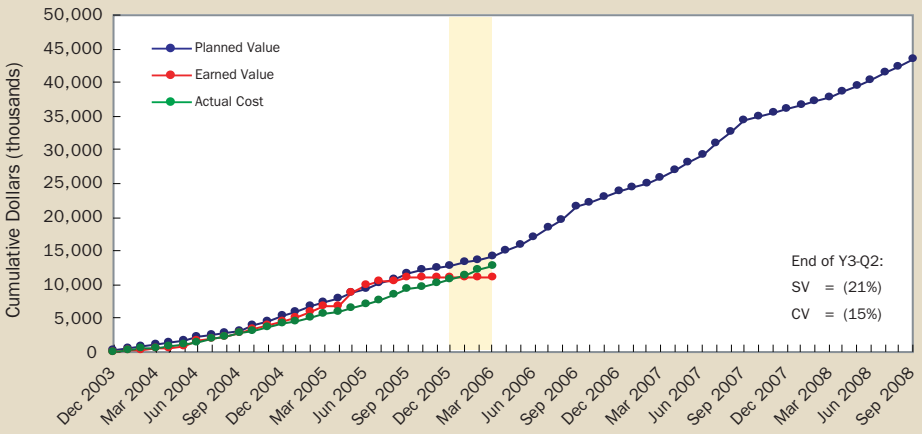
1.3.3 Procurement (Level 3)



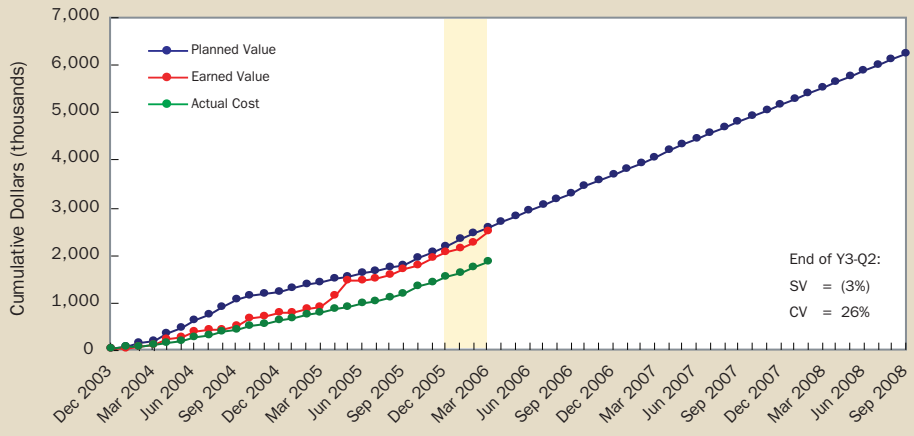
1.3.4 Fab/Test/Campaign (Level 3)



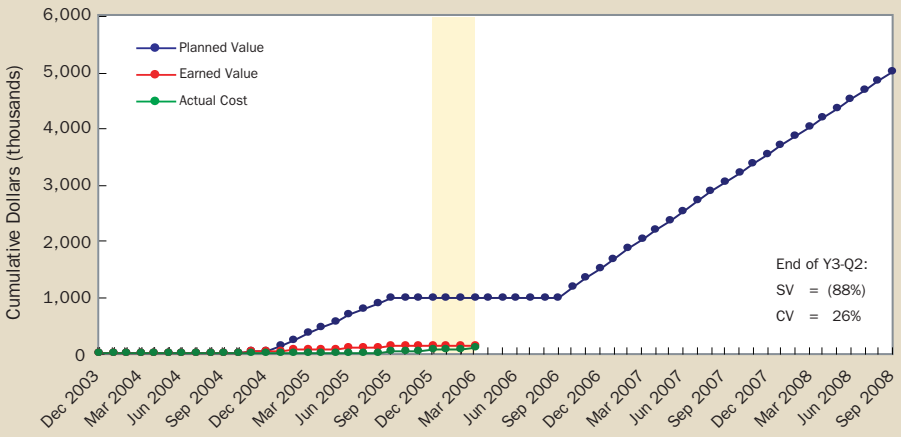
1.3.5 Facility Construction (Level 3)



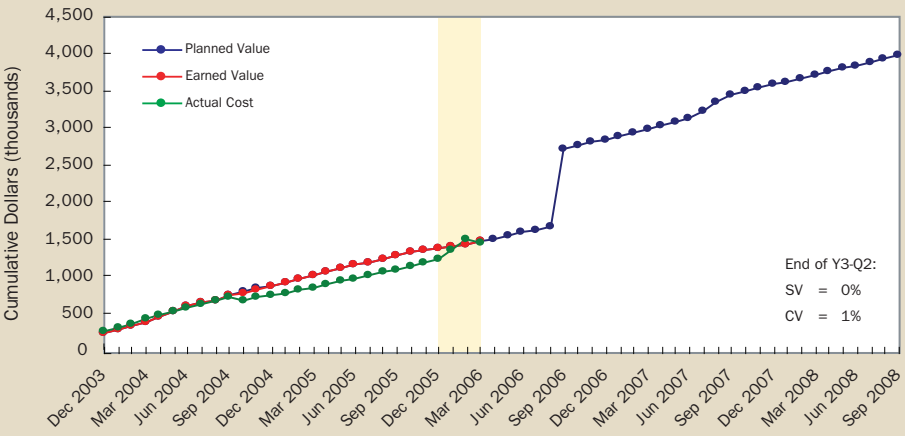
1.3.6 Data & Data Products (Level 3)



1.3.7 GeoEarthScope (Level 3)



1.3.8 Project Support (Level 3)



▶ ***Variance Report:*** 1.3.1 Program Management

CV: 11% or $302,000

■ **Reason:** This positive cost variance is primarily driven by communications charges. Recent cellular plan price reductions have resulted in an under-run to the historical rate. In addition, the cellular plan values were time phased on a linear basis whereas the actual costs tend to increase during the summer installation season. Site Working Group costs are behind the planned value.

■ **Other Affected Tasks:** None.

■ **Corrective Action:** Communications costs are being monitored through the summer season. The plan may be revised at the next baseline review if the deviations continue. Site Working Groups will be monitored in the coming months. A number of meetings are schedule for the next quarter which will increase spending in this area.

■ **Predicted Recovery Time:** The positive cost variance will continue for the remainder of this year but will decrease during the summer installation season.

▶ *Variance Report:* 1.3.4 Fab/Test/Campaign

CV: 17% or $151,000

■ **Reason:** The positive cost variance is caused mostly by reduced charging by the depot engineer and reduced shipping charges during the winter season.

■ **Other Affected Tasks:** None.

■ **Corrective Action:** All staffing has been hired and is supporting the PBO production schedule. If required, the UNAVCO Facility can supply additional personnel to meet peak requirements. Shipping charges will increase as a result of stocking during the peak summer months.

■ **Predicted Recovery Time:** This variance will continue but the rate of increase will be reduced during the peak summer months. Unanticipated quality assurance issues, should they occur, could substantially reduce this variance.

▶ *Variance Report:* 1.3.5 Facility Construction

SV: (21%) or ($3,035,000) **CV: (15%) or (1,692,000)**

■ **Reason:** Both cost and schedule variances for Facility Construction are driven by a suspension of any new monthly earned value on discrete tasks. This earned value will be implemented in next month's report. If the suspended earned value were implemented this month the schedule variance would drop from (21%) to approximately (9%). It is estimated that the negative cost variance would disappear.

- **GPS:** The Facility Construction schedule and cost variance have been distorted due to a suspension of earned value. It is estimated that the GPS will run both a positive schedule and cost variance when the earned valued system is in place. The recons and permits are substantially ahead of plan and more than offset being slightly behind plan on actual installations.

- **Borehole Strainmeters (BSM):** The borehole strainmeter area continues to be in its initial ramp-up phase. The borehole strainmeter regional office in Washington state is staffed and two installation crews are being fully staffed for the summer installation season. Additional staffing is in place for driller support.

The negative schedule and positive cost variance for Facility Construction is focused in the following tasks:

Task	Name	Schedule Variance	Cost Variance
1.3.5.1	Facility Construction Management	$0	($13,852)
1.3.5.1.2	Permitting	($226,259)	($266,945)
1.3.5.2	Northern California Region	($728,112)	($1,343,753)
1.3.5.3	Southern California Region	($338,733)	($132,208)
1.3.5.4	Pacific Northwest Region	($248,704)	($56,797)
1.3.5.5	Basin & Range Region	($196,064)	$32,920
1.3.5.6	Rocky Mountain Region	($53,994)	($32,394)
1.3.5.7	Alaska Region	($554,523)	($492,937)
1.3.5.9	Borehole Strainmeter	($688,312)	$745,493
1.3.5.10	Targets of Interest	$0	($131,495)
Total		**($3,034,701)**	**($1,691,968)**

- **Other Affected Tasks:** None
- **Corrective Action:**
  - **GPS:** Additional permitting resources have been contracted. Temporary and intern staffing were utilized to augment the peak build season and regional personnel requirements have been reviewed to insure that adequate resources are available to meet the increased production goals.
  - **Borehole Strainmeters (BSM):** Although this area is behind the current plan (14 installations as of this writing) they continue to make progress. Now that the necessary management, staffing, and facilities are in place we expect to make rapid progress.
- **Predicted Recovery Time:** The negative schedule variance will be substantially reduced when the revised earned value is implemented. In fact a positive cost variance is forecasted which will erode in the coming year as more expensive summer drilling occurs.

▶ *Variance Report:* 1.3.6 Data & Data Products

CV: 26% or $646,000

- **Reason:** The positive cost variance for PBO Data & Data Products is focused in the following tasks:

Task	Name	Cost Variance
1.3.6.2.3	Data Analysis & Archive Subcontracts	$493,301
1.3.6.4.2	PBO Operational Database	$39,456
1.3.6.1.3	Contract Code Development	$106,560
1.3.6.4.1	Software Engineering	($74,021)
	Other	$80,376
Total		**$645,672**

The Data Analysis and Archive Task positive cost variance is driven by delays in GPS Analysis Centers, Analysis Center Coordinator, and Archive Billings. Universities are often slow in billing for performed services which drive positive cost variances. PBO management anticipates that this cost variance will be reduced as payment requests are made and fulfilled. The next largest driver of the positive cost variance is from the first year's software projects that had been budgeted for, but were not required.

The budgeted amount for contract code-software is $106,560, even though nearly all software that needed development in the first year was developed in-house. Because this external software development was not required, the tasks were closed out and earned value was taken at beginning of the second year. This budget will be used by increased in-house salary expenses to accomplish the tasks originally budgeted as contract code support.

Version 1.7.3 of the PBO Operational Database (POD) and POD Operational Interface (POI) is complete and in use by PBO staff. Continued refinement of the POD and POI, and ongoing development of web-based POD interfaces, will erode the cumulative positive cost variance.

- **Other Affected Tasks:** None.
- **Corrective Action:** A revised baseline, approved by the NSF on March 22, 2006, has been implemented on April 1, 2006. This includes a detailed plan for all Data Products activities developed in November 2005. This detailed plan for all data products activities is being closely monitored by PBO management.
- **Predicted Recovery Time:** The positive cost variance will decrease in the coming months as the Archive and Analysis Center billings catch up.

▶ *Variance Report:* 1.3.7 GeoEarthScope

SV: (88%) or ($880,000) **CV: 26% or $30,000**

Reason: GeoEarthScope activity has been delayed while the detailed scope of work is clarified between UNAVCO and the NSF. Working groups have been scheduled in the LiDAR, InSAR, and geochronology areas during the months of May and June.

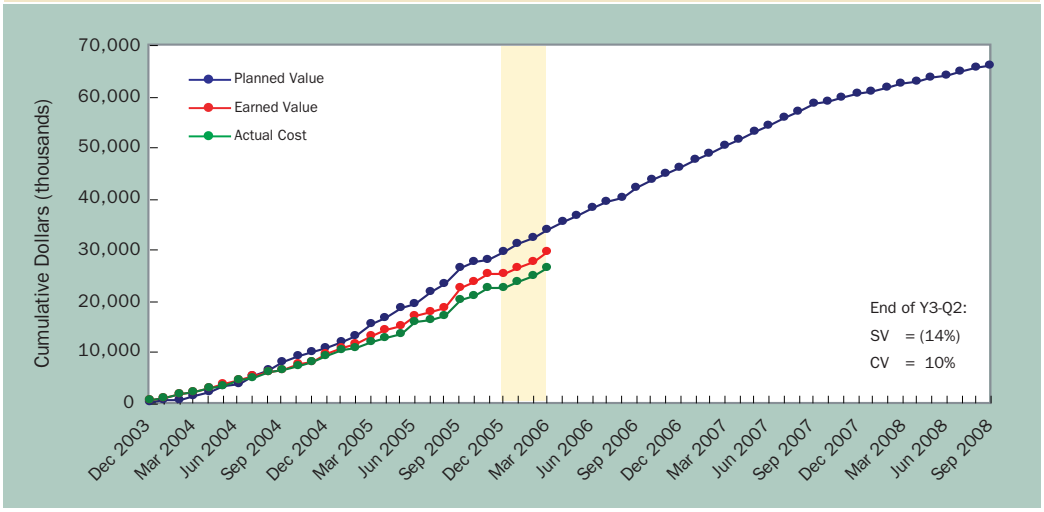
Other Affected Tasks: None.

Corrective Action: The GeoEarthScope Coordinator has been hired and the GeoEarthScope website has been created. The upcoming working group meeting will aid in further defining the remaining effort. The revised baseline continues to contain a large GeoEarthScope historical variance which will be decreased as the detailed GeoEarthScope effort is defined and performed.

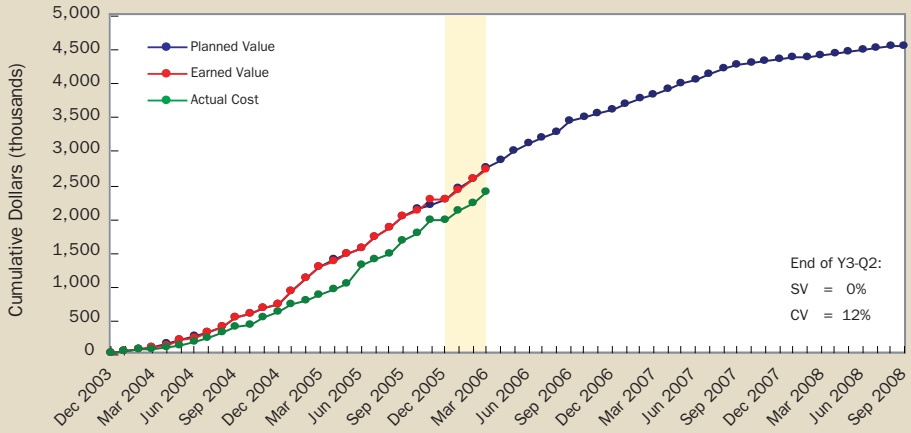
Predicted Recovery Time: Even after hiring a coordinator the negative schedule variance will continue to be an issue. Since the current re-baselining action does not include a reprogramming of past GeoEarthScope budget, the large positive variance will continue to occur throughout the remainder of this year. The variance will decrease when the detailed scope definition is defined and performed.

1.4 USArray finishes the quarter 14% ($4,645,000) behind schedule and is 10% ($3,054,000) under budget for the work performed. The schedule variance is driven by 1.4.2 ANSS Backbone Stations, 1.4.3 Transportable Array Stations, and 1.4.4 Flexible Array Stations, which are explained in the variance report below.

