

# SECED

THE SOCIETY FOR  
EARTHQUAKE AND  
CIVIL ENGINEERING  
DYNAMICS

# NEWSLETTER

January 1987 Vol. 1 No. 1

## FROM THE CHAIRMAN

In launching this newsletter we wish to dispel all rumours that SECED is a secret society! We would like to bring the membership in closer touch with the activities, developments and debates within the society. At the same time, we hope that some members would see this as an opportunity to share their views by contributing to the newsletter. It is our intention to publish the newsletter at least on a quarterly basis and more often if needed. We would welcome your suggestions and participation to make this venture a success.

As some of you probably know, the affairs of the society are managed by a committee made up of six elected members, six co-opted members, and one representative each from the Institution of Structural Engineers, the Institution of Mechanical Engineers, the Institution of Civil Engineers and the British Geotechnical Society. There are several sub-committees that have been set up to administer the directives of the committee. Each of the sub-committees will be reporting regularly in the newsletter to keep you informed and to encourage you to contribute to any of the activities. Please respond! Remember this is our society and each of us can make our contribution.

I will be serving as your chairman for the next two years. In this period two special activities are planned. Firstly, there is the Inaugural Mallet-Milne Lecture, which is to be held on 27 May 1987 and the second SECED conference to be held in March 1988. Watch this space to see how you can contribute to the success of these two very important events.

May I take this opportunity on behalf of the committee of SECED to wish you all a happy Christmas and a peaceful and prosperous new year.

R.R. KUNAR

## EDITOR'S NOTE

Throughout its history the Society has, by chance, devoted much of its attention to the discussion of earthquake engineering. The Society takes as its field all aspects of civil engineering dynamics and we look to members and all others interested to provide news items dealing with the whole of the subject.

The SECED Newsletter is published four times a year by the SOCIETY FOR EARTHQUAKE AND CIVIL ENGINEERING DYNAMICS and is available to all members of the society. Articles for inclusion should be sent to The Editor, SECED Newsletter, Mr. D.A. Howells at The Institution of Civil Engineers, Great George Street, London SW1P 3AA.

## PROGRAMME OF MEETINGS

Wednesday  
21 January 1987  
at 2.00 p.m.

Joint meeting with the Institution  
of Structural Engineers on: The  
Kalamata and El Salvador Earthquakes.

Wednesday  
25 February 1987  
at 5.30 p.m.

Informal discussion: Protection of  
Historic Monuments against Earthquakes  
introduced by Sir Bernard Feilden  
(possibly to be joined by Professor  
Chiarugi, University of Florence).

Wednesday  
25 March 1987  
at 5.30 p.m.

AGM followed by informal discussion:  
Earthquake Engineering Design in  
Canada introduced by Professor  
Heidebrecht.

Wednesday  
29 April 1987  
at 5.30 p.m.

Informal discussion: Gas Cloud  
Explosions introduced by Dr S Hall.

Wednesday  
27 May 1987  
at 5.30 p.m.

The inaugural Mallet-Milne Lecture:  
Engineering Seismology Professor  
N N Ambraseys

---

### MALLET-MILNE LECTURE

The Society announces the establishment of a biennial prestige lecture series in honour of the pioneering British Scientists, Robert Mallet (1810-1883) and John Milne (1850-1913).

The First Mallet-Milne Lecture

will be delivered by

PROFESSOR N.N. AMBRASEYS  
Department of Civil Engineering  
Imperial College of Science and Technology  
London

who will speak on

"ENGINEERING SEISMOLOGY"

on Wednesday, 27 May 1987 at 5.30 p.m.

at

The Institution of Civil Engineers  
Great George Street  
Westminster  
London

---

## 1988 CONFERENCE ON CIVIL ENGINEERING DYNAMICS

This conference will be held on 24/25 March 1988 at Bristol University. It will include presented papers, invited Keynote lecturers, a commercial exhibition and poster sessions.

The lead-in programme will be:

1	Call for papers and first announcement	December 1986
2	Extended abstracts submitted	April 1987
3	Acceptance of papers	June 1987
4	Final papers	December 1987

The contents of the conference will include seismic, wind, wave and man made vibrations.

Visits are being arranged to places of interest.

---

## DIRECTORY OF PRACTITIONERS

SECED have decided to update and re-issue the Directory of Practitioners in Earthquake Engineering and Civil Engineering Dynamics. A different format is going to be used and practitioners will be circulated at an early date. It is hoped that the Directory will be published by March/April 1987.

---

## CORPORATE MEMBERSHIP

From January 1987 SECED is introducing Corporate Membership for an annual subscription of £35. The Company will be entitled to nominate 3 of its staff as voting members of the Society and will be able to change those nominations at any time. It will benefit, in particular, from having its name listed inside the cover of SECED's Directory of Practitioners which will be revised and re-issued in 1987. A corporate Membership form is included in this Newsletter.

