

Minutes of the 2001 FDSN Meeting

**January 21 & 24, 2001
OHP Symposium, Mt. Fuji Japan**

**First FDSN Business Meeting
Sunday January 21, 2001 3PM – 6PM**

The FDSN meeting was called to order at 16:15 by Chairman Yoshio Fukao. The meeting had started late due to unexpected snow and difficulty for some participants to make it to the meeting as planned.

The agenda was modified such that Rhett Butler could present the H2O report on the first day and the meeting times of working groups were adjusted so as not to conflict with some OHP functions. Working Group IV was moved to 17:00 on 22/1/2001, Working Group II was moved to 16:30 on 23/1/2001, and Working Group III was moved to 21:00 on 23/1/2001. The rest of the agenda was approved as proposed.

The minutes of the Birmingham meeting were unanimously approved without modification.

Chairman Fukao presented his brief report covering three separate topics.

1. In the area of membership, Fukao mentioned that Denmark was previously approved but confirmation of their acceptance still needed to be finalized. Ahern will contact them again. We discussed membership for Korea. There are two organizations and both seem to meet the requirements of FDSN membership. Finally Iran had been mentioned but at the last meeting it was unclear if they operated broadband stations. Ahern clarified that in fact IIEES currently operated such stations and the University of Tehran Institute of Geophysics had active plans to install broadband seismometers. Ahern will contact both organizations and ask them if they wish to join the FDSN. The final issue related to membership was with Extrema and MedNET. Both organizations are at ING in Rome. The FDSN decided that both could be part of the FDSN but only ING should have representation. At the present time the ING representative is Salvatore Mazza.
2. The second issue related to IASPEI. Fukao and Ahern both received email from Brian Kennett, the president of IASPEI. Kennett identified how IASPEI was reorganizing in the 21st century. IASPEI was asking each commission to reply to see if the present connection with IASPEI was important and if the FDSN wished to continue as an IASPEI commission. The FDSN chairman responded to IASPEI and this communication was successful. As such IASPEI will continue to sponsor the FDSN. IASPEI did change its focus to study the deep interior of the earth and earth dynamics.
3. In the area of CTBT issues, IASPEI had asked several questions about CTBT data release. Butler, Fukao and Ahern responded. The CTBT responded by sending a representative (Florian Hasslinger) to the FDSN meeting.
4. Bob Engdahl contacted the FDSN indicating his desire to step down as chair of WGI and as the IASPEI representative. Fukao responded and asked Engdahl to recommend someone to replace him. Engdahl recommended Kaye Shedlock. The FDSN endorsed her selection as WGI chair. Fukao asked Kennett to be

IASPEI representative. Kennett indicated he would rather not act in that role due to other commitments. IASPEI instead selected Kaye Shedlock to be their representative. The FDSN acknowledged her appointment enthusiastically.

Shedlock brought a proposed station naming nomenclature to the attention of the FDSN. This is being developed as part of the ANSS in the United States but the FDSN should make recommendations about it. It is closely associated with SEED. Fukao referred this to Working Group II. Dost indicated that he had not received this communication.

This ended the chairman's report.

Reports of the Member Networks

Australia was not present.

Canada was not present.

Chile was not present.

China was not present but was expected for the second meeting at which time they may report.

Czech Republic was not present but sent a report (See attachment A)

GEOSCOPE presented by Genevieve Roulit (See attachment B)

Roulit gave a brief summary of the history of GEOSCOPE. In 1982 they had two stations, in 1988 half of the FDSN stations were GEOSCOPE stations. In 1994 GEOSCOPE had 26 stations, 25 in 2000 and presently they have 26. Many of their stations now return data continuously at 20 samples per second.

Five GEOSCOPE stations are CTBT stations. Roulit indicated that they have very good relations with the CTBTO.

GEOSCOPE routinely computes moment tensors for events that are larger than 6.5. They plan to install microbargraphs at all GEOSCOPE stations to assist in removing non-seismic noise from the VBB data due to pressure variations.

GEOSCOPE generally is able to locate 200 events per year in the southern hemisphere that are not in the NEIC catalogs.

