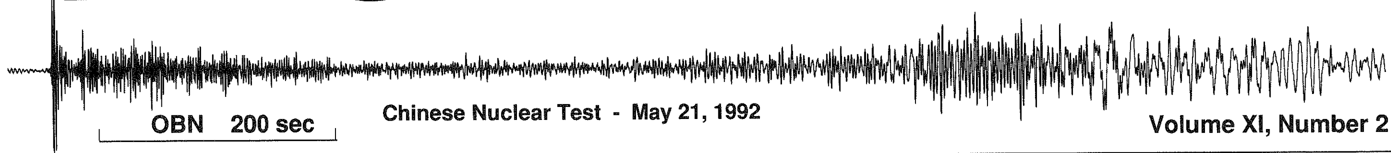
IRIS Newsletter



Volume XI, Number 2

PASSCAL Instruments Tackle an Active Volcano, Redoubt, Alaska

Phil Dawson, U.S. Geological Survey, Menlo Park, California

During July 1991, the USGS deployed 20 PASSCAL digital seismic recorders around Redoubt Volcano in southern Alaska and across its glacier-hung slopes and summit. For three weeks these instruments recorded local, regional and teleseismic waveforms, as well as four chemical explosions. The primary goal of the experiment was to define the velocity structure of the volcano in order to more accurately locate the seismicity associated with the eruptions of 1989-90. Three 350 kg chemical explosions were detonated in glacial kettles at the base of the volcano. One 350 kg shot was detonated in a glacial crevasse within the summit crater adjacent to the new lava dome. Two of the shots and ten of the recorders provided a reversed profile across the mountain. The remainder of the stations were located around the volcano to fill gaps between the permanent network stations and to provide adequate coverage for tomographic studies.

The entire experiment was conducted by helicopter, and based out of the Drift River oil terminal on Cook Inlet. Redoubt Volcano, rising to just over 10,000 feet in elevation, provided an exhilarating and challenging environment in which to collect seismic data. The upper slopes are heavily glaciated with only sharp ridges of exposed rock. Our choice of station locations was dictated by the morphology of the mountain and the disposition of the helicopter pilots. We used 3-component L-22 geophones and for 16 sites data were stored on a 200 megabyte hard disk. Four stations near the summit of the volcano were equipped with 660 megabyte disks. One disk swap was performed at sites with the lower capacity drives during the experiment.

Eight separate data streams were utilized for the experiment. The first stream recorded the vertical component continuously at 50 samples per second (sps). The second stream recorded all three components in a trigger mode at 100 sps. Streams 3-7 consisted of five predetermined 1-minute recording windows at 100 sps. Each of these streams recorded once a day for six days (a total of 30 windows) to provide the opportunity to record the four chemical explosions while leaving room for poor weather or other difficulties. Stream 8 was used to input a reference time pulse from a master clock.

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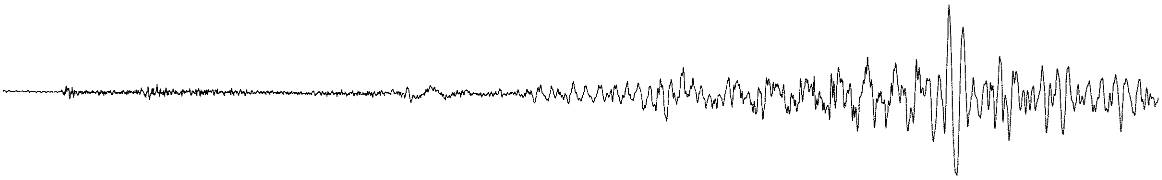
Installation of a PASSCAL instrument on Redoubt Volcano. *(Photo - Phil Dawson)*

What's Inside



From the President

One of the topics discussed at the Fourth Annual IRIS Workshop in Santa Fe in April was the development of a Rapid Array Mobilization Program (RAMP), to respond with portable PASSCAL instruments following a major earthquake. A scientific session on aftershock studies stressed the value of aftershocks in understanding the stress changes during a mainshock. A Special Interest Group (SIG) considered the more practical aspects of how to mount a successful field deployment. It was announced at the Workshop that PASSCAL has purchased five recorders for exclusive RAMP use.

