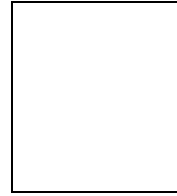




# International Association of Seismology and Physics of the Earth's Interior



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## NEWSLETTER No. 32

**April 1993**

To: National Correspondents, Officers and Representatives of the Association, and related organizations.

This issue of the IASPEI Newsletter consists mainly of contributions from Association members. I am pleased with this development and encourage you to continue to send me any items of general interest to the Association. I am especially intent on keeping the list of publications and forthcoming meetings timely and accurate.

In this issue I especially bring your attention to important announcements about our General Assembly in New Zealand this coming January, a Regional Seismological Assembly in South America being planned for Brazil during August 1994, and the IUGG meeting to be held in Boulder, Colorado, during July 1995.

E. R. Engdahl

Secretary-General

### **Progress in the IDNDR Program**

When IASPEI at the 1991 Vienna Assembly adopted its program for the International Decade of Natural Disaster Reduction, there were both enthusiasts and doubters about the worthwhile nature of the effort. While the general aims were acceptable to all, namely, the reduction of the risk from earthquakes around the world, the lack of new IASPEI funds and possible competition with basic

research in seismology were detracting factors. It therefore is pleasant to report that, although the effort to obtain significant additional IASPEI finance for a program at a much enhanced level continues, the IDNDR has become a unifying and stimulating element in a great deal of work carried out by seismologists, geophysicists and others associated with earthquake hazards, earthquake occurrence and measurements.

NAS/ICSU Special Funds for Natural Hazards in 1993 will be used primarily to support the IASPEI planning activities related to the IDNDR. Support of symposia and workshops at the 27th General Assembly in Wellington, New Zealand have been weighted with the IDNDR objectives in mind. The Commission is now devoting attention to the enhancement of financial resources for general assistance and for new initiatives.

The first newsletter concerning the IASPEI/IDNDR activities was circulated by the Beijing Secretariat in December 1992. Those wishing to secure copies of this and future issues should contact Yin Zhijun, FAX 86-1-8210995. The IASPEI Progress Report for the IDNDR Demonstration Project was presented by Dr. Karnik to the Fourth Session of the Scientific and Technical Committee (STC) of the UN/IDNDR at its meeting in New Delhi, postponed to February 1993. There was stress on the need for additional funds for the IDNDR initiatives from United Nation's sources, including UNESCO and UNDRO.

The Commission has taken a lead in support for a special international conference on the

fifth anniversary of the 1988 Spitak earthquake. The conference title is "Continental Collision Zone Earthquakes and Earthquake Hazard Reduction". It will be held in Yerevan, Armenia, 1-4 October 1993, organized by the National Survey for Seismic Protection of Armenia. Information can be obtained from the Beijing Secretariat or from Dr. Balassanian, FAX in Armenia 7-88-52-15-10-36. Among the other meetings in the next two years are the conference on "Natural Disasters - Protecting Vulnerable Communities", sponsored by the United Kingdom, IDNDR Committee, to be held in London at the Royal Society (13-15 October 1993). There is to be a workshop on "The Impact of the 1989 Newcastle Earthquake for Australian Urban Communities", at the University of Newcastle, 4-6 April, 1993, undertaken by an initiative of the Australian IDNDR Coordination Committee. A "Regional Seismological Assembly in South America" to be held in Brazil (22-26 August, 1994) will also place an emphasis on the goals of the IDNDR. A training course and workshop on the analysis of digital seismic data is planned through an initiative of the IASPEI Committee for Developing Countries. In a parallel effort, an ICESA symposium on "Natural Disaster Reduction in Africa" is being organized at the Colloquium on African Geology to be held at Mbabane, Swaziland, in November 1993.

One emphasis in the goals of the IASPEI/IDNDR Program is further assistance in seismology and geophysics in developing countries. In this regard, the Committee for Developing Countries (R.D. Adams, Chairman) has listed a number of possible initiatives over the next several years.

Progress has been made in another aspect of the Program, namely, the special series publication of earthquake hazard reduction material. Volume 3 of the series will consist of selected papers from the 2nd International Conference on Continental Earthquakes published by Seismological Press, Beijing. Emphasis is now being given to the dissemination of practical manuals of practice set out in Chapter 6.1 of the Commission program. Plans to hold workshops on the legislative side of seismic hazard reduction will be pursued and presented at the New Zealand Assembly.

B.A. Bolt (Chairman, Commission for IDNDR)

## **2nd International Conference on Continental Earthquakes (some impressions)**

The second ICCE took place in Beijing, China, from 7 to 10 October, 1992. This means that 10 years has elapsed since the first ICCE was held in the same location. In that decade the world seismic energy release was low, in contrast to the abnormally high activity observed during the two previous decades and, in particular, the destructive shock in Tangshan (1976). This 1992 Conference demonstrated the remarkable buildup of the Chinese State Seismological Bureau to face future crisis. Three facts testified to this progress: (1) the impressive number of participants from China; (2) the good quality of their presentations; and (3) the abundance of new documents presented in relation to seismic risk mapping, safety of buildings, and civil preparedness.

