

Building Capacity for Earthquake Monitoring

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Linking Global Seismic Networks with Regional and National Deployments

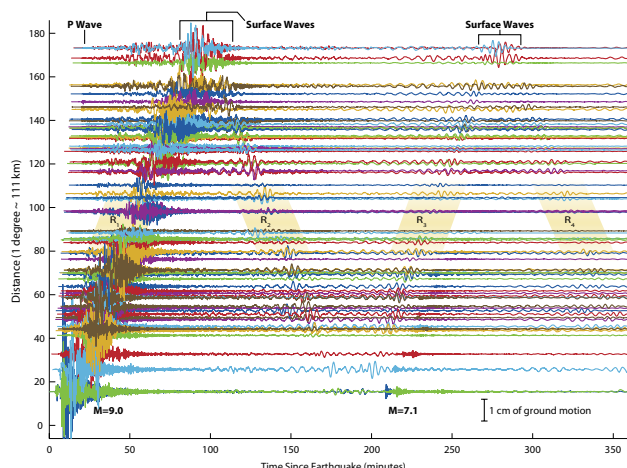
The world focuses on emergency relief in the aftermath a major natural disaster, but attention often fades quickly or is distracted by other news. We expect a "teachable moment" when support will be available for efforts to mitigate the impact of the next similar event, but the moment is likely to be most fleeting. Unless we are prepared, mitigation efforts will be hastily organized and may accomplish less than we hope. In retrospect, despite an energetic response, we could very well see a lost opportunity.

Installing or upgrading a seismic monitoring network is often among the mitigation efforts after earthquake disasters, and this is happening in response to the events both in the Sumatra during December 2005 and in Pakistan during October 2006. Seismologists know the benefits that these networks can yield: improved hazard assessment, more resilient buildings where they are most needed, and emergency relief directed more quickly to the worst hit areas after the next large earthquake. Several commercial organizations are well prepared for the brief opportunity to provide the instrumentation that comprises a seismic network, including sensors, data loggers, telemetry stations, and the computers and software required for the network center.

But seismologists also know that seismic monitoring requires more than hardware and software, no matter how advanced. We know that a well-trained staff is required to select appropriate and mutually compatible components, install and maintain telemetered stations, manage and archive data, and perform the analyses that actually yield the intended benefits. We also know that monitoring is more effective when network operators cooperate with a larger community through free and open exchange of data, sharing information about working practices, and international collaboration in research.

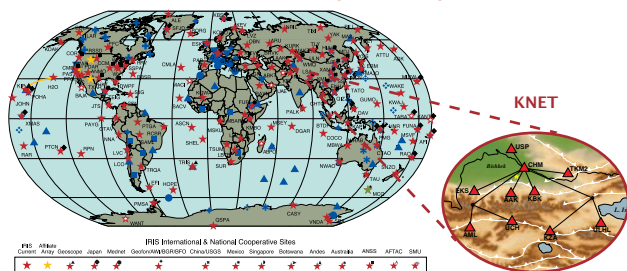
As an academic consortium, a facility operator and a founding member of the International Federation of Digital Seismographic Networks, IRIS has access to a broad range of expertise with the skills that are required to help design, install, and operate a seismic network and earthquake analysis center, and stimulate the core training for the professional teams required to establish and maintain these facilities. To deliver expertise quickly when and where it is unexpectedly in demand, however, requires advance planning and coordination in order to respond to the needs of organizations that are building a seismic network, either with tight time constraints imposed by the budget cycles of aid agencies following a disastrous earthquake, or as part of more informed national programs for hazard assessment and mitigation.

GSN Records of the Magnitude 9.3 December, 2004 Sumatra-Andaman Islands Earthquake