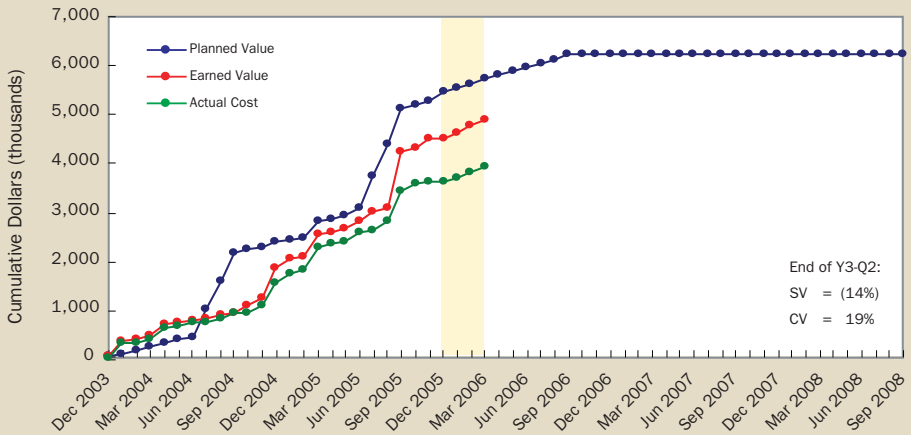
1.4 USArray (Level 2)



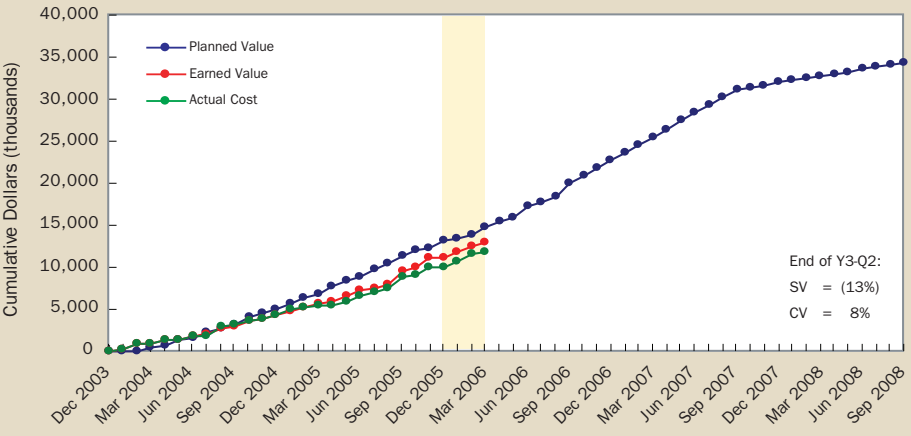
1.4.1 USArray Management (Level 3)



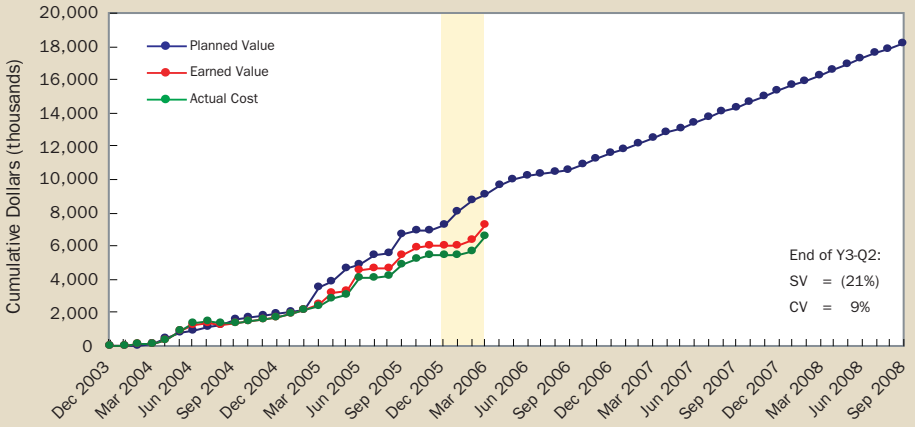
1.4.2 ANSS Backbone Stations (Level 3)



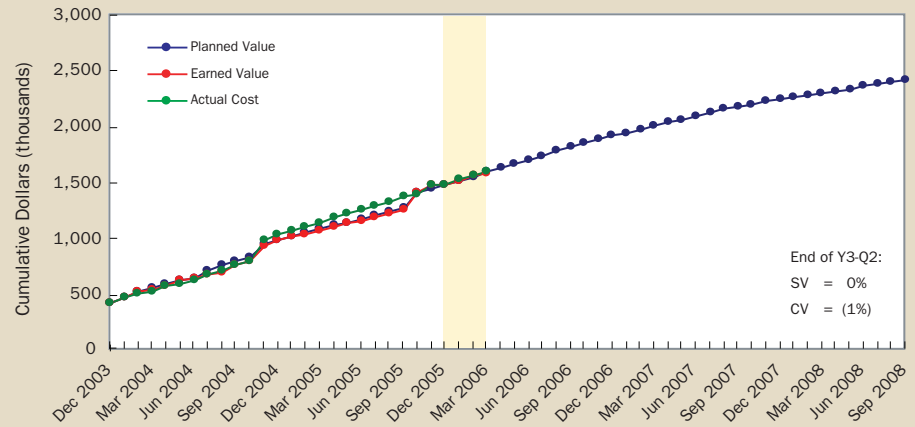
1.4.3 Transportable Array Stations (Level 3)



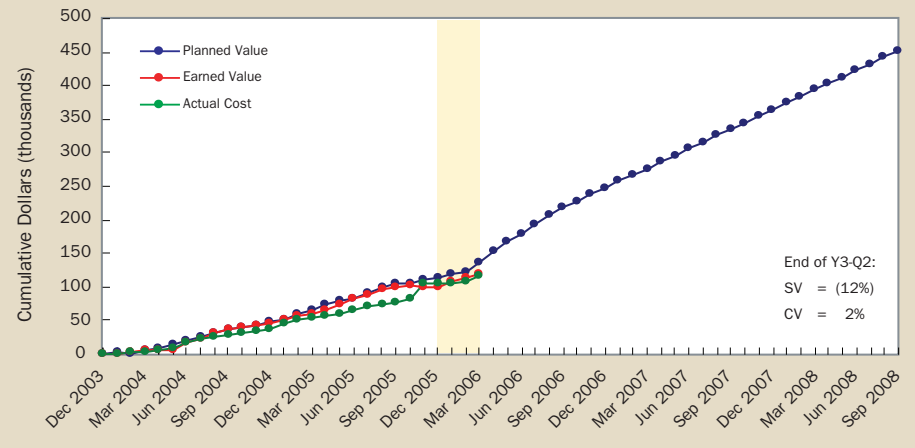
1.4.4 Flexible Array Stations (Level 3)



1.4.5 Data Management (Level 3)



1.4.6 Siting Outreach (Level 3)



▶ *Variance Report:* 1.4.1 USArray Management

CV: 12% or $336,000

- **Reason:** Indirect general and administrative (G&A) expenses associated with all USArray components are accumulated and reported under this task. Indirect G&A cost recovery for USArray has been less than baselined, because total program expenditures have been less than budgeted. As program expenses are incurred, the budgeted indirect cost recovery will be realized in subsequent periods.
- **Other Affected Tasks:** None.
- **Corrective Action:** Align budget and program expenditures.
- **Predicted Recovery Time:** April 1, 2006 baseline should resolve.

▶ *Variance Report:* 1.4.2 ANSS Backbone Stations

SV: (14%) or ($828,000) **CV: 19% or $952,000**

- **Reason:** The negative schedule and positive cost variance is focused on the following tasks:

Task	Name	Schedule Variance	Cost Variance
1.4.2.2.1	Sensors	($41,000)	$92,376
1.4.2.2.3	Power	$0	$378,047
1.4.2.2.4	Communications	($146,100)	$17,662
1.4.2.2.5	Microbarographs	$0	$196,829
1.4.2.3.1	Albuquerque Seismological Laboratory	($151,775)	$67,464
1.4.2.3.2	Major Civil Works	($489,500)	$178,245
Total		**($828,375)**	**$930,623**

A majority of the schedule variance is due to delayed work in the Albuquerque Seismological Laboratory subaward and the award of major civil works contracts. Two contracts for drilling boreholes were released in October with an estimated value of $260,000. The value for these contracts cannot be earned until the drilling is completed (expected April 2006). Communications is another area of schedule delay and the US Geological Survey is sorting out how to bill for these procurements. As of the time of this report, the US Geological Survey has agreed to let USArray fund the VSAT hardware directly and a purchase order will be issued as soon as a quote is obtained. However, the VSAT provider is running out of room on their satellites and the equipment to be procured for new sites will be different – delaying the quote. These systems are on the shelf, it is just receipt of an invoice that is producing the schedule variance. IRIS is still waiting for delivery of the CMG-1 (see Guralp deliveries under Flexible Array).

The cost variance is primarily tied to the vastly reduced cost of power systems and GPS receivers since the original proposal. As there are still outstanding high-risk procurements (major civil works contracts), these will be held as a variance until the remaining procurements are under control.

- **Other Affected Tasks:** None.
- **Corrective Action:** Albuquerque Seismological Laboratory is augmenting staff to catch up on delayed work including the negotiation of civil works contracts. Also, summer interns have been hired to assist in field operations. Two sets of vehicles are now available to accelerate field efforts.
- **Predicted Recovery Time:** The variances should be less than 10% with implementation of the new baseline effective April 1, 2006.

▶ *Variance Report:* 1.4.3 Transportable Array

SV: (13%) or ($1,918,000)

■ **Reason:** The negative schedule variance is focused on the following tasks:

Task	Name	Schedule Variance
1.4.3.2.1.1	Sensors	($398,192)
1.4.3.2.1.2	Data Acquisition Systems	($645,000)
1.4.3.2.1.3	Other Station Equipment	$577,624
1.4.3.2.2	Communications	($456,639)
1.4.3.2.3	Additional Equipment/Supplies	($354,348)
1.4.3.2.4	Magnetotellurics	($144,780)
1.4.3.3.3	Shared Stations	($41,775)
1.4.3.4.1	Permitting	($140,000)
1.4.3.4.2	Station Contruction/Install	($285,000)
Total		**($1,888,110)**

The schedule variance is due to an error in Year 2 budgeting. This has been rectified in Year 3 and the schedule variance will gradually be reduced.

■ **Other Affected Tasks:** WBS task 1.4.1 USArray Management: The general and administrative expense shortfall is partially due to this schedule variance.

■ **Corrective Action:** The error in Year 2 budgeting is be corrected in the new baseline effective April 1, 2006.

■ **Predicted Recovery Time:** The schedule variance should be corrected with implementation of the new baseline effective April 2006.

▶ *Variance Report:* 1.4.4 Flexible Array

SV: (21%) or ($1,870,000)

■ **Reason:** The negative schedule variance is focused on the following tasks:

Task	Name	Schedule Variance
1.4.4.2.1	Sensors	($242,744)
1.4.4.2.2	Data Acquisition Systems	($770,120)
1.4.4.2.3	Power	($361,550)
1.4.4.2.4	Communications	($273,400)
1.4.4.2.6	Additional Equipment/Supplies	($241,094)
Total		**($1,888,908)**

The Flexible Array schedule variance is reduced from 28% last month. We received 30 short-period sensors, 40 of the high-resolution data-acquisition systems, 510 active-source sensors and 105 Texans. The remaining Texans are on schedule for delivery in April and May. We should start receiving new broadband sensors in May. The broadband sensor manufacturer (Guralp) is overcommitted and quality is suffering. We have met with the manufacturer and agreed on a plan for resolution. We received 20 repaired broadband sensors in March and expect 20 more in April. We are also considering an alternative source of supply.

- **Other Affected Tasks:** None.
- **Corrective Action:** We have contacted the affected vendors and negotiated revised delivery schedules. This will be reflected more accurately in the April 2006 baseline.
- **Predicted Recovery Time:** The variance should be corrected with the adoption of a new baseline in April 2006.

▶ ***Variance Report:*** 1.4.6 Siting Outreach

SV: (12%) or ($17,000)

- **Reason:** Arizona State University siting outreach subaward activities have taken longer than anticipated.
- **Other Affected Tasks:** None.
- **Corrective Action:** Plan for subaward completion in June 2006.
- **Predicted Recovery Time:** June 2006.

MANAGEMENT RESERVE AND CONTINGENCY SUMMARY

To mitigate the overall EarthScope risk, each management component of EarthScope reserves funds for unforeseen events. The use of these funds for the quarter are reported in the logs below.

NSF-held MREFC Contingency Log for Y3Q2

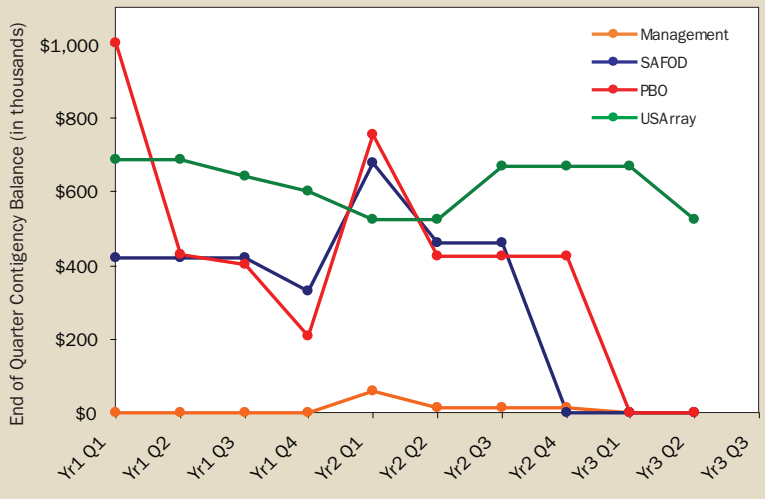
Description	Transactions
Balance at Beginning of Year 3	$1,879,200
Change Order SAFOD-024	($350,000)
Ending Balance	$1,529,200
No Liens	$0
Ending Balance with Liens	$1,529,200

Element-held MREFC Management Reserve Log for Y3Q2

Description	Transactions
1.1 EarthScope Management	
Balance at Beginning of Quarter	$0
No Contingency Used	$0
Ending Balance	$0
No Liens	$0
Ending Balance with Liens	$0
1.2 SAFOD	
Balance at Beginning of Quarter	$0
No Contingency Used	$0
Ending Balance	$0
No Liens	$0
Ending Balance with Liens	$0
1.3 PBO	
Balance at Beginning of Quarter	$0
No Contingency Used	$0
Ending Balance	$0
No Liens	$0
Ending Balance with Liens	$0
1.4 USArray	
Balance at Beginning of Quarter	$670,438
Change Order SAFOD-015	($144,780)
Ending Balance	$525,658
No Liens	$0
Ending Balance with Liens	$525,658

The Contingency Summary below tracks the use of contingency funds over the course of the project.

