

Newsletter

EDITORIAL

I am grateful to EMSC for providing me with the opportunity to address the seismological community through this EMSC Newsletter. The ESC, as the promoter of the birth of EMSC, has closely followed its activities ever since and, in particular, has actively helped EMSC's new evolution into its present multi-task and key nodal member-based organisation. This new truly "European" dimension of EMSC, along with its beautiful new headquarters on LDG premises in Bruyères-le-Châtel, will certainly improve its effectiveness and strengthen its role as the European rapid earthquake determination Agency and parametric database provider. The new EMSC structure is being illustrated in several issues of the Newsletter, the present one being dedicated to the activities of two EMSC data providers: the Fast Earthquake Information Service at the Ruhr-University, Bochum, Germany and the CEPRIS centre for seismic hazard assessment, Morocco.

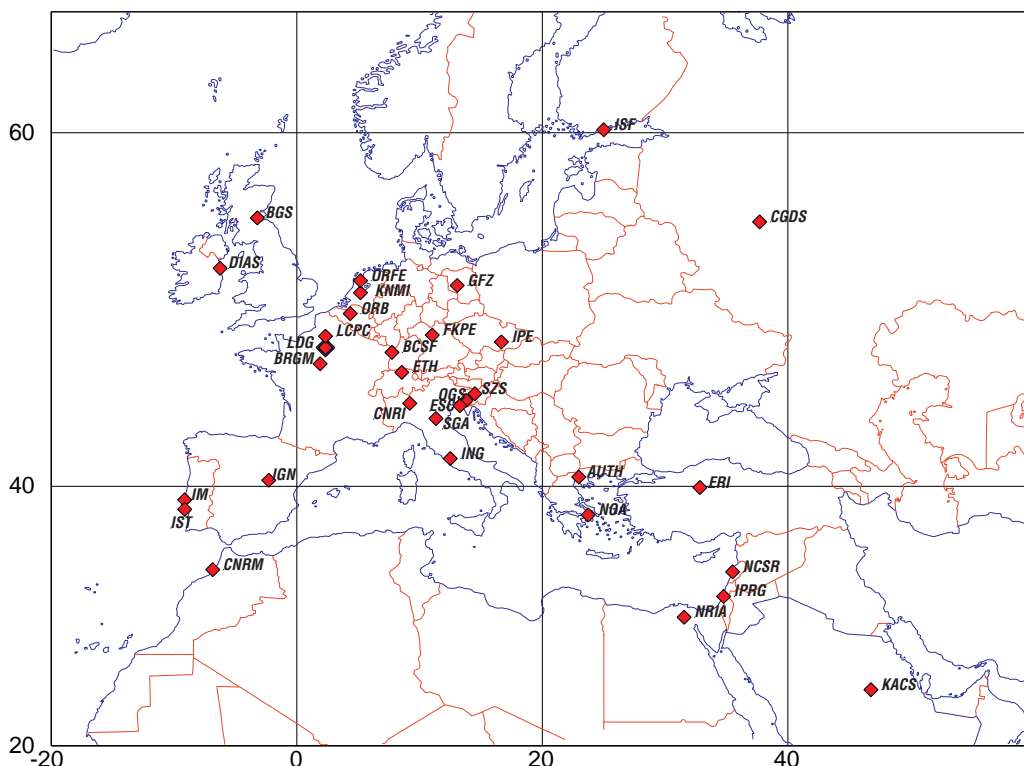
The needs of EMSC members and those of the wider seismological community in Europe do require an efficient seismological centre, as pointed out also by the Joint EMSC-ORFEUS Scientific Advisory Board nominated by ESC. In this respect, we do recommend the strengthening of the already good collaboration between EMSC and ORFEUS, the latter being responsible for the collection and distribution of broadband waveform data. A close interaction

between these two centres can only be beneficial to the whole European seismological community, and a page of this Newsletter dedicated to ORFEUS is certainly a step in this direction.

On September 9-14 this year ESC will hold its 25th General Assembly in Reykjavik, Iceland, under the auspices of the Icelandic Meteorological Office, the Icelandic Ministry of Environment and the University of Iceland. We look forward very much to this jubilee assembly held at a seismologically unique place in the world, a land expression of a well-developed mid-oceanic ridge associated with a hot spot. A number of specialized symposia, therefore, will be dedicated to these features and the closely related volcanological aspects. We certainly hope that this assembly will be as successful as the last one in Athens, the Proceedings of which - three impressive volumes - have just been published and distributed. In order to speed up the publication of ESC papers presented at its assemblies, it has been decided to publish the related papers in advance and to distribute the book at the conference in Reykjavik. All the details can be found either in the Second Circular, extra copies of which can be obtained from the LOC (esc96@vedur.is), or on the ESC www homepage (<http://ui.nmh.ac.uk/esc.html>).

