2002 FDSN Meeting
Waikoloa, Hawaii
June 12, 2002

First Plenary Meeting June 12, 2002

Chairman Yoshio Fukao called the meeting to order at 15:04. The Agenda (See Attachment A1) was adopted without change. The minutes of the 2001 FDSN meeting in Japan were approved without change. Chairman Fukao gave a brief presentation addressing many of the activities of the FDSN that had taken place since the previous meeting (See Attachment A2).

Secretary Ahern gave a brief review of FDSN requests for new members. Letters had been written to two network operators in Portugal, Instituto Superior Tecnico as well as the University of Lisbon. The membership of Denmark was clarified and the National Survey and Cadastre of Denmark is now a full member. Letters were written inviting two organizations from the Islamic Republic of Iran to join the FDSN (IIEES and the University of Tehran) but responses were not received from either of these organizations.

Reports from member Networks

Australia (no written report - See Attachment A20)

Brian Kennett gave a brief review of the situation in Australia, which is changing again. It is now Geoscience Australia, no longer AGSO. They have broadband stations at Stevens Creek, Fitzroy Crossing, Charters Towers, Waramonga (24 element array), and Canberra in conjunction with Geoscope and Davis in Antarctica, which should be available through ANU with a delay.

Canada by Jim Lyons (See Attachment A3)

Lyons gave a brief summary of the various components of the CNSN that have been upgraded. In 2000 there were 121 stations in the CNSN and as of May 2002 there were 124 stations. There has been a net increase in the number of broadband stations by 12.

The Canadian High Arctic Seismic Monitoring Experiment (CHASME) currently has 7 stations.

4 Canadian Universities and the GSC are undertaking the Portable Observatories for Lithosphere Analysis Research Investigating Seismicity (POLARIS) project. In total POLARIS will have 90 broadband stations in 3 sub-arrays. Each deployment will have 4-5 year deployments. They will eventually include MT and perhaps GPS instrumentation. At the present time there are 10 stations in Ontario, 4 stations in the Northwest Territories and 6 stations in BC.
The CNSN archives continuous real time Polaris waveform data available through autoDRM and real time Internet feeds. The Canadians operate 3 primary stations and 6 auxiliary stations for the CTBT. Canada is an independent subnet.

China by Chen Yun-Tai (See Attachment A4)

The CDSN has 11 stations but the digitizer at LZH has failed so only 10 stations are truly operating.
The Chinese National Digital Seismic Network has 47 stations including the 10 in the CDSN. These data are being managed at the Institute of Geophysics in Beijing.
In 2001, 148 scientific papers using China National Seismic Network data were published in China. A summary of how much data was sent to scientists and how data are used to generate the bulletins was presented.

The activity of China in the CTBT was summarized. Data from China still has some restrictions but they are working on opening up access. It will take time.

Czech Republic by Jan Zednik (See Attachment A5)

Jan Zednik updated the status of the 10 broadband stations in the Czech Republic. There are now 2 years of continuous data from the Praha station and many of their stations are available in real time. Two data centers service the data needs of the networks, one in Praha and one in Brno.

GEOFON by Joachim Saul (See Attachment A6)

There are currently 48 stations in the GEOFON Network. They have added 2 stations in 2001, one in Libya and one station (HLG) Helgoland in Germany.

Joachim Saul reviewed the SEEDlink protocol in some detail. It is widely used in Europe and seems quite robust.

GEOFON raised two issues 1) attribution for networks and 2) the use of data by international centers and the effect it has on local observatories. These two issues were referred to Working Group II.

MEDNET by Salvatore Mazza (See Attachment A21)

MEDNET is trying to consolidate the network that they have now. They are moving the Monaco station to Rabat, the Belgrade station is moving to a new site about 70 km away. Many of the N. African stations are not operating at the present time. All of the MEDNET stations are Quanterra stations.

Mazza reported that NetDC is functioning but there are problems with firewalls and the data merging efforts. They are using the IRIS PDCC system as the way to maintain their station database.

They are implementing SEEDlink for real time data. Butler asked what chances there are to reopen N. African stations. Mazza indicated that politics and logistics make it very difficult and therefore unlikely.

Pacific 21 Report by Seiji Tsuboi (See Attachment A7)

The broadband seismograms from Ocean Hemispheres Project (OHP) network and the Superplume network will be merged and distributed from IFREE data center. Universities and IFREE in general operate OHP stations. The Superplume stations are primarily in the South Pacific and are operated by NIED. IFREE stands for Institute for Frontier Research of Earth Evolution.