---

## THE KALAMATA (S GREECE) EARTHQUAKE OF 13 SEPTEMBER 1986.

The earthquake hit the town of Kalamata and neighbouring villages in the S Peloponnisos (Fig 1) at about 20:30 local time causing the collapse of houses and of a block of flats. Rescue workers from the Fire Brigade and a French team with specialised equipment and trained dogs provided immediate assistance to people trapped under the rubble. 19 People were killed and about 300 people injured. Aftershocks (the main one occurred two days later) caused additional collapses, one further death and increased the number of injuries. The local hospital maintained limited functions whereas most of the casualties were airlifted to regional medical centres. Lifelines were disrupted for a short time by rockfalls in the mountains. Assistance was coordinated apparently on an emergency plan prepared before the earthquake by the Nat Techn Univ in Athens. Soon after the event the centre of the town was revived around an open space where information and coordination centres were operating. People were moved to the familiar surroundings of tent camps arranged by neighbourhoods of the damaged town. About 1/3 of the population left Kalamata following the earthquake. Estimates of the aggregate financial loss have been suggested in the range of 1-1 billion £.

The shock was recorded clearly on distant stations (Fig 2) and was assigned by NEIS  $M_s=5.9$ . The Greek network located the event in the sea with  $M_s=5.7$ . Immediately after the earthquake two local seismonets were operated by the Universities of Athens and Thessaloniki, low flight aerophotos were taken, geologists from the Greek Survey were searching for ground fractures and engineers were assessing damage. Strong motion instruments operated by the Greek Earthq Eng Inst registered two records of the main event; aftershocks were also registered by additional instruments installed by the Institute the day after the main event.

The accelerogram triggered by the main shock in Kalamata (Fig 3) showed horizontal  $pga$ 's around 25% and 22% vertical and indicated an epicentral distance around 12km. The record triggered by the main aftershock indicated a shorter epicentral distance (about 6km), horizontal  $pga$ 's around 20% but only 11% vertical. Field investigations picked up a broad zone of minor open cracks following the projection of the coastline into the foothills of Mount Tayghetos in a NE direction and for about 10km (Fig 1). The seismonet recordings are being processed but apparently, preliminary locations followed the same general trend. Displaced objects indicated north of east motion. An early macroseismic picture emerged from the inspection of churches and monuments in the general area by the Ministry of Culture. The records are homogeneous and consistent with historical intensities and delineated quite accurately the epicentral area shown on Fig 1. The overall evidence suggests that the earthquake was caused by slip on a steep fault dipping under Kalamata and striking NE along the heavily damaged villages in the mountains. However, a definite picture will only emerge after integration of collected data particularly from the local seismonets.

The old town of Kalamata is built on stiff dilluvium around the medieval castle whereas modern expansion has occupied the alluvial plain to the coast. The alluvium includes medium density saturated sands and the town expansion has involved levelling of the ground over the pre-existing delta of the Nedhon River. Preliminary statistics suggest that about 3/4 of houses and about 1/4 of R/C frame blocks of flats were damaged. The old houses have stone or sun-dried clay brick walls and tile roofs; their restoration will benefit from careful recording of the modes of failure. The R/C frame buildings were designed, in general, for a base shear coefficient of 0.08. Their performance provides a unique test of the earthquake resistance provisions that involves a number of issues. The first general issue is the calibration of the triangle: empirical base shear coefficient - acceptable damage - peak ground motion. Damage inflicted by the 1986 earthquake

on engineered structures showed large scatter; the tails of the damage distribution involved collapses at one end and intact buildings at the other end. Many factors have contributed to this large scatter: non-symmetrical layouts, strong vertical component of motion, large storey drifts and lack of seismic isolation, distribution of structural rigidity, construction details, limited energy absorption capacity, possible independent action of foundation footings, etc. In general, damage does not appear to have followed the local geology. Experimental evidence on this apparent lack of correlation was provided by two recordings of the main aftershock on the alluvial plain separated by about 150m: although the housing buildings were a 7-storey and a 4-storey respectively the two records are almost identical (Fig 3). The second general issue, central to the assessment of the earthquake resistance provisions, is the hazard associated with the 1986 earthquake. Regional hazard assessments have indicated that Kalamata is exposed to an intensity VIII-IX with a mean recurrence of over 500 years. However, such studies do not have the resolution to clarify the exposure to a direct hit. Probably, the most important element of a future microzonation study will be a careful examination of the recent geological, the archeological and the historical records in an attempt to elucidate the instantaneous seismic hazard. Such studies should not ignore the possibility of a larger more distant earthquake of the subduction type with dynamic characteristics vastly different to the ones exhibited by the recent earthquakes.