As is traditional, this year's EMSC General Assembly will be held during the ESC conference, so I am certainly looking forward to greeting you all in Reykjavik!

Peter Suhadolc
ESC Secretary-General



CSEM/EMSC MEMBERS (Since October 1995)

FAST EARTHQUAKE INFORMATION SERVICE (FEIS):

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Introduction

The German Experimental Seismic System (GERESS, Fig. 1) has been operated by Ruhr-University Bochum since 1990 (Harjes, 1990; Harjes et al., 1993). GERESS data are continuously transmitted from the array hub in Bavaria to Bochum and analyzed by an on-line processing system to detect and locate seismic events near real-time. In addition, automatic first arrivals have been manually analyzed and parameter data are sent to EMSC and NEIC.

The automatic data processing consists of 4 steps: STA/LTA detection on 185 filtered beams, parameter extraction of each detection (e.g., slowness, azimuth, onset-time, amplitude, period), phase association, and location using the

Jeffreys Bullen travel time tables. On average, more than 260 regional phases are automatically detected and processed each day, from which about 30 events are located. Most of these are caused by man made activities (mine-blasts, mining induced events).

In 1992/1993, an interactive routine analysis of regional events had been performed which revealed the following typical problems of a single array automatic location: spurious events (phase associations from different events), wrong epicentral distance (overshooting due to late detections, phase misidentification due to fixed slowness intervals), azimuthal errors (scattering and multipathing), and missed events (undetected phases). However, the sensitivity of GERESS would require a significant effort for a full scale analyst

review of regional events. Hence, an automated relocation procedure using data from the German Regional Seismic Network (GRSN) has been developed. The GRSN (Hanka, 1991) consists of 12 broad-band stations (Fig. 1), each running a Murdock-Hutt-detector. All stations are open and waveforms as well as parameter data (detection lists) can be obtained via computer links.

Based on an automatic GERESS single-array location of a regional event, an automatic relocation process has been developed which associates suitable detections from the GRSN. The results of the relocation are distributed to EMSC via electronic mail as a FEIS alert message within about 30 minutes after the event.

The FEIS Algorithm

After each automatic GERESS location with local magnitude above 3.0, the FEIS algorithm is started. First, an initial location is calculated from GERESS data alone using LOCSAT (Bratt and Bache, 1988). Second, from the origin time of the initial solution, the onset times of regional phases (Pn, Pg, Sn, Sg) are calculated for all GRSN-stations. Third, GRSN detection lists are polled via telecommunication lines for a large time interval ± 5 minutes. Fourth, a small time-interval around the theoretical onset time is searched for Pg or Pn detections, depending on epicentral distance. If several GRSN detections occur within the same time interval, the first one is chosen. Detections are associated with respect to the GERESS data. For P-type onsets, a time interval of 10 sec is used. If the initial solution differs strongly from the real epicenter, correct GRSN detections cannot be found. If the time interval would be too long, false GRSN detections might be associated. Assuming that a P-type phase has been associa-