About forty participants came from outside China, a number that one would have liked to be larger. The seismic quiescence of the past decade and the slow progress in precursor research may provide partial explanations. For IASPEI, at the beginning of the Decade for Natural Disaster Reduction, this represents certainly a small deception. However, the quality probably compensated for the quantity.

The format of this second ICCE meeting favored good exchanges. Three mornings were kept for "keynote presentations" covering broad subjects. During the other half days, three parallel sessions were organized and ample time was given for coffee breaks in a room displaying posters, books and instruments. The quality of the organization, the top class conference center and hotel facilities, and the delightful entertainments made this trip a fascinating experience for most foreign delegates.

Three field trips were offered after the Conference. The author of this brief report took the trip to Yunan, where the SSB has installed a test site covering about 100 x 200 km along the Red River fault system, somewhat near the border with Burma. On-line recording seismic stations combined with regular geodetic and electromagnetic surveys,

as well as the important monitoring of source water chemistry (including radon activity), have convinced many specialists that the Yunan data base is among the best available. So far the Chinese statistical analysis demonstrates the reliability of chemical signals in ground water prior to certain earthquakes, the evolution of the seismicity patterns being probably also identified in certain cases. This interesting post-conference tour was also an opportunity to appreciate the great diversity of traditional cultures in this southern mountain province, and the warm hospitality of our hosts was deeply appreciated. This should also encourage members of the IASPEI community at large to undertake further scientific common ventures.

Future ICCE: some participants raised the question of organizing future meetings in countries other than China. My impression is that the initiative should remain in the hands of the organizers of the first two ICCE, with the possibility of focussing on one specific group of earthquakes occurring before the turn of the century. The selection of convenors from outside China should help to attract a broader audience and IASPEI could also become more directly involved now that its regional office for IDNDR has been officially opened in Beijing. [Ed: See also ICCE report in Newsletter No. 31 by Yin Zhijun, IASPEI/IDNDR Secretariat]

C. Froidevaux (First Vice-President, IASPEI)

## **Second Planning Meeting on Post Earthquake Investigations Strasbourg, France 2-3 November 1992**

The U.S. Geological Survey, UNESCO, and Council of Europe convened the meeting to continue the dialogue started in the first planning meeting held in Paris on 10-12 March 1992.

In response to a recommendation by the participants, the three organizational convenors agreed to sponsor a pilot study, "Post Earthquake Evaluation Program" (PEEP), to improve the efficiency and benefit of post earthquake investigations (i.e., pilot, reconnaissance, and follow-up missions following damaging earthquakes worldwide). Other organizations are invited to form an *ad hoc* Expert Group and participate in PEEP in any way they choose as the following four actions are undertaken: (1) Creation of a mechanism for sharing information; (2) Strengthening interdisciplinary cooperation; (3) Development of a resource pool for comprehensive post earthquake investigations; and (4) Fostering the adoption and implementation of mitigation, preparedness, and recovery measures.

Council of Europe will organize a meeting, possibly in late spring 1993, to evaluate the status of PEEP and to make mid course corrections.

W. Hays (Representative for U.S. Geological Survey)

## **International Recording Format for Mobile DSS-Stations**

The International Lithosphere Program (ILP) and IASPEI have started a new joint initiative to define an internationally agreed recording format which will allow fast selection of useful events recorded by a large number of mobile Deep Seismic Sounding (DSS) stations. This fast selection will be achieved by the formation of an index file during recording, containing information on the event such as trigger, amplitudes and times of subsequent signal extrema.

*Scenario for DSS experiments in the year 2000.* A scenario for large scale DSS experiments with an array of about 500-1000 instruments is envisaged towards the year

2000. These experiments could consist, for example, of both an active component involving the recording of a known number of shots at pre-determined times and locations, and a passive component involving the recording of a number of teleseismic, regional and local events. Various countries would like to join these international experiments, however, a major obstacle presently is the merger of data files recorded in different formats in the field. Furthermore, for quality control and preliminary interpretation, a fast retrieval of recorded earthquake events according to predetermined selection criteria becomes an essential part of a seismic experiment with a mobile array involving a large number of instruments. An array with 1000 stations recording 1000 events results in 1 million three-component seismogram recordings. Such a large number of recordings requires fast data retrieval and automatic event selection.

*File Index or File Log Format during Recording.* Fast event search or selection implies the creation of a block-oriented and indexed file-system at the time of data acquisition. The indexed file-system should facilitate fast random access of the data via pointers, e.g., one pointer per minute in continuous mode or one pointer per event in triggered mode. The information in the block headers and in the choice of data pointers should be well-conceived and focussed on a minimal common standard.

*Recording Media.* Fast data retrieval without the step of physically copying data to a computer's primary mass storage implies the use of a random access medium, e.g., optical disc, flash card, removable hard disc, and we feel we should strive towards this goal. The agreement on an international format does not hinder the recording medium being DAT as long as the provision can be made for the recording of the agreed-upon file index. The modular design of the instrument should facilitate the updating with state-of-the-art mass storage medium.

