Geologic Hazard Assessments Subactivity

Subactivity	FY 2000 Estimate	Uncontrol. & Related Changes	Program Changes	FY 2001 Budget Request	Change from FY 2000
Earthquake Hazards	43,893	+867	+2,600	47,360	+3,467
Volcano Hazards	17,181	+284	+250	17,715	+534
Landslide Hazards	2,580	+48	0	2,628	+48
Global Seismographic Network	**3,464**	**+33**	**0**	**3,497**	**+33**
Geomagnetism	1,993	+43	0	2,036	+43
Total Requirements $000	69,111	+1,275	+2,850	73,236	+4,125

Global Seismographic Network

Current Program Highlights

The Global Seismographic Network (GSN) is a worldwide network currently consisting of 117 modern seismographic stations. The GSN has a goal of 150 stations providing high-quality data used to address problems related to disaster management, hazards assessment, national security, loss reduction, and the structure and dynamics of the Earth. GSN is a joint effort involving the USGS, the Incorporated Research Institutions for Seismology (IRIS, a consortium of universities supported by the National Science Foundation), and the Institute for Geophysics and Planetary Physics (IGPP) at the University of California. The network is maintained in cooperation with many international partners who, in most cases, provide facilities to house the instruments and personnel to oversee the security of each station. The majority of GSN stations are operated within the framework of agreements between a host organization (academic institution or foreign government agency) and either the USGS, IRIS, or IGPP.

Funds for the purchase and installation of new GSN stations are provided to IRIS by NSF; the USGS and IGPP install new GSN stations on behalf of IRIS. Once installed, the USGS is responsible for maintenance, data collection, and quality control of about two-thirds of the GSN stations. The minor and routine maintenance at most foreign GSN stations is carried out by host organization personnel who are trained by the USGS. USGS tasks include training station operators, providing major repairs, conducting routine service visits to network stations, and providing direct financial aid in support of station operations at those sites lacking an indigenous host organization (most of these stations reside within the former Soviet Union).

The USGS and IRIS also evaluate, develop, and exploit new technologies in data acquisition and data management and improve station performance by relocating unusually noisy stations to quieter sites or configurations (e.g., placing sensors in boreholes) so that smaller events (earthquakes or explosions) may be detected. Siting, permitting, and installation of GSN stations are nearing completion. Currently, GSN is making the transition from development and deployment to operation and maintenance. The planned lifetime of the completed network is 30 years. However, with proper maintenance and gradual upgrades of data system components, GSN will produce data indefinitely and its performance will improve year by year.

Principal end-users of GSN data include the USGS National Earthquake Information Center in Golden, Colorado; the Center for (Nuclear) Monitoring Research in Arlington, Virginia; a broad assembly of government and academic researchers both domestic and international. Copies of all the data from USGS GSN stations are sent to the IRIS Data Management Center in Seattle, Washington. The IRIS data center is the distribution point for GSN data to users (such as scientists, engineers, and government agencies) throughout the world; every year it responds to over ten thousand requests for GSN data. In addition, data from over 50 GSN stations are currently available within hours of large earthquakes to the worldwide user community via telephone dial-up and (or) Internet connections.

GSN data are used daily in the routine operations of the USGS National Earthquake Information Center (NEIC). Real-time data are transmitted continuously to the NEIC where they are used, with other data, to determine the locations, depths, magnitudes, and other parameters of earthquakes worldwide. When appropriate, GSN data and parametric reports are provided to the Pacific and Alaskan tsunami warning centers. A unique feature of the GSN data is that they can be used to determine, within an hour, the geometric orientation of the fault that caused the earthquake, and provide an estimate of the length of the fault that ruptured during the earthquake. A damaging earthquake near a populated region generates great demand for such information by government officials and scientists responsible for assessing and responding to an earthquake disaster. Such information about significant domestic earthquakes is immediately sent to Federal and State emergency management and public safety agencies, operators of transportation facilities and public utilities, and national news media. Information about potentially damaging foreign earthquakes is immediately sent to the Department of State, embassies and consulates in the affected region, the Office of Foreign Disaster Assistance, the Red Cross, and the United Nations as well as national and international news media.

Recent Accomplishments

Network Status -- The USGS maintained 73 GSN stations at the end of FY1999. During FY1999 new stations were installed in Gabon and Brazil and on Midway Island and the Island of Hawaii. Plans called for eight new stations to be installed in FY1999; however, a major effort was required to ensure that the GSN was Y2K compatible. This involved replacing software for GSN operating systems that had 22 hardware variations and replacing non-compliant GPS clocks at 31 stations. Y2K compliancy for the GSN presented significant problems because of the diversity of system configurations and the wide geographical distribution of stations. These problems were overcome and the GSN was fully ready for Y2K and experienced no operational failures.

New Stations -- During FY2000 seven new GSN stations will be installed with funding from NSF. These stations will be at Ellice Island, Tarawa Island, Ecuador, Tristian Da Cunha, Raoul Island, Argentina, and Brazil. Five new GSN stations are planned for FY2001.

International Monitoring System -- U.S. national security interests continue to require seismic data from worldwide sources to monitor underground testing of nuclear weapons by foreign countries. Thirty-four GSN stations are part of the auxiliary seismic network of the International Monitoring System.

Research Support -- Data from the GSN are used extensively in basic and applied research on earthquakes, Earth structure, and seismic monitoring. Since the development of the GSN over

400 articles in scientific journals have acknowledged the use of GSN data in the reported research.

Real-Time Data Distribution -- Approximately 1.5 giga bytes (10^9) of data are recorded each day by USGS GSN stations. Data from 35 stations are now acquired in real-time and made available for monitoring and research through a Live Internet Seismic Server (LISS) developed for the GSN by USGS personnel. The LISS approach is much less expensive and more reliable than telephone dial up. The LISS is being adopted by other groups as an effective, low-cost means to collect large volumes of data from worldwide sites. The LISS approach provides seismic data immediately to the USGS National Earthquake Information Center for improved location and characterization of earthquakes worldwide. LISS also provides the schools and the general public with immediate access to GSN data.