Although the available resources are limited, RAMP has already been tested four times in the three months since the Workshop. Three instruments were sent to southern California following the Joshua Tree earthquake on April 22. For the Petrolia earthquake three days later in northern California, IRIS assisted by providing financial support to the field program and limited equipment (see EOS, June 30, pg 277). Eight instruments were again sent to southern California for the Landers and Big Bear earthquakes near Yucca Valley on June 28. Sixty of the new PASSCAL 3-component instruments were tested during a one day deployment in the Yucca Valley area to record late aftershocks and calibration shots. IRIS GSN data, retrieved through the Gopher system, also played an important role in determining the details of the source mechanisms of these earthquakes, especially the complexity of the source for the Landers event.

With new NSF funding, at least two additional RAMP instruments will be purchased this year. In cooperation with NSF, SCEC and other regional groups, a policy for RAMP is being developed. •

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Our goal was to record for three weeks and we recovered an average of 15.5 days per station. The shots were recorded by 19 of the stations. One station failed to write to disk. A second station missed two of the shots due to an unfortunate misunderstanding with a grizzly bear. A third station missed one shot due to the devices of an unknown critter with sharp teeth and a liking for SCSI cables. Three of the stations had trouble latching onto the OMEGA time signal and consequently have some question about the accuracy of their timing.

Approximately eight gigabytes of interesting, high-quality data were collected during the experiment. Contained within this data set are about 200 volcano-tectonic events and 250 regional and Wadati-Benioff zone events, all with three-component records; hundreds of glacier quakes; several teleseisms; and, thousands of small microearthquakes, low-frequency earthquakes, and steam bursts, most associated with cooling of the crater dome. Vertical component records were retrieved from the continuous data stream for any station that did not trigger on approximately 1500 of the most interesting events from this data set.

Tom Jackson from the Lamont PASSCAL center contributed much to the success of this experiment by joining our pre-deployment party. After conducting a huddle test in Anchorage, he was able to repair five instruments, which might have otherwise failed in our field deployment. Michael Wilton, Rick Farish, and Walt Woodrow provided a safe helicopter experience. John Van Schaack and Ed Criley provided some very nice pyrotechnics; and were brave enough to spend eight hours on a glacier above the active dome in the company of a pile of explosives. Bernard Chouet, John Lahr, and Bob Page also enjoyed some thrilling moments on the volcano.

A revised velocity model relocates the summit shot to within 100 meters, and will provide much more constraint on the location of seismicity within the volcano. A preliminary inversion of P-wave traveltimes from local earthquakes shows a significant low-velocity anomaly of approximately 1 cubic km located 1.5 km beneath the crater dome. This region was the source zone for the long period volcanic tremor observed prior to the initial eruption of the volcano. Although preliminary, this evidence for a shallow magma reservoir in a primarily andesitic continental arc volcano is quite exciting. •

This Issue's Bannergram: The seismogram on the cover shows the vertical component, broadband velocity record from the large (m_b ~ 6.6) Chinese nuclear test on May 21, 1992 recorded at station Obninsk (OBN, epicentral distance = 4000 km). The data have been decimated by a factor of seven. On the inside pages, the explosion record is repeated on the right side and on the left is the record from OBN from an earthquake in Mongolia (December 27, 1991, m_b ~6.4), at approximately the same distance from OBN (3900 km). These records have been scaled so the maximum amplitudes are approximately the same. If the same amplitude scale had been used for both records, the high frequency P waves would be approximately the same (and hence the two events have similar m_b), whereas the long period surface waves from the earthquake would be more than an order of magnitude larger than for the explosion. Obninsk is located just outside of Moscow, and OBN is one of the IRIS/IDA stations installed as part of the Joint Seismic Program. •

Mike Ritzwoller, JSPC, University of Colorado, Boulder

Rarotonga Borehole Site

Rhett Butler, The IRIS Consortium
C. R. Hutt, U.S. Geological Survey, Albuquerque Seismological Laboratory

The goal of the GSN program is broad, uniform coverage of the Earth with a 128 station network. To achieve this goal and provide for coverage in oceanic areas, many stations will be sited on

Figure 1. Location of the Island of Rarotonga in the South Pacific Ocean.

islands. As only a few existing stations are sited on islands, a major siting consideration for new stations is whether to build a surface vault or else drill a borehole. Neither option is inexpensive, but the typical costs are greater for drilling a cased hole and purchasing a borehole sensor. The benefit of a borehole site is primarily reduced seismic noise relative to surface siting. This benefit translates into recording greater numbers of smaller earthquakes (or other seismic sources).

