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New Array Monitors Seismic Activity near the Gulf of California in Mexico

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The Gulf of California rift forms a geologically young and active plate boundary that links the San Andreas strike-slip fault system in California to the oceanic spreading system of the East Pacific Rise. Although this is a classical example of a transform-rift plate boundary, the tectonic evolution of the Gulf of California and surrounding regions is complex and poorly understood due to a lack of geological and geophysical data. In 2002, the Network of Autonomously Recording Seismographs (NARS)-Baja network was installed. It consists of 19 broadband seismic stations deployed in the Baja-California and Sonora provinces of Mexico (Figure 1). Since NARS-Baja surrounds the Gulf of California rift system, it is ideal for constraining earthquake faulting processes and the crust-mantle structure of the region. Moreover, NARS-Baja, in combination with permanent Mexican and U.S. arrays, forms a unique linear array in excess of 4000 km that should lend itself ideally to seismological studies of the North American-Pacific plate boundary on a larger scale. NARS-Baja is planned to operate for at least 5 years. To promote involvement from the entire research community, the data collected from the stations will be made available immediately following routine data quality checks.

The need for a broadband seismic network surrounding the Gulf of California is clear from catalogues of the International Seismological Centre (ISC) and the National Earthquake Information Center (NEIC), which contain an unrealistically low number of earthquakes with magnitudes smaller than 4. Owing to a nearly complete station distribution achieved with NARS-Baja around the Gulf of California, an improved detection level should allow accurate earthquake locations and well-constrained focal mechanisms of moderate ($M > 3$–4) earthquakes to be determined. This will enable us to delineate active faults more accurately and improve our understanding of strain release and tectonic deformation in the region.

In addition, NARS-Baja data will be crucial for studying the crust and upper mantle structure beneath the entire Gulf. While global and continent-scale seismological models suggest that the seismic velocity structure in the mantle beneath the Gulf of California is as anomalous as that of the East Pacific Rise, NARS-Baja data will allow us to make models of the crust and mantle with unprecedented resolution. Resulting crustal and mantle models will provide new constraints on the nature of this young plate boundary and its transition from strike-slip faulting along the San Andreas Fault system, to

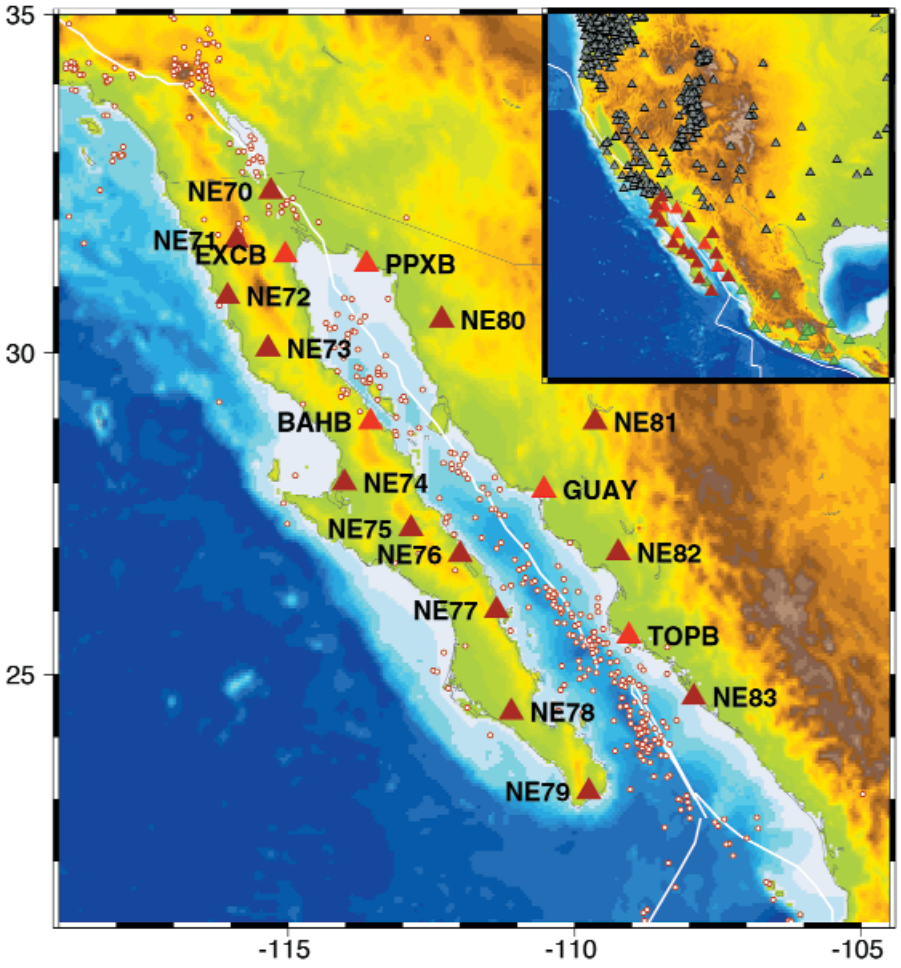

Fig. 1. This topographic map shows the station distribution of the NARS-Baja project. Dark red triangles are NARS stations. Lighter red triangles are CICESE stations. Earthquake hypocenters are indicated by red circles, and plate boundaries are plotted in white. The inset shows an enlarged area illustrating the gap filled by NARS-Baja between the U.S. stations (gray triangles) and the UNAM stations in Mexico (green triangles).

ocean spreading along the East Pacific Rise. The Moho depth can be mapped using body wave coda and short-period surface waves, while the lithospheric and asthenospheric structure can be determined using body wave travel times and waveforms and long-period, surface-wave dispersion measurements. The surface-wave data further provide important constraints on anisotropy in the uppermost mantle, and together with shear wave-splitting measurements, mantle flow can be imaged. These are several examples of well-established techniques that can readily be applied, but the NARS-Baja network, especially in conjunction with existing Mexican and Californian seismic arrays (Figure 1, inset), offers ample research opportunities for deep mantle and core studies as well. We hope that our policy of full data availability will encourage many members of our research community to participate in analy- zing the NARS-Baja data.