Contingency Summary



CHANGE ORDERS

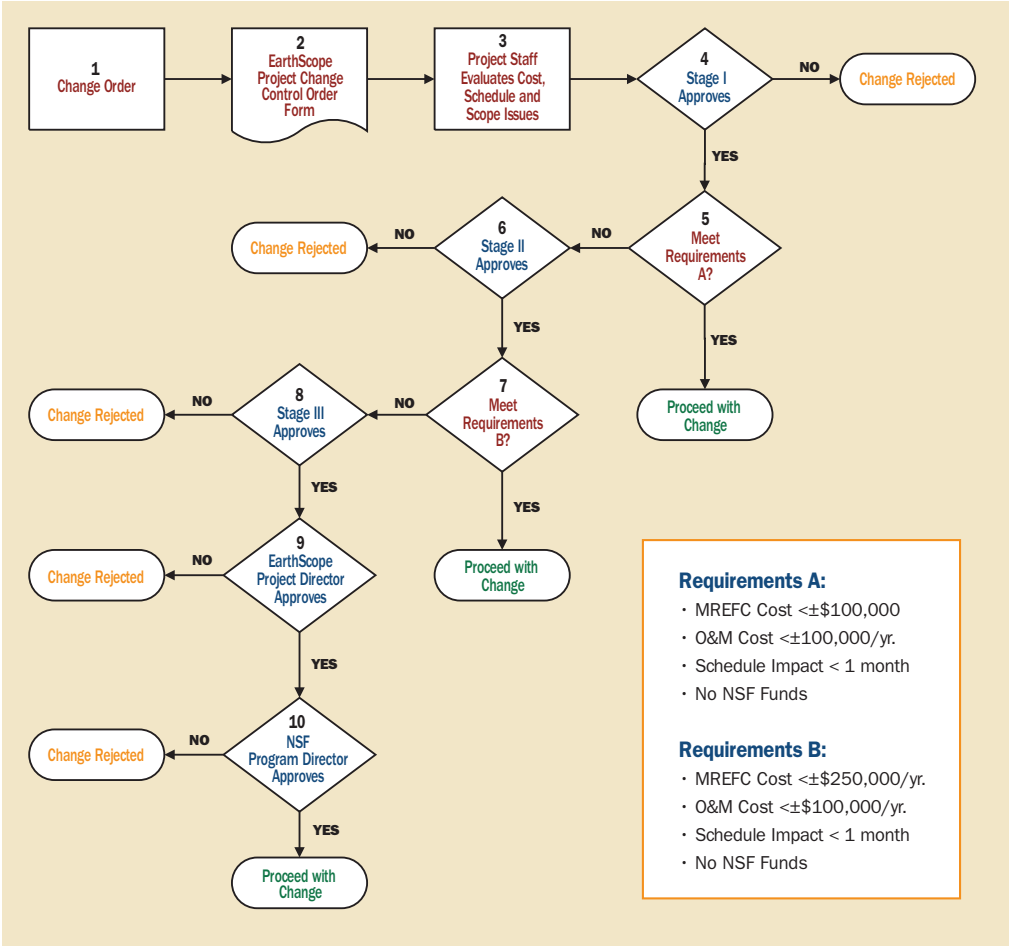
The approval process for a proposed project change is illustrated below. It is multi-tiered with the approval process based on the dollar value and impact of the proposed change. Proposed changes less than $250,000 to the MREFC cost, less than $100,000 per year to the Operations and Maintenance cost, or with an impact of less than one month require approval within the respective management component, sometimes with advisory committee consultation. For proposed changes over $250,000 to the MREFC cost, over $100,000 per year to the Operations and Maintenance cost, or with an impact of over a month, the change must also be approved by EarthScope Project Director and the National Science Foundation Program Director.

The change control process outlined on the following page is defined as follows:

1. **Change Request:** A cost account manager (e.g., Regional Engineering Manager, Operational Manager, Data Manager), the science community, or the project itself initiates the change process. Changes can be requested to cover additional scope or effort outside the current project budget or a request of project management reserve to meet project requirements that were not covered in the original budget. The Change Order can also request a reduction of budget and associated scope previously allocated to the project baseline (BCWS). Any realized cost savings will be shifted into the project management reserve.

2. **EarthScope Project Change Request:** The EarthScope Project Change Request is filled out by the requestor and a detailed time-phased estimate is made of the change.

3. **Project Staff Evaluates Cost/Schedule and Scope Issues:** Project staff evaluates cost, schedule, and scope issues associated with the change and verifies that the EarthScope Project Change Request is complete.



4. **Stage I Approves:** Stage I evaluates and then approves or denies the proposed change request. Stage I is defined as:
   - The EarthScope Project Director for changes affecting 1.1 EarthScope Management,
   - The SAFOD Principal Investigator or Co-PI for changes affecting 1.2 SAFOD,
   - The PBO Director for changes affecting 1.3 PBO, and
   - The appropriate IRIS Program Manager for changes affecting 1.4 USArray.

   If the change process is completed (approved or denied) a copy of this request is sent to the EarthScope Project Office.

5. **Meet Requirements A?:**

   - **Requirements A:** The impact of the proposed change is less than $100,000 to the MREFC budget. The impact of the change is less than $100,000 to the Operations and Maintenance budget, The schedule impact is less than one month. The schedule impact does not require any changes to the most recently approved milestone list. NSF held contingency funds are not requested.

     Yes: The change may proceed after full documentation, including a revised time-phase budget (if applicable) and completed change order forms are submitted to the EarthScope Project Office.

     The EarthScope Project Director and the NSF Program Director reserve the right to reject any change order if they interpret it as inconsistent with EarthScope policies or inconsistent with either the letter or intent of the change control process.

     No: If Requirements A are not met, Stage II approval is required.

6. **Stage II Approves:** Stage II evaluates and then approves or denies the change request. Stage II is defined as:
   - The EarthScope Project Director for changes affecting 1.1 EarthScope Management,
   - The SAFOD Principal Investigator or Co-PI for changes affecting 1.2 SAFOD,
   - The PBO Principal Investigator for changes affecting 1.3 PBO, and
   - The USArray Principal Investigator for changes affecting 1.4 USArray.

   If the change process is completed (approved or denied) a copy of this request is sent to the EarthScope Project Office.

7. **Meet Requirements B?:**

   - **Requirements B:** The impact of the proposed change is less than $250,000 to the MREFC budget. The impact is less than $100,000 to the Operations and Maintenance budget. The schedule impact is less than one month. The schedule impact does not require any changes to the most recently approved milestone list. NSF held contingency funds are not requested.

     Yes: The change may proceed after full documentation, including a revised time-phase budget (if applicable) and completed change order forms are submitted to the EarthScope Project Office.

     The EarthScope Project Director and the NSF Program Director reserve the right to reject any change order if they interpret it as inconsistent with EarthScope policies or inconsistent with either the letter or intent of the change control process.

     No: If Requirements B are not met, Stage III approval is required.

8. **Stage III Approves:** Stage III evaluates and then approves or denies the change. Stage III is defined as:
   - The EarthScope Project Director for changes affecting 1.1 EarthScope Management,
   - The SAFOD Principal Investigator or Co-PI for changes affecting 1.2 SAFOD,
   - The PBO Standing Committee Chair for changes affecting 1.3 PBO, and
   - The IRIS Coordinating Committee Chair for changes affecting 1.4 USArray.

   If the change process is completed (approved or denied) a copy of this request is sent to the EarthScope Project Office for approval by the Project Director.

9. **EarthScope Project Director Approves:** The change request is sent to the EarthScope Project Office. The EarthScope Project Director evaluates and then approves or denies the change request both as the Project Director and the Chair of the EFEC in consultation with the EFEC.

10. **NSF Program Director Approves:** The EarthScope Project Office sends the change request to the NSF Program Director for approval. The NSF Program Director approves or denies the change request.

    If approved, the EarthScope Project Office will notify the appropriate EarthScope element. The EarthScope Project Office will request a revised baseline if not already included in the change request to complete the change control process.

Approved Change Orders:

During the past year, 20 change orders were approved.

Date Requested:	**February 27, 2005**	**Schedule Impact:**	**>1 month**
Change Order:	**SAFOD-013**	**MREFC Cost:**	**$15,000**
Requested by:	**C. Weiland**	**O&M Cost:**	**$35,000/year**
WBS Task:	**1.2.3.3**	**Milestones Affected:**	**Yes**
		Other WBS Tasks Affected:	**1.2.1 and 1.2.3.4**

Description: This change order clarifies the instrumentation for Stage 2 fault zone monitoring instrumentation in the SAFOD project. We indicated in the EarthScope proposal and Project Execution Plan that we planned to use Sandia National Laboratories as the system integration contractor for the Stage 2 monitoring instrumentation. The Stage 2 monitoring plan now involves working with two subcontractors: Duke University for an "in hole" seismometer and University of California San Diego for a "behind the casing" strainmeter.

Status: Stage I approved by M. Zoback on on April 12, 2005
Approval Process Complete

Date Requested:	**March 20, 2005**	**Schedule Impact:**	**>1 month**
Change Order:	**SAFOD-015**	**MREFC Cost:**	**$0**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.3.2**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: This change order is to revise the configuration of the Stage 1 sonde. The Stage 1 sonde was designed to have a Gladwin strainmeter included into the package. However, the technical challenges of the strainmeter have made integrating it into the sonde more difficult than planned. Work will continue on integrating the strainmeter, but the sonde will be deployed in Spring 2005 without the strainmeter. Once the technical challenges have been met, we will pull the Stage 1 sonde and redeploy the complete package. There are no anticipated costs to the MREFC or O&M program related to this change.

Status: Stage I approved by M. Zoback on April 12, 2005
Approval Process Complete

Date Requested:	**March 31, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-014**	**MREFC Cost:**	**$25,206**
Requested by:	**C. Weiland**	**O&M Cost:**	**$1,000/year**
WBS Task:	**1.2.3.4**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: This change order is to request funds for a highly accurate, highly reliable pressure and temperature recorder. This will be a wireline deployable instrument that will be a standalone instrument that we can use to monitor conditions within and at the bottom of the Main Hole. It is also a prototype tool that may be included with the Stage 3 monitoring package. As such, the funds for this tool will come from the Stage 3 instrumentation budget. As this tool comes with its own read-out and data recording system, we anticipate the only O&M costs will be the labor to deploy/retrieve the transducer.

Status: Stage I approved by M. Zoback on April 12, 2005
Approval Process Complete

Date Requested:	**March 31, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-017**	**MREFC Cost:**	**$0**
Requested by:	**C. Weiland**	**O&M Cost:**	**$25,000/year**
WBS Task:	**1.2.4**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: This change order is to change the repository for the SAFOD core and physical samples. The MREFC proposal indicates that the samples will be stored at the USGS facility in Denver, Colorado. Instead the physical samples will be stored at the Gulf Coast Repository of the Integrated Ocean Drilling Program, in College Station, Texas. The main reason we are not using the USGS core facility is that they have no provision for storing the core under refrigeration, and thus all of their core is stored dry in boxes at room temperature.

Status: Stage I approved by M. Zoback on April 18, 2005
Approval Process Complete

Date Requested:	**April 12, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-018**	**MREFC Cost:**	**$5,823**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**1.3.5.2.1**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: It is estimated that at least 2% (8 of 400) of the sites in California will not be accessible by the PBO GPS installation trucks. In these cases, an all-terrain-vehicle is an ideal alternative to a helicopter in bringing installation hardware (compressors, generators, welders, batteries, enclosures, etc.) to the site. The purchase of an additional heavy-duty all-wheel-drive all-terrain-vehicle with cargo box, such as the Polaris ATP 500, would give PBO the ability to install GPS stations in otherwise inaccessible areas of California. This vehicle plus the one purchased under PBO-017 will result in one all-terrain vehicle for both the Northern California and Southern California regional offices.

Status: Stage I approved by M. Jackson on April 13, 2005
Approval Process Complete

Date Requested:	**April 12, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-019**	**MREFC Cost:**	**$67,980**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**1.3.5.2.3**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: This change order adds budget for geophysical logging for the first eight borehole strainmeter sites. This was requested by the PBO Standing Committee and was not included in the original borehole strainmeter budget. It will allow early funding for logging activity in Year 2 from the general Management Reserve (MR). MR funds will be "paid back" in later years so that the total amount of money dedicated to borehole strainmeters remains constant and consistent with the proposal. Services have been procured from Golder and Associates in November 2004.

Status: Stage I approved by M. Jackson on April 13, 2005
Approval Process Complete

Date Requested:	**April 12, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-020**	**MREFC Cost:**	**$134,436**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**1.3.3.3.6**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: Per PBO Standing Committee Recommendations, PBO Management has decided not to include tiltmeter instruments at the first 16 borehole strainmeter sites. This transaction transfers this budget from the tiltmeter task to Management Reserve which will help offset the extra funds required by PBO-016. Additional tiltmeters are being considered for some volcanic sites and may be considered in future change orders.

Status: Stage I approved by M. Jackson on April 13, 2005
Stage II approved by W. Prescott on April 13, 2005
Approval Process Complete

Date Requested:	**April 12, 2005**	**Schedule Impact:**	**<1 month**
Change Order:	**PBO-021**	**MREFC Cost:**	**$203,067**
Requested by:	**G. Anderson**	**O&M Cost:**	**$0**
WBS Task:	**1.3.6**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: This request is to provide funding for required hardware and software for the computer systems comprising the PBO core data flow infrastructure, including data collection and quality control metadata management, data distribution, and related activities.

Status: Stage I approved by M. Jackson on April 13, 2005
Stage II approved by W. Prescott on April 13, 2005
Approval Process Complete

Date Requested:	**April 12, 2005**	**Schedule Impact:**	**< 1 month**
Change Order:	**PBO-022**	**MREFC Cost:**	**$60,373**
Requested by:	**G. Anderson**	**O&M Cost:**	**$0**
WBS Task:	**1.3.6**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: This request is to provide funding for required maintenance contracts for the computer systems comprising the PBO core data flow infrastructure, including data collection and quality control, metadata management, data distribution, and related activities.

Status: Stage I approved by M. Jackson on April 13, 2005
Approval Process Complete

Date Requested:	**April 13, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-023**	**MREFC Cost:**	**$88,751**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**1.3.5.6.1**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: PBO Facility Construction proposes hiring seven summer interns to be assigned to the various regions for 5 months (May 1, 2005 through September 30, 2005). These interns will be used to facilitate the construction process during the busy summer months. This is for salary only and any associated travel, per diem, and materials costs will be absorbed by each supported region.

Status: Stage I approved by M. Jackson on April 14, 2005
Approval Process Complete

Date Requested:	**April 14, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-024**	**MREFC Cost:**	**$38,560**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**1.3.3.5.2**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**None**

Description: UNAVCO is procuring a tape back-up system which a substantial portion will be used by PBO. PBO has been asked to fund the portion of the system that supports that backup needs of the project. This has been determined by UNAVCO management to be $35,000, plus the associated burden giving a cost of $38,560.

Status: Stage I approved by M. Jackson on April 14, 2005
Approval Process Complete

Date Requested:	***May 12, 2005***	***Schedule Impact:***	***>1 month***
Change Order:	***USArray-010***	***MREFC Cost:***	***$145,000***
Requested by:	***R. Butler***	***O&M Cost:***	***$0***
WBS Task:	***1.4.2***	***Milestones Affected:***	***Yes***
		Other WBS Tasks Affected:	***None***

Description: The ANSS Backbone has been unable to order STS-1 seismometers during the past year from Streckeisen AG of Switzerland, as they are no longer manufactured. This sensor was planned for use at 6 ANSS Backbone sites where there was a desire for "GSN-type" long-period performance. This was an assumed risk outlined in the original EarthScope Project Execution Plan (PEP). This change order implements the Management Response in the Project Execution Plan, using high-gain STS-2 sensors instead of STS-1s.

