COCONet and TLALOCNet: Multi-hazard GPS/Met observatories, enhancing geodetic infrastructure and the scientific community in Mexico and the Caribbean

Ninth Session of the Intergovernmental
Oceanographic Commission (IOC)
Intergovernmental Coordination Group for the
Tsunami and other Coastal Hazards Warning
System for the Caribbean and Adjacent Regions

May 13, 2014

Karl Feaux
UNAVCO
• UNAVCO and The Plate Boundary Observatory
• COCONet and TLALOCNet Status
• COCONet Tide Gauge Network
• Upcoming Installations
• Outreach Highlights
UNAVCO, a non-profit membership-governed consortium, funded by the National Science Foundation, facilitates geoscience research and education using geodesy.

Currently there are 194 UNAVCO Members (106 Full Members, 88 Associate Members)

UNAVCO Support
- Engineering Services
  - Small and Large network Installation (permitting, reconnaissance, and construction)
  - Operations and Maintenance
  - Development and Testing
- Equipment Pool
- Data Management and Archiving
- CyberInfrastructure
- Education and Outreach

Technologies - A Growing Geodetic “Toolbox”
- GNSS (GPS, GLONASS, Galileo) with ancillary meteorological instruments
- Borehole Strainmeters and Seismometers
- Accelerometers
- Borehole Tiltmeters
- Geodetic Imaging
  - Terrestrial Laser Scanners
  - Airborne Laser Swath Mapping project support
  - InSAR Data Archives (WInSAR/EarthScope)
Focused, dense deployments of GPS and strainmeters
- 1100 continuous Global Positioning Systems around tectonic clusters
- 78 borehole strainmeters
- 5 long baseline strainmeters
- 26 tiltmeters
- 100 meteorological instruments

Portable GPS receivers
- Pool of 100 portable GPS receivers for temporary deployments to areas not sufficiently covered by continuous GPS

Geo-EarthScope
- InSAR imagery covering the western US
- LIDAR imagery covering the northern and southern San Andreas Fault, Yellowstone Caldera, and faults in Cascadia and Alaska

Network Costs
- $100M - Construction Phase (2003-2008)
- $53M - Operations and Maintenance Phase 1 (2009-2013)
WHAT IS COCONET?

COCONet: Continuously Operating Caribbean GPS Observational Network

• 5-year, $5.9M network construction project

• A partnership and community for improving our ability to prepare for and predict natural hazards in the Caribbean

• Integrated network, GPS co-located with meteorological instruments, plus two tide gauge stations

• Siting plan: 80 (new and refurbished) plus 60+ existing

• Data archiving and processing

• All raw data and data products must be shared, open, and available free-of-charge to users

• Science Objectives: Network will support atmospheric, earth science, and sea level monitoring
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PROJECT SCHEDULE

COCONet 5-Year Project Schedule

- FY2011: Reconnaissance (16), Permits (8), Installations (6)
- FY2012: Reconnaissance (30), Permits (24), Installations (24)
- FY2013: Reconnaissance (29), Permits (29), Installations (20)
- FY2014: Reconnaissance (0), Permits (14), Installations (25)
- FY2015: Reconnaissance (0), Permits (0), Installations (0)

Operations/Maintenance Only

Bars represent:
- Blue: Reconnaissance
- Green: Permits
- Orange: Installations
STANDARD COCONET STATION

GPS Antenna

GPS Monument

Meteorological Instrument

Enclosure

Solar Array
New Stations Planned: 60 (including 8 instruments co-located at 4 tide gauge stations)

Refurbished Planned: 20

New or Refurbished Stations Completed: 52

Stations To Be Completed: 28

Network Construction 65% complete: over halfway there!
Cuba (scheduled for late May, 2014)
Cayman Islands (x3)
Venezuela (x5)
Dominica
Antigua
Sombrero Island, Anguilla
2 new tide gauge stations (TBD)
GPS (x2) at 2 existing tide gauge stations (TBD)
PROPOSED TIDE GAUGE LOCATIONS

Puerto Morelos, Mexico
Port Royal, Jamaica
Barahona, Dominican Republic
San Andreas
Bocas Del Toro, Panama
GPS CONSTRAINED TIDE GAUGE SITE LAYOUT

cGPS to be installed on the pier and within 5 km of the pier, will add GPS to 2 existing tide gauge stations.
TIDE GAUGE COMPONENTS AND DATA FLOW

SUTRON Radar Level Recorder

SUTRON XLite Data Logger

GOES telemetry via Sutron Satlink 2

SUTRON Submersible Pressure sensor

Trimble Chokering GNSS antenna

Trimble NETR9

cellular modem/LAN

Vaisala WTX 520 Met Sensor

www.ioc-sealevelmonitoring.org

coconet.unavco.org
• 5 graduate research fellowships awarded in 2013, ranging from $10,000 - $25,000

• 2 additional graduate research fellowships starting in August or September of 2014.

• The COCONet Graduate Fellowships provide individual awards between $5,000 and $10,000 per year for a maximum of 2 years to support solid Earth or atmospheric science graduate research projects conducted at a U.S. institution of higher education.

• Requirement for consideration: Research projects must be within the COCONet footprint or directly use data from the COCONet GPS stations and/or meteorological sensors.
Science and impact goals: Development of a continuous GPS-MET array in Mexico for atmospheric, climatic, and seismotectonic research in the Americas:

- North America Monsoon studies
- Weather and climate
- Regional framework for studies of specific faults and volcanoes
- Earthquake cycle deformation including episodic tremor and slip
- Earthquake hazards - subduction zone
TLALOCNET - Development of a continuous GPS-Met array in Mexico for atmospheric, climatic, and seismotectonic research in the Americas:

• A continuous GPS-Met array in Mexico
• Four-year MRI (Major Research Instrumentation) proposal funded for $1.50M with Sept. 1, 2013 start date
• 30% cost-share from UNAM (13 sites) a total project cost of $2.14M
• Revised plan calls for 6 new and 18 upgraded sites ($1.50M)
• Kickoff telecon on Oct. 11, 2013; first reconnaissance in Sonora in February, 2014; first installations scheduled for late May in Hermosillo
Thank You For Your Attention!