*Definition of a clear interface.* The requirements for the file-system structure include: (1) a minimal common standard with the goal to define a common interface for access by a higher level Data Bank System (e.g., Informix, Postgres); and (2) an open-file

system so that, e.g., extra entities can be added.

*Advantages of an International Format.* Provided that all manufacturers stick to the internationally agreed format, it would be possible to do the following: to read from any product of any manufacturer; to choose the best instrument at the time of its acquisition; to gradually build up an instrument pool, taking advantage of technological developments; to even buy instruments which will meet special requirements, such as low temperature, non-standard number of channels as required by special experiments, as long as this is specified in the file index or general header. Last, but not least, the manufacturers will in the future be competing for the best technology and price rather than to "marry the customer" and put him in enormous difficulty in data communication with users of another producer.

*Data Bank Format.* Although not directly of concern at this point, we should use this opportunity to exchange experience and ideas directly between experts on Data Base Management, including implementation under UNIX, relational data bank systems (e.g., Informix, Postgres) and direct access to data on the original recording medium.

If you would like to contribute your ideas to this initiative please contact: Karl Fuchs, Geophysical Institute, Karlsruhe, GERMANY (Tel: 49 721 608 4493; Fax: 49 721 71173; E-mail: bi72@dkauni2.bitnet)

K. Fuchs (Past President, ILP)

### **Monograph on Earthquake Hazard Assessment**

In the spirit of the IDNDR, the Working Group on Seismic Hazard Assessment Techniques of the Sub-Commission on Earthquake Hazard and the European Seismological Commission have cooperated to compile a monograph on "The Practice of Seismic Hazard Assessment." This is a compilation of seismic hazard methods and results as currently practiced in countries throughout the world. Fifty-nine countries are represented and the monograph consists of separate chapters for each country, each authored by a researcher or practitioner of seismic hazard assessment in that country.

The monograph was edited by Robin K. McGuire. Regional coordinators for the monograph were Dieter Mayer-Rosa, Vladimir Schenk, Avi Shapira, and Robin K. McGuire. Each country's contribution is similar in format, with sections on the history of earthquake hazard assessment in that country, available data, methods used, parameters used to quantify earthquake hazard, representative maps, and future plans. Figures for each country consist of maps of historical epicenters, ground motion parameters, and seismic zones. The monograph is a unique compendium of methods and results that will be useful for researchers throughout the world who are attempting to quantify earthquake hazards, either in the specific countries included or in adjacent countries. Funds are currently being sought to publish the monograph.

R.K. McGuire (Chairman, Working Group on Seismic Hazard Assessment Techniques)

### **Progress Report, IASPEI's International Semi-Controlled Experiment on Seismic Events**

South Africa's seismicity is mostly associated with the world's largest concentration of deep mines, which forms an arc between 26°S and 28°S. During a working day about 400,000 miners are underground, between 2 and 4 km below the surface. These men are typically extending a long tabular slit - a stope - which may have a height of only 1.0 to 1.5 m, at the advancing rock face. Most evenings there is an explosive blast, when the face advances by ~0.7 m; there is a large population of seismic events during the ensuing hours and days. They represent a large number of brittle failures within the strong quartzite, as the stresses at the edge of the slit advance toward the 'primitive' undisturbed environment.

In 1992 workers at the University of the Witwatersrand and Dr. A. McGarr of the USGS, Menlo Park, California, proposed that a small rock volume, within such a deep gold mine, be designated as an IASPEI Site, where a Semi-Controlled Experiment on Seismic Events could be conducted. Here a large population of seismic events, with source mechanisms similar to those of shallow natural earthquakes, will certainly occur during a period of intensive observation lasting one

year. Some events are expected to have magnitudes between  $M = 3.5$  and  $M = 4$ .

The key feature, in the design of the Experiment, is that instruments from a wide range of sciences should be placed in boreholes, so that they lie within a few tens to a few hundreds of meters of the impending seismic events. Accordingly, the experiment might become humanity's most concerted attempt to fully instrument, and more fully understand, a volume of rock affected by seismic events. Two key questions were framed: (1) Will there be reliable estimators of seismic hazard within this IASPEI Site?; (2) Will new insights emerge on the physics of the seismic source (which might be used in estimating risk)?

The fields obviously involved in the Experiment include: seismology; rock mechanics and the analysis of the elasto-gravitational field 'driving' the events; non-linear physics, fractals, pattern recognition; detection of weak electromagnetic, electrical, magnetic and gravity field signatures in noisy environments; and gaseous geochemical tracers.

From appropriate borehole sensors, digital data will be sent to underground and surface data acquisition systems, and then distributed to investigators through international networks.

At our Assembly in Vienna in 1991, the Sub-Commission on Earthquake Prediction (Chairman: Dr. Max Wyss) supported participation in the Experiment and financial support (at 'seed money' level) was found by IASPEI for 1992 and 1993.

Early in 1992, an Announcement about the Experiment was sent to a large number of seismologists and workers in rock mechanics. Scientists from Austria, Germany, Japan, Russia and the U.S.A. responded positively. In 1992 Dr. Iio of the Disaster Prevention Research Institute, University of Kyoto, visited the Witwatersrand and assessed research facilities available underground; Prof. Nicolaysen of the University of the Witwatersrand then visited seven research centers in Japan and discussed aims and current planning, over a period of one month.