Status: Stage I approved by R. Butler on May 12, 2005
Stage II approved by D. Simpson on June 1, 2005
Stage III approved by T. Owens on June 9, 2005
EarthScope Project Director approved on June 13, 2005
Comment: Proposed changes to milestone list and PEP contingent on approval of revised PEP V.3 during NSF Management and Baseline Review.
NSF EarthScope Program Director approved on June 14, 2005
Comment: I concur with comments from Greg van der Vink (above) and note that this was a risk noted in the original PEP. The solution is the best possible outcome.
Approval Process Complete

Date Requested:	**July 25, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-018**	**MREFC Cost:**	**$0**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.2.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: This change order updates and revises change order SAFOD-002 which lists the plan for Phase 2 drilling to have a measured depth of 4,200 meters and total vertical depth of 3,221 meters. During the hiatus between Phase 1 and Phase 2 drilling there have been several seismic experiments designed to refine the location of the target magnitude 2 repeating earthquakes. As a consequence of these efforts the current target for Phase 2 drilling was rotated slightly counterclockwise from the Phase 1 trajectory and will drill to total vertical depth of 3,140 meters. This slight change in drilling target will have no significant cost or schedule change of Phase 2 drilling.

Status: Stage I approved by M. Zoback on July 27, 2005.
EarthScope Project Director approved on August 1, 2005.
Comment: Change due to improved locations of target earthquakes. No significant cost or schedule impact.
Approval Process Complete

Date Requested:	**July 25, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-019**	**MREFC Cost:**	**$85,100**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.2.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: For an approximately 60 hour period from June 16 to June 19, the drill pipe was stuck in the SAFOD main hole. This change order requests management reserve funds to cover the expense of he addition services and rig time required to free the drill pipe. The added services include fishing tools, free point tools, and additional jars for a total of $18,000; the drilling operations cost approximately $1,100/hour or $67,100 for the period. The total request is $85,100.

Status: Stage I approved by M. Zoback on July 27, 2005
Approval Process Complete

Date Requested:	**July 25, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-020**	**MREFC Cost:**	**$221,000**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.2.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: For an approximately 16-day period between June 24, 2005 and July 10, 2005, Phase 2 drilling operations stopped because of multiple problems with the Nabors Drilling's top drive. The top drive failed twice during this period, each failure lasting about 1 week. The first failure (gearbox) required the top drive to be removed from the rig and repaired in Bakersfield, CA. After this repair, the top drive was re-installed only to discover that the electric motor was seriously damaged and had to be rebuilt. This too required the top drive to be removed from the rig and repaired in Bakersfield, CA. While Nabors Drilling took financial responsibility for the failure of their equipment, there are many other standing costs. These standing costs run abut $4,000 per day for security, equipment rental, site maintenance, supervision, housing, and utilities. Further, at the time the top drive failed, the Logging While Drilling (LWD) equipment had just arrived on site. Because of the high demand for LWD from the oil industry the service provider requested the tools be shipped back to Louisiana at our expense, but all of the associated equipment (computer van, telemetry systems, etc.) remained on site. The additional shipping costs were approximately $22,000. The 15 days of standby cost for the LWD equipment that remained on site was approximately $135,000 ($9,000 per day).

Status: Stage I approved by M. Zoback on July 27, 2005
Stage II approved by M. Zoback on July 27, 2005
Approval Process Complete

Date Requested:	**August 4, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-021**	**MREFC Cost:**	**$199,924**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.2.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: For an approximately 61 hour period from July 24, 2005 at 4 pm to July 27, 2005 at 9 am, the drill pipe was stuck in the SAFOD Main Hole. This change order requests management reserve funds to cover the expense of the addition services and rig time required to free the drill pipe. The added services include fishing tools, free point tools, and additional jars for a total of $35,224. Because the logging while drilling tools were on site, daily operations cost approximately $2,700/hour or $164,700 for the period. The total request is $199,924.

Status: Stage I approved by M. Zoback on August 5, 2005
Stage II approved by M. Zoback on August 5, 2005
Approval Process Complete

Date Requested:	**August 10, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-027**	**MREFC Cost:**	**$0**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**All Year 3 Tasks**	**Milestones Affected:**	**Yes**
		Other WBS Tasks Affected:	**None**

Description: PBO has been scheduled to allocate $5,250,000 of management reserve over the life of the five-year MREFC Project. Management reserve was planned at $1,000,000 per year (not including the proposed $250,000 GeoEarthScope reserve). For GFY 2005/06 the management reserve withheld from the task budget was forecasted at $1,000,000. For GFY 2005/06 NSF has withheld a PBO Management Reserve of $1,568,050. We request that $568,050 be allocated to UNAVCO for GFY 2005/06 detailed

task requirements. This amount is required to meet that year's GPS, borehole strainmeter, long-baseline laser strainmeter, and GeoEarthScope goals. This would leave $1,000,000 in management reserve as was previously planned.

Status: Stage I approved by M. Jackson on August 10, 2005.
Stage II approved by W. Prescott on August 10, 2005.
EarthScope Project Director approved on August 26, 2005.
Comment: This change order restores the PBO budget to its original structure, leaving the intended management reserve.
NSF EarthScope Program Director approved on September 27, 2005.
Approval Process Complete

Date Requested:	**October 3, 2005**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-023**	**MREFC Cost:**	**$105,820**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: As stated in Project Execution Plan v2.0, the SAFOD budget for EarthScope Year 3 is $970,000. As noted in the PEP, there are no contingency funds allocated during EarthScope Year 3. Therefore the money NSF withheld for Year 3 contingency derives from the budget for planned tasks. In order to complete all planned and scheduled Year 3 activities, we need the full $970,000 as budgeted in the PEP. It is important to note that we have spent all the contingency money ($960,000) allocated during Year 1 and Year 2, and thus we have no contingency money to carry forward to support the planned activities. We request the $105,820 of NSF-held contingency funds to restore the full amount budgeted to SAFOD. These funds are needed as soon as possible to initiate the procurement of the Stage 3 monitoring instrumentation system without delay.

Status: Stage I approved by M. Zoback on October 3, 2005.
Stage II approved by M. Zoback on October 3, 200
EarthScope Project Director approved on October 7, 2005.
Comment: As indicated in the PEP, SAFOD did not plan on holding contingency in year 3. These funds are required for budgeted activities.
NSF EarthScope Program Director approved on October 20, 2005.
Approval Process Complete.

Date Requested:	**January 10, 2006**	**Schedule Impact:**	**None**
Change Order:	**SAFOD-024**	**MREFC Cost:**	**$350,000**
Requested by:	**C. Weiland**	**O&M Cost:**	**$0**
WBS Task:	**1.2.2.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: This change order requests $350,000 of National Science Foundation held contingency funds to cover cost overruns from Phase 1 and 2 Drilling operations. This overrun results from a combination of unanticipated events such as the top drive on the drill rig being broken for two weeks, slower than expected penetration rates, record rainfalls during the winter of 2004-2005, and the increased costs of drilling supplies and services resulting from the extremely heavy demand for such supplies and services due to very high oil and gas prices. It is important to note that as we have successfully drilled through the San Andreas Fault at seismogenic depth and met all of SAFOD's Phase 1 and 2 objectives, the cost overrun associated with this change order does not represent a systemic problem. Funding of this request will preclude impact on other SAFOD WBS elements.

Status: Stage I approved by M. Zoback on January 10, 2006
Stage II approved by M. Zoback on January 10, 2006
Stage III approved by M. Zoback on January 10, 2006
EarthScope Project Director approved on January 10, 2006
NSF EarthScope Program Director approved on January 26, 2006.
Approval Process Complete.

Date Requested:	**January 25, 2006**	**Schedule Impact:**	**None**
Change Order:	**USArray-015**	**MREFC Cost:**	**$144,780**
Requested by:	**S. Ingate**	**O&M Cost:**	**$0**
WBS Task:	**1.4.2**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: This change order requests $144, 780 for Magentotelluric (MT) equipment procurement form USArray-held management reserve in order to restore the approved MREFC MT request to $579, 120 and also defines a statement of work for the completion of the MT component of EarthScope within the fenced budget for MT activities as provided in the 2003 EarthScope MREFC proposal.

Status: Stage I approved by S. Ingate on January 25, 2006
Stage II approved by D. Simpson on January 30, 2006,
Stage III approved by T. Owens on February 6, 2006.
EarthScope Project Director approved on February 9, 2006.
NSF EarthScope Program Director approved on February 24, 2006.
Approval Process Complete.

Denied Changes Orders:

Five change requests were denied during the year.

Date Requested:	**March 4, 2005**	**Schedule Impact:**	**None**
Change Order:	**USArray-011**	**MREFC Cost:**	**$0**
Requested by:	**S. Ingate**	**O&M Cost:**	**$0**
WBS Task:	**2.4.2.3**	**Milestones Affected:**	**None**
		Other WBS Tasks Affected:	**2.4.6.2, 2.4.3.2, 2.4.5.2, and 2.4.3.5**

Description: USArray intends to use subawards to integrate the Backbone Magnetotelluric stations into the ANSS Backbone, and also for testing candidate Magnetotelluric systems for EarthScope. A competitive request for bids has been conducted and the award for the first year services will be made to Oregon State University. Insufficient funds were identified in the USArray budget for the Backbone Magnetotelluric installations. The purpose of this change order is to re-program funds within USArray for this subaward.

Status: Stage I approved by J. Fowler, T. Ahern, and R. Butler on March 4, 2005
EarthScope Project Director denied on April 22, 2005
Comment: The overrun in magnetotelluric should be carried forward as a cost variance with a lien against the contingency and then adjusted through a change order as part of the annual budgeting process.
Approval Process Complete

Date Requested:	**July 27, 2005**	**Schedule Impact:**	**>1 month**
Change Order:	**PBO-025**	**MREFC Cost:**	**TBD**
Requested by:	**B. Stephanus**	**O&M Cost:**	**TBD**
WBS Task:	**1.3.5**	**Milestones Affected:**	**Yes**
		Other WBS Tasks Affected:	**None**

Description: NSF-Directed Alaska Magmatic Plan Revision: A July 15, 2005 letter from the National Science Foundation directed a cessation of any further reconnaissance, permitting, and construction of GPS Aleutian magmatic installations beyond those already installed. EarthScope was also encouraged to shift any remaining Aleutian budget to new "targets of interest" that may develop. As of the date of the directive, PBO installed 13 magmatic systems stations on volcano clusters. PBO's baseline plan (per a peer-reviewed and funded MREFC proposal) assumed that 48 stations would be installed on the Aleutians. The directive by NSF leaves 35 stations uninstalled. This change order de-scopes the Aleutian installations by 35 stations bringing the total number of PBO GPS stations to 840. In the next few months we will assess any cost impact associated with this descoping and make that money available for "targets of interest".

Status: Stage I approved by M. Jackson on July 27, 2005.
Stage II approved by W. Prescott on July 28, 2005.
EarthScope Project Director approved on August 1, 2005.
Comment: This is a baseline change that would normally require baseline review process. NSF directive pre-empts baseline review requirement. De-scoping of PBO sites acknowledged through this change order. Additional change order expected once available funds are defined.
NSF EarthScope Program Director denied on August 29, 2005.
Comment: As noted in J. Whitcomb's recent letter to Paul Segall: "In your letter you state your concern, and the concern of the PBO Steering committee, about an apparent NSF decision to cut back Aleutian Island PBO clusters for 7 to 2. However, it is not possible for NSF to make a decision to cut 5 clusters because the decision to install more than 2 clusters in the Aleutians was never made or authorized by NSF. Addition of clusters or any other substantive change requires prior approval by NSF." There is no "de-scoping" involved.
Approval Process Complete

Date Requested:	**July 31, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-026**	**MREFC Cost:**	**>$250,000**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**1.3**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

Description: Monthly CSSR: The PBO MREFC Cooperative Agreement between the National Science Foundation (NSF) and UNAVCO requires quarterly reports (EAR-0350028 September 1, 2003; Paragraph 5). The NSF Program Director has requested access to monthly reports which were made available. The change in scope has a cost impact to the program which is currently being evaluated. EarthScope's Project Execution Plan required monthly internal reporting within the program to allow EFEC management time to assess and understand program issues before they were known by NSF. It is part of a natural desire to have increase internal granularity beyond NSF requirements. NSF's request for monthly reports has the potential to increase inquiries based on twelve sets of information rather than four. Cost associated with this increase in scope will be evaluated in the coming months.

Status: Stage I approved by M. Jackson on August 1, 2005.
Stage II approved by W. Prescott on August 1, 2005.
EarthScope Project Director approved on August 2, 2005
Comment: This is a change of scope in response to NSF Directive. PBO has been told to keep this activity to the lowest possible level that will still meet NSF request, thus minimizing any impact on cost or schedule. This request is being passed to NSF, as it does constitute change in scope. Expect second change order providing cost estimate and fund use.
NSF EarthScope Program Director denied August 8, 2005.
Comment: This is a request based on poor/faulty communication. The Program Director will meet with PBO personnel to discuss/clarify.
Approval Process Complete

Date Requested:	**August 10, 2005**	**Schedule Impact:**	**None**
Change Order:	**PBO-028**	**MREFC Cost:**	**$656,353**
Requested by:	**B. Stephanus**	**O&M Cost:**	**$0**
WBS Task:	**All Year 3 Tasks**	**Milestones Affected:**	**Yes**
		Other WBS Tasks Affected:	**1.2**

Description: The PBO proposal did not include $656,353 of UNAVCO general and administrative (G&A) expenses for GFY 2005/06. In calendar year 2003, the PBO portion of UNAVCO headquarters cost was direct charged to the project per NSF direction. UNAVCO implemented an indirect cost system (per NSF direction) for calendar year 2004 and beyond. In past years, PBO has funded these G&A expenses out of Management Reserve (PBO-1, PBO Year 2 Detailed Planning). UNAVCO requests that these funds be taken out of the GFY 2005/06 Management Reserve which is now being held at NSF. This will allow UNAVCO to have the budget to meet production goals originally proposed and budgeted without this additional G&A expenses. A detailed analysis of this expense is attached.

Status: Stage I approved by M. Jackson on August 10, 2005.
Stage II approved by W. Prescott on August 10, 2005.
EarthScope Project Director approved on August 26, 2005.
Comment: As stated, this change order reflects the previously known consequences resulting from the implementation by UNAVCO of an indirect cost structure as mandated by NSF.
NSF EarthScope Program Director denied on October 13, 2005.
Approval Process Complete.