Tsuboi described the research programs at IFREE.

The Centre for Data and Sample Analysis is just being setup now. Japan is still supporting Ninja. It is installed at ERI and they now have a new version of Ninja. They will install it at NIED, IFREE and ERI. NINJA will merge data holdings at the three centers.

Portugal by Joao Fonseca - IST (No Written Report)

Portugal has two new members of the FDSN and IST was present at the meeting. The University of Lisbon was not present. The Institute for Higher Technology (IST) foundation is in Earthquake Engineering. Lisbon has a history of earthquakes in the 6.5 to 7.0 range.

Their involvement in Broadband Seismology began with the Cape Verde Islands IRIS/IDA station. Data are available from Orfeus Centre from 2 additional stations. They have received funding for a broadband network in Portugal. Four stations will be deployed soon and two more will eventually be installed (6 in total). Data distribution is coordinated through ORFEUS. They think there is some possibility to aid in station installation in Angola and Mozambique.

Switzerland (not present - See Attachment A8 [pdf])

Taiwan by Honn Kao (BATS) (See Attachment A9)

BATS now has 2 STS-1 and 11 STS-2 equipped broadband stations. All stations are equipped with strong motion sensors. They are using frame relay connections where possible and their total archive is 40 gigabytes in size.

They have established a data center in Taiwan using the Ninja technology.

Plans call for 17 comprehensive observatories equipped with GPS, VBB and Strong Motion sensors. There are 19 additional BB sensors run by the Central Weather Bureau (CWB) and 6 broadband stations run by NCU. All of these are combined into the BATS network.

Taiwan has a mobile array of 45 stations, 24 broadband stations and 21 short period stations.

IRIS GSN by Rhett Butler (See Attachment A10 [pdf])

The GSN now has 125 stations. Since the last FDSN meeting the GSN has opened one station in Marble Bar, Australia and closed one station in the Canary Islands.

IRIS is no longer planning to install stations in Oman or Madagascar but they have added Trindade to the siting list.

Butler showed the data availability that clearly shows improvement from 2000 to 2001.

Butler highlighted the observatory nature of several of the stations. A summary of the telemetry status at several of the stations has given. 27 stations have added continuous telemetry since the Mt. Fuji meeting. There are only 25 stations in the GSN that remain dial-up stations.

Butler mentioned the progress with the Global Communication Infrastructure (GCI) with the CTBTO.
A summary of IRIS efforts at the South Pole were also mentioned with plans for moving the South Pole Station to the "quiet zone" near the South Pole. He also summarized an idea to install a three dimensional seismic network in the ice near the South Pole called CRYSTAL (Cryo-Scientific Three Dimensional Array Lattice)

USNSN by Kaye Shedlock (See Attachment A11)

The USNSN will become part of the ANSS. Shedlock highlighted the cooperative nature of all the permanent broadband stations. ANSS will have 1000 BB regional stations, 120 VBB stations as part of the permanent backbone and 6000 strong motion sensors, roughly half in structures.

ANSS will have a national data distribution center. They have a working group established to determine the details of this distribution center.

GEOSCOPE by Barbara Romanowicz (See Attachment A12)

Romanowicz gave a brief history of the GEOSCOPE program. Currently data are distributed using a variety of mechanisms including CD-ROMs, anonymous ftp for large events, a WWW server and the NetDC system within the FDSN.

There is an evolving problem with maintaining the GEOSCOPE stations. Current thinking is that GEOSCOPE must consolidate its operations and maintenance of GEOSCOPE stations. The strategy being considered includes 1) transfer the maintenance to local authorities, 2) install new stations, and 3) transfer the operation to a third party. So GEOSCOPE is investigating a variety of ways to maintain its stations.
There is a large effort within GEOSCOPE to get data in real time.

New Zealand by Ken Gledhill (no written report)

New Zealand is currently deploying 8 broadband stations with either STS-2 or Guralp sensors and Quanterra 4120 data loggers. The long-term goal is 40 stations. 15 of these stations are currently being built. The preferred method of communication is VSAT.

ION by Barbara Romanowicz

ION was founded in 1993. In 1995 the first workshop took place in Marseille. The second major activity was the ION symposium at Mt. Fuji in 2001. There have been several preliminary deployments. Romanowicz summarized activities that have taken place at MOISE, OSN1 and H2O.

