Centre Sismologique Euro-Méditerranéen
European-Mediterranean Seismological Centre

Newsletter

N° 8 DECEMBER 1995

EDITORIAL

EMSC held its 15th General Assembly on 12 October in its offices within LDG's new building at Bruyères-le-Châtel. The excellent facilities include room for visiting scientists and all members are welcome to use them, by arrangement with Bruno Feignier. Highlights of recent EMSC activities reported include an increase in the number of networks participating in the rapid determination of epicentres from 6 to 21, an expansion in the number of laboratories establishing Automatic Data Request Managers (AutoDRM), advances in the rapid determination of source parameters and the new initiative to provide a second release of information following a destructive earthquake. The last provides macroseismic and other information useful to members in their own responses to media, national authorities, holidaymakers etc. It depends on members sending in their own information through direct contacts in the affected region and we seek your help for this service.

The Assembly was pleased to welcome 4 new members to EMSC and to receive personal presentations from the 3 representatives able to attend. They are, NRIAG (Egypt), LCPC (France), DIAS (Dublin), NCSR (Lebanon) whose membership both deepens and extends, geographically, our coverage.

Links between EMSC and ORFEUS have progressed following a hiatus during EMSC's restructuring. The 2 organisations received a helpful report from their joint Scientific Advisory Board (SAB) and the EMSC-ORFEUS Coordinating Committee met in DeBilt on 23 September. It was agreed that the idea of merging the two should be abandoned but that joint scientific and, where appropriate, funding opportunities should be sought. Continuation of the SAB and the Coordinating Committee will facilitate the linkage and an ESC representative has been included to strengthen the latter. An ORFEUS news page will become a feature of the Newsletter starting with this issue.

Also reported in this issue, is news of the Eastern Mediterranean JSOP experiment for which EMSC acted as the data centre. The initiative will strengthen responses to, and knowledge of, seismicity and risk in the region through essential cross-border collaboration.

The next Assembly of EMSC will take place at the time of the ESC meeting in Iccland in September 1996. Details are included here and can be found on the new ESC homepage on http://ui.nmh.ac.uk/esc.html.

Chris Browitt
President

Participants of the 15th EMSC Assembly which took place on October 12, 1995 at EMSC new offices in Bruyères-le-Chatel (building at the back).

THE JOINT SEISMIC OBSERVATION PROGRAM (JSOP) OF THE EAST MEDITERRANEAN REGION

A summary report by

Avi Shapira

(Seismology Division, The Institute for Petroleum Research and Geophysics, Israel)

The East Mediterranean Region (EMR) has a long documented history of devastating earthquakes. On average, we are informed every 10 years or so of another destructive earthquake which occurred in this region bringing death, injury and tremendous damage to the heavily populated parts of the EMR. Earthquakes have no political boundaries, nor do seismic waves need special visas to shake neighbouring countries. This simple truth has been fully recognized by the scientific communities of the EMR countries, but, until recently, very little has been done to overcome the political difficulties. The change in the political atmosphere in the EMR region, and especially the beginning of the peace process, has made earthquakes the main threat to the safety of the people of the EMR as well as to the welfare of the nations in that region.

In 1992, under the aegis of the US Geological Survey, the Earth Science Division of UNESCO and the European Council through the Open Partial Agreement, a regional cooperation program for Reducing Earthquake Loss in the EMR (RELEMR), was initiated, activated and expedited. One of the first objectives to be implemented in this program is the improvement of the earthquake monitoring capabilities in the East Mediterranean Region; an improvement which could only be achieved through genuine cooperation between the seismological institutions operating in the region. At a workshop held in Nicosia, Cyprus (1994), members of the seismological centers in Cyprus, Egypt, Israel, Jordan, Lebanon, Saudi Arabia, Turkey and Yemen have agreed upon a joint seismological observation period (JSOP-1), i.e. September - November 1994. During this period, each earthquake of magnitude 3.0 or above had to be reported to all participating institutions. The reports include measurements (arrival times, amplitudes and polarity data, where available) as well as source parameters (origin time, hypocenter location and magnitude) if determined. The European-Mediterranean Seismological Centre (EMSC in Paris, France) has taken upon itself the task of coordination, collection and dissemination of the data from and to all the participants. The efficiency of EMSC on one hand and the scientific interests of the participants on the other, enabled, for the first time in the history of the EMR, full capacity seismic monitoring operation in the region.

