

**FDSN Plenary Meeting  
July 26 & 29, 1999  
1999 IUGG  
Birmingham, England**

Chairman Yoshio Fukao called the first plenary meeting of the FDSN to order at 1800. The proposed agenda was modified in order to discuss the FDSN resolution to IASPEI/IUGG concerning the release of information from the Comprehensive Test Ban Treaty Organization (CTBTO).

The acting chairman of WG IV, Rhett Butler, distributed the proposed resolution. Butler indicated that this resolution is being presented from a purely scientific perspective. WGIV produced a draft of a resolution, by email, which resulted in what was presented before the FDSN Plenary session. Discussion continued with several questions asked and discussed. It was asked why the radionuclide data were excluded from the resolution. It was answered that this is being presented from the FDSN and therefore the emphasis was being placed on seismic data.

Gerardo Suarez clarified that the CTBTO is not part of this decision. The state's parties are making it in a political environment.

The FDSN agreed to the resolution as worded. Engdahl will submit the resolution to IUGG and if not adopted there, to IASPEI.

Fukao then asked if the minutes of the 1998 meeting were acceptable. Hanka indicated that the WG-I report did not correctly include at least one GEOFON station. Dost indicated that the WG-II report had not been included in the minutes. The minutes were approved as written with the understanding that the two items mentioned would be corrected and included.

We then began the member network reports.

## **MEMBER NETWORK REPORTS**

### **Australia by Mark Leonard (See attachment A)**

The Australian National network consists of 23 telemetered digital stations. The data are available by autoDRM from [autodrm@ausseis.gov.au](mailto:autodrm@ausseis.gov.au). The Australian network uses primarily CMG3 seismometers. Australia has near term plans to send data to the FDSN archive in SEED format.

### **China by Chen Yun Tai (See attachment B)**

The China Digital Seismic Network underwent major upgrades in 1998. Prior to then, data availability was 96%. After the upgrade data availability dropped to about 80%. China Seismological Bureau (CSB) acts as the China National Data Center for the CTBT. The goal is to be able to detect all events larger than magnitude 5.5 within China. Effort has been placed on being able to provide rapid determination of earthquake parameters for all larger Chinese events.

In 1988, 8 stations were upgraded as part of the New China Digital Seismograph Network. These stations included SUN workstations at each station.

### **GEOSCOPE by Genevieve Roult (See attachment C)**

GEOSCOPE now has 28 stations, thirteen of them are running VBB channels recorded continuously at 20 samples per second. Thirteen of the stations are situated near telephone lines.

Roult then summarized developments at GEOSCOPE that have taken place since the last FDSN meeting. They have a new database management system at GEOSCOPE. They generate the GEOSCOPE station book pages automatically from the database. The FDSN station book now links to the GEOSCOPE pages for the stations book.

Roult summarized future activities at GEOSCOPE as specified in the attached report. These include the production of the CMT solution for larger events within 1-2 days. They produce CMT solutions for all events larger than 6.5.

Data at GEOSCOPE can be accessed by CDROMs, anonymous ftp, WWW, autoDRM and most recently the NetDC system.

The GEOSCOPE 2000 plans call for the development of a new data logger. It will be capable of recording 6 channels of 24bit data at 20 samples per second continuous and 80 samples per second of event triggered data. The data loggers will also record the one sample per second data at 24bit resolution.

### **GEOFON by Winfried Hanka (See attachment D)**

For GEOFON this was a year of survival. They had problems both with stations and with the data center. They had new stations in Maui, Rio Bravo in the Western Amazon, the Mediterranean station (MAHO), a station in Poland and several stations in the Greece/Aegean area.

At the Seattle FDSN meeting it was agreed that IRIS would distribute the GEOFON data. Instead GEOFON decided to remove all the old software and hardware and build an entirely new system that was much simpler. These tasks were completed and the GEOFON data center is again fully functional. The hardware is now paced on two PCs to do the archiving and distribution. Hanka described the new data center system that was developed. GEOFON now creates its own FARM volumes.

GEOFON still plans to participate in the NetDC system.

### **Graefenberg by Helmut Aichelle ( no attachment)**

Aichelle indicated that continuous data have been recorded in Graefenberg since 1976. The data are available by ftp. Data from the German Regional Seismograph Network are available from 1992.