ION has been involved in 7 ODP drilling activities as well as sponsoring many workshops and symposia.

In the US there are many ION related activities taking place. The H2O observatory is one (see later report). The Monterey Bay MOISE is another (MOISE) and the Ocean Observatories Initiative (OOI) is another. It is composed of the NEPTUNE plate observatory, moored buoys and some coastal observatories.

First Plenary Session was adjourned at 18:15.

Second Plenary Meeting June 16, 2002

Chairman Yoshio Pukao called the second plenary meeting to order at 20:42. The first agenda item was a discussion of the various working group meetings.

WG I - Stations and Instrumentation by Kaye Shedlock (See Attachment A13)

The maintenance of the inventory was the first item discussed. There was a consensus that the inventory should have several other fields added, including Network Code, Data Center where data are available and access methods.

There was also a discussion that the STS-1 might be made available again if large enough numbers were mentioned.

WG II - Data Centers and Formats by Bernard Dost (See Attachment A14)

There was considerable discussion about a proposal drafted by Ray Buland related to station channel naming conventions for the SEED format. The proposal would require changes to both the metadata (dataless SEED) and the waveform miniSEED headers. This is a complicated accommodation and since it was generally felt that the existing SEED definition could accommodate ANSS and other needs without modification. The decision was made to not change SEED format and the proposal was rejected.

The Working Group next considered a proposal by Ray Willemann of the ISC related to an International Registry network code. This proposal was accepted with the stipulation that the IR Network Code should be used only for parametric data and it is discouraged for use with waveform data. Stations with approved International Registry will therefore have two network codes assigned at times, one of IR and the other of the local network operator where applicable.

The Japanese presented a proposal to the FDSN related to moving SEED into an XML based implementation. They provided a prototype of such a system. The discussion was brief but WG II encouraged Japan to push this concept forward. In general this was well received.

Several small SEED related issues (b1000) etc were approved without objection. Specific wording will be added to the SEED manual accordingly.

The issue of data attribution was raised and the FDSN will raise the issue of attribution on our Web pages.

WG III - Software Coordination by Tim Ahern (See Attachment A15)

Ahern quickly reviewed the activities in WG III. This meeting was devoted toward summarizing the various software applications and systems being developed by FDSN members.
The three basic topics covered included

1. Real Time Data Systems
2. Software Libraries and Shared Applications
3. Object Oriented Systems

ORFEUS reviewed progress in the Meridian Project where currently 43 stations are sending data in real time with a volume of 24 megabytes per day. They use Antelope from BRTT to perform these real time tasks.

GEOFON reviewed the progress of the SEEDlink system. It is a data relay and buffering system that is miniSEED based. It seems to be robust and reliable with significant use in Europe and interest in the US.
IRIS reviewed the BUD system. It uses Antelope and Earthworm for ingestion of data. Currently between 600-700 stations are being accessed with between 3000 and 4000 channels. It has access by autoDRM, FISSURES DHI, LISS and WWW tools.

USGS/ASL described the LISS system. It requires one connection per station but can have multiple LISS servers for distribution. It is a push protocol for miniSEED data. LISS 2 is still in development.

USGS/NEIC described the Earthworm system. It is used heavily by the USNSN and US Regional networks and has wide community support in the US. It is likely to play a role in the ANSS. It is rich in products such as SeisNetWatch, Event Association, Earthquake maps and Shakemaps.

ORFEUS reviewed the extensive software library available through them. They also reviewed two systems developed in Europe. The first is Quake Explorer that provides access to the SPYDER® and FARM data sets. A second program, CollectWaves, uses autoDRM to acquire seismograms for specific events.

IRIS reviewed its activities. IRIS is now porting most of the User Applications to Java for broader support of multiple platforms. This includes rdseed, JEvalRESP, JPlotRESP and JQL. In the area of Data Center Applications, IRIS is presently developing version 3 of PDCC in Java. The release of this system should be within the next few months. IRIS also has several data center utilities that can merge, split, sniff, edit and verify SEED data. IRIS also reviewed its major effort in object-oriented development, FISSURES/DHI.