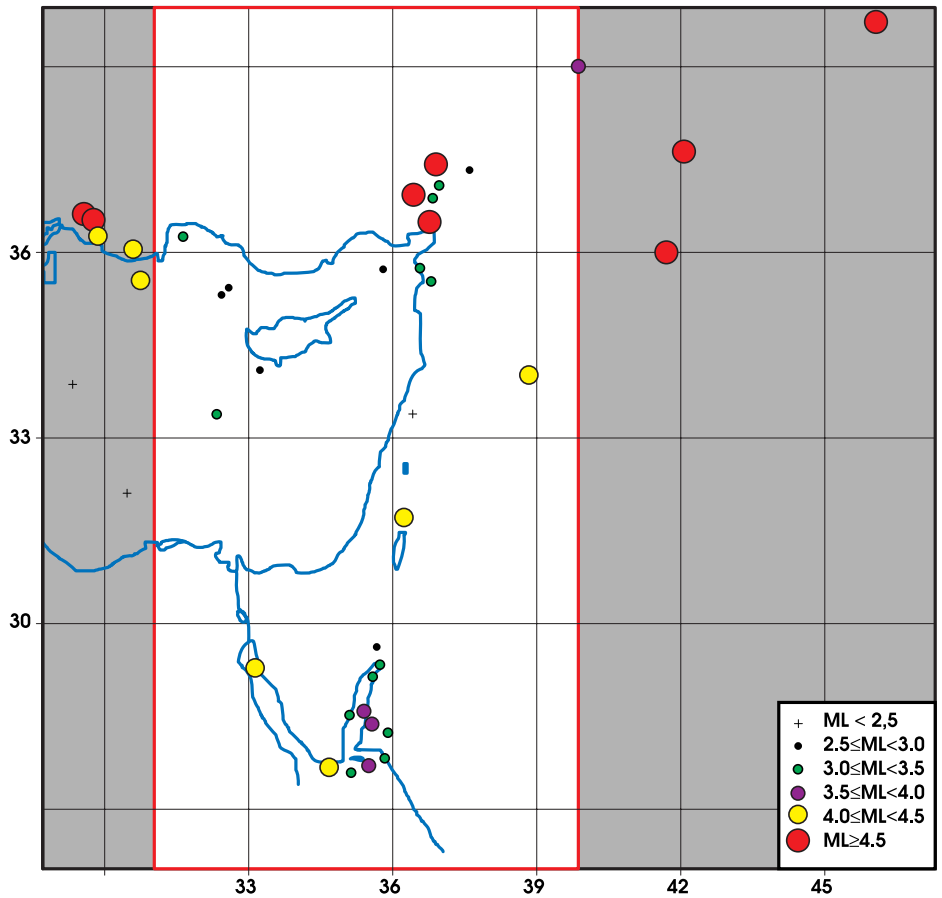

Fig. 1: Epicenter map of earthquakes recorded and analyzed during the JSOP-1. These determinations are based on all available data from the seismic stations in the EMR. The white area (Latitude : 26-40 N ; Longitude : 31-40 E) defines the so-called EMR area.

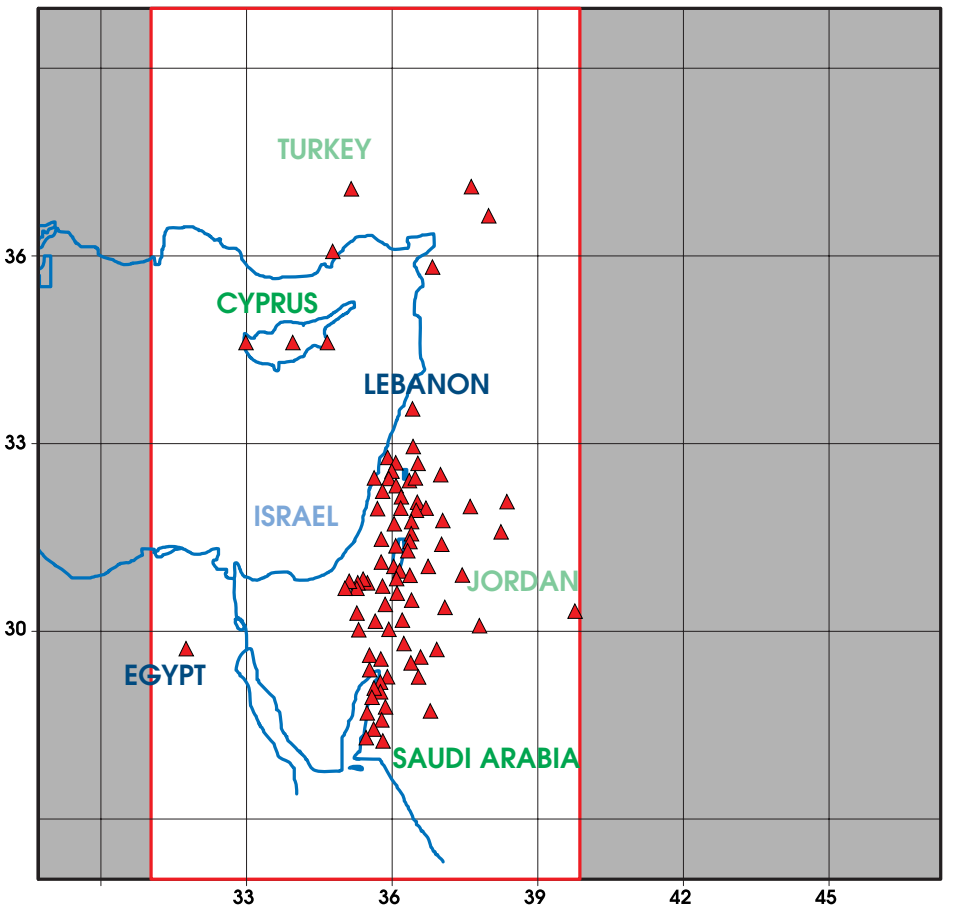

Fig. 2: Location of seismic stations participating in JSOP-1.