On the continents and large islands, these noise benefits were recognized years ago, and led to the deployment of the network of Seismic Research Observatory borehole sensors in the 1970's. For small islands, the noise improvement for borehole siting was not well established. The USGS has operated both Streckeisen STS-1 seismometers and the broadband Geotech KS36000i borehole sensor on Guam. Although the horizontal ground noise was about 30 dB lower for the borehole sensor at a period of 100 seconds, the results were not conclusive. Both sensors were not operating simultaneously, and the STS-1 sensors were installed in non-ideal circumstances in the well head of the SRO borehole. To provide for a definitive comparison for a small island, the GSN Standing Committee approved a plan to drill a new borehole on the Island of Rarotonga.

Last autumn, IRIS GSN contracted with the New Zealand Department of Scientific and Industrial Research to drill a borehole on Rarotonga in the Cook Islands. Rarotonga is located nearly 5000 km south of Hawaii at about 21°S, 160°W (Figure 1). It is a small (67 km^2, population 9500) volcanic island encircled by a narrow coral reef. The topography on the island reaches 650 m. The location of the drilling site is 30 m from the existing WWSSN RAR vault (Figure 2). A 100 m cased borehole was completed on October 30, 1991. The hole penetrates alternating basalt and gravel layers near the top of the hole, alternating basalt and clay layers near the bottom, and ends in 40 m of basalt.

A USGS field team visited the site in March of this year. A KS36000i seismometer was installed in the new borehole, and Streckeisen STS-1 seismometers were installed in the WWSSN RAR vault, replacing the old Benioff and Sprengnether seismometers. Both the STS-1 and KS36000i are broadband sensors with a response flat to velocity from about 5 Hz to 360 seconds period. A GSN station processor with six 24-bit A/D channels records both sets of sensors. Subsequent to the installation of the KS36000i, it was discovered that the orientation of the borehole sensors was rotated ('north' points N25°W) with respect to the STS-1 sensors. This orientation is correctly noted in the data headers.

The station processor records the three-component data on both sensors continuously at 20 samples per second, and is also equipped for telephone dial-up access to the data. Data segments were initially available via telephone even though the quality of the phone line was poor. Telephone communications to RAR, however, were indefinitely disrupted when local unrest, following a decision to allow a new hotel to be built on the island, led to burning many government buildings and the destruction of phone equipment. There were no problems at the RAR site, and data tapes continue to reach the Data Collection Center at the USGS Albuquerque Seismological Laboratory.

Preliminary results indicate 20-30 dB improvement in horizontal noise at periods beyond 20 seconds (Figure 3). Substantial diurnal noise observed on the vault sensors is absent from the borehole sensors. At periods beyond 400 sec the vertical sensors are quieter in the borehole during the daytime when noise conditions in the surface vault increase.

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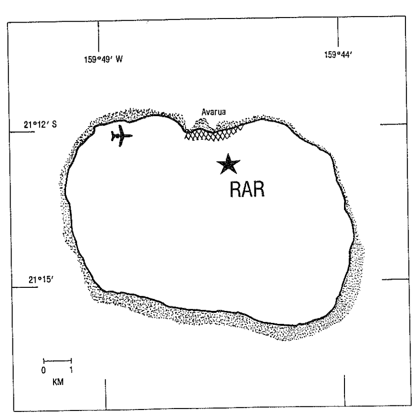

Figure 2. The location of the RAR borehole and seismic vault on Rarotonga. The site is in a valley about 1 km south of the principal town, Avarua (cross-hatched), and about 4 km from the airport. A stream runs through the valley 30 m from the site. A coral reef and narrow lagoon surround the island.

United States National Seismograph Network

Ray Buland, U.S. Geological Survey, Golden, Colorado

The concept of a United States National Seismograph Network (USNSN) dates back nearly 30 years. The idea was revived several times over the decades, but never funded. For example, a national network was proposed and discussed at great length in the so called Bolt Report (U. S. Earthquake Observatories: Recommendations for a New National Network, National Academy Press, Washington, D. C., 1980, 122 pp). From the beginning, a national network was viewed as augmenting and complementing the relatively dense, predominantly short period vertical coverage of selected areas provided by the Regional Seismograph Networks (RSN's) with a sparse, well distributed network of 3-component, observatory quality, permanent stations. The opportunity to finally begin developing a national network arose in 1986 with discussions between the U. S. Geological Survey (USGS) and the Nuclear Regulatory Commission (NRC). Under the agreement signed in 1987, the NRC has provided $5 M in new funding for capital equipment (over the period 1987-1992) and the USGS has provided personnel and facilities to develop, deploy, and operate the network. Because the NRC funding was earmarked for the eastern US, new USNSN station deployments are mostly east of 105 W longitude while the network in the western US is mostly made up of cooperating stations.