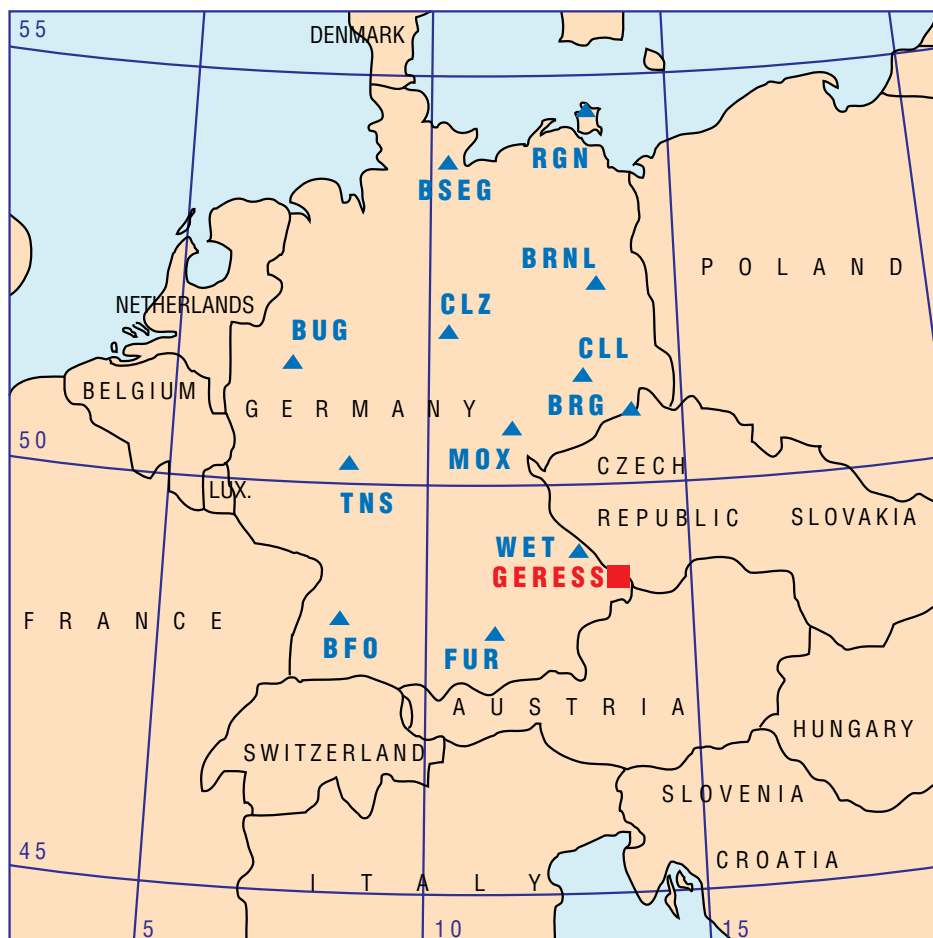


Figure 1. GERESS and the German Regional Seismic Network (GRSN).

ted, a possible S-type detection is searched within the interval t_P found + ($t_S - t_P$) ± 3 sec. The time interval for secondary phases has been chosen smaller because of the lower reliability of S-type detections with Murdock-Hutt. Fifth, parameter data are weighted (primary phases stronger than secondary ones), and all GERESS phases (arrival time and back-azimuth) and applicable GRSN detections are associated to the event, and a relocation is done with LOCSAT. If the solution is stable, the resulting location is distributed automatically via electronic mail about 30 minutes after the event as FEIS-alert (e.g., Fig. 2).

Results

To illustrate the improvement of location accuracy, the earthquake cluster Merlebach in the Saar-Hunsrück Region (French-German border) was analyzed off-line with the FEIS algorithm. The seismicity in the area is dominated by induced events in the Lorraine-Saar Mining District (about $49.09 < \text{lat} < 49.14$; $6.84 < \text{lon} < 6.94$). Only few minor tectonic earthquakes are present in the Hunsrück. The automatic GERESS locations (asterisks) and the final FEIS locations (circles) are shown in Fig. 3 for events from 1.1.1993 to 19.5.1993. For this test, only the nearest 2 GRSN stations (BFO, TNS) were used. The initial GERESS locations show a large scatter and a systematic azimuthal bias. However, the FEIS locations focus somewhat north of the known mining area.

The on-line implementation of the FEIS-program was evaluated for 118-days which resulted in 45 FEIS alert messages. Altogether 198 phases were associated, 156 correctly and 42 incorrectly according to visual inspection of waveforms. From 155 P-type onsets were 138 correct, but from 43 S-type onsets only 18.5% of the P-type detections were false, but 43% of S-type. Differences in the amount of contributed detections between GRSN stations were found to be caused by noise conditions, distance to the event, and technical problems. A comparison of the automatic GERESS single-array location with the FEIS network solution and the

FAST EARTHQUAKE INFORMATION SERVICE (FEIS) BOCHUM - GERMANY

This is an unreviewed automatic location
of a local or regional seismic event.

Starting from a GERESS automatic detection above a certain threshold, the FEIS routine automatically accesses the detection lists of the German Regional Seismic Network (GRSN) and other stations using the GRSN-type Data request manager (DRM). Currently, the following stations are used: BFO, BRG, BRNL, BUG, CLL, CLZ, FUR, HAM, MOX, TNS, and WET. Using all available detections from this network, the routine proceeds to calculate a new location using the LOCSAT algorithm.