### **Israel by Hanka**

Hanka indicated that at the present time Israel operates the seismic stations. Israel plans to install 8 more stations at which time Israel will distribute the data themselves.

### **MEDNET by Andrea Morelli (See attachment E)**

There has not been any change since the December FDSN meeting. They did lose the Belgrade seismic station. Morelli indicated that he thought it was possible to reopen the Albanian and Algerian stations.

MedNET needs to upgrade the field equipment to solve year 2000 problems.

They are still planning one station with GEOFON in Turkey and 3 more stations in Italy.

MedNET operates an automated dial up system. They compute regional CMT solutions for the Mediterranean region. They do this for all events with magnitudes 4.2 to 5.5. It is not extended to larger magnitudes because Harvard does those.

MedNET has the hardware for a new mass storage system and a large RAID system. Several stations contribute to the CTBT. They still operate station TNV in Antarctica. They may be able to add a telecommunications link to it.

## **Pacific 21**

### **by Seiji Tsuboi ( See attachment F) and Mizuho Ishida (See Attachment G)**

Tsuboi summarized Pacific 21. It consists of three parts, FREESIA and Plume Project of the Japanese Science and Technology Agency (STA), and the Ocean Hemispheres Project funded by the Ministry of Education through the University of Tokyo.

Project FREESIA will eventually have 50 VBB stations in the Japanese Islands. The Plume project will install VBB stations in the Southern Pacific Ocean in a network called SPANET. The Ocean Hemisphere Project (OHP) is the successor to project POSEIDON. OHP is attempting to install VBB seismometers in ODP drill holes as well as maintaining the VBB stations that were installed as part of the POSEIDON project.

They have a large number of WWW based tools to access data from the various Pacific 21 Data Centers. Pacific 21 will not have a single data center, but rather three separate centers, one for each of the major programs. Data are available for either continuous data or event data.

Muzuhmo Ishida gave a more complete report on FRESSIA. Each of the 50 FREESIA stations will have 3 STS-1 seismometers and one strong motion instrument. They are using Quanterra Q680 data loggers. All data are transmitted by TCP/IP. Data are available at a data center in Tsukuba. They have developed a near-real time data recovery system that is triggered by JMA event notification bulletins. They determine CMT solutions for events and distribute the solutions within minutes.

Ishida presented many examples of what is available by the STA WWW pages. These can be found at

<http://bosai.go.jp.index.html> and

<http://argent.geo.bosai.go.jp/fresia/index.html>

## **Poland by Winfried Hanka**

Hanka said a few words about stations in Poland. He indicated that they are suing two STS-2 sensors at 2 stations in Poland.

## **Switzerland by Domenico Giardini (See attachment H)**

The national network of Switzerland is currently still being upgraded and as such is running both new stations as well as several older stations. At the present time 12 stations are operating with the expectation that 17 stations will be installed by August , 1999. They are using STS-2 seismometers.

All data are available via the Swiss autoDRM.

They also run a 16bit strong motion network of 60 stations.

The Swiss are involved in the MARS project.

All data are available in real time.

## **Taiwan Report by Ben Kuo (See attachment I)**

There are presently 12 stations in the Broadband Array in Taiwan for Seismology (BATS). 9 of these stations are equipped with STS-2 sensors and 3 with STS-1 sensors. They also operate 17 REFTEK portable instruments with STS-2 sensors.

Some of the IES stations are operated in conjunction with the Central Weather Bureau (CWB) in Taipei.

The Institute of Earth Sciences (IES) has formed a committee to determine the need to establish a regional data center. Honn Kao wants it to meet FDSN standards.

### **IRIS GSN by Rhett Butler**

Butler summarized the new GSN stations that have been installed since the last meeting of the FDSN. He mentioned that Botswana has had its GTSN station join the IRIS GSN. Butler then discussed installations that should be completed in the near future. These included the Big Island, Midway with NIED of Japan, Raoul Island and RSSD in South Dakota. There have been a total of 5 installations from 12/1998 until now.

IRIS anticipates installing 8 more stations by the end of this year. They are still looking at telemetry options including the use of satellite technology and perhaps using the GCI of the CTBTO.