The GEOSCOPE Data Center has been actively involved in several projects since the last FDSN meeting. These include calculation of the CMTs, implementation of NetDC, Adoption of a Relational Data Base Management System and expansion of their primary RAID system.

GEOFON presented by Winfried Hanka (See attachment C)

Hanka reported that GEOFON has installed two stations since the Birmingham FDSN meeting. Station MELI was installed in Morocco, and station MALT was installed in Eastern Turkey. They also extended their temporary network in Greece. They also have a station in Libya from which they log data daily.

They have worked on the SeiscomP concept. They have extended this to real time application. They presently have 9 stations in Europe and the

Middle East as well as 1 station in Antarctica returning data in real time through the SeiscomP system.

They are currently building their systems using the Earth Data Digitizer.

The GEOFON Data Center is now using a new, very much simplified system that is 99% automatic. They have changed their policy; they don't send data to anyone anymore. Data centers must get it themselves. It is a very automated system.

Hanka indicated that they are having problems with their SPYDER® system since it is the only piece of software that must still run under Solaris, everything else is Linux.

Israel was not present.

MedNET was not present.

Pacific 21 presented by Seiji Tsuboi (See attachment D).

Pacific 21 consists of three different sub-networks, Freesia, OHP and Superplume. Freesia and Superplume are managed from Tskuba and OHP is managed by ERI in Tokyo.

Tsuboi indicated that there is now a new program in Japan. The Institute for Frontier Research on Earth Evolution will partly support the Ocean Drilling Program.

OHP and Superplume will merge and the data will be distributed by a new data center that has not yet been determined.

At the OHP they have developed a new data distribution system. Dr. Nozumo will present the OHP Data Distribution System in a talk during the OHP symposium. They have developed the NINJA system. Nozumo should present an overview of several GUI's that are part of the Ninja System.

Mexico was not present.

ORFEUS was presented by Bernard Dost (no report)

Dost showed the structure of the Orfeus Data Center and then highlighted the broadband stations in Europe.

ODC quality control the SEED data and it is now available through 1995. Distribution is now by DVD.

Near real time system still relies heavily upon the SPYDER® system. Up to 140 stations are available to SPYDER® on a worldwide basis. Typically 80-90 stations are contacted for larger events.

They have upgraded their RAID storage to 700 gigabytes. They also have a total of 37 CD-ROMs of QC'D data available.

They have between 3000 and 4000 unique visitors to their WWW site every month. Dost summarized their WILBER and WWW statistics.

Dost then discussed the Meridian Project. The project is to provide secure

access to real time data (minute delay), provide for automated data exchange (autoDRM) and additionally they are developing NetDC.

ORFEUS has also put significant effort into the seismological software archive. There is a special focus on Java. Dost ended by showing a map of autoDRM station distribution in Europe.

Poland was not present but they have provided a written report. (See attachment E).

Switzerland was presented by Domenico Giardini. (See attachment F).

The Swiss Digital Seismograph Network (SDSNet) is now basically fully functioning. Giardini showed a map of the Swiss Network. Data is available from all stations rapidly (in seconds). They are working on real time data exchange with ORFEUS and GFZ.

Taiwan was not present.

IRIS GSN was presented by Rhett Butler (See attachment G)

Butler showed a map highlighting the new sites installed since Birmingham. These include the Big Island of Hawaii and South Dakota. The station in Columbia was closed and moved to Ecuador. A new station, TRQA, was installed in Argentina,. Cape Verde, Uganda, Sri Lanka, Kwajalane, Midway and QIZ in China will soon be upgraded.

Butler then summarized the future plans of the IRIS GSN. He summarized activity related to Geophysical Observatories.

Kennett mentioned that WRAB will be a broadband array with open data. Butler showed a map of communication access capabilities at all of the stations. Much of the work of the GSN will be to continually upgrade the communication links to the various stations.

Butler summarized the efforts to cooperate with the IMS to use the Global Communication Infrastructure (GCI). They are presently doing a test with the CTBT to show that the GCI can transmit both the CTBT data and the GSN data with no interference.

Butler then gave a brief summary of the H2O observatory. At the time of the Birmingham meeting, H2O was down. By October 1999 the station was back up and has produced 95% data availability since.