(For further information and questions, please contact:

M. L. Jost, H. Schulte-Theis, or J. Schweitzer at

GERESS Data Center of Ruhr-University Bochum).

Event number : 49920

Flinn-Engdahl-Region : VOGTLAND REGION # = 543

Origin Time :	28.09.1993 21:06:27.	6 +/-	0.6 sec
Latitude :	50.887 deg.	N +/-	0.5 km.
Longitude :	12.223 deg.	E +/-	0.4 km.
Depth :	0.00 km.	+/-	0.0 km. (Fixed)

Confidence region at 0.90 level:

Semi-major axis : 9.5 km. = 0.09 deg.

Semi-minor axis : 6.1 km. = 0.05 deg.

Major-axis strike : 154.7 deg. clockwise from North

Magnitude (GERESS) : 3.2

Maximum azimuthal GAP : 99 deg.

Method: Locsat (Geiger), Tables : Jeffreys-Bullen

Stat	Phase	Arrival	Residual	Dist	Azi	Weight
MOX	Pg	271:21.06.37.1	0.372	0.455	238.2	0.458
CLL	Pg	271:21.06.42.0	1.352	0.649	49.0	0.616
CLL	Sg	271:21.06.54.9	5.887			0.013
BRG	Pn	271:21.06.49.5	-0.508	1.091	90.0	0.409
CLZ	Pn	271:21.06.53.3	-2.583	503	310.3	0.545
WET	Pn	271:21.06.59.0	-0.998	1.794	166.1	0.569
GEC2	Pn	271:21.07.06.4	-0.328	2.257	154.4	0.006
GEC2	Pn	Backaz 324.6	-10.880			0.000
GEC2	Pg	271:21.07.11.5	-1.140			0.010
GEC2	Pg	Backaz 326.2	-9.280			0.000
GEC2	Sg	271:21.07.40.4	-1.757			0.024
GEC2	Sg	Backaz 333.2	-2.280			0.000
GEC2	Rg	271:21.07.47.7	-3.580	2.258	154.4	0.030
GEC2	Rg	Backaz 315.4	-20.080			0.000
TNS	Pn	271:21.07.12.5	2.379	2.497	256.0	0.311
TNS	Sn	271:21.07.41.3	-0.378			0.007

Figure 2. FEIS alert from an earthquake in the Vogtland area.

