GPS System Measures Earthquake Potential

Full Mitigation Best Practice Story

Multiple Counties, California

Southern California - The Chinese philosopher Chang Heng invented the first seismoscope in A.D. 132. The instrument was a large urn, on the outside of which were eight dragonheads facing the eight principal directions of the compass. Below each dragonhead was a toad with its mouth opened toward the dragon. When an earthquake struck, one or more of the eight dragon mouths would release a ball into the open mouth of the toad sitting below. The direction of the shaking determined which of the dragons released its ball. The instrument was reported to have detected an earthquake up to 400 miles away.

Almost 2,000 years later, on July 6, 2001, earthquake scientists unveiled the Southern California Integrated GPS Network (SCIGN), a new type of ground motion monitoring network. Unlike other instrument networks that record shaking, SCIGN tracks the slow motion of the Earth's plates using a Global Positioning System (GPS). With SCIGN, the link between the motions of the plates that make up the Earth's crust and the resulting earthquakes is now being observed by an array of GPS stations operating in southern California and Baja California, one of the world's most seismically active and highly populated areas. On July 2, 2001, the 250th SCIGN station was installed. Using SCIGN data to measure deformation of the Earth's crust, which can occur as movement on a fault or as slow distortion of the ground, scientists can determine how strain builds up slowly over time before being released suddenly during an earthquake. These new GPS measurements contribute to improving the region's earthquake hazards assessments that help motivate people to prepare for earthquakes.

Scientists of the Southern California Earthquake Center (SCEC) designed and manage SCIGN. NASA's Jet Propulsion Laboratory, the Scripps Institution of Oceanography at the University of California at San Diego, and the United States Geological Survey are the principal SCEC partners in SCIGN, and all data from the array are openly available on the Internet.

Activity/Project Location

Geographical Area:	**Multiple Counties in a State**
FEMA Region:	**Region IX**
State:	**California**
County:	**Los Angeles County; Orange County; Riverside County; San Bernardino County; San Diego County; Santa Barbara County; Ventura County**

Key Activity/Project Information

Sector:	**Public**
Hazard Type:	**Earthquake**
Activity/Project Type:	**Warning Systems**
Activity/Project Start Date:	**07/2001**
Activity/Project End Date:	**Ongoing**
Funding Source:	**National Earthquake Hazards Reduction Program (NEHRP); National Earthquake Technical Assistance Program (NETAP)**

Key Activity/Project Information

Activity/Project Economic Analysis

Cost:	**Amount Not Available**
Non FEMA Cost:	**0**

Activity/Project Disaster Information

Mitigation Resulted From Federal Disaster?	**Unknown**
Value Tested By Disaster?	**Unknown**
Repetitive Loss Property?	**Unknown**

Reference URLs

Reference URL 1:	**http://www.fema.gov/plan/prevent/earthquake/sty_gps.shtm**
Reference URL 2:	**http://www.fema.gov/plan/prevent/bestpractices/NEHRP_BP_page.shtm**

Main Points

- On July 6, 2001, earthquake scientists unveiled the Southern California Integrated GPS Network (SCIGN)
- SCIGN tracks the slow motion of the Earth's plates using a Global Positioning System (GPS).
- With SCIGN, the link between the motions of the plates that make up the Earth's crust and the resulting earthquakes is now being observed by an array of GPS stations operating in southern California and Baja California.
- New GPS measurements contribute to improving the region's earthquake hazards assessments that help motivate people to prepare for earthquakes.