



NSF Award Abstract - #0506463

Collaborative Research: Seismic, Aseismic and Slow Transient Deformation at the Costa Rica Seismogenic Zone

NSF Org EAR

Initial Amendment Date July 26, 2005

Latest Amendment Date July 26, 2005

Award Number 0506463

Award Instrument Standard Grant

Program Manager David Fountain

EAR Division of Earth Sciences

GEO Directorate for Geosciences

Start Date August 1, 2005

Expires July 31, 2008 (Estimated)

Awarded Amount to Date \$165357

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NSF Program(s) MARINE GEOLOGY AND GEOPHYSICS

Field Application(s) 0000099 Other Applications NEC

Program Reference Code(s) OTHR,0000

Program Element Code(s) 1620

Abstract

A network of continuous GPS and six seismometers is being developed to monitor transient strain and seismic events above the subducting slab on the Nicoya Peninsula, northern Costa Rica. This will allow investigation of a number of seismogenic zone processes. One of the most exciting recent discoveries in the solid earth sciences is the occurrence of silent slip or aseismic creep events at subduction zones. The physical processes responsible for these events are not well understood; detection and study of their behavior at several locations is important. Aseismic creep episodes have been observed prior to the occurrence of large earthquakes and therefore

may have important implications for earthquake hazard. Creep episodes perturb the surrounding stress field and their occurrence at the down dip edge of the seismogenic zone could bring the megathrust closer to failure. These stress increases are small, however if the fault is close to failure aseismic creep could trigger a large earthquake. Relative to other subduction zones, Nicoya has a big advantage for this type of project: the peninsula is quite close to the trench. Instruments deployed here are essentially perched directly over the locked part of the plate boundary, enabling high-resolution study of plate boundary strain and seismic processes. The correlation between deep episodic creep and low frequency tremor, recently uncovered at the Cascadia subduction zone, could be significant in deciphering the key physical processes. The project is an international collaboration with scientists from Costa Rica, Germany, Japan and the United States.

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