USNSN Design and Implementation

The USNSN was designed, with extensive input from the seismological community and industry, to serve the purposes of the National Earthquake Information Service (NEIS), the NRC, and the seismological research community. The goals that evolved were to provide highly reliable, highly linear, real-time, 3-component, calibrated, broadband, on-scale monitoring of moderate to large earthquakes at local, regional, and teleseismic distances. In many ways, the USNSN can be thought of as a continental scale, real-time version of the IRIS GSN.

During 1987-1989, the USNSN was planned, specified, and underwent a lengthy competitive procurement process, including rigorous production sample testing. Equipment for the field, telemetry, and central control and processing system was selected. During 1990, hardware was delivered and development was begun on the critical system integration software. The USNSN became operational and was dedicated in April, 1991. Since then, extensive work has been done on stabilizing the real-time processes, enhancing functionality, and adding cooperating stations.

The USNSN is based on the following hardware:

1. In the field, Guralp Systems CMG-3 seismometers and CMG-5 accelerometers are interfaced with a 6-channel, 80 sample/s, 24-bit Quanterra station processor. There is no local data storage except processor buffer memory. The principal band of interest is from 200 s to 30 Hz.

2. Telemetry is provided by a Scientific Atlanta Ku-band, time division multiple access (TDMA), very small aperture satellite (VSAT) system. A VSAT connects each station processor to the master earth station (MES) located at the National Earthquake Information Center (NEIC) in Golden, Colorado via the GE K-2 geosynchronous telecommunications satellite using the X.25 communications protocol.

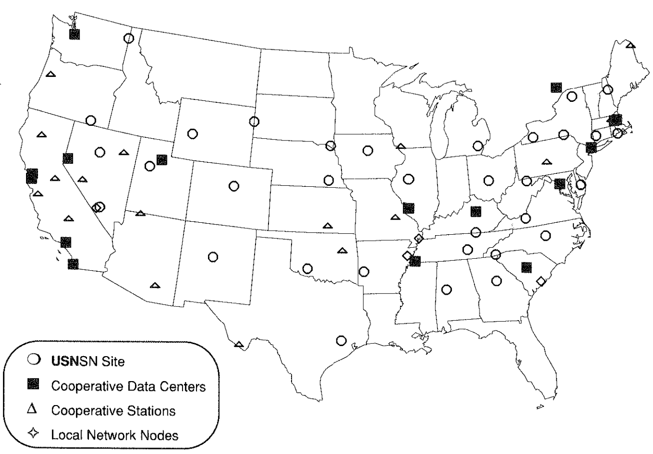

Figure 1. Existing and planned USNSN telemetry sites projected for the fall of 1992. Note that the octagons and triangles represent broadband stations while the diamonds show RSN sub-network nodes and the squares show cooperating data centers.

3. The network processor system at the NEIC runs on four Digital Equipment Corporation VAX 3000/4000 32-bit microcomputers (under the VMS operating system) configured as a local area VAXcluster. Scratch storage is provided by two System Industries Clustor III multi-ported disk subsystems. The network processor receives X.25 data from the MES via Simpact coprocessors. Archival data storage is provided by an Aquidneck Systems write-once optical disk jukebox.

USNSN Software Architecture

The USNSN components are integrated together by USGS supplied software which extends from the seismological processing in the field to all network processor functionality at the NEIC. In the field, USNSN station processors generate data streams at rates of 1, 10, 20, 40, and 80 samples/s from six analog to digital converters. The 1 sample/s "long period" data are transmitted continuously with a lag of 120 s. The 40 sample/s "broadband" data are transmitted for events (from either the seismometers or the accelerometers depending on amplitude). The 80 sample/s "high frequency" data are transmitted from the accelerometers for accelerations exceeding

100 μg. Event detection is done in the frequency domain using a fixed point FFT algorithm. Data are divided into USNSN/RSN telemetry packets in the USNSN compression format for transmission.