In highly stressed quartzite at a depth of  $2\frac{1}{2}$  km, core drilling required to locate

instruments in boreholes is expensive. At ~US\$320 per meter, a single 12-meter borehole required for a three-component seismometer installation will cost ~US\$4,000. The Semi-Controlled Experiment requires funding from different countries, advanced technology in respect of data acquisition in the aggressive underground environment, and sustained effort. Negotiations with potential funders have begun, concerning monies needed for an experiment including: three-component seismometers; three-component accelerometers; magnetic field sensors; electromagnetic field sensors; galvanic sensors; strain gauges; tiltmeters; radon detectors; and helium detectors.

In an era when the gold mining industry is implementing severe cut-backs, we are motivating this Experiment for the gains it will bring to basic understanding (of the shallow seismic source and rockbursts). We must convince funders of the value of a risky venture, at a time when many in industry stress short-term practical benefits. If we gain cohesive participation of scientists and engineers from a wide range of disciplines, we will be entering uncharted territory and this factor brings zest to our efforts.

Interest and critical comment will be sincerely welcomed. For a copy of the Announcement and a 17 page semi-popular article (which reviews the existing publications in this field, as well as the proposal) write to: The Proposers, ISCESE, Bernard Price Institute of Geophysics, University of the Witwatersrand, Private Bag 3, Wits 2050, SOUTH AFRICA (Fax: 27 11 339 7367).

### **Commission on Practice**

For the last six years the Commission on Practice has experimented with a new structure, under which the Sub-Commissions were disbanded and the number of Working Groups expanded. This structure has met with mixed success. Several of the Working Groups were formed in order to perform a specific task. Most of these *ad hoc* Working Groups have now successfully completed these tasks. Several Working Groups have been inactive.

After consultation with the IASPEI Secretary-General and several of the Working Group chairmen, I have instituted a change in the structure of the Commission. The Working

Groups that have completed their missions have been disbanded, with the thanks of the Commission for the fine jobs they have done. Their enthusiasm and hard work is very much appreciated. Several redundant Working Groups have also been disbanded. I have reinstalled a Sub-Commission structure, with each remaining Working Group under a Sub-Commission. This change will help improve the communication and coordination between Working Groups engaged in related activities. The new structure, and membership of the Commission, is as follows:

Chairman: S.A. Sipkin

Secretary: P. Bormann

Senior Advisor: A.L. Hales

Members: H. Aichele, P.W. Basham, E.A. Bergman, Y. Chen, M.A. Chinnery, D. Denham, G. Ekström, D. Giardini, V. Gusiakov, E.G. Kausel, N.V. Kondorskaya, O. Kulhánek, W.H.K. Lee, A. Ostrovsky, S.E. Pirhonen, A. Plesinger, B.A. Romanowicz, K. Shimazaki, P.G. Silver, W.D. Smith, H.N. Srivastava, D.A. Wiens, Y.T. Yeh

Observers: J. Filson (NEIC), A. Hughes (ISC), T.H. Jordan (ISOP)

Sub-Commission on Earthquake Size (G. Ekström)

Working Group on Moment-Magnitude (G. Ekström)

Working Group on Magnitude Calibrating Functions (S. Duda and T. Yanovskaya)

Working Group on Estimation of Seismic Energy (G.L. Choy)

Sub-Commission on Reporting Standards (H. Aichele)

Working Group on Telegraphic Formats (B. Presgrave)

Working Group on Regionalization (J. Young)

Working Group on Regional Data Centers (J. Bonnin)

Sub-Commission on Seismogram Analysis and Interpretation (A. Plesinger)

Working Group on Digital Seismogram Interpretation (A. Plesinger and D. Seidl)

Working Group on Manual of Seismogram Interpretation (G.L. Choy)

Working Group on Personal Computers  
(W.H.K. Lee)

Sub-Commission on Microseisms (A.  
Ostrovsky)

Joint Sub-Commission on Earthquake  
Algorithms (with Wave Propagation) (D.  
Giardini)

I am confident that this new structure will enable the Commission on Practice to more readily respond to the opportunities and challenges ahead, in particular those represented by activities such as the International Decade for Natural Disaster Reduction (IDNDR) and the International Seismological Observing Period (ISOP).

S.A. Sipkin (Chairman)

### **IASPEI Software Library Volumes 4 and 5**

Volumes 4 and 5 of the IASPEI Software Library will shortly be available. Volume 4 is a toolbox for managing bibliographic information and includes programs to automate the reference preparation in manuscripts and to manage a user's own references. It also includes a database of all articles published in the Bulletin of SSA (1911-1992), selected articles from the Journal of Geophysical Research (1959-92), and some most frequently cited articles by seismologists. The volume is scheduled for publication in March, 1993.

Volume 5 is A Programmable Interactive Toolbox for Seismological Analysis (PITSA) by Frank Scherbaum and James Johnson, and includes a short course on "First Principles of Digital Signal Processing for Seismologists." It supports both IBM-compatible PCs and SUN workstations. The PC-version was published in December, 1992, and the SUN-version will be available in the spring of 1993.