### **IRIS DMC (FDSN Data Center) by Tim Ahern (See attachment J)**

Ahern summarized the statistics as they relate to the FDSN activities at the IRIS DMC. The IRIS DMC archive presently contains about 9.6 terabytes of waveform data. The total of FDSN data at the DMC is 1.8 terabytes with about half of that amount coming from FDSN networks that have direct IRIS or USGS assistance. Therefore about 1 terabyte of waveform data from FDSN members not related to IRIS & USGS is available in the FDSN archive.

Ahern summarized the various user data access tools at the IRIS DMC. He indicated that there were both email or client based tools as well as a variety of WWW tools. There are three repositories of data and information at the FDSN archive. The SPYDER® data are SEED volumes available in near real time, the FARM data are now generated about 3-4 months behind real time and placed in on-line disk systems accessible by everyone. As well as the SPYDER® and FARM event related data sets, the entire continuous archive is also available.

One WWW tool (SeismiQuery) is available that provides complete access to all of the information available in the ORACLE DBMS system at IRIS. SeismiQuery offers a convenient point and click method of generating SQL making it usable by everyone.

Ahern indicated that the IRIS DMC expects to ship about 38,000 shipments of data in 1999. About 21,000 of these shipments will be customized shipments built due to requests of individual scientists. Of these 21,000 customized shipments, about 12,000 come from automated tools such as WILBER and CROP that access the on-line data sets.

Ahern then presented summaries of the number of data shipments that were made from the IRIS DMC to individuals outside of the United States. The attached report has more specific details.

Ahern also showed a summary of the amount of FDSN supplied data that the FDSN archive has shipped to all users. The trend is toward increasing amounts of FDSN data shipped every year.

### **Denmark by Peter Voss**

Voss briefly summarized the state of broadband seismic stations in Denmark. At the present time they operate 4 stations. One is equipped with an STS1 seismometer, 2 with STS2 seismometers and the final one with an S-13.

Data are available by autoDRM.

There are 5 VBB stations in Greenland, 1 with STS1 seismometers and 4 with STS2 seismometers.

### **CTBTO by Gerardo Suarez**

Suarez summarized the design goals for the International Monitoring System (IMS). It is to consist of 50 primary stations, roughly half of which are seismic arrays. There are also 120 auxiliary stations in the planned network. Of these auxiliary stations about 60 stations belong to the FDSN and 30 stations belong to other national networks. There is a report available that describes the status of auxiliary stations in terms of the CTBT.

They propose that an interface box should be constructed that will interface existing stations to the IMS network. This box will provide the 7-day required buffer as well as providing data authentication if needed and provide the interface to the Global Communications Infrastructure (GCI). They feel that this is perhaps the most unobtrusive method of attaching FDSN stations to the IMS infrastructure.

There has been progress in developing an interface box at IRIS/IDA and IRIS/USGS stations and they will soon issue a contract to enable the manufacture of these boxes.

Suarez indicated that the FDSN might be able to use the GCI to access some data from FDSN stations. The need statistics of how much data the FDSN anticipates needing to transmit via the GCI.

There are several issues that need to be worked out between the CTBTO and the FDSN network operators in terms of how the various stations should be operated.

Suarez mentioned that there are some sites on the IMS list that don't exist. In this case the IMS will pay for the installation. They may want FDSN cooperation in running and operating some of these stations.

Suarez mentioned that perhaps the FDSN might wish to cooperate in training of station operators.

Daemiano Pesaresi gave a brief review of the IMS. He mentioned the 4 different technologies, seismic, infrasound, hydroacoustic and radionuclide. He also discussed the GCI and how it will be used to obtain data from stations as well as distributing waveform data and products to data centers. He gave an excellent summary of the various GCI models and how they might be used.

Pesaresi summarized the current status of IMS in terms of site surveys as well as installation of stations.

### **Nomination of New FDSN Members**

Ahern indicated that a few countries had contacted the FDSN about membership. These include

- KIGAM in South Korea
- Korean Meteorological Agency (KMA) in South Korea
- International Institute of Earthquake and Engineering Seismology (IIEES) in Iran
- Geophysical Institute of Tehran University in Iran

Denmark also indicated its desire to join the FDSN.