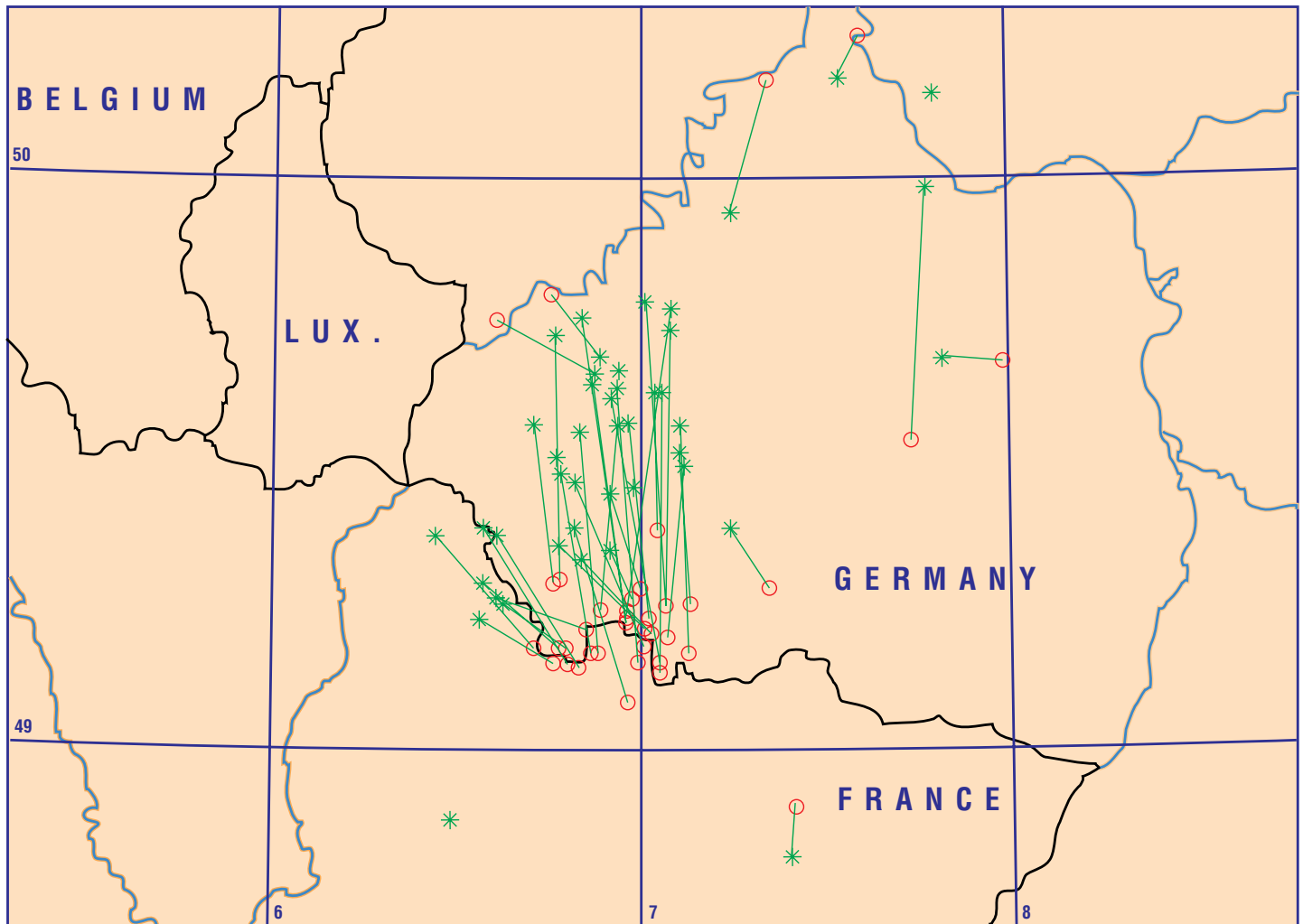


Figure 3. Seismicity during the first 139 days of 1993 in the Merlebach cluster (distance to GERESS about 500km). The automatic GERESS locations (asterisks) focus after relocation (FEIS locations: circles) near the Lorraine-Saar Mining District.

PDE bulletin indicates that locations of events within and near the aperture of the GRSN were generally improved by the FEIS algorithm. As expected, no improvement was achieved for regional events far beyond the aperture of the network (Greece, Southern Italy). For the events at a distance of less than 8 deg. to GERESS, we calculated the median of the lengths of the mislocation vectors. The corresponding median for the automatic GERESS and PDE locations is 0.46 deg., and for FEIS and the PDE 0.38 deg.

Conclusions

An automatic 2 stage regional location process has been implemented which improves the location capabilities of the GERESS single-array by automatically associating suitable detections from the GRSN. Starting from an automatic GERESS location with a local magnitude above 3, theoretical onset

times are calculated for different phases and GRSN stations. The routine automatically polls parameter data from the GRSN within time windows around the theoretical onsets. If consistent detections were found, the event is relocated and the location is distributed via electronic mail as a FEIS alert message within about 30 minutes after the event. Comparisons with PDE locations indicate that the relocation procedure significantly improves location accuracy.

References

- Bratt, S.R. and T.C. Bache (1988). Locating events with a sparse network of regional arrays, *Bull. Seism. Soc. Am.*, 78, 780-798.
- Hanka, W. (1991). The German Regional Broadband Seismic Network (GRN) Project, in: E. Boschi, D. Giardini, A. Morelli (eds.): *I Workshop on MedNet - The broadband seismic*

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Harjes, H.-P. (1990). Design and siting of a new regional array in Central Europe, *Bull. Seism. Soc. Am.*, 80, 1801-1817.

Harjes, H.-P., M.L. Jost, J. Schweitzer, and N. Gester mann (1993). Automatic seismogram analysis at GERESS, *Computers and Geosciences*, 19, 157-166.

GERESS DRM:

134.147.164.6 login as guest

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CREATION OF A EUROPEAN-MEDITERRANEAN CENTRE FOR THE EVALUATION AND PREVENTION OF SEISMIC HAZARD (CEPRIS) IN RABAT, MOROCCO, IN ASSOCIATION WITH THE EUR-OPA MAJOR HAZARD AGREEMENT (COUNCIL OF EUROPE)

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(Centre National de Coordination et de Planification de la Recherche Scientifique et Technique, Rabat, Morocco)

In the framework of the prevention of natural disasters, the EUR-OPA Major Hazard Agreement of the Council of Europe has established a network of specialised Centres in 1987, five of which are dealing with various aspects related to earthquake hazard. The CEPRIS (Centre Euro-Méditerranéen d'Evaluation et de la Prévention du Risque Sismique) in Rabat, Morocco has recently been established to complement this network.