NARS-Baja originated from a desire to combine scientific interest—regional, as well as global—with a maximum ease of operation in terms of instrument availability, data storage, and manpower. It is a joint effort between Utrecht University (The Netherlands), Centro de Investigación Científica y de Educación Superior de Enseñada (CICESE, Mexico), and the California Institute of Technology, and it consists of 19 broadband seismic stations deployed on either side of the Gulf of California with a 100–150 km station spacing. A typical site with station equipment is shown in Figure 2. Every 3 months or so, all stations will be visited by CICESE researchers for maintenance and downloading of the data. The raw data will immediately be sent to Caltech where, after preliminary quality inspection, full seed volumes will be assembled and archived.

Both the IRIS Data Management Center in Seattle and the SCEC Data Center at Caltech will store continuous data that will be made available to the community via convenient, Web-based request tools. We welcome potential users to visit our Web site (http://www.geo.uu.nl/Research/Seismology) for updates on the progress of the data collection. Full station descriptions, installation details, and preliminary results from our own analyses can also be found on the Web site. If funds permit, telephone connections will be installed at selected stations to allow real-time data transfer in the near future.

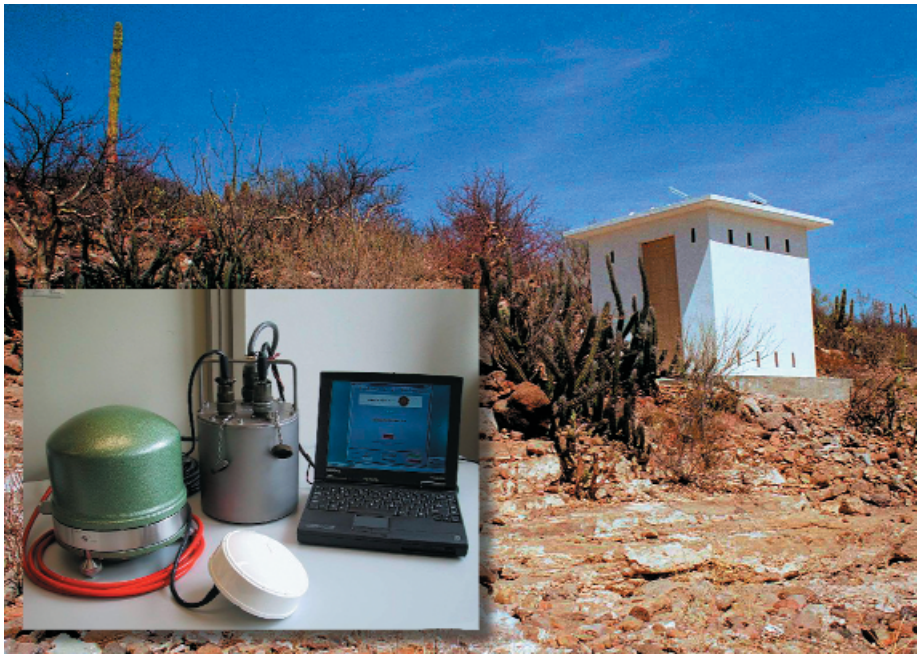

Fig. 2. The equipment of a typical NARS station (inset) consists of an STS2 sensor, the passive data logger, a GPS receiver, and a laptop that handles data acquisition and timing. Every station is housed in a similar shelter to provide protection from severe weather conditions and vandalism. Station NE75 is pictured.

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Draft Report Suggests Reclassifying Oceanography in Research Rankings

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A draft report by the National Research Council (NRC) that proposes a new accounting system for doctoral research programs would group oceanography among other geosciences, and would cease listing it individually.

The proposal is a suggestion of a committee charged with revising the methodology used to assess doctoral research programs; their report is the first stage of an effort to rearrange the fields used for ranking and evaluating Ph.D.-granting programs in U.S. graduate schools. The first decadal report was completed in 1995, and is used, for example, by ranking systems such as the well-known list published annually by *U.S. News and World Report*.

The total number of individual fields in the suggested taxonomy would grow from 41 to 57, with new fields like genomics and nanoscience added to the evaluations. Along with the shift in oceanography, the newly created environmental sciences listing will become a sub-field of ecology and environmental sciences.

Oceanography, however, is the only field to potentially switch from having—in the previous report—its own category, to becoming part of another. This reflects the committee's recognition that geosciences is increasingly an interdisciplinary field, but it also reflects the fact that the number of doctoral degrees granted specifically in oceanography was 85 in 2001; down from 99 in 2000, according to a National Science Foundation report. This falls below a minimum cutoff number set by the NRC committee, said Charlotte Kuh, study director, and deputy executive director for the Policy and Global Affairs Division at the National Academy of Sciences. Kuh described oceanography as a larger part of world system sciences, and envisions the integrated geosciences field as a source for evaluating such connected research programs.

The category switch will not affect the educational focus of either students or the schools, said John W. Farrington, vice president of academic programs and dean at Woods Hole Oceanographic Institute in Massachusetts. While he is currently evaluating the proposed change, Farrington noted that his staff would collect opinions and arguments to respond to the report's conclusions.

Farrington doesn't believe that the change would necessarily be detrimental. He said that his concern is with the committee's plans to