During JSOP-1, 70 earthquakes occurred (excluding quarry blasts) and were reported to the EMSC; 61 of which were located either in or close to the EMR. Their locations, determined using all available phase readings, are shown in Fig. 1. These data have been obtained from more than 80 seismic stations operating in the EMR (see Fig. 2). No institution among those participating in the JSOP-1, has been required to perform any special analysis. Yet, at a workshop held in Nicosia, Cyprus in May 1995, it became apparent that the compiled data had been analyzed by all participants. Various conclusions have been derived by the different organizations regarding the evaluation of their capabilities to detect, locate and report earthquakes; however, there are some important conclusions shared by all the participants:

1. There is no one single seismological organization in the EMR which can monitor with sufficient accuracy the seismic activity, while relying only on its seismic stations. In almost every case, data from beyond the borders were extremely important in locating events.

2. JSOP-1 has proved that more earthquake source information with greater reliability and accuracy can only be obtained by sharing the available information within a relatively short time.

3. JSOP should continue and the mechanism of data transfer by each organization should be improved in order to reduce the time lapse between the occurrence of the earthquake and availability of its complete data to the different institutions

4. Within the EMR there are areas of poor instrument coverage yielding biased results for hypocenter and magnitude determinations and strongly limiting detection capabilities.
Consequently, it is highly recommended that new seismic stations be installed mainly in Egypt and Cyprus, i.e. at locations bordering the seismically active areas in the Gulfs of Suez and Aqaba and in the East Mediterranean sea. The new seismic network in Syria was not yet operational during JSOP-1. It was recognized that their anticipated participation in the program is most valuable and important.

5. Three major problems, associated with the analysis of the disseminated information, have been observed:

a) There appears to be occasional difficulties in clock synchronization.

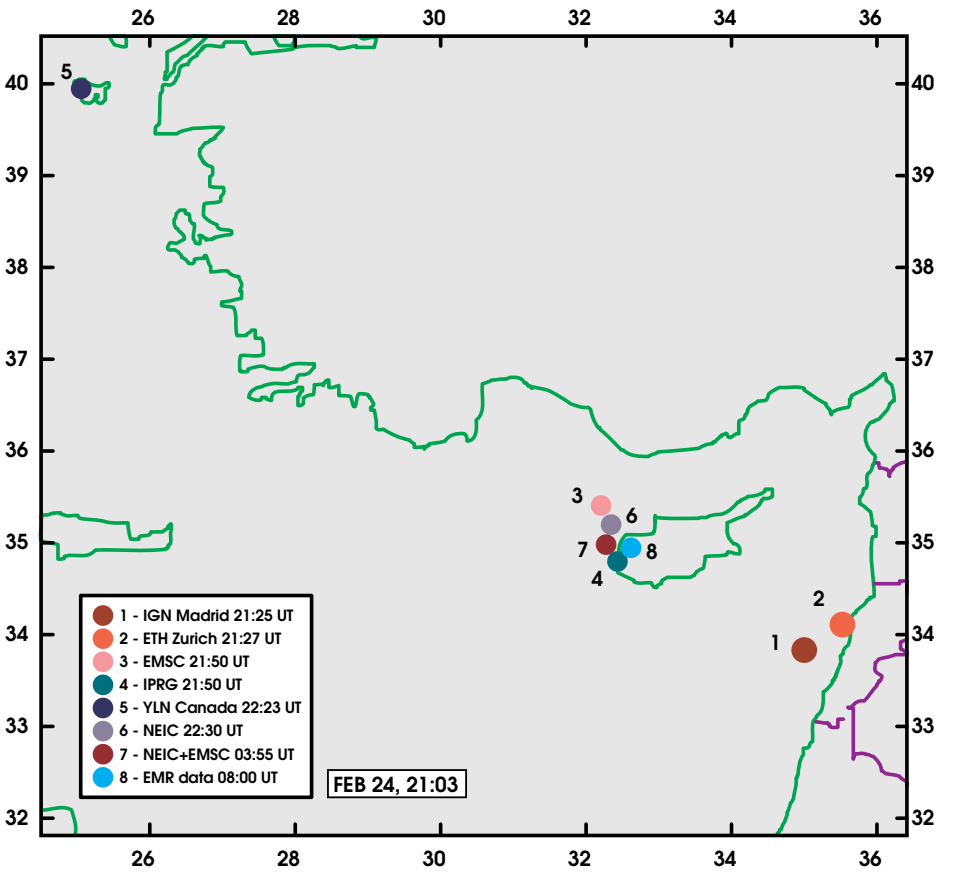

Fig. 3: The sequence of reported epicenter location of the Cyprus earthquake of February 23, 1995.