Each IASPEI software volume includes the executable code, examples on floppy diskettes, and printed documentation in IBM-type software packaging. The regular cost is \$250 for each volume, including tax, handling and shipping. For Volume 4, a pre-paid pre-publication order is available for US\$150 each. Source code for the IASPEI Software Library volumes is available at US\$250 per volume. For further information or to order

volumes contact the Seismological Society of America, 201 Plaza Professional Building, El Cerrito, CA 94530, U.S.A. (Tel: 1 510 525 5474; Fax: 1 510 525 7204).

W.H.K. Lee (Chairman, Working Group on Personal Computers)

### **IASPEI PC Shareware Library**

Under the auspices of the Working Group on Personal Computers, a diskette with several useful programs for seismological applications, provided by the authors on a shareware basis, was distributed during the Workshop on "Applications of Personal Computers in Geophysics" held at the 1991 IUGG General Assembly in Vienna. Due to the success of this initiative it was decided to complement the existing volumes of the IASPEI Seismological Software Library (SSL) with the publication of the new IASPEI PC Shareware Library for fast and wide distribution of geophysical programs and utilities, reduced or demonstration versions of geophysical software, and beta-versions of new programs to be included in future volumes of the SSL. The IASPEI PC Shareware Library will be published on diskette, including files with short-form manuals of the programs. They will be distributed at nominal cost at scientific meetings or mailed on request to the editor. For further information contact Dr. M. García-Fernández, Estación Volcanológica de Canarias/IPNAC-CSIC, Astrofísico Francisco Sánchez, 3, E-38080 La Laguna, Tenerife, SPAIN.(Tel: 34 22 256847; Fax: 34 22 633439; E-mail: evc@ll.aic.es)

M. García-Fernández (Editor)

### **Low-Frequency Radiomonitoring of the Lithosphere**

The National Geophysical Committee of Russia proposes the initiation of a new project called "Low-Frequency Radiomonitoring of the Lithosphere". The purpose of the project is to study the state and deep structure of the lithosphere for acquisition of information about geodynamical processes and earthquake focii, and for prospecting of useful minerals. The project presumes the usage of already existing powerful and highly stable sources of long-range radio communications (in the Hz-frequency range). If you are interested in

further information about this project, please contact the National Geophysical Committee of Russia, Molodezhnaya 3, Moscow, 117296, RUSSIA (Tel: 7 095 930 0546; Fax: 7 095 930 5509; Telex: 411478 SGC SU; E-mail: sgc@node.ias.msk.su or @adonis.ias.msk.su)

G.A. Sobolev (President, National Geophysical Committee of Russia)

**27th General Assembly, IASPEI  
Wellington, New Zealand  
10-21 January 1994**

The Second Circular for this Assembly which includes the Call for Papers has now been distributed. Important deadlines to remember:

Abstract Submittal: **September 15, 1993**

Discount Registration: **September 15, 1993**

Hotel Reservations: **September 30, 1993**

Abstracts *must* be sent to the Local Organizing Committee (LOC), but you may send a copy to the Principal Convenor for your session as well. **Please use e-mail if at all possible.** Receipt will be acknowledged by e-mail whenever possible, otherwise by mail. The LOC will send all abstracts on immediately to the appropriate convenors. The convenors for each session will decide which papers to include and may also decide whether to allocate oral or poster presentations. In some cases convenors may suggest that a paper would fit better in a different session. The Principal Convenor will have the final responsibility for the session content and scheduling.

Requests for financial support should be addressed to the Principal Convenor for your session. Commission, Sub-Commission and Working Group Members may also send requests for financial support to the appropriate Commission Chairman.

Copies of the Second Circular and Registration Form can be obtained from the Local organizing Committee. (Tel: 64 4 73 8208; Fax: 64 4 471 0977; E-mail: IASPEI94@m2g.gns.cri.nz).

**Regional Seismological Assembly  
in South America  
Brasilia, Brazil  
21-26 August 1994**

On behalf of the organizing institution CERESIS and of the sponsoring bodies, IASPEI, ILP and UNESCO, it is our pleasure to invite you to attend the Regional Seismological Assembly in South America, to be held during 22-26 August, 1994, in the city of Brasilia, Brazil. The Assembly is an event organized in the framework of the International Decade for Natural Disaster Reduction (IDNDR).



The main purpose of the Regional Assembly is to take knowledge of and discuss the work and research being carried out in seismology and related disciplines, regarding Latin American and Caribbean regions. It is also an opportunity to encourage activities relevant to the objective and goals of IDNDR. Travel support will be provided to a limited number of participants from the region.

Among other topics, subjects to be presented and discussed at the Regional Assembly include seismicity, seismotectonics, Earth structure, stress distribution, modelling, wave propagation, engineering seismology, earthquake mitigation and prediction, data acquisition and processing, geothermics and volcanology.