IRIS DMC was presented by Tim Ahern (See attachment H)

Ahern showed the DMC archive has grown to more than 16 terabytes. He summarized the anticipated archive growth over the next five years. It will rise to about 120 terabytes if 3 new large networks and data sources materialize, including the IMS of the CTBTO, the Advanced National Seismic System (ANSS) of the USGS and the USArray project of IRIS and the National Science Foundation. He indicated that the present mass storage system was being replaced with a much more capable system whose capacity could increase to 1 petabyte (1000 terabytes) within 3-4 years. PASSCAL data is now the largest source of data arriving at the

DMC. Data flow from the GSN has leveled out at about 1.3 terabytes per year.

Ahern highlighted the amount of FDSN data flowing into the FDSN archive at the DMC. Very good progress has been made with all networks in terms of reducing the latency of the data. Of significance are MedNET and Pacific-21 that have recently submitted large amounts of data. The entire archive of GEOSCOPE data is being replaced to correct very long-term problems related to inconsistency of metadata and waveform data. Progress on this project is going well.

Ahern summarized user request processing at the DMC. In the year 2000, the DMC serviced 60,000 requests for data including 40,000 requests for customized data. Shipments outside the US rose to more than 6000 shipments in 2000, a near doubling over 1999. China, Great Britain, Japan, Australia, and Russia are heavy users.

Ahern presented a summary of how many shipments made by the DMC contained data from various FDSN networks. The most frequently requested data come from the two networks in China (CD and IC). In the year 2000, more than 1000 requests contained data from the Canadian, GEOSCOPE, GEOPHONE, MedNET, and USNSN. The written summary provides greater detail.

Ahern summarized efforts toward handling data electronically and in some cases in real time. Currently the DMC is receiving data at a rate of 3.6 gigabytes/day (1.3 terabytes per year). The DMC is using ftp, Antelope ORB and Earthworm waveservers to receive data electronically. Ahern showed a slide that showed data from 9 different networks reaching the DMC via Antelope ORB with two more networks to be added shortly. The Earthworm Waveserver is new software just now being tested. It currently is used to get USNSN data but data from about 7 other networks will probably reach the DMC via Earthworm over the next year. All the data are placed into a Uniform Data System called BUD at the DMC. It is used to build the FARM products, populate the archive in some cases and send data to users.

The DMC is presently capable of sending data in real time using Antelope ORB, LISS connections from the BUD. Work is under way using a new Data Handling System that uses Object oriented techniques built from the FISSURE model. It is expected to be ready for testing by early spring in 2001.

USGS was not present.

There were no non-FDSN networks in attendance other than the CTBT representative who will give his report at the second FDSN plenary meeting.

Ahern reviewed the times of the Working Group meetings and Chairman Fukao adjourned the meeting.

**Second FDSN Business Meeting
Wednesday January 24, 2001 8PM- 10PM**

Chairman Fukao called the meeting to order at 8:05PM.

Report from WG I given by Winfried Hanka (See attachment I) ([minutes](#))

WG I discussed several points. The first was siting. Most networks are complete now. A few gaps remain but the job is nearly complete. A short list of needed sites was identified and members were encouraged to consider putting in stations at those sites. Most of the sites were on islands. WG I compiled a list of higher priority locations for consideration. They also discussed temporary OBS stations as an option where they lie near a shipping lane. They added a few stations to the FDSN network. Hanka showed a map of these. WGI removed the station in Egypt, and TBT in the Canary Islands. They added several IRIS stations and one GEOSCOPE station.

WGI discussed the role of the FDSN network. The original goal was to define the dataset that would be on the FDSN CD-ROMs. This may no longer be needed. The IRIS DMC is producing FARM volumes and they will be available on-line at the FDSN Data Center in Seattle.

WGI is interested in inviting India to join the FDSN. There is only one FDSN station in India, Hyderabad.

The Station Inventory will be modified on the FDSN WWW pages. For instance we will add links to the relevant pages in the station book. The station book will be decentralized and this is encouraged.

WGI encourages Japan to give the data in the Pacific and elsewhere to the FDSN system of open data. They should record high frequencies as well.