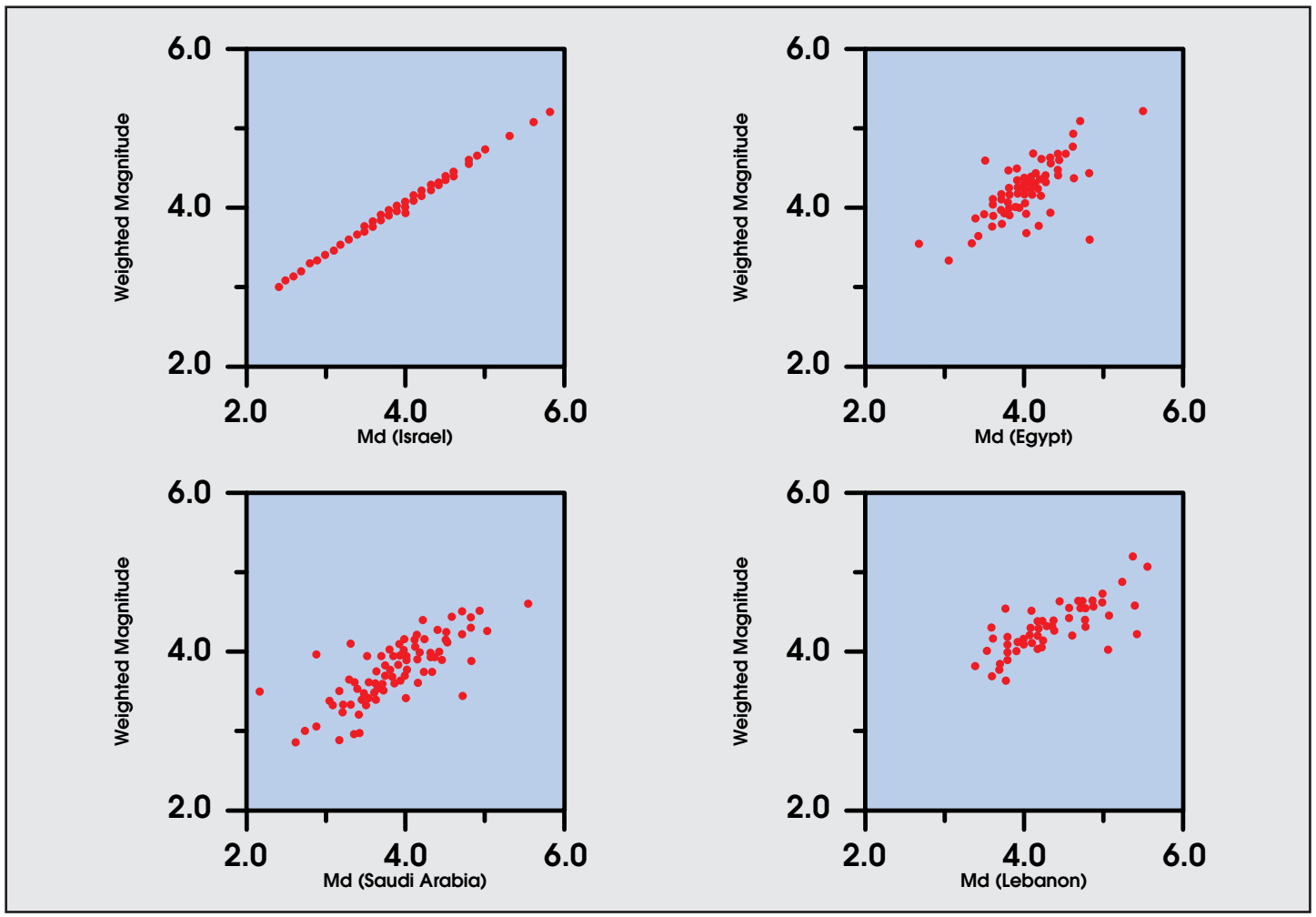

Fig. 4: A few examples of correlation between the unified magnitude for the EMR and locally determined magnitudes (after G. Orgulu, 1995).

b) Different institutions report different magnitudes for the same events.

c) Travel time computations are based on generalized crustal models which yield considerable variations in their solutions.

Evidently, the only practical way to identify timing problems and misidentification of arrival times is by checking the seismograms. As may be expected, automatic association of phase picking may lead to erroneous results. This was demonstrated during the February 23, 1995 earthquake in Cyprus, when automated procedures yielded unrealistic location estimations at a time when accurate information was very important. Fig. 3 shows the sequence of epicenters of that earthquake located by the different organizations. The non-unified magnitude problem was dealt with by Ms. G. Orgulu of Kandilli Observatory, Turkey. Based on reported magnitudes from different EMR seismological organizations, a unified magnitude (ML) has been defined and the relationship to other local magnitude scales has been determined. Examples are shown in Fig. 4.