To receive the Second Circular please contact: Observatório Sismológico, Universidade de Brasília, 70910-900 Brasília, DF - BRASIL (Tel: 55 61 348 2145/2675; Fax: 55 61 274 5927; E-mail: OBSIS@BRUNB; Telex: 612730 UNBS BR)

A.A. Giesecke (Director, CERESIS)

**21st General Assembly, IUGG  
28th General Assembly, IASPEI  
Boulder, Colorado, U.S.A.  
July 1995**

The XXI General Assembly of IUGG and 28th General Assembly of IASPEI will meet in Boulder, Colorado, on the campus of the University of Colorado, in July, 1995.

IASPEI is represented on the Program Committee by your Secretary-General, E.R. Engdahl. This committee had its first meeting on 27-28 February 1993 in Boulder, Colorado. At this meeting Program Committee Guidelines were adopted and a Planning and Promotion Schedule was developed. Some immediate milestones should be noted. A First Circular will be distributed widely in March 1993 and at all 1993 and 1994 Association meetings. By October 1993 a list of Union, Inter-Association and Association Symposia will have been prepared. (Since IASPEI does not meet until January 1994, our proposals will have to be preliminary; final proposals from IASPEI will be submitted February 1994.) The IUGG Executive Committee will meet 15-19 November 1993 to discuss the Program Committee's plan for the Boulder program.

The Second Circular will be issued 15 February 1994. This circular will contain the following: program information; call for papers with listings of symposia, workshops, and convenors; and abstract submittal information.

## Publications

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Hurtig, E., and Haack, H. (Editors), *Geothermal Atlas of Europe*, Rudolf Muller International Booksellers, Amsterdam, The Netherlands, 36 maps, 156 pp, 1992.

Ebinger, C.J., Gupta, H.K., and Nyambok, I.O. (Editors), Special Issue, *Seismology and Related Sciences in Africa*, selected papers from the IASPEI Regional Seismological Assembly held in Nairobi, Kenya, August 1992, *Tectonophysics*, v. 209, 1992.

Ohnaka, M. (Editor), Special Issue, *Earthquake Source Physics and Earthquake Precursors*, Proceedings of the IASPEI sponsored Symposium held in Tokyo, Japan, November, 1990, *Tectonophysics*, v. 211, 1992.

Poirier, J.-P., and Ahrens, T.J. (Editors), Special Issue, *Physical Properties of the Earth's Interior: Mantle to Core*, Proceedings of the IASPEI Symposium held during the 26th General Assembly in Vienna, Austria, *Physics of the Earth and Planetary Interiors*, v. 74, 1992.

Giardini, D. (Editor), Special Issue, *Lateral Heterogeneity and Earthquake Location*, Proceedings of the IASPEI Symposium held during the 26th General Assembly in Vienna, Austria, *Physics of the Earth and Planetary Interiors*, v. 75, 1992.

Lewis, T. (Editor), Special Issue, *Climatic Change Inferred from Underground Temperatures, Paleogeography, Paleoclimatology, Paleocology*, v. 98, *Global and Planetary Change*, v.6, 1992.

Ranalli, G. (Editor), Special section, *Heat Flow, Rock Mechanics, and Seismicity*, Proceedings of the IASPEI Symposium held during the 26th General Assembly in Vienna, Austria, *Tectonophysics*, v. 217, 1993.

Duda, S.J., and Yanovskaya, T.B., (Editors), Special section, *Estimation of Earthquake Size*, Proceedings of the IASPEI Symposium held during the 26th General Assembly in Vienna, Austria, *Tectonophysics*, v. 217, 1993.

We have been advised that UNESCO still has a few copies of "Anatomy of Seismograms", Volume I of the IASPEI Software Library for personal computers, and the IASPEI 1991 Seismological Tables, which could be made

available to suitable institutions in developing countries on written request. The request should be made to: Dr. M. Hashizume, Division of Earth Sciences, Science Sector, UNESCO, 7 place de Fontenoy, 75700 Paris, FRANCE (Fax: 33-1-4306 1122).

## **FORTHCOMING MEETINGS**

The following is a selection of forthcoming meetings in fields of interest to the Association:

1993 APRIL 4-6  
IDNDR WORKSHOP: THE IMPACT OF THE 1989 NEWCASTLE EARTHQUAKE FOR AUSTRALIAN URBAN COMMUNITIES, Newcastle, AUSTRALIA

1993 April 4-8  
EUROPEAN UNION OF GEOSCIENCES VII: THE BIENNIAL MEETING, Strasbourg, FRANCE

EUG VII Organizing/Scientific Committee, Geological Survey of The Netherlands, P.O. Box 157, 2000 AD Haarlem, THE NETHERLANDS  
(Tel: 31 23 300112; Fax: 31 23 351614)

1993 May 3-7  
EUROPEAN GEOPHYSICAL SOCIETY, XVIII GENERAL ASSEMBLY, Weisbaden, GERMANY  
EGS Office, Postfach 49, Max-Planck Strasse 1, W-3411 Katlenburg-Lindau, GERMANY  
(Tel: 49 611 144245; Fax: 49 611 144118; Telex: 965515 COP D)