The network processor automatically estimates phase arrival times and locates events. Event associated phase and waveform data as well as continuous long period and high frequency event data are stored in the on-line data base. Comprehensive review and analysis tools are available for the NEIS analysts. The data base is designed to support waveforms with asynchronous timing, different sample rates, different numbers and types of channels per station, and to efficiently store data arriving in different binary data formats.

The network processor software has been designed to be very flexible, both in terms of load and capability. The multi-processing design with automatic load balancing provides redundancy and handles the highly variable (and rapidly growing) real-time load. A multi-programming implementation with extensive interprocess (and interprocessor) communication makes the functionality extensible. In addition, the system is self monitoring and self repairing. Broadband and traditional short and long period data arrive in two different protocols and in three different formats. The front end software treats each type of data separately to maximize capability and then reduces all data to a common format to make data differences transparent to subsequent processing. Support for additional protocols and formats can be added as needed.

Current Network Status

There are currently 88 short period verticals, seven long period verticals, and one 3-component long period station coming into the USNSN data base from the so called USNET. These data are subsets of the various RSN's which are digitized at the RSN processing centers using USGS hardware (12-bits at ~20 samples/s), and transmitted via telephone lines to the NEIC. These data continue to be invaluable for earthquake monitoring.

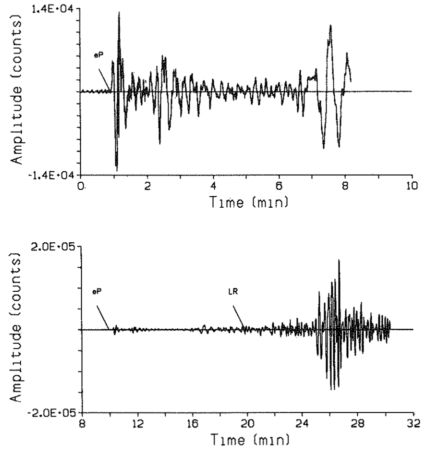

Figure 2. Broadband vertical (top) and long period vertical (bottom) records for the 25 April 1992, M_s = 7.0, Cape Mendocino, California earthquake recorded by USNSN station CEH (Chapel Hill, North Carolina).

There are currently five USNSN stations, located at Golden, Colorado (GOL; the USNSN prototype); Mont Chateau, West Virginia (MCWV); Chapel Hill, North Carolina (CEH); Albuquerque, New Mexico (ALQ); and Topopah Springs, Nevada (TPNV; in cooperation with the Southern Great Basin Seismograph Network [SGBSN]). Deployments have been delayed because of slow deliveries of the seismometers. This was due to modifications required by the USGS to optimize the sensor/station processor interface which turned out to be significantly more difficult to implement than expected. These problems were finally put behind us in January, 1992 when a 3-component set was delivered which greatly exceeded the stringent USNSN specifications (notable at very long periods and on the horizontals as well as the verticals). Since then, a variety of start-up problems have added delays, but new sensors should be ready to be deployed in July. The distribution of the USNSN broadband stations to be deployed through the end of 1992 and telemetry sites at cooperating institutions are shown in Figure 1. Sample data from USNSN station CEH for the Cape Mendocino earthquake is shown in Figure 2.

There are currently six cooperating USNSN stations located at Harvard, Massachusetts (HRV; with Harvard University); Cathedral Cave, Missouri (CCM; with IRIS and Saint Louis University); Isabella, California (ISA; with the California Institute of Technology); Adirondack, New York (RSNY; USGS operated RSTN); Black Hills, South Dakota (RSSD; USGS operated RSTN); and Tucson, Arizona (TUC; with IRIS and the University of Arizona). These stations fall into two broad categories: IRIS (and IRIS-like) stations and other stations. The IRIS and IRIS-like stations now include custom coding provided by Joe Steim of Quanterra to send data of interest in the USNSN transmission format. At the other stations, digital data streams from broadband sensors have been interfaced to a USGS developed, Digital Equipment Corporation based, LSI-11/23 station processor which emulates most functions of the USNSN station processors. A waveform from the first cooperating USNSN station (HRV) is shown in Figure 3. This station provided critical control and magnitude information in the first minutes following this recent East Coast earthquake.

Under agreements with cooperating institutions, the USNSN is also providing telemetry (via the NEIC) from field sites back to some of the host institutions. A link to Harvard is already active with receiver software at Saint Louis University and Caltech under development.