It was agreed by the participating institutions that additional work must be done in order to improve the travel time models. The Gulf of Aqaba was chosen as the first to be studied, using controlled source information such as detonations in quarries and specially prepared explosions.

The JSOP-1 is considered a very successful experiment and the contribution of the EMSC is highly appreciated by the participants. All look forward to the continuation of the Joint Seismological Observation Program.

Country	$a_c \pm s_a$	$b_c \pm s_b$
Israel	0.842 ± 0.020	- 0.218 ± 0.005
Egypt	0.578 ± 0.269	- 0.109 ± 0.067
Saudi Arabia	0.689 ± 0.175	- 0.202 ± 0.046
Jordan	0.729 ± 0.160	- 0.234 ± 0.046
Lebanon	1.726 ± 0.180	- 0.410 ± 0.042

Correction parameters for a simple regression model, M = a M(country)+b, with respect to second iteration, together with the standard deviations.

Country	Organization
Cyprus	Geological Survey Department, Nicosia
Egypt	National Research Institute for Astronomy and Geophysics, Helwan
Israel	Institute for Petroleum Research and Geophysics, Holon
Jordan	National Resource Authority, Jordan Seismological Observatory, Amman
Lebanon	National Council for Scientific Research, Centre for Geophysical Research, Beirut
Saudi Arabia	King Saud University, Department of Geology, Riyadh
Turkey	Kandilli Observatory and Earthquake Research Institute, Istanbul
Turkey	Marmara Research Center, Gebze
Yemen	Seismological Observatory Center, Dhamar

Participating organizations to JSOP-1

JSOP-2 : A NEW AND IMPROVED DATA EXCHANGE EXPERIMENT IN THE EAST MEDITERRANEAN REGION

Bruno Feignier

European-Mediterranean Seismological Centre

As of January 1, 1996, the second phase of JSOP will be initiated. JSOP-2 will be a data exchange experiment that could last up to 6 months. It will keep the same general structure as JSOP-1, with the EMSC acting as data center in charge of collecting and distributing the data to all the participants. However, in order to further enhance the quality of the overall dataset, several improvements were discussed and agreed upon during a seminar held in Nicosia in May 1995. In particular, it was agreed that direct communication should be achieved between the participants in case of a strong earthquake in the region and that data exchange with the EMSC should focus on a high-quality seismological bulletin. Consequently, it has been decided to operate as follows :

• Weekly seismological bulletins will be sent by each participant to the EMSC (instead of sending messages after events with magnitude > 3.0). The EMSC will forward these bulletins to all the participants ;

• The magnitude threshold will be lowered to 2.5 for the region (i.e. 31-40°E, 26-40°N) ;

• The format for data exchange will be unified ;

• Bulletins will include : P-wave and S-wave arrival times, first-motion readings and hypocenter location ;

• Additional information such as source parameters will also be included when available.

The participation of both the new Syrian seismological network and the temporary network deployed by the Egyptian Geological Survey in the Sinai region will be of great benefit to the whole experiment.

Eventually, the data collected during this experiment will be stored into the EMSC database. Easy access to this dataset by the seismological community will be possible through the EMSC AutoDRM (see EMSC Newsletter, N° 7, September 1995).

RAPID DETERMINATION OF EPICENTRES AT THE EMSC: CURRENT STATUS AND PERFORMANCES

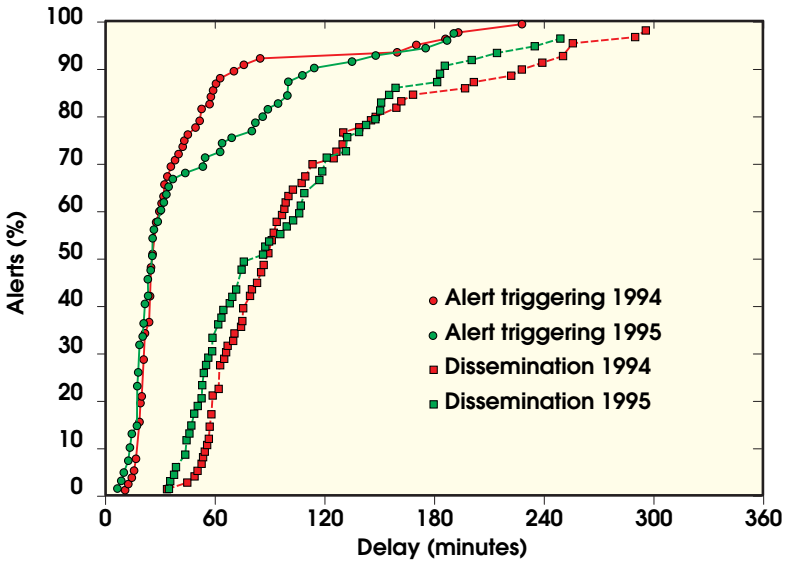

Figure 1 : Cumulative plot of delays for alert triggering and dissemination in 1994 and 1995.