1993 June 12-17  
YEMEN SEMINAR ON SEISMIC HAZARD REDUCTION AND EARTHQUAKE DISASTER MITIGATION, Sana'a, REPUBLIC OF YEMEN  
Eng. Gamal M. Sholan, Chairman of Organizing Committee, Seismological Observatory Center, P.O. Box 87175, Dhamar, REPUBLIC OF YEMEN  
(Tel: 967 6 500597; Fax: 967 6 502519)

1993 June 14-16  
6th INTERNATIONAL CONFERENCE ON SOIL DYNAMICS AND EARTHQUAKE ENGINEERING, Bath, England, UNITED KINGDOM  
Elizabeth Cherry, Conference Secretariat, SDEE '93, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, England SO4 2AA, UNITED KINGDOM

(Tel: 44 0 703 293223; Fax: 44 0 703 292853; E-mail: cmi@uk.ac.rl.ib)

1993 June 20-26  
WORKSHOP ON PHYSICAL AND NUMERICAL MODELLING OF MANTLE CONVECTION AND LITHOSPHERIC DYNAMICS, Oléron, FRANCE  
Jean-Pierre Vilotte, Département T.A.O., Ecole Normale Supérieure, 24 Rue Lhomond, 75231 - Paris Cedex 05, FRANCE  
(Tel: 33 1 44 32 22 13; Fax: 33 1 44 32 22 00; E-mail: vilotte@jadeite.ens)  
Philippe Machetel, UPR 234/CNRS, G.R.G.S./C.N.E.S., 18 Rue Edouard Belin, 31055 Toulouse Cedex, FRANCE  
(Tel: 33 61 33 29 66; Fax: 33 61 25 32 05; E-mail: machetel@ourea.cnes.fr)

1993 June 21-27  
INTERNATIONAL SYMPOSIUM ON PROBLEMS OF GEOTHERMAL ENERGY, St. Petersburg, RUSSIA

1993 July 28-31  
WORKSHOP IN GLOBAL DYNAMICS OF THE SOLID EARTH, Pístina, Southern Bohemia, CZECH REPUBLIC  
Local Organizers, Department of Geophysics, Faculty of Mathematics and Physics, Charles University, V Holesovickách 2, 180 00 Praha 8, CZECH REPUBLIC (Tel: 42 2 847774; Fax: 42 2 843153 or 42 2 847688)  
David A. Yuen, 1200 Washington Ave, S., M.S.I., Minneapolis, MN 55415, U.S.A.  
(Tel: 1 612 624 1868; Fax: 1 612 624 8861; E-mail: davey@sop.geo.umn.edu)

1993 August 6-13  
INTERNATIONAL ASSOCIATION OF GEODESY GENERAL MEETING, Beijing, CHINA  
Local Organizing Committee for IAG General Meeting 1992, Chinese Society for Geodesy, Photogrammetry, and Cartography, Baiwanzhuang, Beijing 100830, CHINA  
(Tel: 86 1 8322012; Fax: 86 1 8311564)

1993 August 8-20  
7th SCIENTIFIC ASSEMBLY OF THE INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY, Buenos Aires, ARGENTINA  
Michael Gadsen, IAGA, Physics Unit, Fraser Noble Building, Aberdeen University, Aberdeen AB9 2UE, Scotland, U.K. 573838  
(Fax: 44 224 584776)

1993 August 9-11  
INTERNATIONAL SCIENTIFIC  
CONFERENCE: GEOPHYSICS AND  
MODERN WORLD, Moscow, RUSSIA  
Organizing Committee, 113105,  
VNIIGeosystem, Varshavskoye shosse, 8,  
Moscow, RUSSIA (Fax: 7 095 230 37 11;  
E-mail: network RELCOM RootCgeosys)

1993 August 16-18  
3rd INTERNATIONAL SYMPOSIUM ON  
ROCKBURSTS AND SEISMICITY IN  
MINES, Kingston, CANADA  
R. Paul Young, Engineering Seismology  
Laboratory, Dept. of Geological Sciences,  
Queen's University, Kingston, Ontario,  
CANADA K7L 3N6

1993 August 29-September 3  
5th INTERNATIONAL CONFERENCE ON  
NATURAL AND MAN-MADE HAZARDS,  
Quingdao, CHINA  
Mohammed I. El-Sabh, President, Natural  
Hazards Society, Centre Océanographique de  
Rimouski, 310 Allée des Ursulines, Quebec,  
G5L 3A1, CANADA

1993 September 21-23  
2nd INTERNATIONAL SYMPOSIUM ON  
ANDEAN GEODYNAMICS, Oxford,  
England, UNITED KINGDOM  
Pierre Soler, ISAG '93, ORSTROM, Cs1, 213  
rue Lafayette, 75480 Cedex 10, FRANCE  
(Fax: 33 1 48 03 08 29)

1993 September 25-October 1  
IAVCEI 1993 GENERAL ASSEMBLY:  
ANCIENT VOLCANISM & MODERN  
ANALOGUES, Canberra, AUSTRALIA  
IAVCEI General Assembly, C/-ACTS, GPO  
Box 2200, Canberra, ACT, 2601  
AUSTRALIA (Fax: 61 6 2573256)