The FDSN felt that those networks that currently operated more than one broadband seismic station should be invited to join. The FDSN Secretary will send these letters of invitation on behalf of the FDSN. As there was some question as to the status of the broadband stations

operated by the Geophysical Institute it was felt that their status should be first determined and if it is determined they are running broadband stations, they will also be invited.

## Working Group Meetings

Times of the various meetings of the working groups were clarified. The proposed agenda was correct with the exception of WG IV on CTBT issues. WG IV was to meet at 12:45 on Tuesday and Wednesday in Assembly Room A.

The final plenary meeting of the FDSN will be at 18:00 on Thursday July 28, 1999.

Chairman Fukao adjourned the first business meeting at 20:45.

## Day 1 Attendees:

Name	Institution	E-mail
Tim Ahern	IRIS	<a href="mailto:tim@iris.washington.edu">tim@iris.washington.edu</a>
Helmut Aichele	Seismological Centre Observatory, SZGRF	<a href="mailto:aichele@szgrf.uni-erlangen.de">aichele@szgrf.uni-erlangen.de</a>
Peter Basham	CTBTO	<a href="mailto:peter.basham@ctbto.org">peter.basham@ctbto.org</a>
Peter Davis	Univ. of Calif/San Diego, IDA	<a href="mailto:pdavis@ucsd.edu">pdavis@ucsd.edu</a>
Bernard Dost	ORFEUS/KNMI	<a href="mailto:dost@knmi.nl">dost@knmi.nl</a>
Bob Engdahl	IASPEI	<a href="mailto:engdahl@colorado.edu">engdahl@colorado.edu</a>
Yoshio Fukao	ERI/Univ. of Tokyo	<a href="mailto:fukao@eri.u-tokyo.ac.jp">fukao@eri.u-tokyo.ac.jp</a>
Domenico Giardini	SED/ETHZ	<a href="mailto:giardini@seismo.ifg.ethz.ch">giardini@seismo.ifg.ethz.ch</a>
Soren Gregersen	KMS/Denmark	<a href="mailto:sg@kms.dk">sg@kms.dk</a>
Winfried Hanka	GEOFON/GFZ	<a href="mailto:hanka@gfz-potsdam.de">hanka@gfz-potsdam.de</a>
Charles R. (Bob) Hutt	USGS/ASL	<a href="mailto:bhutt@usgs.gov">bhutt@usgs.gov</a>
Mizuho Ishida	MIED, STA	<a href="mailto:ishida@geo.bosai.go.jp">ishida@geo.bosai.go.jp</a>
Mark Leonard	AGSO/Australia	<a href="mailto:mleonard@agso.gov.au">mleonard@agso.gov.au</a>
Andrea Morelli	MEDNET/ING	<a href="mailto:morelli@ingrm.it">morelli@ingrm.it</a>
Damiano Pesaresi	CTBTO	<a href="mailto:damiano.pesaresi@ctbto.org">damiano.pesaresi@ctbto.org</a>
Barbara Romanowicz	Univ. of Calif./Berkeley	<a href="mailto:barbara@seismo.berkeley.edu">barbara@seismo.berkeley.edu</a>
Genevieve Roult	GEOSCOPE/IPGP	<a href="mailto:groult@ipgp.jussieu.fr">groult@ipgp.jussieu.fr</a>
Mikhail Rozhkov	Moscow Data Ctr./SYNAPSE	<a href="mailto:mike@synapse.ru">mike@synapse.ru</a>
Johannes Schweitzer	Norsar	<a href="mailto:Johannes@norsar.no">Johannes@norsar.no</a>
Kaye Shedlock	USGS	<a href="mailto:shedlock@usgs.gov">shedlock@usgs.gov</a>
Reinoud Sleeman	KNMI/ORFEUS	<a href="mailto:sleeman@knmi.nl">sleeman@knmi.nl</a>
Gerardo Suárez	IMS, Vienna	<a href="mailto:gsuarez@ctbto.org">gsuarez@ctbto.org</a>
Yi-Ben Tsai	National Central Univ./Taiwan	<a href="mailto:ybtsai@eqm.gep.ncu.edu.tw">ybtsai@eqm.gep.ncu.edu.tw</a>
Seiji Tsuboi	Pacific 21	<a href="mailto:tsuboi@cc.nda.ac.jp">tsuboi@cc.nda.ac.jp</a>
Torild van Eck	ORFEUS/KNMI	<a href="mailto:vaneck@knmi.nl">vaneck@knmi.nl</a>
Peter Voss	KMS/Denmark	<a href="mailto:pv@kms.dk">pv@kms.dk</a>
Shingo Watada	ERI/Univ. of Tokyo	<a href="mailto:watada@eri.u-tokyo.ac.jp">watada@eri.u-tokyo.ac.jp</a>

