Presentation Outline

UNAVCO
- Networks, Support, Resources

PBO Status Overview
- Network Performance and Data Return
- Real Time

Other PBO Projects
- Cascadia Expansion
- Recent Upgrades in SW Region
- Edison/Geopentech
- Multi-Monument
Polar Services

- Arctic - Support for 24 PI projects in Alaska, Greenland, Shetland Islands during the 2012 season
- Antarctic - Support for 28 PI projects during the 2012/2013 season; first continuous GPS site on South Georgia Island
- Campaign and permanent station GPS, Lidar
- Determine vertical and horizontal velocity fields to investigate ice mass changes, ice dynamics, sea level change
COCONet

Continuously Operating Caribbean GPS Observational Network

- Planned: 47 new, 21 refurbished stations
- Current status:
  34 completed (red dots)
  34 to be completed (yellow dots)
- This spring, new stations installed in Panama (3), the British Virgin Islands, and the Lesser Antilles
- Permit obtained for the Camaguey, Cuba station. Working with US Department of Treasury on export requirements for materials
Terrestrial Laser Scanning (TLS)

- Unavco maintains pool of instruments, provides engineering support, processing
- Steady increase of demand for a large variety of applications

Mapping sedimentation change in the Toutle River, Mount St. Helens, WA

Examining geology and glacial sediments in bluff beneath a 12th century castle, Tirol, Italy

Characterizing forest structure for snow prediction, INSTAAR Mountain Research Station, CO
PBO Status Overview

PBO is the geodetic component of EarthScope

- 1107 Continuous GPS
- 78 Borehole Strainmeters and Seismometers
- 6 Laser Strainmeters
- 26 Shallow Borehole Tiltmeters
## PBO Network Uptime

<table>
<thead>
<tr>
<th></th>
<th>GPS</th>
<th>BSM</th>
<th>Seismic</th>
<th>Tilt</th>
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</thead>
<tbody>
<tr>
<td>March 2013</td>
<td>95.3%</td>
<td>94.5%</td>
<td>95.2%</td>
<td></td>
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<tr>
<td>FY2013 Q2 (Jan-March 2013)</td>
<td>95.9%</td>
<td>93.3%</td>
<td>93.5%</td>
<td>74.6%</td>
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<tr>
<td>O&amp;M Project (since 2009)</td>
<td>94.1%</td>
<td>93.3%</td>
<td>89.9%</td>
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Cumulative data return since the beginning of the O&M project:

- 99% for GPS/Met
- 97% for seismic
- 98% for BSM
- 99% for LSM
- 91% pore pressure
- 79% for tilt

David Phillips, Kathleen Hodgkinson, Christine Puskas, Dave Mencin, Karl Feaux
411 (348) PBO stations are operating in real-time at 1 Hz
- Completeness: 88%
- Average latency: 500ms
- Unique “Active Users”: 98
- 14.4Tb RT data delivered since 2009-01; 1.9 Tb in last quarter (2013-02)
Real-Time GPS Data Users

Number of new users: Percentage of commercial users relative to academic and agency users has increased consistently over the past 4 years.
Real-Time GPS Data Users

Volume of data downloaded: Percentage of commercial users relative to academic and agency users has decreased consistently over the past 3 years.
Other PBO Projects

- Cascadia Expansion
- East Region
- Recent Upgrades in SW Region
- Multi-Monument
- Edison/Geopentech
Cascadia Expansion

- Original Cascadia RT upgrades: 230 sites – blue

- Cascadia RT expansion: 50 sites – red (44 completed)

- Other RT sites: ~130 – yellow

- 22 additional meteorological instruments (20 completed)

- 3 sites with BGAN comms failover systems (P365, P405, NEAH); will be installed June 2013
East Region Installs

- Replaced 3 underperforming sites in Texas, Georgia, New York (green)
- Added 2 new sites in North Dakota and Wisconsin to fill in gaps in the network. Will add 1 more site in Pennsylvania this summer.
Improvement of Data Communications, Power Systems (ongoing effort)

- Upgrade to High-Speed Cellular (3G & 4G)
- Upgrade slower radios (replace 900MHz with 5GHz)
- Additional solar panels/batteries

Data Communications in the South West region:

- Cell modems: 291
- Radios: 100
- VSAT: 32
- DSL/T1/other: 25
- Manual downloads: 1
Salton Trough Radio Network Upgrades

Brawley earthquake swarm August 2012

Salton Trough Radio network (19 stations)
Salton Trough Radio Network Upgrades

Phase 1: 4 sites upgraded
Phase 2: 8 additional sites upgraded
Vandalism
Multi-Monument Project

• Install 2 additional GPS monuments at 5 existing PBO sites

• Compare long-term monument stability of various types of monumentation

• 3 of 5 sites installed (The Rock, GA; Delano, CA; California City, CA)

• Permitting in progress at proposed sites in Forks, WA, and Wilbur, WA

P591, P811, P812 - California City, CA

P565, P809, P810 - Delano, CA
Goals:
• 12-13 new stations
• Augment existing network (PBO, SCIGN-SIO, green)
• SONGS Seismic Source Characterization

Progress:
• 8 Stations built (yellow)
• 4 Permits in process (LUSD and 3 Pendleton - blue)
• 1 Siting in progress (ALSO - red)
What’s ahead?

GAGE – Geodesy Advancing Geosciences and EarthScope

- Integration of Unavco’s core funding streams and activities into a single Facility (Geodetic Infrastructure, Geodetic Data Services, Education & Community Engagement)

- Continued upgrade of PBO stations with advanced GNSS and Real-Time capabilities

- 750+ Real-Time stations
The End
More than 1,028 unique institutions downloaded data from PBO in Y4Q3.
Real Time Integrated Atmospheric Water Vapor and TEC from GPS