It has been almost 2 years since the EMSC moved to Bruyères-le-Châtel and the new procedure for Rapid Determination of Epicentres (RDE) was established between the 3 key nodal members: LDG Paris, IGN Madrid and ING Rome. This page will briefly summarize some of the results achieved over the last 2 years.

The number of seismic networks contributing their data rapidly after an earthquake increased from 6 in early 1994, to 12 in July 1994 (cf. EMSC Newsletter, N°5, 1994) and to 21 at the moment. The participating networks and their identification codes can be retrieved from the EMSC DRM, which is freely accessible (for details on the connection, refer to EMSC Newsletter N°7, page 8). The data are sent through e-mail, automatically decoded and can trigger the alarm system if the magnitude of the event exceeds the predefined magnitude threshold for the region of interest. In Figure 1, a cumulative plot of all the alerts processed in 1994 (red - 75 alerts processed) and 1995 (green - 56 alerts processed as of November 15) is shown. The circles represent the time lag between the origin time of the earthquake and the triggering of the alert at the EMSC. As can be seen, this triggering occurs fairly rapidly in general, and in less than 30 minutes for 65 % of the alerts in 1994 and 1995. In some instances, especially in 1995 (green circles), the alert triggering took longer, implying that a manually processed event triggered the system. The second set of data (squares) corresponds to the time needed before disseminating the information to the users (i.e, to collect enough data for a reliable solution). The two lines, 1994 and 1995, are very close, indicating overall a constant level of efficiency in the information dissemination. In both cases, over 70 % of the alerts were disseminated within 2 hours of the earthquake occurrence.

In Figure 2, a cumulative diagram, using the same data set as in Figure 1, displays the location difference between the epicenters given in the EMSC alert message and the ones produced in the NEIC PDE catalogue. We have used this catalogue as a reference to check the accuracy of our epicenter location. We used the monthly PDE listing for the 1994 data and early 1995 (until March 1995). For the latest events (March to November 1995), since the monthly PDE catalogue is not yet available, we used the NEIC QED solutions (Quick Epicenter Determination), which are published approximately one week behind real-time. These catalogues were used because they provide a good bulletin reference at a global scale. The diagram clearly shows an improvement in the accuracy of the solutions provided by the EMSC between 1994 and 1995. In 1994, approximately 80 % of the alerts were located within 200 km of the NEIC location, while in 1995, over 85 % of the alerts are located within 100 km of the NEIC bulletin solution. Another independent estimate of the location accuracy is provided by the uncertainty on the epicenter location (major and minor axes of the uncertainty ellipse). In 1995, 75 % of the alerts processed had an ellipse of less than 1000 km2 (which corresponds to an average radius of 18 km), while in 1994 only 40 % of the alerts could fit this criterion.

These improvements in the accuracy of the solutions provided by the EMSC are related directly to the increase of seismic networks sending their data rapidly to the EMSC. The level of communication between key nodal members is another important improvement in the RDE procedure. The system is now fully operational at both LDG and IGN and should become operational at ING in early 1996. This full backup procedure ensures an excellent reliability of the service, as it has been demonstrated successfully in 1995. Efforts will continue in 1996 to further increase the quality of the service. We would like to encourage more European-Mediterranean agencies to join this network of seismic networks for the benefit of the whole seismological community.

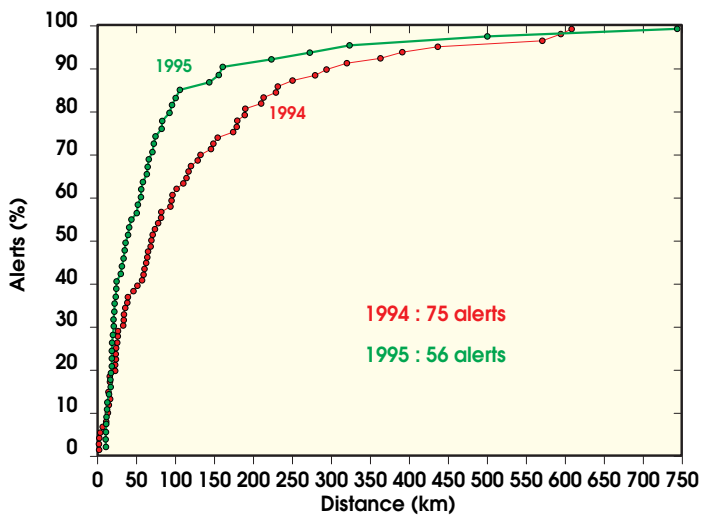

Figure 2 : Cumulative plot of the distances between EMSC and PDE epicenters in 1994 and 1995.

The ORFEUS page

Dear ORFEUS and EMSC community!

This ORFEUS page within the EMSC Newsletter is a first result of a desired closer cooperation between ORFEUS and EMSC. In future, you will find here regularly news from the ORFEUS community. The ORFEUS Executive Committee appreciates the deployment of this space for ORFEUS related contributions by EMSC. In this first edition a summary of previous and future ORFEUS activities will be given.