**Second FDSN Plenary Meeting**  
**July 29, 1999**  
**1999 IUGG**  
**Birmingham, England**

The second plenary meeting of the 1999 FDSN was called to order by Chairman Yoshio Fukao at 6:04 PM. Due to late arrivals of some people the agenda was not followed in the exact order.

**WGII Report** Bernard Dost, chairman of WG II on Data Exchange was asked to present the WG II report. Dost reported that WGII was a relatively short meeting partly due to the fact that SEED is now a very mature format. There were two SEED related issues. The WG added two new instrument codes that had not previously been assigned.

Code O was reserved for water current measurements

Code J was reserved for Electric Potential or EMF

The second SEED related issue concerned the depth of emplacement of a sensor. At the present time the maximum value in this field is 999.9 meters. We have encountered a situation where this does not allow a large enough value. Tim Ahern will send a proposal as to how to solve this issue and the WG will act upon it by email.

In the area of data exchange there are three significant areas. The first is the use of autoDRMs. ORFEUS has developed a mechanism whereby SEED data can be the selected data format. The latest release by Kradolfer includes this capability. The second area is related to NetDC. There is presently an implementation of NetDC at IRIS DMC, Berkeley, ORFEUS and GEOSCOPE. The initial tests are very positive but testing of the system will continue the rest of this year and at a later date the system will be announced. The final exchange mechanism was WILBER. It is now installed at several locations; at IRIS it accesses both FARM and SPYDER® data, at GEOFON it accesses both FARM and SPYDER® data, at ORFEUS it accesses SPYDER® data and it is currently being installed at GEOSCOPE.

Other issues considered included the ability of FDSN data centers to produce their own FARM volumes. Timeliness of production of these volumes is now important. There was little discussion about production of FDSN CD-ROMs.

**WG III Report** Tim Ahern, Chairperson of WGIII summarized the WGIII meeting. The working group reviewed the description of the working group that is to be posted on the WWW. It was suggested that we add a distinct reference to the fact that object-oriented approaches are to be followed and these will support distributed computing. The description will be modified accordingly and published on the WWW.

Torild Van Eck of ORFEUS gave a summary of software libraries at ORFEUS and recommended that working group III help coordinate activities in this area. He recommended that in the future FDSN software developers include the GNU licensing agreement in all seismological software.

It was recommended that FDSN WGIII assume the responsibility for the IASPEI Software Library. A specific subgroup of people will be formed that will aid in this activity.

Anthony Lomax discussed the issue of copyrighting of software. He summarized the various

types of copyrighting available to software developers. These included copyhoarding, licensing, shareware, copylefting (the GNU approach), Freeware, and Public Domain software. Discussion continued and although no specific recommendation was made it was thought that we might wish to consider GNU copyrighting. More information can be found at <http://www.gnu.org>. In the long run it was felt that WGIII should make a recommendation as to copyrighting approaches the FDSN should adopt.

Philip Crotwell of the University of South Carolina then summarized the IRIS FISSURES initiative. A copy of his presentation can be found at <http://www.seis.sc.edu/crotwell/iugg>. Crotwell presented an overview of the IRIS FISSURES initiative. He identified some specific advantages of JAVA and provided a definition of CORBA. He indicated that CORBA adds little complexity to a programming task but has significant advantages in terms of future benefits. He gave an overview of FISSURES including a discussion of the FISSURES business model that summarizes the seismic classes being used and the interconnections between the various objects. Crotwell indicated that the FISSURES class definitions should be completed this year. Much has been learned since the original Pilot Application for FISSURES was written and the classes are changing as a result.

The WGIII strongly recommended that the FISSURES classes be published so that the community can provide comment on them as well as using them in their own developments.