Working Group IV - CTBT Issues by Jim Lyons (See Attachment A16)

Working Group IV discussed the issue of access to IMS data. A letter was written by Chairman Fukao that while acknowledged did not change the status of the data flow. Ideas that were discussed including continued pressure on Working Group B by writing periodic letters. The FDSN will approach Canada and Australia to gain access to IMS data from IMS stations within their territories.

The issue of a station in Papua New Guinea was raised but there was no interest by any FDSN members in supporting this station.

Working Group IV noted that IRIS had made some progress in shared use of the GCI of the CTBTO.
It was also noted that Steve Bratt has left the IDC. WGIV feels that it would be appropriate to invite Florence Riviere to join the FDSN WG IV to replace Bratt.

Report of FDSN Data Centers

ORFEUS Report by Bernard Dost

Dost summarized the activities within the Meridian project that was devoted to real time data collection within Europe. He also mentioned that as a result of a major meeting within Europe, ORFEUS may consider growing to a size comparable to the IRIS DMC assuming funding can be found. They may be able to find additional funding through the European Union Network of Excellence Program.

TPC-1 and Pacific 21 Data Center by Nozumu Takeuchi

Takeuchi summarized the activities within Japan. NINJA will soon have a new release. It currently ties data centers together within OHP, Pacific-21, TPC-1 and JMA together. TPC-1 data is also forwarded to the IRIS DMC. They plan to support the NetDC system by the end of this year.

FDSN Continuous Data Archive by Tim Ahern (see Attachment 17)

Ahern commented that there had been a significant improvement of data flow to the FDSN Archive at the IRIS DMC. All FDSN networks except GEOSCOPE and MEDNET have data at the DMC for the year 2002 and progress is being made for those two networks as well. There have been significant increases in the amount of data received from the GEOFON, GEOSCOPE and Taiwanese networks during 2001.

Data shipments to FDSN members also continue to rise with very significant numbers sent to France, Great Britain, Japan, Russia, and Switzerland. More than 10,000 shipments were made to non-US users during 2001.

Ahern also summarized the amount of data sent in 2001 from the FDSN archive for each network. More than 1000 users received data from the following networks through the FDNS archive, PS, G, CN, MN, CZ and GE. More complete information may be found in the attachment.

Other Reports

IASPEI Report by Brian Kennett

Kennett reiterated that the home of the FDSN is in IASPEI. IASPEI is also pushing the IMS data access issue. Kennett encouraged using the IASPEI mailing service as a way to better advertise the activities of the FDSN.

CTBTO by Florian Haslinger (see Attachment 18)

Hasslinger reported that the IDC has now entered phase 5A. At this time they have updated their mass storage system to accommodate the data flowing into Vienna.
The GCI is now installed at more than 100 stations of the IMS.
States parties have requested more than one terabyte of information during the past year. There have been 392 users of IMS data from a large number of countries.

There is a major calibration program going on coordinated by the IDC.

Haslinger gave the status of the seismic, hydro-acoustic, infrasound, and radio-nuclide networks of the IMS. He highlighted the use of a standard interface to incorporate data from auxiliary seismic stations to the IMS.

As a one-time measure, phase data were provided to the ISC. However there have been no new developments in access to the waveform data.

International Seismological Centre (Not Present-See Attachment 19)

H2O Observatory by Fred Duennebier

Duennebier reported that the H2O observatory is attached to an old AT&T cable that was given to IRIS Ocean Cable. Data flow from the sensor to Hawaii and from there to the IRIS DMC. The system is not quiet at long periods but it is comparable to other stations in other frequency bands.

Duennebier showed several examples of earthquakes demonstrating the usefulness of the data from H2O. The current plan is to incorporate additional sensors at the H2O location. There are plans to use other cables in the area, specifically the ANZCAN cable.

Election of New FDSN Executive Committee

Chairman Fukao provided the slate of candidates compiled by the current Executive Committee with input from the Steering Committee. The Steering Committee unanimously approved the following members for the 2002-2006 FDSN Executive Committee

- Domenico Giardini, Chair
- Jim Lyons
- Tim Ahern, Secretary
- Seiji Tsuboi
- Bernard Dost
- Kaye Shedlock, IASPEI rep.

All members had been contacted and have agreed to serve.

New Members

It was decided to formally invite representatives from New Zealand and two Korean Networks to join the FDSN. The FDSN Secretary will send letters of invitation.

Other Issues

The new executive committee should consider the issue of membership for temporary networks such as the Canadian POLARIS network.