The WG discussed the future tasks of WGI. This is also the WG on instrumentation since it has been merged with WG I. This fact was stressed.

Fukao asked what the Japanese response was to the proposal of opening up all their data. Hanka said the first step is just to make sure the stations get listed in the inventory. Fukao said that they could promise that these data will be open very soon.

Report from WG II by Bernard Dost ([minutes](#))

First we discussed format issues. There was one proposal from Kaye Shedlock on station naming. It was briefly discussed and it was agreed to have further correspondence on this. In general there would not only be station names, but also source codes, network codes, etc. It gives more flexibility in the station naming convention. Dost would like to have comments quickly. This will require changes in SEED and this may have major impact. This would be the beginning of a new version of SEED if it were adopted.

There were questions about sample rates. The issue of channel naming conflicts could be resolved with the Location Identifier.

We discussed the CD1 format used by the CTBTO. There are conversions from CD 1.0 to SEED but CD 1.1 is not yet convertible to SEED. We will

keep our eyes open on this point.

The usage of the time tolerance in SEED was discussed. There will be further work on how time tolerance may be implemented in a later version of SEED.

IRIS is developing a new Java SEED reader. It presently functions but does not have all the features that rdseed has.

WG II next discussed data exchange mechanisms. AutoDRM was discussed first. We assume that Urs Kradofer is the person who maintains the autoDRM code. There is a newer version available from the IDC in Vienna.

NetDC is operational now and heavily used by GEOSCOPE, IRIS and Berkeley. It was noted that firewalls could affect the usage of Networked Data Center schemes. There was a discussion about improving the user friendliness of NetDC. For instance we will include html links and help mechanisms. ORFEUS will develop an autoDRM to NetDC interface. NetDC will be installed in Japan and China as well as GEOFON and MedNET. Once this installation is complete all of the major FDSN data centers will have installed NetDC.

WILBER is changing as the underlying FARM structure is changing. The new WILBER will be made available if it is useful to any FDSN data center.

Developments in real time data were discussed. Antelope, Seiscomp, LISS, and Earthworm systems were described in some detail. We discussed all of these systems. ORFEUS is analyzing all of these systems at the present time. One problem is that one never knows if they get all the data. The FDSN is going to adopt the synchronization file mechanism of IRIS. There are two IRIS programs called GOAT and COMBINE that manipulate these files that can be distributed.

Finally we discussed the FDSN CD-ROMs. The USGS is questioning if we should continue these. WG II felt that most users of the CD-ROMs are in the third world. Most people can download the data from the on-line sources. WGII proposes to write a letter to the USGS to see if they wish to continue to produce the CD-ROMs. If they do not, then the USGS would no longer be the FDSN archive for event data. WGII proposes that a letter be written to the NEIC asking for them to decide.

The last point was related to the production of the FARM volumes. Previously it was decided that the networks should produce their own FARM volumes. This would help offload the IRIS DMC's task.

Kennett indicated that getting data on-line is difficult in some locations, even Australia. Dost indicated that we should at least try to move to DVDs. Firbas mentioned that the CD-ROMs might be incentive for some countries to participate in FDSN activities.

Working Group III - report given by Tim Ahern (See attachment J) ([minutes](#))

Ahern provides the report. Dayre mentioned that we should also stress that XML should be coordinated with Seismic Classes.

Working Group IV - report given by Ahern in place of Rhett Butler (See attachment K) ([minutes](#))

A report is included. Kennett encouraged the FDSN to make the request to IMS to release data to the FDSN but to be sure to include Kennett as the IASPEI and IUGG representative on the copy list. Fukao said that the draft letter would be circulated for member approval before it is sent.

Network Report for the CDSN - report given by Mr. Zhou (See attachment L).

From January to December 2000 two stations of the CDSN stopped operating.

In 2000, 720 cartridge tapes with 95 gigabytes of data were sent to the ASL DCC. From 1997 - 2000, the Chinese seismologists have published 137 papers using CDSN data.

Zhou indicated that the agreement was reached with CSB and USGS. The new data transmission link is now established using Internet rather than satellite links between China and the US. The stations are still connected to the IG Data Center using satellite links. As such real time data is now available for 9 stations of the NCDSN, BJT, KMI, ENH, QIZ, WMQ, HIA, MDJ, LSA, and XAN.