Future USNSN Deployments

USNSN deployments for the summer and fall 1992 are being planned at Wichita Mountains, Oklahoma (WMOK); Dugway, Utah (DUG; with DARPA); Mineral Point, Wisconsin (JFWS; with Saint Louis University using STS-1 sensors); Caribou, Maine (CBM; with Boston College using STS-1 sensors); Mount Ida, Arkansas (MIAR); Battle Mountain, Nevada

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(BMN; with SGBSN); Blacksburg, Virginia (BLA; with Virginia Polytechnic); Godfrey, Georgia (GOGA); Wildhorse Valley, Oregon (WVOR; with SGBSN); Standing Stone, Pennsylvania (SSPA; with Pennsylvania State University using KS-36000 sensors); and Newport, Washington (NEW). Sites are also being investigated near Binghamton, New York; Greenwood, Delaware; Lisbon, New Hampshire; Lakeside, Connecticut; Yorkshire, New York; and Murphy, North Carolina for possible deployment in the fall.

IRIS and IRIS-like stations which will become cooperating USNSN stations in the near future include Colombia, California (CMB; with the University of California at Berkeley); Whiskeytown, California (WDC; with Berkeley); Corvallis, Oregon (COR; with Oregon State University); Kipapa, Hawaii (KIP; with IRIS and the Pacific Tsunami Warning Center); and Fairbanks, Alaska (COL; with IRIS and the University of Alaska). Transmission of data from CMB and WDC back to Berkeley is planned.

Other stations which will become cooperating USNSN stations in the near future include Cumberland Plateau, Tennessee (RSCP; RSTN, now being revived); Boulder, Wyoming (BDW; using DSVS equipment); Lajitas, Texas (LTX; with AFTAC); Mina, Nevada (MNV; with the Lawrence Livermore Laboratory [LLL]); Elko, Nevada (ELK; with LLL); and Kanab, Utah (KNB; with LLL). Transmission of data from MNV, ELK, and KNB back to LLL is planned.

Target

The USNSN is projected to grow to approximately 60 stations spanning the continental United States. Plans to improve this coverage and to extend it into Alaska, Hawaii, and Puerto Rico will be pursued as funding permits. In addition, arrangements to exchange subsets of event detected waveform data with both the Canadian and the Mexican National Seismograph Networks have been made.

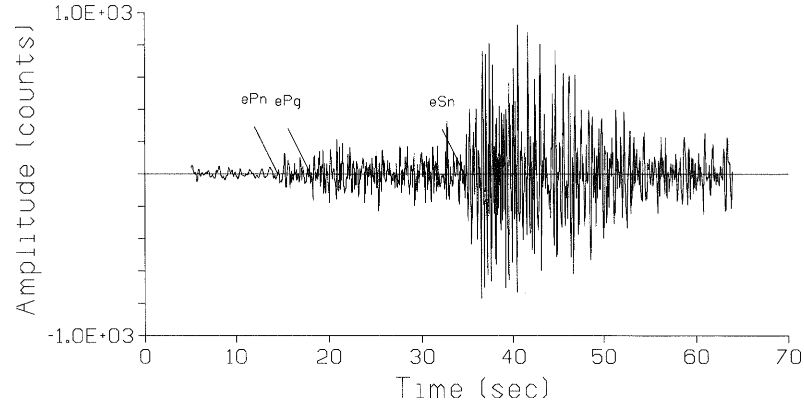

Figure 3. A short period filtered record for the 10 March 1992, M_L = 2.8, Long Island, New York earthquake recorded by IRIS station HRV (Harvard, Massachusetts).

Because of the type and quality of the instrumentation and the network distribution, greatly enhanced by the highly cooperative nature of the project, the USNSN has an unprecedented research potential for new studies on regional and continental scales.

Regional Network Interactions

The USNSN has a mission responsibility to promote communications among the RSN's. To this end, VSAT's have been installed at Memphis State University, Menlo Park, Caltech, and Saint Louis University with additional installations planned at Lamont, the University of South Carolina, the University of Washington, and the University of Utah. At each site, RSN triggered short period data will be sent to the NEIC and USNSN data of interest and possibly RSN data from adjacent networks will be transmitted back. Thus, the RSN component of the USNSN data base will continue to grow, including data at higher sample rates and from more stations. For Memphis State University, Saint Louis University, and Lamont, the USNSN will also act as communications provider for one or more sub-networks from the field to the respective institutions.