The main objective of the CEPRIS is to implement a unified strategy and a common frame for coordinating and correlating activities aimed at realizing a regional seismotectonic zoning and seismic hazard and risk assessment in the Mediterranean region. In the first phase, which will extend over

a 5-year span, the activities of the Centre will be concentrated on the Western and Central Mediterranean Sea, and will encompass the 5 countries of the Ibero-Maghreb region (Morocco, Algeria, Tunisia, Spain and Portugal) and Italy (Figure 1). However, additional countries are invited to participate and contribute to the activities of the Centre. These activities will allow the establishment of:

- a uniform regional catalogue for instrumental and historical seismicity;
- regional seismotectonic maps including active faulting and seismogenic zones;
- regional maps of seismic risk and paleoseismicity studies in test areas.

Such activities will take into account national efforts and will be achieved in collaboration with other projects in the Mediterranean basin. These eva-

luations will be made available to the various users and national decision-makers for the setting up of strategies for the prevention and mitigation of seismic hazard.

This will provide the basis for a second phase, which is expected to include the following topics:

- 1 - the identification of high-risk areas which will go under detailed local studies;
- 2 - the establishment of regional maps of seismic hazard;
- 3 - the development of automated systems for seismic alert within the concerned countries, in collaboration with the EMSC;
- 4 - the extension of the activities of the Centre to cover the whole Mediterranean area, in coordination with the other OPA Centres and under the auspices of the EUR-OPA Major Hazard Agreement.

The Centre National de Coordination et de Planification Scientifique et Technique (CNCPRST) in Rabat, Morocco, has been hosting the CEPRIS since December 1995. The functioning of the Centre will be under the charge of a Manager, a Coordinator, an Organizing Committee, a Scientific Steering Committee and scientific teams (one per activity: regional catalogue, regional mapping, seismic risk and paleoseismicity), composed of representatives from the concerned countries (Figure 2).

Since the creation of the CEPRIS, a temporary committee has been established. This committee has already made facilities available to the CEPRIS, set up an ETHERNET network and carried out a feasibility study concerning a connection to the INTERNET. This will greatly facilitate contacts and data exchange between institutions participating in the CEPRIS activities.