Next month ASL will upgrade one more station in China to the NCDSN standard. This should be complete by the end of February. Mr. Zhou gave some specific details of some of the stations of the CDSN.

IASPEI Reported by Kennett

Kennett reported on the FDSN resolution that was drafted in Birmingham. Kennett wrote a letter to Dahlman indicating his desire to have the resolution presented to the CTBTO. Kennett and Giardini represented IASPEI in Vienna. This was in February 2000. Kennett was pushing the issue of data release and Giardini was pushing the concept of real time data release.

This effort continues within IASPEI and IUGG.

Kennett then discussed changes in the organization of IASPEI. He indicated that several commissions have now been defined.

- Earth structure and Geodynamics
- Tectonophysics
- Chemistry
- Commission on Seismological Observation and Interpretation
- Earthquake Sources
- Education and Outreach

There are a total of 8 commissions at the present time. Kennett feels that this new structure more closely aligns with interests of individual scientists.

Report on the International Monitoring System by Hasslinger (See Attachment M)

Hasslinger indicated that there are 15 primary stations transmitting data. For auxiliary stations there are 59 stations installed. Infrasound has 7 stations transmitting data. The hydro acoustic network has 2 stations installed. He showed a map of where the various stations in the various networks were located and what the status of the stations was.

Hasslinger discussed issues related to the GCI. IRIS is investigating the dual use of using the GCI to transmit IRIS data as well as IMS data. Other GCI issues were discussed.

Data release issues were discussed. It seems certain that data from earthquakes larger than 4 will be released to relief organizations. Hasslinger reemphasized that trying to influence the states parties would be most useful in the effort to release the IMS data to the FDSN.

The standard station interface was discussed. It will run on a PC with LINUX or SOLARIS. It will allow existing stations to connect with the GCI. It is designed to be very modular. It has authentication, 7-day buffer and the command interface implemented. It will be specifically targeted to initially interface with Quanterra data loggers. First testing will be on IRIS GSN stations.

The 2001 plan calls for installing 6 new primary stations and to certify 10. They plan to have 7 auxiliary stations start transmitting data to Vienna. Infrasound will install 15 new stations and certify 8. Hydroacoustic will install 2 new stations and certify 2 stations.

Hasslinger indicated that his personal view was that data from FDSN stations was very useful to the effort of the IMS.

ION Report by Romanowicz

The global seismic community, to facilitate the installation of permanent ocean floor observatories, formed ION in 1993. 20 areas had been identified where no land-based stations could be installed. For the last few years, ION has worked with the ODP program for the purpose of drilling holes to install seismic systems. In 1998 the first hole was drilled. Japan and France are doing this effort. There have also been two holes drilled in the Pacific, one in the Japan Trench and one in the north Pacific. There are plans in the Philippines Sea and the H2O site of course already exists.

ION has coordinated with the OSN-1 experiment near Hawaii. It has worked with MBARI to install a seismometer in Monterrey Bay.

ION has a steering committee that is somewhat informal, somewhat like the FDSN. It has sponsored symposia at IASPEI and AGU meetings. It held a workshop in Marseilles to discuss observatories on the deep sea floor. The meeting at Mt. Fuji is now being held to see if ION can expand to the larger oceanographic community.

Fukao asked how the data would be distributed. Romanowicz indicated that there are no specific plans in this area at this time as ION is still early in its planning.

TPC-1 status by Takeuchi

TPC-1 is an ocean bottom station that was installed by ERI and IRIS. The data are available at IRIS and by ERI data distribution system. It is 700 meters below the sea level, there was a problem with SEED in this area in that depths such as -700m can not be truly represented in SEED.

The EOC network is a regional network surrounding Tokyo that has 20 stations. Their data are available via ERI data center. Takeuchi also mentioned one other network for which data are available using the ERI Ninja system.