It was recommended to have the next FDSN meetings in conjunction with 2003 IUGG meetings in Sapporo, Japan.

Meeting was adjourned at 22:25.

Minutes Submitted by Tim Ahern, FDSN Secretary

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Name	Institution	Email
Tim Ahern	IRIS	tim@iris.washington.edu
Yoshio Fukao	ERI/IFREE	Fukao@eri.u-tokyo.ac.jp
Jim Lyons	GSC	lyons@seismo.nrcan.gc.ca
Chen Yun-tai	IGCSB	chenyt@cdsn.org.cn
Zhou Gongwei	IGCSB	zhou@cdsn.org.cn
Honn Kao	IES, Academia Sinica	kao@earth.sinica.edu.tw
Wen-Tzong Liang	IES, Academia Sinica	wtl@earth.sinica.edu.tw
Nozumu Takeuchi	OHP/ERI	takeuchi@eri.u-tokyo.ac.jp
Joachim Saul	GFZ/GEOFON	saul@gfz-potsdam.de
Seiji Tsuboi	IFREE	tsuboi@jamstec.go.jp
Shane Ingate	IRIS	shane@iris.edu
Robert Casey	IRIS	rob@iris.washington.edu
David Simpson	IRIS	simpson@iris.edu

Ken Gledhill	GNS (New Zealand)	k.gledhill@gns.cri.nz
Terry Webb	GNS (New Zealand)	T.Webb@gns.cri.nz
Barry Hirshorn	PTWC/NWS/NOAA	hirshorn@ptwc.noaa.gov
Brian Kennett	IASPEI (RSES, ANU)	brian@rses.anu.edu.au
Florian Haslinger	CTBTO/IMS	Florian.haslinger@ctbto.org
Chad Trabant	ORFEUS/KNMI	trabant@knmi.nl
Jan Zednik	GI AS (Czech Rep)	jzd@ig.cas.cz
Damiano Pesaresi	INGV- Italian CTBTO NDC	pesaresi@ingv.it
Rhett Butler	IRIS	Rhett@iris.edu
Kaye Shedlock	USGS	Shedlock@usgs.gov
Bernard Dost	ORFEUS	dost@knmi.nl
Joao Fonseca	IST Lisbon	fonseca@alfa.ist.ut1.pt
Salvatore Mazza	INGV- MEDNET	mazza@ingv.it
Marco Olivieri	MEDNET-INGV	olivieri@ingv.it
Barbara Romanowicz	UC Berkeley	Barbara@seismo.berkeley.edu

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Name	Institution	Email address
Joao Fonseca	IST Lisbon	fonseca@alfa.ist.ut1.pt
Salvatore Mazza	INGV- MEDNET	mazza@ingv.it
Jim Lyons	GSC	lyons@seismo.nrcan.gc.ca
Tim Ahern	IRIS	tim@iris.washington.edu
Yoshio Fukao	ERI/IFREE	Fukao@eri.u-tokyo.ac.jp
Rhett Butler	IRIS	Rhett@iris.edu
Chen Yun-tai	IGCSB	chenyt@cdsn.org.cn
Zhou Gongwei	IGCSB	zhou@cdsn.org.cn
Jan Zednik	GI ASCR	jzd@ig.cas.cz
Seiji Tsuboi	IFREE	tsuboi@jamstec.go.jp
Nozumu Takeuchi	OHP/ERI	takeuchi@eri.u-tokyo.ac.jp
Damiano Pesaresi	INGV- Italian CTBTO NDC	pesaresi@ingv.it
Marco Olivieri	MEDNET-INGV	olivieri@ingv.it
Ilya Dricker	ISTI	i.dricker@isti.com
Brian Kennett	IASPEI (RSES, ANU)	brian@rses.anu.edu.au
Barbara Romanowicz	UC Berkeley	Barbara@seismo.berkeley.edu
Bernard Dost	ORFEUS	dost@knmi.nl
Harold Bolton	USGS ASL	bolton@asl.cr.usgs.gov
Kaye Shedlock	USGS	Shedlock@usgs.gov
Robert Casey	IRIS	rob@iris.washington.edu
Fred Duennebier	U. of Hawaii	fred@soest.hawaii.edu
Florian Haslinger	CTBTO/IMS	Florian.haslinger@ctbto.org
Joachim Saul	GFZ/GEOFON	saul@gfz-potsdam.de