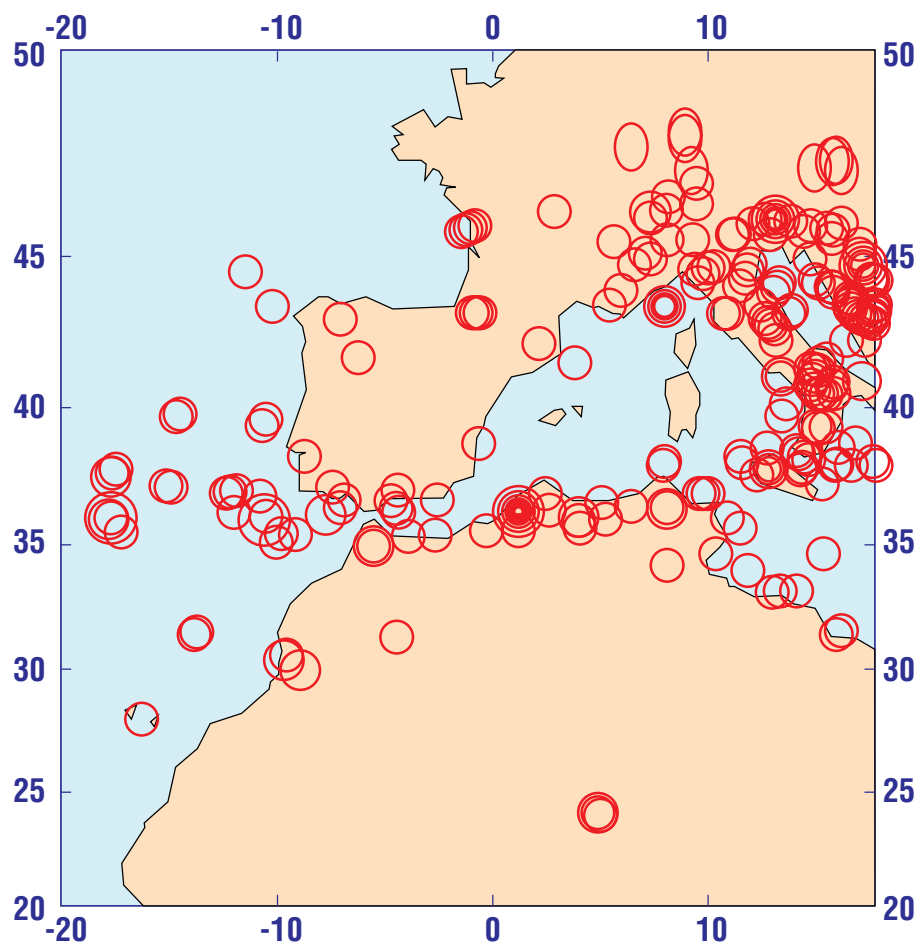


Figure 1: Seismic activity in the Western and Central Mediterranean Region from 1968 to 1995 (M 5).

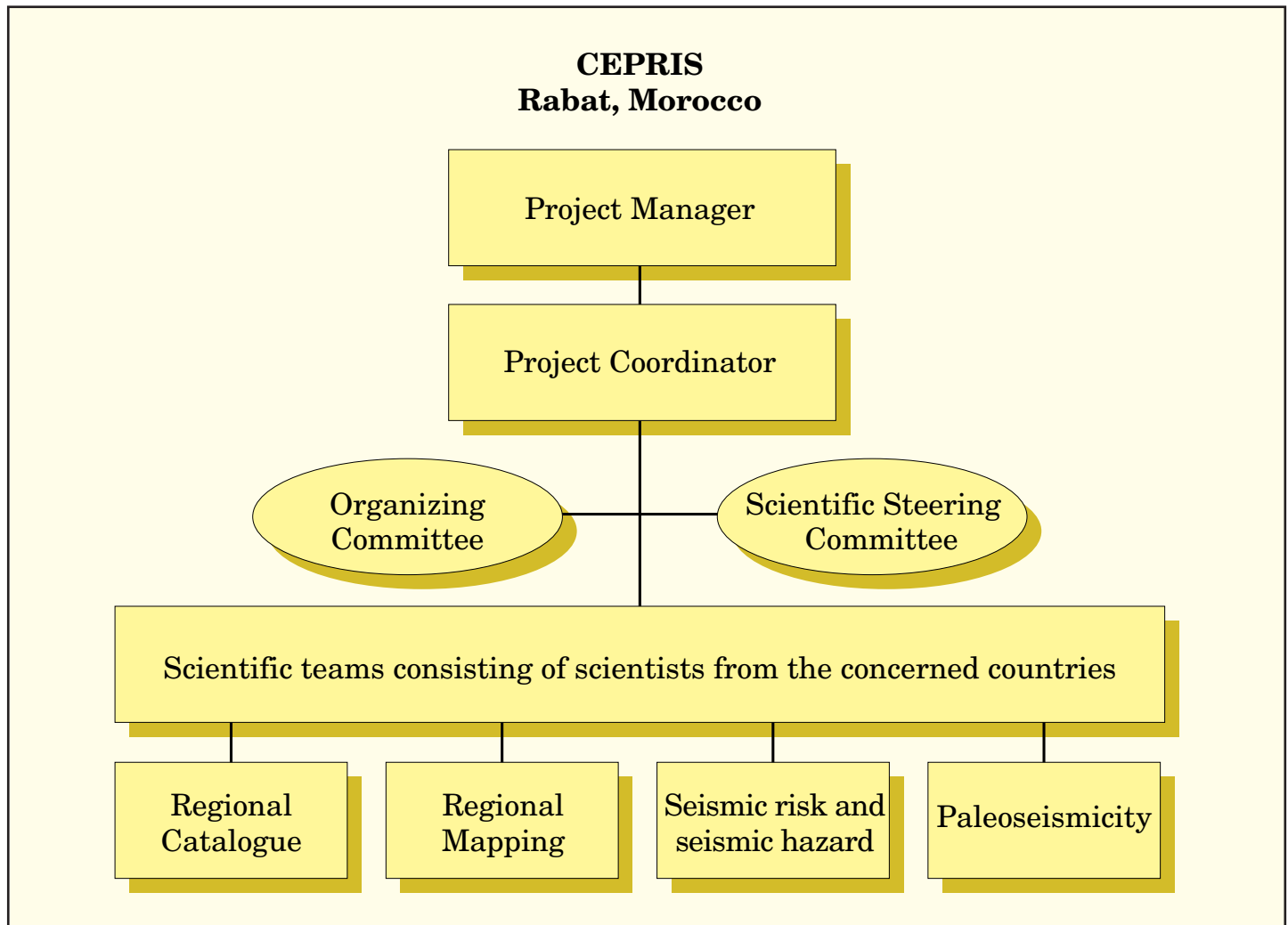


Figure 2: Flow chart of the CEPRIS.