ANSS reported by Ahern

In the absence of Kaye Shedlock, the USGS representative, Tim Ahern presented a few slides that gave the background of the ANSS. ANSS is a very large USGS effort funded entirely by the Department of the Interior. It is separate from, but coordinated with, the USArray program that is reported next. The ANSS goal is to add 100 stations in the permanent observation network to complete the USNSN, 3000 strong motion free field instruments, 3000 strong motion instruments for structures, and 1000 broadband instruments to enhance the broadband recording capability of the US Regional Networks. ANSS has currently received about \$4million and has purchased and installed a total of 80 strong motion systems in the San Francisco, Seattle, and Salt Lake City urban areas.

USArray reported by Ahern

USArray is part of the NSF Earthscope initiative. There are four phases for Earthscope. Phase 1 includes the San Andreas Observatory of Depth (SAFOD) and the USArray project. Phase 2 is the Plate Boundary Observatory, a large effort to install the Pacific North American plate boundary using GPS technology. Phase 3 INSAR, an initiative to use satellite interferometer techniques.

USArray is not yet funded but the proposed budget is on the order of \$75million. It will consist of 100 permanent recording stations to act as a reference network, a 400 element movable array called "Bigfoot" and another 400 instruments to be used by PIs in a flexible array component. Data would be telemetered in real time from the field.

It is expected that funding will be available beginning next year.

International Seismological Centre not present (See attachment N)

Contact with CTBT

Fukao returned the discussion to the issue of IMS data release. Fukao suggested that Ahern and Fukao write the first version of the letter. The draft will then be circulated to the FDSN membership and to Brian Kennett as IASPEI representative. Hasslinger indicated that this sounded like a good idea.

Action Item: A letter will be sent to CTBTO

Membership

Ahern indicated that he would send letters of invitation to 2 groups in

Korea, 2 groups in Iran and the one group in Denmark.

Working group I recommends that India be invited to join. A letter will also be sent to India to S. Bhattacharya who attended the FDSN meetings in Greece in 1987. A representative from Portugal was present and indicated that they are running a large broadband network and would be interested in joining. A letter will also be sent to Portugal.

Next Meeting

It was generally agreeable to see if the next FDSN meeting could be held in conjunction with the IRIS workshop in Hawaii in 2002. Ahern will investigate this possibility and report to the FDSN Excom.

Action Item: Investigate having the next FDSN meeting in conjunction with the IRIS workshop in 2002.

Chairman Fukao adjourned the meeting at 10:05PM

Meeting Participants				
Name	Institution	E-mail	1 st Meeting	2 nd Meeting
Tim Ahern	IRIS	tim@iris.washington.edu	X	X
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		NUMBER OF PARTICIPANTS	17	17

**Proposed Agenda 2001 FDSN Meeting
January 21 & 24, 2001
OHP Symposium, Mt. Fuji Japan**

**First FDSN Business Meeting
Sunday January 21, 2001 3PM – 6PM**

1. Adoption of Agenda
2. Approval of 1999 FDSN minutes from Birmingham, England
3. Chairman's Report Fukao
4. Reports of Member Networks
 - Networks
 - Data Centers
5. Reports of non-FDSN Networks in attendance
6. Verify Meeting times of working groups – the following are proposed
 - I. Working Group I on Station Siting and Instrumentation 21Jan00 8PM - Hanka
 - II. Working Group II on Data Exchange 23Jan00 5PM - Dost
 - III. Working Group III on Software Coordination 23Jan00 8PM - Ahern
 - IV. Working Group IV on CTBT Coordination 22Jan00 5PM - Butler

Second FDSN Business Meeting

Wednesday, January 24, 2001 8PM – 9:30PM

7. Reports of Working Groups
 - [Working Group I](#) – Hanka
 - [Working Group II](#) – Dost
 - [Working Group III](#) – Ahern
 - [Working Group IV](#) - Butler
 8. Reports from other organizations
 - IASPEI - Kennett
 - CTBTO
 - IMS, GCI and IDC - Haslinger
 - Ocean Based Initiatives
 - ION - Romanowicz
 - TPC-1 - Fukao
 - H2O - Butler
 - ANSS - Ahern
 - USArray - Ahern
 - ISC - Written report from Willeman
 9. Nominations for new FDSN Members
 10. Next Annual Meeting
 11. Adjourn
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