What was ORFEUS founded for?

In 1987, ORFEUS (Observatories and Research Facilities for European Seismology) was founded as a foundation under Dutch law as an organisation to promote digital seismology, specially broadband seismology, in Europe in all aspects. These goals should be achieved by the exploitation of a European data center for storage and exchange of digital broadband seismograms; advice in matters of location and setting up of seismological stations; stimulation of the deployment of portable broadband seismographs. Moreover, the ORFEUS Science Plan formulated the aim that «by the year 1996, digital broad-band stations in Europe should be separated not more than 200 km apart, especially in regions of tectonic interest and a pool of at least 200 mobile broad-band stations should be available for temporary increase of the local station density».

What has been done?

The year 1996 has almost begun and the original goals are not quite yet achieved. The ORFEUS data center has been founded at Utrecht University in 1988 and moved to the KNMI at de Bilt later in 1993. Its main services to the European seismological community were the collection and distribution of broadband event data on CD Roms and the provision of near-realtime online data. Apart from this, not very many of ORFEUS' original tasks have been reached. Specially the ORFEUS broadband network is - except for Central Europe - far from completion. Apart from global or regional multinational projects like IRIS, MedNet and GEOFON, not many national initiatives for the deployment of broad-band stations could be started. One major exception was the German Regional Seismic Network. Also in other countries several single broadband stations could be installed but in many important regions the network is still incomplete or even not existing.

What about the future of ORFEUS?

Facing these facts, a new Executive Committee was formed in 1995 to try to achieve more of the original ORFEUS tasks. The following goals for future ORFEUS activities were formulated during its first meetings:

* providing a forum for exchange of scientific ideas and results
* distribution of technical knowledge
* forcing of new station deployment, recovery of «hidden» stations
* coordination of siting of permanent stations
* coordination of temporary BB deployments
* extended data center services

As first concrete steps towards an achievement of these goals, the annual organization of an ORFEUS workshop for the exchange of scientific and technical results, the restart of an ORFEUS Newsletter in printed form (jointly with EMSC) and as an electronic version (for small technical contributions), the start of a Technical Support Group, consisting of scientists and technicians from GEOSCOPE, MedNet and GEOFON (to be extended...) for giving concrete advice for the planning, installation and operation of broadband stations in Europe, the start of a Working Group on Siting and Station Standards for maintaining a station inventory, definition of an ORFEUS network, forcing the deployment of new stations and recovery of «hidden» stations as part of the ORFEUS network, the start of a Working Group on Temporary Broadband Station Deployments, and extended ODC tasks such as a Regional Spyder System for EuMed region, an extended online data pool and unified access and request routing via ODC to the continuous data archives in Europe (GEOSCOPE, MedNet, GRSN, GEOFON...) were initiated.
Since the personnel at the ORFEUS office can presently not be increased, the success of these initiatives are more or less related to the active participation and engagement of the ORFEUS members. Therefore, I would like to invite all people interested in a more active role of ORFEUS in European broadband seismology to participate actively in the proposed initiatives. In this editorial, I would specially request ORFEUS related contributions for this Newsletter page and for electronic submission. Any communication, which might be of broader interest, is welcome.

Winfried Hanka
President of ORFEUS Executive Committee

The ORFEUS Data Center (ODC)

The main aim of the ODC is to provide access to digital, broad-band waveform data. Presently, data exchange is organized in three ways:

1. Off-line data exchange

Data are collected on magnetic media (4mm or 8mm tapes) or on CD-ROMs (e.g. GEOSCOPE network data). After conversion to the standard SEED format, data of different networks/stations are merged and written in event oriented SEED volumes on CD-ROM. Software development concentrates on the conversion of local data formats into SEED and the development of software to read and select CD-ROM data. Until present, the ODC did produce and distribute 4 CD-ROMs of European digital broad-band data and in addition one CD-ROM containing data from the NARS network. Volume 5 and 6 are near completion. These 6 CD-ROM volumes cover the period 1988 (jan)- 1990 (may). Since CD-ROMs can only be produced when data from all stations are collected and converted, there is quite some delay in the production. Therefore the ODC will make the not (yet) complete datasets on-line available in the near future. Currently (incomplete) data volumes are available at the ODC for the period 1990-1994. The ODC distributes the NEIC CD-ROMs in Europe. Presently 10 NEIC volumes with waveform data have been produced plus the first copy of the Federation of Digital Seismograph Networks (FDSN) CD-ROM. In addition hypocenter CD-ROMs are available.