Through continued close cooperation between the RSN's and the USNSN, we hope to approach the goal of a National Seismic System (NSS). The USGS has assumed the responsibility for establishing a coordinating body for the NSS. Meanwhile, the USNSN is already providing a practical technological framework in which to begin implementing the NSS.

Data Distribution

Data distribution mentioned above is real-time and is in the USNSN telemetry format. A near-real-time satellite broadcast distribution of all broadband event data is still under discussion and would be in the same format. The data will be available in the SEED format both by Internet access and CDROM distribution. Plans are also being made to distribute all or part of the USNSN data through the IRIS DMC. •

Request for Bibliographic Information

A bibliography of articles that have made use of IRIS facilities is being prepared. Please send to the IRIS office a list of any publications that are based on IRIS data or have made use of IRIS facilities (a copy of your vitae indicating IRIS related papers is sufficient). We would also appreciate receiving copies of pre-prints or reprints of articles. Users of PASSCAL instruments are reminded that they are required to provide a data report and deposit copies of data at the Data Management Center. The evidence of wide use of the IRIS facilities, as shown by published articles and the use of data products, is important in developing future support for IRIS. •

Ocean Seismic Network Planning Office is Established

Ellen S. Kappel, Joint Oceanographic Institutions, Incorporated

This summer, an Ocean Seismic Network (OSN) planning office will be established at Joint Oceanographic Institutions (JOI) to coordinate ongoing efforts to develop a global network of permanent seismic observatories on the deep ocean floor as part of the planned Global Seismic Network (GSN). Prior to establishing the planning office, all OSN activities were coordinated and carried out by a U.S. Steering Committee jointly sponsored by JOI's U.S. Science Advisory Committee (JOI/USSAC) and IRIS. The Steering Committee is an outgrowth of a workshop on "Broad Band Seismometers in the Deep Ocean" sponsored by JOI/USSAC and held in 1988. The membership of this Steering Committee is G. M. Purdy (Co-Chairman), A. M.]Dziewonski (Co-Chairman), J.A. Orcutt, F.K. Duennebier, and H. Kanamori. Jeffrey Park has been appointed to act as liaison between the IRIS Executive Committee and the OSN Steering Committee and Barbara Romanowicz serves as liaison with the GSN Standing Committee.

To date, the primary focus of Steering Committee activities has been to: (1) Establish technical plans for the pilot experiments needed before installation of a permanent seafloor network could begin. A workshop was held at JOI in June 1991 to describe these plans in some detail. The report of the JOI/IRIS Ocean Seismic Network U.S. Pilot Experiment Task Force Meeting is available from JOI (1755 Massachusetts Ave., NW, Suite 800, Washington, DC 20036-2102). (2) Establish a site at which the pilot experiments can be carried out. During March 1991, Leg 136 of the Ocean Drilling Program (ODP), led by co-chief scientists Adam Dziewonski and Roy Wilkens, drilled Hole 843B (known as OSN-1) 225 south southwest of Oahu in 4420 m of water, through 243 m of sediment and 70 m into basement. During October 1992, the Scripps wireline reentry system will be tested in OSN-1, sending downhole a logging tool to assess the hole's condition for future emplacement of a broadband borehole seismometer or other borehole instruments. (3) Provide communication and coordination among the many groups in the U.S., France, and Japan which have ongoing programs to develop the technologies which OSN requires. The OSN planning office at JOI will significantly enhance this communication and coordination effort within the U.S. and with other nations. Liaison with the international seismic community is especially critical for encouraging the compatibility of technologies and maintaining and operating OSN seafloor seismic observatories. (4) Provide liaison with JOIDES (the scientific planning structure of ODP) and IRIS. Effective liaison with ODP is critical if the holes required to establish OSN are to be drilled. In addition to providing JOIDES with a list of holes which need to be drilled for OSN, OSN must encourage submission, by individual scientists or groups of scientists, of "mature" proposals to JOIDES. These "OSN proposals" will then undergo the same scrutiny by JOIDES as all other drilling proposals and will be in direct competition with other ODP scientific drilling goals. Close interaction with IRIS's GSN Standing Committee and the international seismic community is clearly necessary for establishing the list of siting priorities required for OSN.