Ray Willemann of the ISC asked about the need for CORBA. Crotwell responded that much of CORBA is still useful in terms of providing common interfaces to the objects through Interface Definition Language (IDL) and that many of the things that programmers need to do are already available through standard CORBA services. For instance, Crotwell was able to develop a robust method of transferring real time seismic data over the Internet using the Event Service of CORBA. The task was accomplished in roughly one day.

A sub-group of WGIII was identified to study the FISSURES class definitions. This group includes

- Manfred Baer, ETH, Switzerland
- Jonathen Lees, Yale University, USA
- Mikhail Rozhkov, Moscow Data Center, Russia
- Philip Crotwell, University of South Carolina, USA
- Anthony Lomax, University of Nice, France
- Reinoud Sleeman, ORFEUS, The Netherlands
- Sergei Yunga, IPE, Russia

**WG I Report** Rhett Butler, acting chairperson of WGI gave the report. Butler showed the FDSN map and commented that most of the stations already exist that are indicated on the Engdahl station list. He also showed the FDSN network and noted that most of those stations also exist. There were several recommendations made at the WGI meeting.

- The FDSN station list is going to be on the WWW. IRIS will host the pages and ORFEUS will host the page for the European stations.
- Links will be made to other sites where possible
- Temporary Networks will be represented
- Networks should register their station codes with the NEIC/ISC.

There was discussion about where the instrumentation function should take place within the FDSN working groups. The possibilities are to keep the function within WGI, start a new working group (WGV?), or organize it within ORFEUS. It was decided to take option 3, ORFEUS, and provide reports within WGI.

**WGIV Report** Rhett Butler, acting for Jim Lyons, presented the report. 90 stations overlap between the FDSN and the CTBT/IMS networks. Some countries have the same organization



for CTBT and the FDSN.

Much of the WGIV meeting was related to the exchange of information that took place.

There were no specific recommendations from WGIV. Topics of discussion included

- Data Access
- Coordination between IMS and Parent Networks
- Use of the Global Communications Infrastructure (GCI) at IMS stations
- Use of GCI infrastructure if FDSN buys satellite time in places where there might be infrasound, no IMS seismic station, but there is an FDSN station.

Ahern read the redrafted IASPEI resolution. Butler indicated that they took the teeth out of the resolution.

**USNSN Report by Kaye Shedlock (See Attachment K).** Shedlock gave the USNSN report. 30 complete broadband stations are installed, 23 cooperative stations and 85 short period stations. Data from the USNSN are now at IRIS, and the responsibility for the dataless SEED maintenance has been shifted to ASL.

Shedlock mentioned they only have data through the end of 1991 for FDSN CD-ROMs. DMC has problems with some networks data in 1992.

Shedlock gave a brief review of the ANSS. She indicated the system would have \$20 million added to the FY 2000 budget. There may be up to 20 regional centers. There will be 3000 free field and 3000 structural strong motion sensors for a total of 6000 strong motion sensors. Hanka asked what she mean in terms of sharing FDSN data in near real time (see the USNSN report for more detail).

Hanka also asked what SPYDER® stations get into the NEIC for review.

**ORFEUS Report Bernard Dost. (See Attachment L)** Dost presented the report on ORFEUS. He first summarized ORFEUS activities. In January 1999 ORFEUS produced 7 CDs with the Jan-Dec 1993 data. In January, 2000 they expect to produce 11 CDs with Jan-Dec 1994 data. The 1995 data are on line with a total size of 4.5 gigabytes.

ORFEUS has several data interfaces. These include SPEED, NRT, SPYDER®, WILBER, autoDRM and NETDC.

ORFEUS organizes Working Groups.

1. WG1 is for station siting and standards,
2. WG2 for technical support,
3. WG3 for Mobile Stations
4. Seismological Software

Dost summarized activities within each of these groups.

**Hawaii 2 Observatory (H2O)** Butler talked about H2O. The ocean-bottom observatory was installed in September 1998. It failed a short time after installation and now is going to be repaired in the fall of 1999.

This system cost about \$3million. It will cost about \$900K to repair it.