2. On-line interactive data exchange (SPYDER)

To accommodate the current need for near real-time access to data, the ODC operates a SPYDER system (formerly known as GOPHER). Since 1992 the ODC is the European node in the world-wide SPYDER system. Within a few hours after an event of magnitude higher than 5.5, located by the NEIC, an increasing number of stations are automatically accessed and data transferred to the ODC. The number of stations accessed this way increased from 15 in 1992 through 30 in 1993 to more than 75 presently. As a consequence data volume increased from 172 Mb in 1992 to more than 1 Gbyte annually at present. Not only data volume increased, also the number of data users increased. In 1992 12 regular users of the SPYDER system were registered. This number increased in 1994 to 101. These users did access the dataset many times. During 1994 the GeoForschungsZentrum (GFZ) in Potsdam became a major sub-node for SPYDER in Europe, providing access to stations from the German Regional Network and GEOFON stations. Future developments will involve the set-up of a regional European Spyder system that is triggered by an event location generated by the EMSC for events of magnitude less than 5.5 in Europe.

3. On-line non-interactive access (autoDRM)

Within the EMSC the automatic Data Request Manager (autoDRM) is currently being used for the exchange of parametric data. AutoDRM also allows the exchange of waveform data and was discussed as an alternative to SPYDER by the working group on data exchange of the FDSN. Although technical details are still under discussion, the FDSN acknowledged the importance of the autoDRM system and members were encouraged to install autoDRMs. The autoDRM system depends on requests made by e_mail and provides answers over e_mail in return. There is no need to connect interactively with the host computer at the data center. Since broad-band waveform data tend to be voluminous, the autoDRM system was extended to accommodate data retrieval by ftp for volumes larger than 0.1Mbyte. Early 1995 a connection between autoDRM and SPYDER was realized at the ODC. If you are interested in more information on the ORFEUS Data Center, please contact me at dost@knmi.nl or Reinoud Sleeman at sleeman@knmi.nl

ORFEUS Working Groups	**Chairperson**	**e_mail address**
Siting and station standards	Dr J. Zednik	jzd@ig.cas.cz
Temporary broad-band station deployment	Dr H. Paulssen	paulssen@geof.ruu.nl
Technical support	Dr J. Trampert	jeannot@sismo.u-strasbg.fr
Other ORFEUS activities		
Newsletter coordinator	Dr A. Pino	pino@in8800.ingrm.it
President ORFEUS Executive Committee	Dr W. Hanka	hanka@gfz-potsdam.de
Director ORFEUS Data Center (ODC)	Dr B. Dost	dost@knmi.nl
Senior ODC programmer	R. Sleeman (Msc)	sleeman@knmi.nl

FORUM

XXV GENERAL ASSEMBLY OF THE EUROPEAN SEISMOLOGICAL COMMISSION (ESC)
IN ICELAND, SEPTEMBER 9-14 1996

The European Seismological Commission invites seismologists, engineeers and volcanologists to participate in its XXV General Assembly in Reykjavik, Iceland.

The programme will focus on the following topics:
- Seismology
- Data Acquisition, Theory and Interpretation
- Physics of Earthquake Sources
- Deep Seismic Sounding
- Earthquake Prediction Research
- Engineering Seismology

In addition to the above topics other sessions have been proposed :
- The Iceland Hot Spot : Crust/Mantle Structure and Processes
- Seismology and Faulting at Ridges
- Volcanoes: Seismology, Deformation, and Structure
- Seismic Phenomena Associated with Volcanic Activity
- Geophysical Observatories on the Sea Floor
- Workshop on European Seismological Bulletins
- Workshop on Manual of Seismological Observatory Practice
- Seismic Noise and Signal Detectability
- Seismic Hazard and Earthquake Impacts

The second circular will be distributed in February 1996 with the outline scientific programme. Abstacts are required by 1 May 1996.

Publication: It has been proposed that the Proceedings should be published before the conference and distributed at the conference. Would all participants note that if the Bureau approves this proposal, camera-ready copies of papers will also be required by 1 May 1996.

Further information about the conference can be obtained from the :

LOC XXV General Assembly ESC
Att: Mr Bardi Thorkelsson
The Icelandic Meteorological Office
Bustadavegur 9
150 Reykjavik, Iceland
Tel: (+354) 560 0600
Fax: (+354) 552 8121
E-mail: esc96@vedur.is

The ESC home page also contains information about the conference and can be accessed using the following address: http://ui.nmh.ac.uk/esc.html

Thank you for your co-operation and we look forward to seeing you in Iceland.

CALL FOR DATA

Dr. Ali Kamel abd el Fattah, from the National Research Institute for Astronomy and Geophysics (NRIAG), Egypt, is interested in the recordings of the recent Aqaba sequence, especially concerning the mainshock on 22/11/1995 at 04:15 U.T. and the aftershock on 23/11/1995 at 18:07 U.T.
You can get in touch with him at: astro@frcu.eun.eg

CENTRE SISMOLOGIQUE EURO-MEDITERRANEEN
EUROPEAN-MEDITERRANEAN SEISMOLOGICAL CENTRE
c/o LDG, BP12
91680 Bruyères-le-Châtel, FRANCE
Phone : +33-169267814; +33-169267813
Fax : +33-169267000; +33-164903218
Telex : 681862 LABOGEO
E-mail : csem@ldg.bruyeres.cea.fr

Merry Christmas & Happy New Year!

Synop6 Nancy