The OSN planning office at JOI will serve as an action arm of the U.S. OSN Steering Committee, accelerating the progress the Steering Committee has made over the last few years. Briefly, the tasks that will be undertaken by the OSN planning office include: 1) generating a regular newsletter to ensure that information about OSN is disseminated to a wide community; 2) assessing the results of the pilot experiments to be carried out at OSN-1 in such a way to avoid potential conflict of interest problems; 3) generating a detailed plan for the emplacement and operation of OSN, including cost estimates and commitments from international colleagues; 4) interacting with funding agencies; 5) providing liaison with IRIS and its committee structure; and 6) providing liaison with the international community. In the early stages of OSN when program planning, pilot experiments, and instrument development are the principal issues, the planning office will be located at JOI. As the emphasis of the effort evolves toward operation of a seismic network, the office will make a transition to IRIS. •

the IRIS CONSORTIUM

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The Incorporated Research Institutions for Seismology (IRIS) is a consortium of 79 research institutions with major commitments to research in seismology and related fields. IRIS operates a facilities program in observational seismology and data management sponsored by the National Science Foundation. Major funding for IRIS programs is provided by the National Science Foundation through its Division of Earth Sciences and the Air Force Office of Scientific Research.

The IRIS Newsletter welcomes contributed articles. Articles should be less than 1000 words and four figures. Please send articles or requests for details on submission of articles to the address listed above. Electronic submission is encouraged.

Executive Editor: David Simpson
Production Editor: Denise Dillman-Crump

CALENDAR

AUGUST

17-21 **Western Pacific AGU, Hong Kong**

SEPTEMBER

14-15 **JSP Meeting, Boulder, Colorado**

16-18 **PL/DARPA Symposium, Tuscon, Arizona**

23-24 **Execom Meeting, Arlington, Virginia**

28-30 **GEOSCOPE Ten Year Symposium, Paris**

DECEMBER

7-11 **AGU, San Francisco, California**

APRIL 1993

14-16 **SSA, Ixtapa, Mexico**

MAY 1993

3-5 **National Earthquake Conference, Memphis, Tennessee**

24-28 **AGU, Baltimore, Maryland**

The calendar is a regular feature of the Newsletter. Please submit dates of interest to IRIS members, including meetings and field programs.

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During quiet nighttime noise conditions, the STS-1 vertical is quieter than the KS36000i vertical at periods beyond 400 seconds, possibly because the borehole instrument may have greater system noise in this band. At high frequencies in the 3–5 Hz band, the borehole sensor is consistently a few dB quieter than the vault sensor on both the vertical and horizontal components.

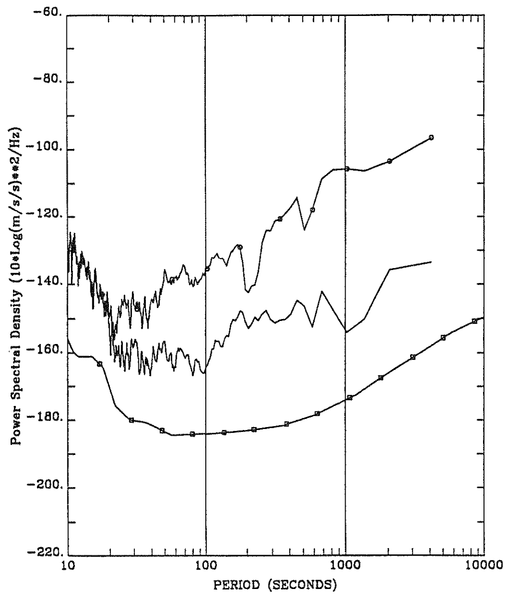

Figure 3. Power spectral density at noon Rarotonga local time for the horizontal (N–S) component of the STS-1 vault sensor (upper trace), KS36000i borehole sensor (middle trace), and for comparison, the USGS low noise model (lower trace). Daytime and nighttime noise levels are 30 and 20 dB, respectively, better for the borehole sensor than the vault sensor.

At 100 seconds period, the noise levels observed on the RAR borehole sensors are comparable to the Guam site, GUMO, but are not as quiet as a good continental site such as ANMO, Albuquerque. The borehole vertical component at RAR is a few dB noisier than ANMO, and the horizontal components of motion are 10–15 dB noisier at RAR than ANMO at 100 seconds.

A one year study comparing surface vault versus borehole noise conditions will investigate the relative noise improvement for borehole deployment of seismometers on a small islands. An EOS article is being prepared which presents more extensive examples of these preliminary noise comparisons. Over the one year of the study we will examine seasonal variations and noise conditions during extreme weather conditions such as hurricanes. •

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