Date Requested:	**October 17, 2005**	**Schedule Impact:**	**None**
Change Order:	**ESO-004**	**MREFC Cost:**	**$26,899**
Requested by:	**R. Morris**	**O&M Cost:**	**$0**
WBS Task:	**1.1.1**	**Milestones Affected:**	**No**
		Other WBS Tasks Affected:	**None**

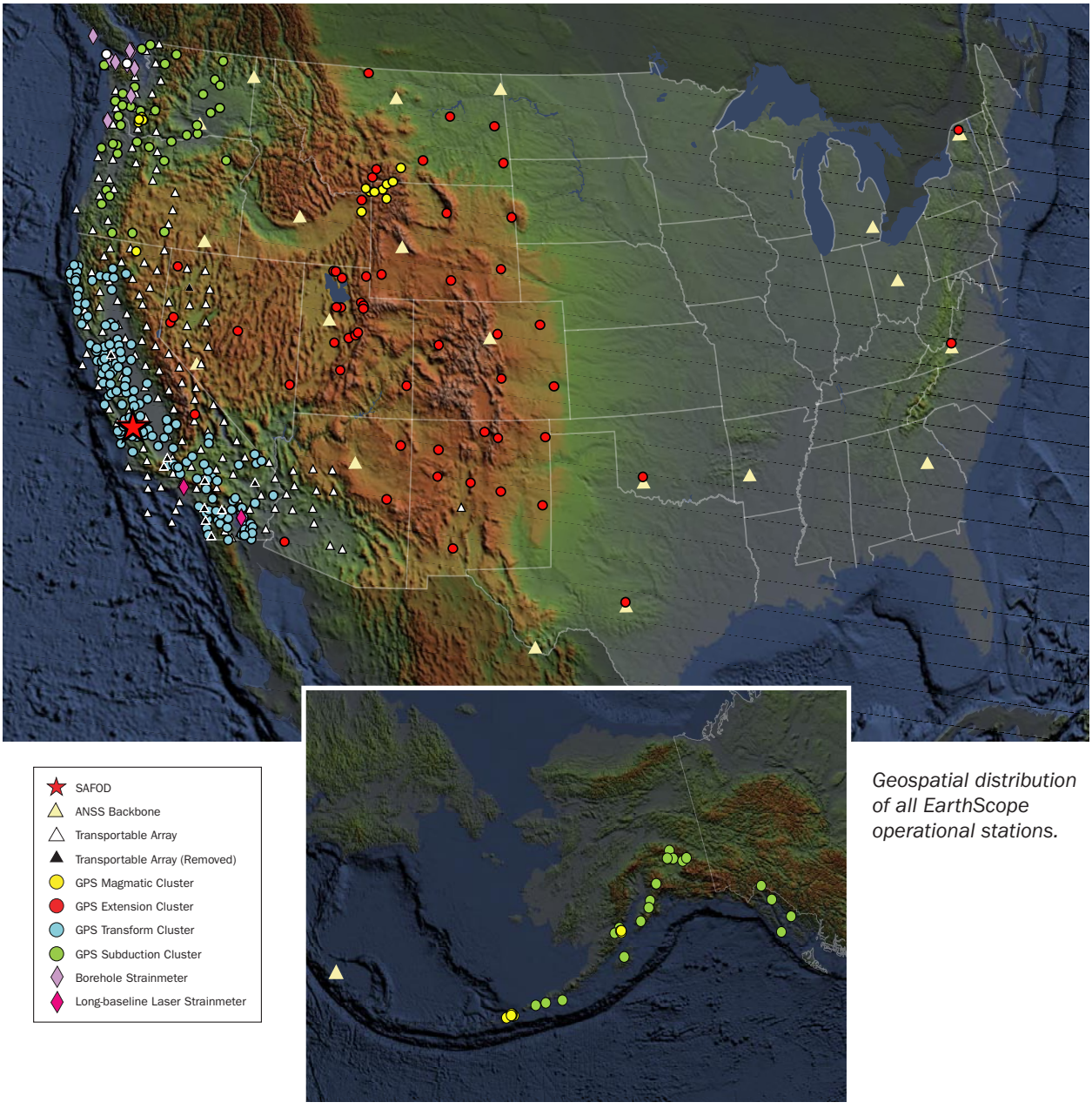
Description: Due to the workload resulting from increased requirements unknown at the time of the proposal, the Senior Project Analyst position is being changed from a 87.5% modified full time to 100% full time. The estimated cost associated with the change will require the use of NSF held management reserves in the amount of $26,899 for Year 3, $27,975 for Year 4, and $29,094 for Year 5. Year 4 and Year 5 estimates are based on current indirect rates which are subject to annual NSF review and may change.

Status: EarthScope Project Director approved on October 18, 2005.
Comment: As per EFEC approval October 14, 2005.
NSF EarthScope Program Director denied on November 2, 2005.
Comment: Sound, responsible project management includes using available resources to fully support required tasks. Use of contingency to support required tasks while unnecessary tasks are fully supported is an inappropriate use of contingency. Facility project change order ESO-004 is declined.
Approval Process Complete.

O&M PERFORMANCE

Operational Stations

Data are available from the seismic array in the SAFOD Pilot Hole, 293 GPS stations, 12 borehole strainmeter stations, 2 long-baseline laser strainmeter stations, 21 ANSS Backbone stations, and 157 Transportable Array seismic stations. Data from the stations are freely available for both research and educational activities through the EarthScope website (www.earthscope.org).



Geospatial distribution of all EarthScope operational stations.

During this year, data from 281 new EarthScope stations became available.

Deployment/ Station Code	Type of Instrument	Geographic Location	Longitude	Latitude	Elevation (m)	Date of Deployment	Date Type, Sample Rate
P380	Subduction	Klamath Falls, OR	121.8 W	42.3 N	1390	4/1/2005	Geodetic GPS, 15 sec
P498	Transform	Brawley, CA	115.6 W	32.9 N	-58	4/1/2005	Geodetic GPS, 15 sec
P028	Extension	Chaco Canyon, NM	107.9 W	36.0 N	1933	4/4/2005	Geodetic GPS, 15 sec
P267	Transform	Dixon, CA	121.8 W	38.4 N	-17	4/7/2005	Geodetic GPS, 15 sec
P401	Subduction	Quillayut, WA	124.6 W	47.9 N	36	4/9/2005	Geodetic GPS, 15 sec
P268	Transform	Dixon, CA	121.6 W	38.5 N	-23	4/10/2005	Geodetic GPS, 15 sec
P430	Subduction	Elma, WA	123.4 W	47.0 N	-4	4/10/2005	Geodetic GPS, 15 sec
TA-V05C	Transportable Array	Boulder Hill, CA	119.9 W	35.9 N	118	4/11/2005	Seismic Broadband, 40 sps
TA-O03C	Transportable Array	Los Molinos, CA	122.0 W	40.0 N	85	4/19/2005	Seismic Broadband, 40 sps
TA-S05C	Transportable Array	Merced, CA	120.3 W	37.3 N	85	4/19/2005	Seismic Broadband, 40 sps
TA-BNLO	Transportable Array	Ben Lomond (Santa Cruz Mountains), CA	122.2 W	37.1 N	794	4/20/2005	Seismic Broadband, 40 sps
TA-O05C	Transportable Array	Quincy, CA	120.9 W	40.0 N	1032	4/20/2005	Seismic Broadband, 40 sps
P500	Transform	All American Canal, El Centro, CA	115.3 W	32.7 N	-20	4/20/2005	Geodetic GPS, 15 sec
P423	Subduction	Grapeview, WA	122.9 W	47.3 N	39	4/22/2005	Geodetic GPS, 15 sec
P504	Transform	South Orocopia Mountains, CA	115.8 W	33.5 N	84	4/28/2005	Geodetic GPS, 15 sec
P119	Extension	Mahogany, UT	111.3 W	40.7 N	2045	5/4/2005	Geodetic GPS, 15 sec
P160	Transform	Rohnerville Airport, CA	124.1 W	40.6 N	94	5/4/2005	Geodetic GPS, 15 sec
P264	Transform	Capell Valley, CA	122.2 W	38.4 N	231	5/13/2005	Geodetic GPS, 15 sec
AC38	Subduction	Quartz Creek, AK	153.3 W	57.8 N	43	5/17/2005	Geodetic GPS, 15 sec
P266	Transform	Rio Vista, CA	121.0 W	37.0 N	25	5/18/2005	Geodetic GPS, 15 sec
P022	Subduction	La Grande, OR	118.0 W	45.2 N	888	5/19/2005	Geodetic GPS, 15 sec
TA-ELFS	Transportable Array	Susanville, CA	120.7 W	40.6 N	1553	5/20/2005	Seismic Broadband, 40 sps
P270	Transform	Hopkins Slough, CA	122.1 W	39.2 N	-12	5/20/2005	Geodetic GPS, 15 sec
TA-HATC	Transportable Array	Hat Creek, CA	121.5 W	40.8 N	1013	5/22/2005	Seismic Broadband, 40 sps
TA-O04C	Transportable Array	Chester, CA	121.1 W	40.3 N	1513	5/25/2005	Seismic Broadband, 40 sps
P210	Transform	Elkhorn Slough, CA	121.7 W	36.8 N	3	5/25/2005	Geodetic GPS, 15 sec
P454	Subduction	Grand Coulee Dam, WA	119.0 W	48.0 N	478	5/26/2005	Geodetic GPS, 15 sec
P477	Transform	Temecula, CA	117.1 W	33.5 N	334	5/26/2005	Geodetic GPS, 15 sec
P213	Transform	Leniham Dam, CA	122.0 W	37.2 N	167	5/27/2005	Geodetic GPS, 15 sec
P240	Transform	Miller Slough, CA	121.5 W	37.0 N	25	5/27/2005	Geodetic GPS, 15 sec
P373	Subduction	Baldy Ranch, CA	123.3 W	43.6 N	169	6/3/2005	Geodetic GPS, 15 sec
TA-P05C	Transportable Array	Truckee, CA	120.6 W	39.3 N	1756	6/7/2005	Seismic Broadband, 40 sps
P586	Transform	Lewis Center, CA	117.3 W	34.5 N	809	6/7/2005	Geodetic GPS, 15 sec
P249	Transform	Call Mountain, CA	121.1 W	36.6 N	1155	6/9/2005	Geodetic GPS, 15 sec
US-AAM	ANSS Backbone	Ann Arbor, MI	83.7 W	42.3 N	172	6/10/2005	Seismic Broadband, 40 sps
US-ACSO	ANSS Backbone	Alum Creek State Park, OH	83.0 W	40.2 N	288	6/10/2005	Seismic Broadband, 40 sps
P127	Extension	Lockwood, NV	119.6 W	39.5 N	1523	6/17/2005	Geodetic GPS, 15 sec
P484	Transform	Chihuahua Valley, CA	116.6 W	33.4 N	1382	6/17/2005	Geodetic GPS, 15 sec
P218	Transform	CalTrans, CA	121.7 W	37.2 N	82	6/18/2005	Geodetic GPS, 15 sec
P072	Extension	Dry Creek Ranch, NV	116.7 W	39.5 N	2061	6/20/2005	Geodetic GPS, 15 sec
P612	Transform	San Bernardino, CA	117.3 W	34.2 N	531	6/20/2005	Geodetic GPS, 15 sec
P190	Transform	Ukiah, CA	123.2 W	39.2 N	202	6/22/2005	Geodetic GPS, 15 sec
P448	Subduction	Alderdale, WA	120.0 W	45.9 N	261	6/23/2005	Geodetic GPS, 15 sec
P479	Transform	Aguanga, CA	116.8 W	33.5 N	1093	6/24/2005	Geodetic GPS, 15 sec
P315	Transform	Leggett Valley, CA	123.7 W	39.9 N	257	6/25/2005	Geodetic GPS, 15 sec
P680	Magmatic	West Yellowstone, MT	111.1 W	44.6 N	2315	6/25/2005	Geodetic GPS, 15 sec
P591	Transform	California City, CA	118.0 W	35.2 N	708	6/27/2005	Geodetic GPS, 15 sec
TA-M06C	Transportable Array	Likely, CA	120.5 W	41.2 N	1434	6/28/2005	Seismic Broadband, 40 sps
TA-Q03C	Transportable Array	Winters, CA	122.0 W	38.6 N	108	6/28/2005	Seismic Broadband, 40 sps
P417	Subduction	Pe Ell, WA	123.3 W	46.6 N	102	6/28/2005	Geodetic GPS, 15 sec
TA-M05C	Subduction	Lookout, CA	121.1 W	41.4 N	1333	6/29/2005	Seismic Broadband, 40 sps
P511	Tranform	Desert Center, CA	115.3 W	33.9 N	273	6/29/2005	Geodetic GPS, 15 sec
P360	Extension	Osborne Bridge, ID	111.5 W	44.3 N	1857	6/30/2005	Geodetic GPS, 15 sec
P408	Subduction	Whakiakum, WA	123.4 W	46.2 N	35	6/30/2005	Geodetic GPS, 15 sec
P623	Transform	Vidal, CA	114.6 W	34.2 N	267	6/30/2005	Geodetic GPS, 15 sec
P409	GPS Subduction	Vernonia, OR	123.2 W	45.9 N	177	7/1/2005	Geodetic GPS, 15 sec
P541	GPS Transform	Lost Hills, CA	120.0 W	35.7 N	209	7/7/2005	Geodetic GPS, 15 sec
P406	GPS Subduction	McMinville, OR	123.2 W	45.2 N	27	7/8/2005	Geodetic GPS, 15 sec
P530	GPS Transform	Estrellita Ranch, CA	120.5 W	35.6 N	388	7/8/2005	Geodetic GPS, 15 sec
P450	GPS Subduction	Paterson, WA	119.5 W	46.0 N	163	7/14/2005	Geodetic GPS, 15 sec
P491	GPS Transform	La Quinta, CA	116.2 W	33.6 N	4	7/15/2005	Geodetic GPS, 15 sec
AC20	GPS Subduction	Girdwood, AK	149.4 W	60.9 N	43	7/16/2005	Geodetic GPS, 15 sec
B005	Borehole Strainmeter	Port Angeles, WA	123.5 W	48.1 N	302	7/19/2005	Strain Data, 1 sps
B006	Borehole Strainmeter	Port Angeles, WA	123.5 W	48.1 N	302	7/19/2005	Strain Data, 1 sps
B007	Borehole Strainmeter	Shores, WA	123.5 W	48.1 N	293	7/19/2005	Strain Data, 1 sps
P567	GPS Transform	Bakersfield, CA	118.8 W	35.4 N	706	7/21/2005	Geodetic GPS, 15 sec
P260	GPS Transform	Salida, CA	121.1 W	37.7 N	-9	7/22/2005	Geodetic GPS, 15 sec
P305	GPS Transform	Planada, CA	120.2 W	37.4 N	96	7/22/2005	Geodetic GPS, 15 sec
P371	GPS Subduction	Glide, OR	123.1 W	43.4 N	1198	7/23/2005	Geodetic GPS, 15 sec
US-HLID	ANSS Backbone	Hailey, ID	114.4 W	43.6 N	1772	7/25/2005	Seismic Broadband, 40 sps
US-WVOR	ANSS Backbone	Wild Horse Valley, OR	118.6 W	42.4 N	1344	7/25/2005	Seismic Broadband, 40 sps
P303	GPS Transform	Los Banos, CA	120.7 W	37.1 N	-1	7/28/2005	Geodetic GPS, 15 sec
P259	GPS Transform	Patterson, CA	121.1 W	37.4 N	3	7/28/2005	Geodetic GPS, 15 sec
P114	GPS Extension	Burgess Ranch, UT	112.5 W	40.6 N	1352	7/30/2005	Geodetic GPS, 15 sec
P428	GPS Subduction	Mt Hood Meadows, OR	121.7 W	45.3 N	1983	7/30/2005	Geodetic GPS, 15 sec
TA-M03C	Transportable Array	McCloud, CA	122.1 W	41.3 N	1047	7/31/2005	Seismic Broadband, 40 sps