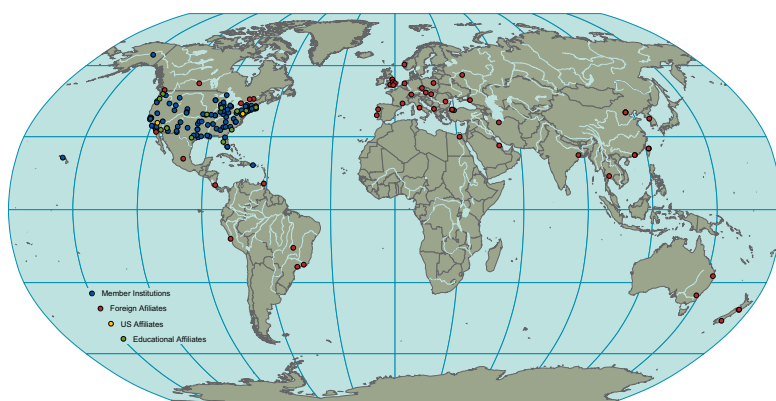
IRIS has experience necessary to offer advice on building and operating hazard monitoring systems. IRIS built the Global Seismographic Network (GSN) in collaboration with the US Geological Survey and numerous international partners and operates a Data Management System (DMS) that retrieves data from GSN stations, executes quality control procedures. These data are freely and openly distributed to scientists, mission agencies and the public worldwide. GSN stations are uniquely capable of measuring the large amplitude, long period waves from the very largest and most damaging earthquakes in the world. The DMS delivers GSN data in near-real-time to hazard monitoring agencies, including the U.S. National Earthquake Information Center and the Tsunami Warning Centers for the Pacific Ocean and for Alaska and the U.S. West Coast.

Global Seismographic Network & International Federation of Digital Seismograph Networks



IRIS has long had a role in the support of field programs for research scientists and the development of broadband regional seismic networks around the world. Working with the Kyrgyz Institute of Seismology, the Russian Institute of High Temperature Physics and the University of California, San Diego, IRIS helped to build the Kyrgyzstan Seismological Network (KNET) as an early example of a national broadband network for research and hazard assessment, and continues contributing to its support to this day.

IRIS Members



IRIS is based principally in the United States, where more than one hundred universities are members of the Consortium. But IRIS includes a growing number of foreign affiliates that already number more than fifty. Most IRIS Foreign Affiliates are universities with significant geophysical research programs, but more than one quarter of the Affiliates are government agencies responsible for natural hazard monitoring or mitigation. Thus the worldwide IRIS community brings together scientific expertise and applied skills.

Staff members from IRIS and its partners joined in post-Sumatra training courses around the Indian Ocean sponsored by US A.I.D. and the IOC and organized by the USGS. Stimulated by this experience and the need it demonstrated, an IRIS Working Group on an International Training Initiative will begin the process of preparing a syllabus and a roster of lecturers. The Working Group consists of faculty members from IRIS Member Institutions, who will work to ensure that syllabus development takes full advantage of IRIS's experience in instrumentation and data management by consulting with IRIS program managers. In addition, the working group will complement the efforts of the US A.I.D. and the US Geological Survey, by consulting with the staff from those agencies.



The six provisional members of the Working Group are:

Art Lerner-Lam Andy Nyblade Göran Ekström
Eric Sandvol Rick Aster Susan Beck

The Working Group expects to hold its first meeting during September 2006.

As part of its mission to facilitate cooperation among seismologists and foster free and open exchange of seismological data, IRIS is making "long term loans" of data loggers that are suitable for permanent geophysical observatories. IRIS's goals for the loans are to:

- Help densify global coverage of stations offering free and open access to geophysical data.
- Advance partnerships and encourage adoption of standards and policies that support free and open data exchange.
- Advance Earth sciences in regions that would benefit from the introduction of digital instrumentation.
- Foster capacity building by making loans to institutions that intend to educate students.



Examples of Qualified Projects

Create a Regional Capacity-Building Project

The AfricaArray project shows that a broad consortium of US universities, foreign educational institutions, and government mission agencies can achieve educational and other goals that extend beyond scientific research.

Establish an Earthquake Alert System

After major disasters affecting developing countries, IRIS instruments could be loaned indefinitely to help newly established geophysical hazard monitoring systems exchange data and integrate more effectively with other networks.

Expand an Existing Monitoring Network

When an existing geophysical monitoring network may not be dense enough or cover a large enough area to completely characterize a hazard, IRIS could promise to indefinitely loan instruments as one element of a broader plan.

The IRIS mission is to:

- Facilitate and conduct geophysical investigation of seismic sources and Earth properties using seismic and other geophysical methods.
- Promote exchange of geophysical data and knowledge, both through use of standards for network operations, data formats and exchange protocols, and through pursuing policies of free and unrestricted data access.
- Foster cooperation among IRIS Members, Affiliates, and other organizations in order to advance geophysical research and convey benefits from geophysical progress to all of humanity.