**USARRAY** Butler said a few words about USARRAY as well. There will be 400 broadband sensors that move around the USA in a deployment that has been named Bigfoot. There will be 400 additional sensors to move around the US and focus on specific targets. This second set of 400 instruments will be PI lead. USARRAY will also uniformly cover the US with GSN stations

(STS-1). This will increase the number of GSN stations from about 10 to about 20.

**FDSN Structure:** This topic was introduced by Yoshio Fukao. Hanka indicated that he wanted a rotating structure. The Executive Committee proposed that the FDSN Data Center (IRIS) retain some functions such as the heart of the WWW and some basic functions such as mailings. The Secretary and chair should rotate with the Executive Committee every 4 years but IRIS will act as a permanent bureau for some infrastructure.

**Next Annual Meeting** Fukao suggested some possibilities. Fukao proposed a Japan meeting in Dec 2000 or January 2001. This will be done in conjunction with an OHP symposium. It was decided to do this.

The meeting was adjourned at 19:30.

Respectfully submitted

Tim Ahern  
FDSN Secretary

**Other Attachments:**

- M. Proposed FDSN Resolution to IASPEI
- N. IASPEI Resolution to CTBTO
- O. WGI Station List and Maps
- P. Czech Network Report

**Day 2 Attendees:**

Name	Institution	E-mail
Tim Ahern	IRIS	<a href="mailto:tim@iris.washington.edu">tim@iris.washington.edu</a>
Rhett Butler	IRIS	<a href="mailto:rhett@iris.edu">rhett@iris.edu</a>
Igor Chernobay	CTBTO	<a href="mailto:ichernobay@ctbto.org">ichernobay@ctbto.org</a>
Bernard Dost	ORFEUS/KNMI	<a href="mailto:dost@knmi.nl">dost@knmi.nl</a>
Láslo Evers	ORFEUS/KNMI	<a href="mailto:evers@knmi.nl">evers@knmi.nl</a>
Yoshio Fukao	ERI/Univ. of Tokyo	<a href="mailto:fukao@eri.u-tokyo.ac.jp">fukao@eri.u-tokyo.ac.jp</a>
Yefim Gitterman	GII/Israel	<a href="mailto:yefim@iprg.energy.gov.il">yefim@iprg.energy.gov.il</a>
Winfried Hanka	GEOFON/GFZ	<a href="mailto:hanka@gfz-potsdam.de">hanka@gfz-potsdam.de</a>
Karl-Heinz Jaeckel	GFZ/GEOFON	<a href="mailto:jaeckel@gfz-potsdam.de">jaeckel@gfz-potsdam.de</a>
Tine Larsen	KMS, Denmark	<a href="mailto:tbl@kms.dk">tbl@kms.dk</a>
Mark Leonard	AGSO/Australia	<a href="mailto:mleonard@agso.gov.au">mleonard@agso.gov.au</a>
Ruifeng Liu	IGCSB, China	<a href="mailto:liurf@eq-igp.ac.cn">liurf@eq-igp.ac.cn</a> OR <a href="mailto:liurf@cdsndmc.css.gov">liurf@cdsndmc.css.gov</a>
Genevieve Roult	GEOSCOPE/IPGP	<a href="mailto:groult@ipgp.jussieu.fr">groult@ipgp.jussieu.fr</a>
Kaye Shedlock	USGS	<a href="mailto:shedlock@usgs.gov">shedlock@usgs.gov</a>
Reinoud Sleeman	KNMI/ORFEUS	<a href="mailto:sleeman@knmi.nl">sleeman@knmi.nl</a>
Seiji Tsuboi	Pacific 21	<a href="mailto:tsuboi@cc.nda.ac.jp">tsuboi@cc.nda.ac.jp</a>
Bojan Uran	Geophys. Survey of Slovenia	<a href="mailto:bojan.uran@gov.si">bojan.uran@gov.si</a>
Torild van Eck	ORFEUS/KNMI	<a href="mailto:vaneck@knmi.nl">vaneck@knmi.nl</a>
Peter Voss	KMS/Denmark	<a href="mailto:pv@kms.dk">pv@kms.dk</a>
Shingo Watada	ERI/Univ. of Tokyo	<a href="mailto:watada@eri.u-tokyo.ac.jp">watada@eri.u-tokyo.ac.jp</a>