1993 October 1-4  
INTERNATIONAL CONFERENCE:  
CONTINENTAL COLLISION ZONE  
EARTHQUAKES AND EARTHQUAKE  
HAZARD REDUCTION, Yerevan,  
ARMENIA  
Dr. S. Balassanian, National Survey for  
Seismic Protection, Davidashen IV Massiv,  
Yerevan, 375054 REPUBLIC OF ARMENIA  
(Tel: 7 88 52 35 59 53; Fax: 7 88 52 15 10 36;  
E-mail: ansysp@adonis.ias.msk.su; Telex:  
243201 SIV SU)  
International Conference, American  
University of Armenia, 300 Lakeside Dr., 18th

Fl., Oakland, CA 94612, U.S.A. (Tel: 1 510  
987 9459; Fax: 1 510 208 3576)

1993 October 11-15  
CARRIBEAN CONFERENCE ON  
VOLCANOLOGY, SEISMOLOGY AND  
EARTHQUAKE ENGINEERING, St.  
Augustine, TRINIDAD  
Seismic Research Unit, University of the West  
Indies, St. Augustine, TRINIDAD  
(Fax: 1 809 663 9293)

1993 October 13-15  
IDNDR CONFERENCE: NATURAL  
DISASTERS - PROTECTING  
VULNERABLE COMMUNITIES, London,  
England, UNITED KINGDOM  
Rachel Coninx, IDNDR, The Conference  
Office, Institution of Civil Engineers, 1-7  
Great George St., London SW1P 3AA, U.K.  
(Fax: 44 71 233 1743)

1993 October 18-23  
INTERNATIONAL SYMPOSIUM ON NEW  
DEVELOPMENTS IN GEOTHERMAL  
MEASUREMENTS IN BOREHOLES,  
Potsdam, GERMANY

1993 October 29 - November 2  
1993 JOINT CONFERENCE OF  
SEISMOLOGY IN EAST ASIA  
Tottori, JAPAN  
Mr. Yuzo Ishikawa, Seismology &  
Volcanology Res. Division, Meteorological  
Research Institute, 1-1 Nagamine, Tsukuba-  
shi, Ibaraki 305, JAPAN (Tel: 81 298 51 7111  
(ex507); Fax: 81 298 51 3730)

1994 January 10-21  
27th GENERAL ASSEMBLY, IASPEI,  
Wellington, NEW ZEALAND  
The Secretary, IASPEI 94, Institute of  
Geological and Nuclear Sciences, P.O. Box  
1320, Wellington, NEW ZEALAND  
(Tel :+64-4-473-8208; Fax: +64-4-471-0977;  
E-mail: IASPEI94@m2g.gns.cri.nz)

1994 January 27-28  
INTERNATIONAL SYMPOSIUM ON  
REMOTE SENSING AND GIS, San  
Francisco, CA, U.S.A.  
Vern Singhroy, Canada Centre for Remote  
Sensing, 588 Booth St., Ottawa, Ontario, K1A  
0Y7 CANADA (Tel: 1 613 947 1215)

1994 April 25-30  
7th INTERNATIONAL SYMPOSIUM ON  
THE OBSERVATION OF THE  
CONTINENTAL CRUST THROUGH

DRILLING, Santa Fe, NM, U.S.A.  
Earl Hoskins, DOSECC, College of  
Geosciences and Maritime Studies, Texas  
A & M University, College Station, TX,  
U.S.A. (Tel: 1 409 845 3651; Fax: 1 409 845  
0056; E-mail: hoskins@pluto.tamu.edu)

1994 August 8-12  
SEDI SYMPOSIUM  
Whistler Mountain, British Columbia,  
CANADA

1994 August 22-26  
REGIONAL SEISMOLOGICAL ASSEMBLY  
IN SOUTH AMERICA, Brasilia, BRAZIL  
Observatório Sismológico, Universidade de  
Brasilia, 70910-900 Brasilia, DF-BRASIL  
(Tel: 55 61 348 2145/2675; Fax: 55 61 274  
5927; E-mail: OBSIS@BRUNB; Telex:  
612730 UNBS BR)

1994 August 28-September 3  
EUROPEAN ASSOCIATION OF  
GEOCHEMISTRY MEETING, Edinburgh,  
UNITED KINGDOM  
B. Harte, Department of Geology and  
Geophysics, Grant Institute, University of  
Edinburgh, West Mains Rd., Edinburgh,  
UNITED KINGDOM

1994 September 12-17  
6TH INTERNATIONAL SYMPOSIUM ON  
SEISMIC REFLECTION PROBING OF THE  
CONTINENTS AND THEIR MARGINS,  
Budapest, HUNGARY  
Dr. Károly Posgay, Eötvös Lorand  
Geophysical Institute, Budapest XIV  
Columbus U 17-23, POB 35, H-1140  
Budapest, HUNGARY (Tel: 361 183 6533 or  
184 3309; Fax: 361 163 7256 or 184 3309; E-  
mail: H612Tit@ELLAHu; Telex: 61 22 6194  
elgi h)

1995 July 3-14  
21st GENERAL ASSEMBLY, IUGG,  
28th GENERAL ASSEMBLY, IASPEI  
Boulder, Colorado, U.S.A.