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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION



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Report on the Workshop
NON-LINEAR DYNAMICS AND EARTHQUAKE PREDICTION
(25 November - 13 December 1991)

The importance of earthquake prediction is rapidly increasing, due to the growth of the seismic vulnerability of densely populated areas and the proliferation of high-risk constructions (nuclear power plants, lifelines, large dams, dangerous waste disposals, etc.)

In some developing countries the cost of prevention and mitigation of seismic risk is comparable to the growth of the GNP.

The new possibilities offered to earthquake prediction are based on the synthesis of modern nonlinear science, similarity in geodynamical processes (in wide range scales), global observational digital networks and new types of computers and specialized software.

The Workshop was organized as a natural continuation of previous ICTP activities with the purpose of training participants in these very advanced research fields.

The Workshop was attended by 33 participants, among these 21 were from developing countries, 19 lectures were delivered by leading scientists in seismology and related sciences.

The program of the Workshop included not only these lectures but also a relevant part of it was devoted to studies of practical methods of intermediate-term earthquake prediction.

This methodology is routinely successfully applied both to retrospective and forward intermediate-term prediction on a global scale, with a level of error less than 20%, the total time of alarm does not exceed 40% of the total time interval considered, and the linear dimension of the area under alarm is of the order of hundreds of Km.

The Workshop included lectures, written exercises, computer exercises and research work with real data pertinent to the regions of interest of the participants.

This training policy made it necessary to divide the participants into two groups, therefore the exercises (both written and computer) had to be repeated twice.

For this purpose 6 teachers from the International Institute of Earthquake Prediction Theory and Mathematical Geophysics of the Academy of Sciences of the USSR (Moscow) were engaged full time both during the Workshop and two weeks before. The complexity of the teaching and research program required the extension of the activity over a period of six days each week.

The participants showed a strong interest in the different topics treated during the Workshop and most of them demonstrated the necessary background to profit from the training. In fact more than half of the participants will be able to apply the studied algorithms for earthquake predictions, using the software which was distributed at the end of the Workshop.

Some participants began the research work using the algorithms studied during the Workshop. They not only tried to apply the algorithms of long-term prediction of earthquakes but also closely investigated the seismicity of different regions.

The Workshop did provide a very important occasion to identify potential participants to the activities to be held within the framework of the International Institute for Earth, Environmental and Marine Sciences and Technologies.

From the experience of this Workshop some remarks can be made concerning the practical aspects of organization of future activities:

1. For computer exercises it is desirable to have only one participant for each computer terminal.
2. If personal computers are used they have to be connected to a network since it is impossible to have all necessary data in each computer.
3. Window interface used in the new version of the software proved to be convenient and effective for work with the programs.
4. For the participants to this Workshop who will apply the studied algorithms to their personal work the future workshops may be useful to test and discuss the obtained results and to obtain information about improvements in the algorithms. The duration of such workshops may be 2 - 3 weeks; the number of participants 15 - 20

Vladimir I. Keilis-Borok

V Keilis-Borok

Giuliano F. Panza



INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
Trieste, Italy

Workshop on Non-Linear Dynamics
and Earthquake Predictions
Trieste, 25 November- 13 December 1991

UNIDO Project US/GLO/89/104
UNIDO Contract No. 91/162/VK

FINANCIAL STATEMENT

(in US\$)

1 DIRECTORS

Bonnin, J.	France	300.00
Caputta, M.	Italy	400.67
Chen Yong	China	1,407.17
Dubinchuk, V.	USSR	308.33
Gaur, V.	India	1,712.23
Gieseke, A.	Peru	954.17
Kausel, E.	Chile	4,360.00
Keilis-Borok, V.	USSR	3,873.50
Kuznetsov, I.	USSR	1,177.14
Panza, G.F.	Italy	83.33
Rosenblueth, E.	Mexico	1,990.95
Shapira, A.	Germany	1,199.30
Sumitomo, N.	Japan	300.00
	<i>Subtotal</i>	18,066.79

2 LECTURERS

Di Gennaro, V.	Italy	29.17
Genti, E.	Italy	62.50
Healy, J.H.	USA	2,832.07
Knopoff, L.	USA	1,880.33
Kossobokov, V.	USSR	4,987.64
Langer, J.	USA	2,083.50
Primakov, I.	USSR	4,896.18
Rotwain, I.	USSR	2,902.14
Rundle, J.B.	USA	1,798.83
Shulyakovskaya, T.	USSR	1,928.44
Soloviev, A.	USSR	4,898.58
Turcotte, D.	USA	1,976.33
	<i>Subtotal</i>	30,275.71

3 PARTICIPANTS

Akoto, M.A.	Ghana	1,925.03
Baris, S.	Turkey	1,230.08
Brenes, A.J.	Costarica	2,061.12
Cecic, I.	Yugoslavia	375.00
Dey, S.C.	Bangladesh	843.29
Ji Ying	China	1,567.38
Khan, S.	Pakistan	1,937.63
Mammo, T.	Ethiopia	1,904.52
Marcak, H.	Poland	695.12
Moscato, P.	Argentina	2,131.54
Nguyen Hong Phuong	Vietnam	2,008.22
Nikolova, S.	Bulgaria	662.97
Rodriguez, T.C.	Cuba	2,461.70
Sileny, J.	Czechoslovakia	731.70
Singh, H.N.	India	2,042.46
Sriram, V.	India	1,829.10
Tarroja, M.F.H.	Philippines	2,780.49
Trifu, C.I.	Romania	810.59
Urban, L.	Czechoslovakia	731.70
Varol, E.	Turkey	1,226.82
Vasquez, M.	Peru	2,710.41
Wu Zhongliang	China	1,567.38
Zhou Cuiying	China	2,645.55
Zhu Yuan-Qing	China	1,567.38

Subtotal **38,447.18**

4 OVERHEADS (*)

UNIDO share of total overhead charges (inclusive of organization, supervision, technical assistance, secretariat, provision of facilities, etc.)

Total **86,789.68**

(*) Overhead costs are not being reported since direct costs do already exceed UNIDO's contractual contribution; they will be covered, together with the overexpenditure, by ICTP's budget.

ICTP Finance/am
1992-01-23