Deployment/ Station Code	Type of Instrument	Geographic Location	Longitude	Latitude	Elevation (m)	Date of Deployment	Date Type, Sample Rate
TA-N02C	Transportable Array	Big Bar, CA	123.3 W	40.8 N	0	7/31/2005	Seismic Broadband, 40 sps
TA-S08C	Transportable Array	Bishop, CA	118.2 W	37.5 N	3087	8/2/2005	Seismic Broadband, 40 sps
TA-R07C	Transportable Array	Lee Vining, CA	119.0 W	38.1 N	1996	8/3/2005	Seismic Broadband, 40 sps
TA-R06C	Transportable Array	Coleville, CA	119.5 W	38.5 N	1698	8/6/2005	Seismic Broadband, 40 sps
TA-O02C	Transportable Array	Red Bluff, CA	122.8 W	40.2 N	962	8/10/2005	Seismic Broadband, 40 sps
TA-R05C	Transportable Array	Kirkwood, CA	120.1 W	38.7 N	2366	8/11/2005	Seismic Broadband, 40 sps
P369	GPS Subduction	Winston, OR	123.4 W	43.1 N	190	8/12/2005	Geodetic GPS, 15 sec
TA-M02C	Transportable Array	Callahan, CA	122.9 W	41.4 N	0	8/13/2005	Seismic Broadband, 40 sps
TA-M04C	Transportable Array	Macdoel, CA	121.8 W	41.8 N	1391	8/13/2005	Seismic Broadband, 40 sps
P370	GPS Subduction	Ashland, OR	122.7 W	42.2 N	555	8/14/2005	Geodetic GPS, 15 sec
AC25	GPS Subduction	King Cove, AK	162.3 W	55.1 N	584	8/21/2005	Geodetic GPS, 15 sec
TA-P01C	Transportable Array	Willits, CA	123.3 W	39.5 N	440	8/24/2005	Seismic Broadband, 40 sps
P197	GPS Transform	Santa Rosa, CA	122.8 W	38.4 N	0	8/24/2005	Geodetic GPS, 15 sec
P716	GPS Magmatic	Canyon Junction, WY	110.5 W	44.7 N	2386	8/24/2005	Geodetic GPS, 15 sec
P200	GPS Transform	Sonoma, CA	122.5 W	38.2 N	-25	8/25/2005	Geodetic GPS, 15 sec
P720	GPS Magmatic	Slough Creek, WY	110.3 W	44.9 N	1923	8/25/2005	Geodetic GPS, 15 sec
P265	GPS Transform	Putah Creek, CA	122.0 W	38.5 N	8	8/26/2005	Geodetic GPS, 15 sec
P684	GPS Extension	St. Anthony, ID	111.5 W	43.9 N	1693	9/8/2005	Geodetic GPS, 15 sec
P030	GPS Extension	Kemmerer, WY	110.5 W	41.8 N	2149	9/9/2005	Geodetic GPS, 15 sec
P553	GPS Transform	Lebec, CA	118.9 W	34.8 N	1335	9/10/2005	Geodetic GPS, 15 sec
P557	GPS Transform	Lebec, CA	118.7 W	34.9 N	1818	9/10/2005	Geodetic GPS, 15 sec
P403	GPS Subduction	Sappho, WA	124.1 W	48.1 N	284	9/13/2005	Geodetic GPS, 15 sec
B011	Borehole Strainmeter	PacGeoSi3BBC2005, BC	123.4 W	48.6 N	22	9/13/2005	Strain Data, 1 sps
B009	Borehole Strainmeter	PacGeoSi1BBC2005, BC	123.5 W	48.6 N	15	9/14/2005	Strain Data, 1 sps
P621	GPS Transform	Mountain Pass, CA	115.5 W	35.5 N	1420	9/14/2005	Geodetic GPS, 15 sec
P168	GPS Transform	Kneeland, CA	123.9 W	40.7 N	1093	9/15/2005	Geodetic GPS, 15 sec
B012	Borehole Strainmeter	UCLUELET1BBC2005, BC	125.5 W	48.9 N	13	9/21/2005	Strain Data, 1 sps
BK-GASB	Transportable Array	Alder Springs, CA	122.7 W	39.7 N	1354	9/22/2005	Seismic Broadband, 40 sps
P189	GPS Transform	Boonville, CA	123.3 W	39.0 N	176	9/22/2005	Geodetic GPS, 15 sec
P452	GPS Subduction	Soap Lake, WA	119.5 W	47.4 N	323	9/22/2005	Geodetic GPS, 15 sec
P341	GPS Transform	Whiskeytown, CA	122.6 W	40.7 N	406	9/23/2005	Geodetic GPS, 15 sec
P332	GPS Transform	Hayfork, CA	123.2 W	40.5 N	684	9/24/2005	Geodetic GPS, 15 sec
B010	Borehole Strainmeter	PacGeoSi2BBC2005, BC	123.5 W	48.6 N	5	9/26/2005	Strain Data, 1 sps
P348	GPS Transform	Burney, CA	121.8 W	40.9 N	1668	9/28/2005	Geodetic GPS, 15 sec
P709	GPS Magmatic	Yellowstone National Park, WY	110.3 W	44.4 N	2379	9/28/2005	Geodetic GPS, 15 sec
P439	GPS Subduction	East Sound, WA	122.9 W	48.7 N	-13	9/28/2005	Geodetic GPS, 15 sec
P460	GPS Extension	Gardiner, MT	111.0 W	45.1 N	2197	9/29/2005	Geodetic GPS, 15 sec
P711	GPS Magmatic	Yellowstone National Park, WY	110.9 W	44.6 N	2118	9/29/2005	Geodetic GPS, 15 sec
P461	GPS Extension	Emigrant, MT	110.8 W	45.4 N	1544	9/30/2005	Geodetic GPS, 15 sec
P672	GPS Transform	Tulelake, CA	121.5 W	41.7 N	1435	9/30/2005	Geodetic GPS, 15 sec
P721	GPS Extension	Silver Gate, MT	110.0 W	45.0 N	2236	9/30/2005	Geodetic GPS, 15 sec
P345	Transform GPS	Red Bluff, CA	122.3 W	40.3 N	134	10/1/05	Geodetic GPS, 15 sec
P453	Subduction GPS	Wilbur, WA	118.7 W	47.8 N	644	10/1/05	Geodetic GPS, 15 sec
AB51	Subduction GPS	Petersburg, AK	132.9 W	56.8 N	75	10/2/05	Geodetic GPS, 15 sec
P445	Subduction GPS	Wasco State Airport, OR	120.7 W	45.6 N	436	10/4/05	Geodetic GPS, 15 sec
AB48	Subduction GPS	Port Alexander, AK	134.6 W	56.2 N	5	10/5/05	Geodetic GPS, 15 sec
US-LOZ	ANSS Backbone	Lake Ozonia, NY	74.5 W	44.6 N	440	10/6/05	Seismic Broadband, 40 sps
LD-LOZ	ANSS Backbone	Lake Ozonia, NY	74.6 W	44.6 N	440	10/6/05	Seismic Broadband, 40 sps
US-LONY	ANSS Backbone	Lake Ozonia, NY	74.5 W	44.6 N	440	10/6/05	Seismic Broadband, 40 sps
P722	Magmatic GPS	Yellowstone - Bass Ranch, MT	109.6 W	45.5 N	1452	10/7/05	Geodetic GPS, 15 sec
P404	Subduction GPS	Sheridan, OR	123.4 W	45.2 N	79	10/7/05	Geodetic GPS, 15 sec
LOZ1	Continuous GPS	NY	74.6 W	44.6 N	441	10/7/05	Geodetic GPS, 15 sec
P495	Transform GPS	Westmoreland, CA	115.6 W	33.0 N	-83	10/10/05	Geodetic GPS, 15 sec
TA-S06C	Transportable Array	Mather, CA	119.8 W	37.9 N	1377	10/10/05	Seismic Broadband, 40 sps
P051	Extension GPS	Billings, MT	108.5 W	45.8 N	1081	10/11/05	Geodetic GPS, 15 sec
CI-MUR	Transportable Array	Lake Elsinore, CA	117.2 W	33.6 N	562	10/12/05	Seismic Broadband, 40 sps
AC15	Subduction GPS	Cooper Landing (CPR), AK	149.7 W	60.5 N	151	10/13/05	Geodetic GPS, 15 sec
P676	Magmatic GPS	Henrys Lake, ID	111.3 W	44.7 N	2189	10/14/05	Geodetic GPS, 15 sec
CI-MLAC	Transportable Array	Mammoth Lakes, CA	118.8 W	37.6 N	2162	10/14/05	Seismic Broadband, 20 sps
P307	Transform GPS	Madera, CA	120.1 W	36.9 N	49	10/17/05	Geodetic GPS, 15 sec
P508	Transform GPS	Angus Property, CA	115.4 W	33.2 N	10	10/18/05	Geodetic GPS, 15 sec
P236	Transform GPS	Lomerias, CA	121.6 W	36.9 N	56	10/19/05	Geodetic GPS, 15 sec
P297	Transform GPS	SAFOD, CA	120.6 W	36.0 N	629	10/19/05	Geodetic GPS, 15 sec
P606	Transform GPS	Mohave, CA	116.9 W	34.5 N	863	10/19/05	Geodetic GPS, 15 sec
TA-C03A	Transportable Array	Forks, WA	124.6 W	47.9 N	48	10/20/05	Seismic Broadband, 40 sps
P622	Transform GPS	Smith Property, CA	115.4 W	35.2 N	1524	10/21/05	Geodetic GPS, 15 sec
TA-B04A	Transportable Array	Port Angeles, WA	123.5 W	48.1 N	293	10/21/05	Seismic Broadband, 40 sps
TA-C04A	Transportable Array	Brinnon, WA	123.0 W	47.7 N	53	10/22/05	Seismic Broadband, 40 sps
TA-D04A	Transportable Array	Lacey, WA	122.8 W	47.1 N	31	10/24/05	Seismic Broadband, 40 sps
TA-F04A	Transportable Array	Amboy, WA	122.4 W	45.9 N	211	10/25/05	Seismic Broadband, 40 sps
JCT1	Continuous GPS	TX	99.8 W	30.5 N	571	10/25/05	Geodetic GPS, 15 sec
P273	Transform GPS	Kettleman, CA	121.4 W	38.1 N	-26	10/26/05	Geodetic GPS, 15 sec
P272	Transform GPS	Sycamore Slough, CA	121.9 W	39.1 N	-12	10/26/05	Geodetic GPS, 15 sec
P060	Transform GPS	Pollard Flat Caltrans, CA	122.4 W	41.0 N	430	10/27/05	Geodetic GPS, 15 sec
P274	Transform GPS	Thornton, CA	121.5 W	38.3 N	-27	10/27/05	Geodetic GPS, 15 sec
P349	Transform GPS	Shasta Lake, CA	122.3 W	40.7 N	275	10/27/05	Geodetic GPS, 15 sec
P095	Extension GPS	Spanish Spring, NV	119.5 W	39.7 N	1608	10/27/05	Geodetic GPS, 15 sec
TA-E04A	Transportable Array	Onalaska, WA	122.7 W	46.6 N	215	10/27/05	Seismic Broadband, 40 sps