Contacts

During the VIth Maghreb Seminar on Earthquake Engineering (Tunisia, December 1995), contacts have been established with representatives from institutions in Algeria and Tunisia interested in the CEPRIS activities. Furthermore, discussions have been initiated with the EMSC on possible cooperations between the two Centres. It has been agreed that close coordination will exist between the two Centres, both in their structure and at the level of their scientific program. This collaboration will be made easier by the fact that CNR Rabat is already a member of the EMSC. It was also agreed that the EMSC will be represented in the Scientific Steering Committee of CEPRIS.

In order to prepare for the Seminar called SIDMED-Maroc, the CEPRIS has been collaborating actively with the Moroccan Ministries. The SID-

MED-Maroc project is one of the demonstration projects for the International Decade for Natural Disasters Reduction (IDNDR). This international Seminar is sponsored by the Council of Europe, Open Partial Agreement.

1996 Activities

For 1996, the following activities have been scheduled at the CEPRIS:

- Follow-up of contacts with the institutions from the 6 concerned countries in order to formally establish the Scientific Steering Committee;
- Meeting of the representatives of all interested institutions from all 6 countries. This meeting will allow to define the activity programme;
- Creation of the committees and regional Working Groups;
- Initiation of the scientific activities;
- Discussions and elaboration of a project for paleoseismicity studies and seismotectonic studies for several

major structures in Morocco;

- Preliminary discussions on the organization, in Rabat, of a Workshop on seismic zoning in Maghreb within the framework of GSHAP and IGCP;
- Organization of a regional Workshop.

Address

For further information, please address your enquiries to:

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The ORFEUS page

ORFEUS and the World Wide Web

Early 1996 the ORFEUS Data Center (ODC) created a WWW-site for ORFEUS-related activities. The reason for the ODC is to give easy access to the on-line data base. It can be viewed as an alternative to straight anonymous ftp access, but there is more. Within the same environment, we can give access to alternative data request methods.

The SPYDER system can be accessed through the WWW pages and we are presently working on a system to allow autoDRM requests through fill-in forms. Also, WWW allows an easy link to other data centers, where data users can find additional data if requested. This set-up makes the ODC more

flexible and stresses its function as information provider, which was one of the recommendations of the ORFEUS-EMSC Scientific Advisory Board.

As was mentioned in the previous newsletter, ORFEUS is working towards fulfilling more of its original goals. Last year several working groups have been formed with specific tasks (station siting and standards; technical support; temporary broad-band station deployments). In order to keep these groups active and show results, these working groups are also included in the WWW page. Clicking at a Working Group (WG) button will bring you directly at its WWW page. This page can be maintained at the ODC, but it

may also be a direct link to a WWW site of a WG member. The WG on siting and station standards is an example of this direct link. Clicking the button will bring you directly to Prague.

The flexibility of the WWW system as information provider allows also a close connection between ORFEUS and EMSC. Since the EMSC is also in the process of constructing a WWW-site, you may expect in the near future more direct links between both organizations.

Please try our pages and let us know your opinion.

The address: <http://orfeus.knmi.nl>



FORUM

WORKSHOP ON EUROPEAN SEISMOLOGICAL BULLETINS

During the ESC96 General Assembly in Reykjavik, Iceland, from September 9 to 14, 1996, a "Workshop on European Seismological Bulletins" is planned. Participants are invited to discuss plans and experiences gained in regional and international seismological bulletins, for example the experience gained during the compilation of the different European Bulletins during GSETT3, along with the project of a European Bulletin by the EMSC, and other regional or international bulletins. Papers dealing with the development and refining of multisource data fusion, processing and analysis are welcome, as well as papers summarizing the results from regional and international collaboration. During the Workshop a discussion is planned to identify problems of the international exchange of seismological data, and to develop strategies for resolving them.

For more information, please contact the convenors:

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