Deployment/ Station Code	Type of Instrument	Geographic Location	Longitude	Latitude	Elevation (m)	Date of Deployment	Date Type, Sample Rate
P626	Transform GPS	San Andreas Mega Cluster, CA	115.2 W	35.3 N	1442	10/28/05	Geodetic GPS, 15 sec
P021	Subduction GPS	Radio Hill Ferry, WA	118.7 W	48.7 N	1163	10/28/05	Geodetic GPS, 15 sec
TA-E05A	Transportable Array	Randle, WA	121.8 W	46.6 N	451	10/29/05	Seismic Broadband, 40 sps
P595	Transform GPS	Searles Mineral Co., CA	117.4 W	35.7 N	644	10/31/05	Geodetic GPS, 15 sec
P108	Extension GPS	Levan, UT	111.9 W	39.6 N	1683	10/31/05	Geodetic GPS, 15 sec
P166	Transform GPS	Larabee Creek, CA	123.9 W	40.4 N	665	11/1/05	Geodetic GPS, 15 sec
P110	Extension GPS	Fountain Green, UT	111.6 W	39.7 N	2266	11/1/05	Geodetic GPS, 15 sec
TA-E03A	Transportable Array	Lebam, WA	123.6 W	46.5 N	72	11/2/05	Seismic Broadband, 40 sps
P583	Transform GPS	Beechers Corner, CA	117.5 W	35.0 N	730	11/3/05	Geodetic GPS, 15 sec
WMOK	Continuous GPS	OK	98.8 W	34.7 N	467	11/4/05	Geodetic GPS, 15 sec
P559	Transform GPS	Blenkhorn and Barnard, CA	118.6 W	34.8 N	927	11/5/05	Geodetic GPS, 15 sec
P556	Transform GPS	Aqueduct Hwy 138, CA	118.5 W	34.8 N	852	11/5/05	Geodetic GPS, 15 sec
TA-F03A	Transportable Array	Seaside, OR	123.6 W	45.9 N	324	11/8/05	Seismic Broadband, 40 sps
P502	Transform GPS	Magnolia Union Elem. School, CA	115.4 W	33.0 N	-66	11/9/05	Geodetic GPS, 15 sec
TA-H04A	Transportable Array	Detroit Lake, OR	122.2 W	44.7 N	652	11/9/05	Seismic Broadband, 40 sps
P496	Transform GPS	McCabe Union School District, CA	115.6 W	32.8 N	-40	11/10/05	Geodetic GPS, 15 sec
P058	Transform GPS	Humbolt State U., CA	124.1 W	40.9 N	21	11/10/05	Geodetic GPS, 15 sec
TA-H03A	Transportable Array	Albany, OR	123.3 W	44.7 N	214	11/10/05	Seismic Broadband, 40 sps
P187	Transform GPS	Three Chop Road, CA	123.6 W	39.4 N	164	11/11/05	Geodetic GPS, 15 sec
P228	Transform GPS	EBRP Del Valle, CA	121.7 W	37.6 N	399	11/12/05	Geodetic GPS, 15 sec
P252	Transform GPS	Gustine, CA	121.1 W	37.2 N	40	11/12/05	Geodetic GPS, 15 sec
P566	Transform GPS	Vaisalia Maintenance Yard, CA	119.2 W	36.3 N	78	11/16/05	Geodetic GPS, 15 sec
TA-H02A	Transportable Array	Toledo, OR	124.0 W	44.7 N	209	11/16/05	Seismic Broadband, 40 sps
P565	Transform GPS	Delano Airport, CA	119.2 W	35.7 N	63	11/17/05	Geodetic GPS, 15 sec
P244	Transform GPS	Casa de Fruita 2, CA	121.4 W	37.0 N	58	11/17/05	Geodetic GPS, 15 sec
P056	Transform GPS	Porterville Airport, CA	119.1 W	36.0 N	101	11/17/05	Geodetic GPS, 15 sec
P199	Transform GPS	Rodgers Creek, CA	122.5 W	38.3 N	55	11/18/05	Geodetic GPS, 15 sec
P276	Transform GPS	Folsom Fifty, CA	121.1 W	38.6 N	207	11/18/05	Geodetic GPS, 15 sec
P145	Extension GPS	Fern Point, NV	119.6 W	41.4 N	1755	11/18/05	Geodetic GPS, 15 sec
TA-I03A	Transportable Array	Eugene, OR	123.3 W	44.0 N	205	11/19/05	Seismic Broadband, 40 sps
TA-F05A	Transportable Array	White Salmon, WA	121.5 W	45.9 N	454	11/20/05	Seismic Broadband, 40 sps
P118	Extension GPS	West Hills, UT	111.3 W	40.6 N	2082	11/21/05	Geodetic GPS, 15 sec
US-EGMT	ANSS Backbone	Eagleton, MT	109.8 W	48.0 N	1055	11/21/05	Seismic Broadband, 40 sps
P257	Transform GPS	East Tracy, CA	121.5 W	37.8 N	-24	11/22/05	Geodetic GPS, 15 sec
P112	Extension GPS	Indianola, UT	111.5 W	39.8 N	1930	11/24/05	Geodetic GPS, 15 sec
TA-O01C	Transportable Array	Redway, CA	123.8 W	40.1 N	137	11/26/05	Seismic Broadband, 40 sps
TA-G04A	Transportable Array	Mulino, OR	122.5 W	45.2 N	272	11/27/05	Seismic Broadband, 40 sps
TA-I02A	Transportable Array	Mapleton, OR	123.8 W	44.0 N	170	11/27/05	Seismic Broadband, 40 sps
TA-D05A	Transportable Array	Enumclaw, WA	122.0 W	47.2 N	266	11/27/05	Seismic Broadband, 40 sps
TA-B05A	Transportable Array	Bryant, WA	122.1 W	48.3 N	154	12/1/05	Seismic Broadband, 40 sps
P033	Extension GPS	Worland Airport, WY	107.4 W	44.0 N	1375	12/4/05	Geodetic GPS, 15 sec
TA-A05A	Transportable Array	Maple Falls, WA	122.1 W	49.0 N	174	12/5/05	Seismic Broadband, 40 sps
P032	Extension GPS	Rawlins, WY	107.3 W	41.7 N	2167	12/6/05	Geodetic GPS, 15 sec
TA-H05A	Transportable Array	Madrase, WA	121.2 W	44.6 N	720	12/12/05	Seismic Broadband, 40 sps
P547	Transform GPS	Utica CalTrans District 6, CA	119.9 W	35.9 N	46	12/14/05	Geodetic GPS, 15 sec
TA-G05A	Transportable Array	Wamic, OR	121.3 W	45.2 N	594	12/14/05	Seismic Broadband, 40 sps
P544	Transform GPS	Twissleman Rd, CA	119.7 W	35.7 N	34	12/15/05	Geodetic GPS, 15 sec
P581	Transform GPS	Travis Wood, CA	117.7 W	34.5 N	972	12/15/05	Geodetic GPS, 15 sec
P563	Transform GPS	Button Willow Airport, CA	119.4 W	35.4 N	57	12/16/05	Geodetic GPS, 15 sec
P063	Subduction GPS	Willowdale, OR	120.9 W	44.9 N	965	12/17/05	Geodetic GPS, 15 sec
TA-J02A	Transportable Array	Umpqua, OR	123.6 W	43.4 N	136	12/25/05	Seismic Broadband, 40 sps
TA-K01A	Transportable Array	Sixes, OR	124.5 W	42.8 N	175	12/27/05	Seismic Broadband, 40 sps
P618	Transform GPS	CSU Desert Studies Center, CA	116.1 W	35.1 N	264	12/29/05	Geodetic GPS, 15 sec
P471	Transform GPS	Quest Diagnostics, CA	117.5 W	33.6 N	174	1/10/2006	Geodetic GPS, 15 sec
P510	Transform GPS	Scheu Properties, CA	115.3 W	33.1 N	1	1/10/2006	Geodetic GPS, 15 sec
P509	Transform GPS	Pansy Lateral, CA	115.3 W	32.9 N	-29	1/10/2006	Geodetic GPS, 15 sec
AV21	Continuous GPS	AK	153.4 W	59.4 N	103	1/10/2006	Geodetic GPS, 15 sec
P497	Transform GPS	Imperial County Airport, CA	115.6 W	32.8 N	-50	1/10/2006	Geodetic GPS, 15 sec
P427	Subduction GPS	US26, OR	122.3 W	45.4 N	149	1/17/2006	Geodetic GPS, 15 sec
P003	Extension GPS	Barry M. Goldwater AFB, AZ	114.0 W	32.7 N	51	1/19/2006	Geodetic GPS, 15 sec
P395	Subduction GPS	Neotsu, OR	123.9 W	45.0 N	53	1/24/2006	Geodetic GPS, 15 sec
BLA1	Continuous GPS	Blacksburg, VA	80.4 W	37.2 N	607	1/26/2006	Geodetic GPS, 15 sec
TA-K06A	Transportable Array	Valley Falls, OR	120.3 W	42.8 N	1340	1/30/2006	Seismic Broadband, 40 sps
US-NEW	ANSS Backbone	Newport, WA	117.1 W	48.3 N	760	1/30/2006	Seismic Broadband, 40 sps
P009	Extension GPS	Kingston, UT	112.2 W	38.5 N	1762	1/30/2006	Geodetic GPS, 15 sec
P523	Transform GPS	Haworth Property, CA	120.9 W	35.3 N	41	1/31/2006	Geodetic GPS, 15 sec
TA-J06A	Transportable Array	Christmas Valley, OR	120.2 W	43.3 N	1407	2/1/2006	Seismic Broadband, 40 sps
P546	Transform GPS	San Andreas Mega Cluster, CA	120.2 W	35.9 N	635	2/2/2006	Geodetic GPS, 15 sec
TA-I06A	Transportable Array	Prineville, OR	120.2 W	43.9 N	1296	2/3/2006	Seismic Broadband, 40 sps
BK-MCCM	Transportable Array	Marshall, CA	122.9 W	38.1 N	-7	2/3/2006	Seismic Broadband, 40 sps
P516	Transform GPS	Keith Property, CA	120.4 W	35.1 N	262	2/5/2006	Geodetic GPS, 15 sec
P540	Transform GPS	San Andreas Mega Cluster, CA	120.1 W	35.8 N	394	2/6/2006	Geodetic GPS, 15 sec
B018	Borehole Seismometer	Delphi, WA	123.0 W	47.0 N	10	2/14/2006	Seismic Broadband, 20 sps
P043	Extension GPS	Newcastle, WY	104.2 W	43.9 N	1490	2/14/2006	Geodetic GPS, 15 sec
P436	Subduction GPS	Dungeness, WA	123.1 W	48.0 N	190	2/15/2006	Geodetic GPS, 15 sec
TA-M08A	Transportable Array	Winnemucca, NV	118.4 W	41.4 N	1288	2/16/2006	Seismic Broadband, 40 sps
P054	Extension GPS	Ekalaka, MT	104.4 W	45.8 N	1093	2/16/2006	Geodetic GPS, 15 sec
TA-M07A	Transportable Array	Soldier Meadows, NV	119.2 W	41.4 N	1400	2/17/2006	Seismic Broadband, 40 sps

Deployment/ Station Code	Type of Instrument	Geographic Location	Longitude	Latitude	Elevation (m)	Date of Deployment	Date Type, Sample Rate
P309	Transform GPS	Linden, CA	121.0 W	38.1 N	41	2/17/2006	Geodetic GPS, 15 sec
P227	Transform GPS	EBRP Betchert Property, CA	121.8 W	37.5 N	707	2/17/2006	Geodetic GPS, 15 sec
P055	Extension GPS	Lindsay, MT	104.7 W	47.1 N	667	2/18/2006	Geodetic GPS, 15 sec
P052	Extension GPS	Sand Spring, MT	107.0 W	47.4 N	858	2/20/2006	Geodetic GPS, 15 sec
B022	Borehole Seismometer	Seaside, OR	123.9 W	46.0 N	10	2/22/2006	Seismic Broadband, 20 sps
P288	Transform GPS	Creep S-SW, CA	120.9 W	36.1 N	397	2/22/2006	Geodetic GPS, 15 sec
P050	Extension GPS	Whitlash area, MT	111.2 W	48.8 N	1266	2/22/2006	Geodetic GPS, 15 sec
TA-N07A	Transportable Array (removed)	Gerlach, NV	119.0 W	40.8 N	1305	2/24/2006	Seismic Broadband, 40 sps
SG27	Continuous GPS	AK	156.6 W	71.3 N	9	2/24/2006	Geodetic GPS, 15 sec
P290	Transform GPS	Creep S-NC, CA	120.7 W	36.2 N	987	2/24/2006	Geodetic GPS, 15 sec
P449	Subduction GPS	Rattlesnake Ridge, WA	119.6 W	46.3 N	208	2/25/2006	Geodetic GPS, 15 sec
P407	Subduction GPS	Elsie, OR	123.9 W	46.0 N	-13	3/1/2006	Geodetic GPS, 15 sec
P123	Extension GPS	Northern Wasatch, NM	105.9 W	36.6 N	2411	3/1/2006	Geodetic GPS, 15 sec
TA-O07A	Transportable Array	Toulon, NV	118.9 W	40.2 N	1203	3/2/2006	Seismic Broadband, 40 sps
P107	Extension GPS	Rio Grande Relocate, NM	107.9 W	35.1 N	1991	3/2/2006	Geodetic GPS, 15 sec
P012	Extension GPS	Needles Overlook, UT	109.3 W	38.1 N	1788	3/3/2006	Geodetic GPS, 15 sec
P031	Extension GPS	Meeker Airport, CO	107.9 W	39.5 N	1657	3/4/2006	Geodetic GPS, 15 sec
P444	Subduction GPS	Ross Lake, WA	121.1 W	48.7 N	493	3/9/2006	Geodetic GPS, 15 sec
TA-W14A	Transportable Array	Seligman, AZ	113.1 W	35.2 N	1756	3/10/2006	Seismic Broadband, 40 sps
TA-W15A	Transportable Array	Williams, AZ	112.3 W	35.2 N	2034	3/12/2006	Seismic Broadband, 40 sps
TA-X14A	Transportable Array	Yava, AZ	112.9 W	34.5 N	1077	3/13/2006	Seismic Broadband, 40 sps
TA-X13A	Transportable Array	Yucca, AZ	113.8 W	34.6 N	889	3/15/2006	Seismic Broadband, 40 sps
TA-Y13A	Transportable Array	Salome, AZ	113.8 W	33.8 N	356	3/16/2006	Seismic Broadband, 40 sps
P208	Transform GPS	Salt Canyon, CA	122.3 W	39.1 N	74	3/16/2006	Geodetic GPS, 15 sec
P467	Extension GPS	Alabama Hills, CA	118.1 W	36.6 N	1380	3/17/2006	Geodetic GPS, 15 sec
TA-Z14A	Transportable Array	Wintersburg, AZ	112.9 W	33.4 N	297	3/17/2006	Seismic Broadband, 40 sps
TA-O06A	Transportable Array	Flanigan, NV	119.8 W	40.2 N	1228	3/18/2006	Seismic Broadband, 40 sps
TA-P07A	Transportable Array	Fallon, NV	118.9 W	39.5 N	1218	3/19/2006	Seismic Broadband, 40 sps
TA-R08A	Transportable Array	Mina, NV	118.1 W	38.3 N	1419	3/19/2006	Seismic Broadband, 40 sps
TA-O08A	Transportable Array	Lovelock, NV	118.2 W	40.3 N	2137	3/20/2006	Seismic Broadband, 40 sps
TA-116A	Transportable Array	Eloy, AZ	111.7 W	32.6 N	477	3/20/2006	Seismic Broadband, 40 sps
TA-Q07A	Transportable Array	Schurz, NV	118.8 W	38.9 N	1275	3/21/2006	Seismic Broadband, 40 sps
P442	Subduction GPS	Darrington Airport, WA	121.6 W	48.3 N	147	3/22/2006	Geodetic GPS, 15 sec
P505	Transform GPS	San Andreas Mega Cluster, CA	115.7 W	33.4 N	-57	3/22/2006	Geodetic GPS, 15 sec
TA-N08A	Transportable Array	Mill City, NV	118.1 W	40.8 N	1492	3/22/2006	Seismic Broadband, 40 sps
TA-X15A	Transportable Array	Humboldt, AZ	112.2 W	34.5 N	1331	3/22/2006	Seismic Broadband, 40 sps
TA-Q08A	Transportable Array	Gabbs, NV	117.9 W	38.9 N	1411	3/23/2006	Seismic Broadband, 40 sps
TA-115A	Transportable Array	Stanfield, AZ	112.2 W	32.7 N	606	3/23/2006	Seismic Broadband, 40 sps
P440	Subduction GPS	WWU Soccer Fields, WA	122.5 W	48.9 N	6	3/24/2006	Geodetic GPS, 15 sec
TA-C05A	Transportable Array	Tolt Reservoir, WA	121.7 W	47.7 N	541	3/24/2006	Seismic Broadband, 40 sps
TA-P08A	Transportable Array	Dixie Valley, NV	118.1 W	39.7 N	1040	3/24/2006	Seismic Broadband, 40 sps
TA-Y14A	Transportable Array	Wickenburg, AZ	113.0 W	33.9 N	730	3/24/2006	Seismic Broadband, 40 sps
TA-L02A	Transportable Array	Cave Junction, OR	123.6 W	42.2 N	484	3/25/2006	Seismic Broadband, 40 sps
TA-W12A	Transportable Array	Cal Nev Ari, NV	114.9 W	35.3 N	774	3/25/2006	Seismic Broadband, 40 sps
TA-W13A	Transportable Array	Kingman, AZ	113.9 W	35.1 N	1988	3/28/2006	Seismic Broadband, 40 sps
P607	Transform GPS	J-Tree Cottonwood Spring, CA	115.8 W	33.7 N	958	3/29/2006	Geodetic GPS, 15 sec
TA-J03A	Transportable Array	Ideyld Park, OR	123.0 W	43.7 N	292	3/29/2006	Seismic Broadband, 40 sps
P601	Transform GPS	J-Tree Geo Tour, CA	116.1 W	34.0 N	1243	3/30/2006	Geodetic GPS, 15 sec

Campaign Instruments

Flexible deployments during this year:

- PASO-TRES: S. Roecker and C. Thurber are producing high-resolution images of the SAFOD drill site area with 15 short-period seismometers from October 1, 2004 to July 31, 2006.
- Campaign System Evaluation: M. Bevis is evaluating the GB-1000 system using 1 TopCon GB-1000 instrument from January 17, 2005 to Mach 30, 2006.
- PBO Mt. St. Helens: M. Jackson and M. Lisowski are measuring volcanic deformation using 2 TopCon GB-1000 instruments from January 17, 2005 to March 30, 2006.
- PBO Campaign System Evaluation: S. McClusky is evaluating the GB-1000 system using 1 TopCon GP-1000 instrument from January 27, 2005 to May 30, 2005.
- SNEP: T. Owens, G. Zandt, and C. Jones are imaging along the length of the Sierra Nevadas using 40 broadband seismic stations from April 15, 2005 to September 30, 2008.
- PBO Northern California Reconnaissance 2005: M. Jackson is verifying data quality during PBO reconnaissance using 3 TopCon GB-1000 instruments from April 15, 2005 to September 30, 2008.
- PBO Rocky Mountain Region Reconnaissance 2005: M. Jackson is verifying data quality during PBO reconnaissance using 2 TopCon GB-1000 instruments from April 15, 2005 to September 30, 2008.

- Sierra Nevada EarthScope Project: T. Owens, G. Zandt, and C. Jones are imaging along the length of the Sierra Nevadas using 50 boradband seismic stations from April 15, 2005 to September 30, 2008.
- PBO RMR Recon 2005: M. Jackson is verifying data quality during PBO reconnaissance using 1 TopCon GB-1000 instrument from April 30, 2005 to September 30, 2005.
- Oregon Coast 2005: D. Schmidt is measuring subduction related deformation with 8 TopCon GB-1000 instruments from June 22, 2005 to July 11, 2005.
- Tremor 2005: K. Creager and D. Johnson are measuring episodic tremor-and-slip-related deformation in the Cascadia region using 30 TopCon GB-1000 instruments from July 27, 2005 to October 31, 2005. K. Creager is also recording slow earthquakes in the Cascadia region using 5 broadband and 6 short-period seismometers from August 1, 2005 to November 30, 2005.
- Coachella Valley 2005: G. Bawden and M. Sneed are measuring hydrological subsidence using 7 TopCon GB-1000 from August 10, 2005 to August 31, 2005.
- Campaign System Evaluation: C. Valldares is studying the low latitude ionosphere and atmosphere using 1 TopCon GB-1000 instrument from January 20, 2006 to February 28, 2006.
- New Mexico Tech GPS/RTK Training: P. Kyle is studying various field GPS applications using 4 TopCon GB-1000 instruments from February 28, 2006 to March 2, 2006.

Campaign (Flexible) Stations

Station Type	Number of Stations			
	Total	Available	In Use	Awaiting Repair
GPS	100	86	8	6
Broadband Seismometers	79	25	48	6
Short-period Seismometers	120	101	15	4
Active Source Seismometers	805	805	0	0

Station Performance

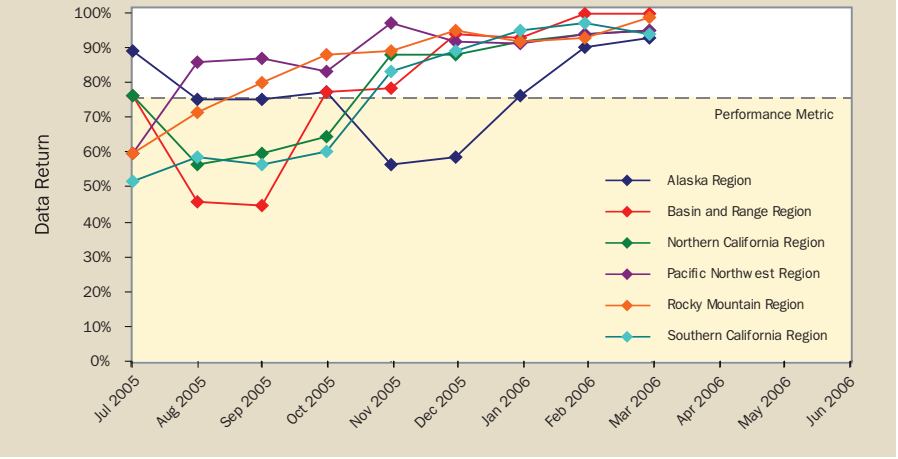
For Geodetic stations, data availability/performance metrics are calculated using data delivered to the archives in stations days versus total possible station days. A station day is the data recorded by a continuous operating PBO station in one 24-hour period. The term station day aids in understanding availability by adding a temporal aspect to the data ratio.

The PBO performance metric of 75% data return during the MREFC Phase of EarthScope is based on experience from the UNAVCO Facility as well as the first 16 months of PBO network operations. PBO believes that this 75% level is sustainable through the MREFC Phase of EarthScope given staffing levels and schedule commitments for station installation. PBO management feels that this data return threshold will not have significant impacts on PBO science goals.

Station Performance Report

Network	Number of Stations	Maximum Station Days	Actual Station Days	Data Return	Performance Metrics	Pass?
GPS Total	314	8,927	8,517	95%	75%	Yes
Alaska	36	834	775	93%	75%	Yes
Basin and Range	22	681	681	100%	75%	Yes
Northern California	84	2,372	2,259	95%	75%	Yes
Pacific Northwest	52	1,507	1,430	95%	75%	Yes
Rocky Mountains	35	1,082	1,069	99%	75%	Yes
Southern California	85	2,451	2,303	94%	75%	Yes
Borehole Strainmeters	12	372	367	99%	N/A	N/A
Long-baseline Laser Strainmeters	1	31	31	100%	N/A	N/A

Station Performance – GPS



For the Transportable Array stations and ANSS Backbone stations, the data availability/ performance metric is calculated by taking the amount of broadband seismic data that was received for each sub-network and dividing it by the total amount of data that should have been received in the reporting period. The calculation is done on a station by station basis, but only the average of all station uptimes is reported for each sub-network.

The 85% performance metric was selected because the research community believes the scientific objectives of USArray can be met if 85% or greater percent of possible data is available. We believe in general that USArray stations will operate above the level of 85%.

The only portion of USArray that used EarthScope Operation and Maintenance funds to maintain operating stations are the Transportable Array New Stations. The ANSS Backbone stations are operated by the US Geological Survey and/or Air Force Technical Application Center and do not receive any operation and maintenance funding. We provide these numbers for informational purposes only.

In March, two stations from the West Great Basin/East Sierra Nevada Network were added as shared stations to the Transportable Array.

Station Performance Report – March 2006

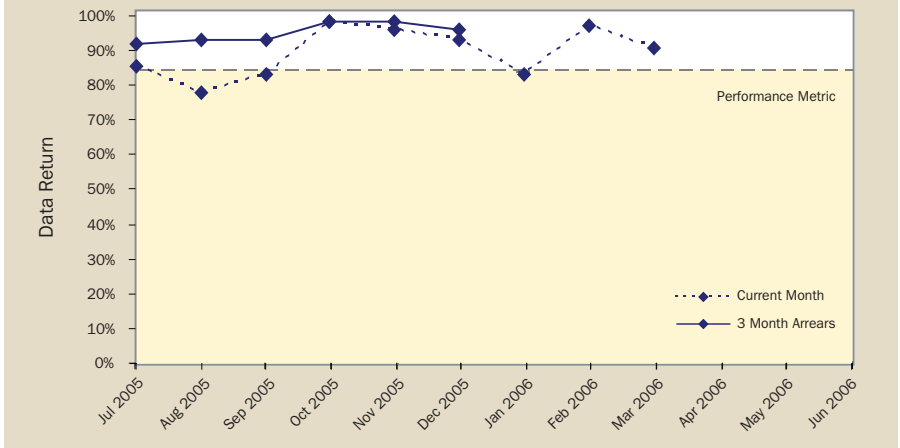
Network		Number of Stations	Data Return	Performance Metrics	Pass?
USArray Total		180	91%	85%	Yes
Transportable Array:	New Stations	95	91%	85%	Yes
	Shared - Berkeley Digital Seismographic Network	19	98%	85%	Yes
	Shared - CalTech Regional Seismic Network	41	95%	85%	Yes
	Shared - ANZA Regional Network	2	100%	85%	Yes
	Shared - West Great Basin/East Sierra Nevada	2	75%	85%	No
ANSS Backbone:	United States National Seismic Network	17	87%	85%	Yes
	International Miscellaneous Stations	4	72%	85%	No

For USArray stations, performance reports are also available for data return rates three months in arrear to account for stations that were not yet telemetered and for stations that were not telemetering during the reporting month due to technical problems.

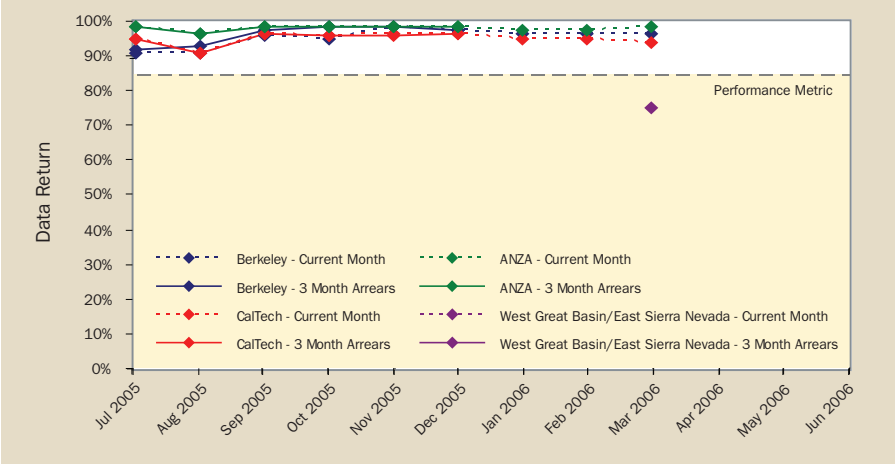
Station Performance Report – Three Months Arrears – December 2005

Network		Number of Stations	Data Return	Performance Metrics	Pass?
USArray Total		145	97%	85%	Yes
Transportable Array:	New Stations	65	96%	85%	Yes
	Shared - Berkeley Digital Seismographic Network	18	99%	85%	Yes
	Shared - CalTech Regional Seismic Network	41	98%	85%	Yes
	Shared - ANZA Regional Network	2	100%	85%	Yes
	Shared - West Great Basin/East Sierra Nevada	0	0%	85%	N/A
ANSS Backbone:	United States National Seismic Network	15	97%	85%	Yes
	International Miscellaneous Stations	4	94%	85%	Yes

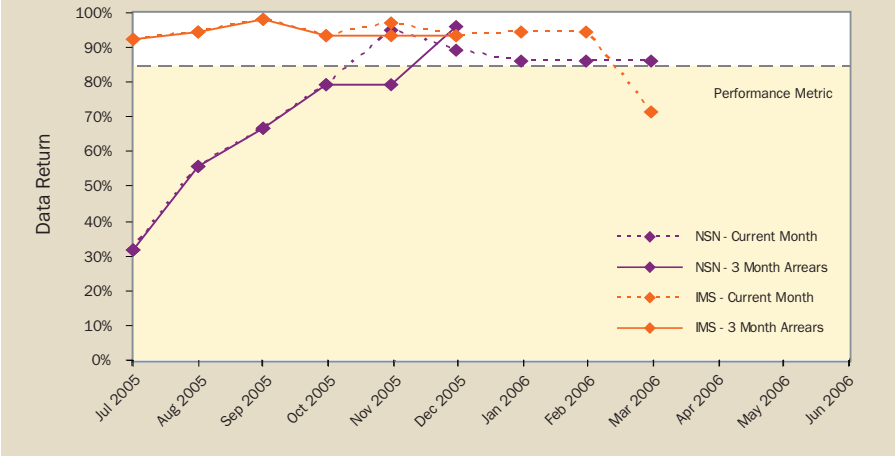
Station Performance – Transportable Array New Stations



Station Performance – Transportable Array Shared Stations



Station Performance – ANSS Backbone Stations



West Great Basin/East Sierra Nevada stations and International Miscellaneous stations provided less than 85% data availability. The West Great Basin/East Sierra Nevada station is maintained by the University of Nevada Reno and the International Miscellaneous station is maintained by the Air Force Technical Applications Center. They are not required to meet EarthScope data availability standards. The explanations below are provided as a courtesy.

Performance Variance Report

Network	Station	Data Return	Reason	Corrective Action
TRANSPORTABLE ARRAY SHARED STATION West Great Basin/East Sierra Nevada	BEK	51%	The station is experiencing an intermittent telemetry link.	The radio has been replaced, resolving the problem.
ANSS BACKBONE International Miscellaneous Stations	TXAR	0%	The station is down for an equipment upgrade.	The equipment upgrade will be completed in mid-April.

WORK PLAN FOR UPCOMING YEAR

April 1, 2006 - March 31, 2007

Reflects the April 1, 2006 NSF-approved baseline and NSF directive received on May 17, 2006.

Year 3 Milestones

Quarter 3 (4/1/06–6/30/06)

1.1	USArray reviewed by EFEC
1.1	Annual Report (April 1, 2005 - March 31, 2006) submitted by June 1, 2006
1.1	Year 3 (FY2005/06) Quarter 2 Report submitted by June 1, 2006
1.1	February 2006 Monthly Report submitted
1.1	March 2006 Monthly Report submitted
1.1	April 2006 Monthly Report submitted
1.3	438 equivalent permanent GPS stations completed
1.3	46 equivalent borehole strainmeters completed
1.3	2.4 equivalent long-baseline laser strainmeters completed
1.4	35 equivalent ANSS Backbone stations completed
1.4	241 equivalent Transportable Array stations completed
1.4	1,390 Flexible Array equipment available

Quarter 4 (7/1/06–9/31/06)

1.1	SAFOD reviewed by EFEC
1.1	Year 3 (FY2005/06) Quarter 3 Report submitted by September 1, 2006
1.1	May 2006 Monthly Report submitted
1.1	June 2006 Monthly Report submitted
1.1	July 2006 Monthly Report submitted
1.1	Semi-annual review of EarthScope website completed
1.2	Prototype Stage 3 monitoring system deployed
1.3	530 equivalent borehole strainmeters completed
1.3	54 equivalent borehole strainmeters completed
1.3	3.1 equivalent long-baseline laser strainmeters completed
1.4	39 ANSS Backbone complete
1.4	Instruments & data acquisition systems for 300 Transportable Array stations acquired
1.4	281 equivalent Transportable Array stations completed
1.4	1,440 Flexible Array equipment available

Year 4 Milestones

Quarter 1 (10/1/06 –12/31/06)

1.1	EarthScope Management reviewed by EFEC
1.1	Year 3 GPRA actuals submitted
1.1	Year 4 GPRA estimates submitted
1.1	Year 3 (FY2005/06) Quarter 4 Report submitted by December 1, 2006
1.1	August 2006 Monthly Report submitted
1.1	September 2006 Monthly Report submitted
1.1	October 2006 Monthly Report submitted
1.3	581 equivalent permanent GPS stations completed
1.3	60 equivalent borehole strainmeters completed
1.3	3.5 equivalent long-baseline laser strainmeters completed
1.4	328 equivalent Tranpsportable Array stations completed
1.4	1,440 Flexible Array equipment available
1.4	7 backbone magnetotelluric systems delivered
1.4	13 transportable magnetotellluric systems delivered

Quarter 2 (1/1/07 –3/31/07)

1.2	Subcontract for Phase 3 drilling and related activities established
1.3	617 equivalent permanent GPS stations completed
1.3	65 equivalent borehole strainmeters completed
1.3	3.6 equivalent long-baseline laser strainmeters completed
1.4	375 equivalent Transportable Array stations completed
1.4	1,670 Flexible Array equipment available
1.4	20 transportable magnetotelluric systems delivered
1.4	7 backbone magnetotelluric systems completed

EarthScope is a national science initiative to explore the structure and evolution of the North American continent and to understand the physical processes controlling earthquakes and volcanoes. EarthScope is taking a comprehensive approach to investigating scientific questions at all scales — from the active nucleation zone of earthquakes, to individual faults and volcanoes, to the deformation along the plate boundary, and to the structure of the continent and plate tectonic motion.

EarthScope is funded by the National Science Foundation and conducted in partnership with the US Geological Survey. EarthScope is being constructed, operated, and maintained as a collaborative effort with UNAVCO Inc., the Incorporated Research Institutions for Seismology, and Stanford University, with contributions from NASA and several other national and international organizations. This material is based upon work supported by the National Science Foundation under Grants No. EAR-0323310, EAR-0323309, EAR-0323700, EAR-0323938, EAR-0323311, and EAR-0323704. Any opinions, finding, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.