The Kalamata earthquake has provided the natural testing facility; careful analysis of the collected data will be required before the proper lessons are drawn.

Dimitri Papastamatiou (DP)  
delta pi associates, London

Amr Elnashai (AE)  
Kypros Pilakoutas (KP)  
Imperial College, London

(DP visited the earthquake area in a joint mission with A Eleftheriou & N Mouyaris of IGME and P Plainis of Nat Techn Univ. AE & KP were helped in their mission by the Nat Obs and OASP; a full report on this mission is available from IC)

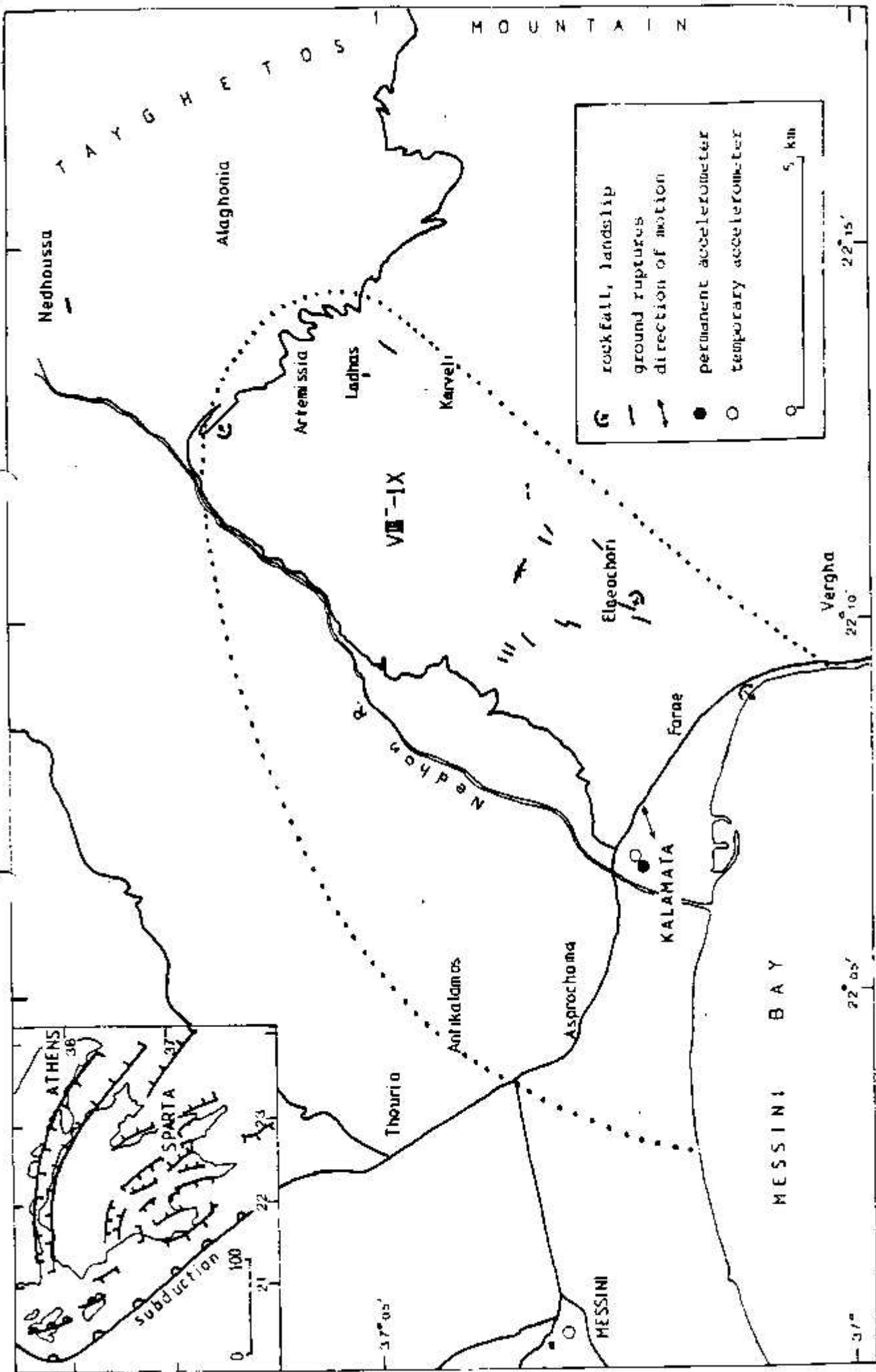


Figure 1. The epicentral area of the September, 1986 earthquake.

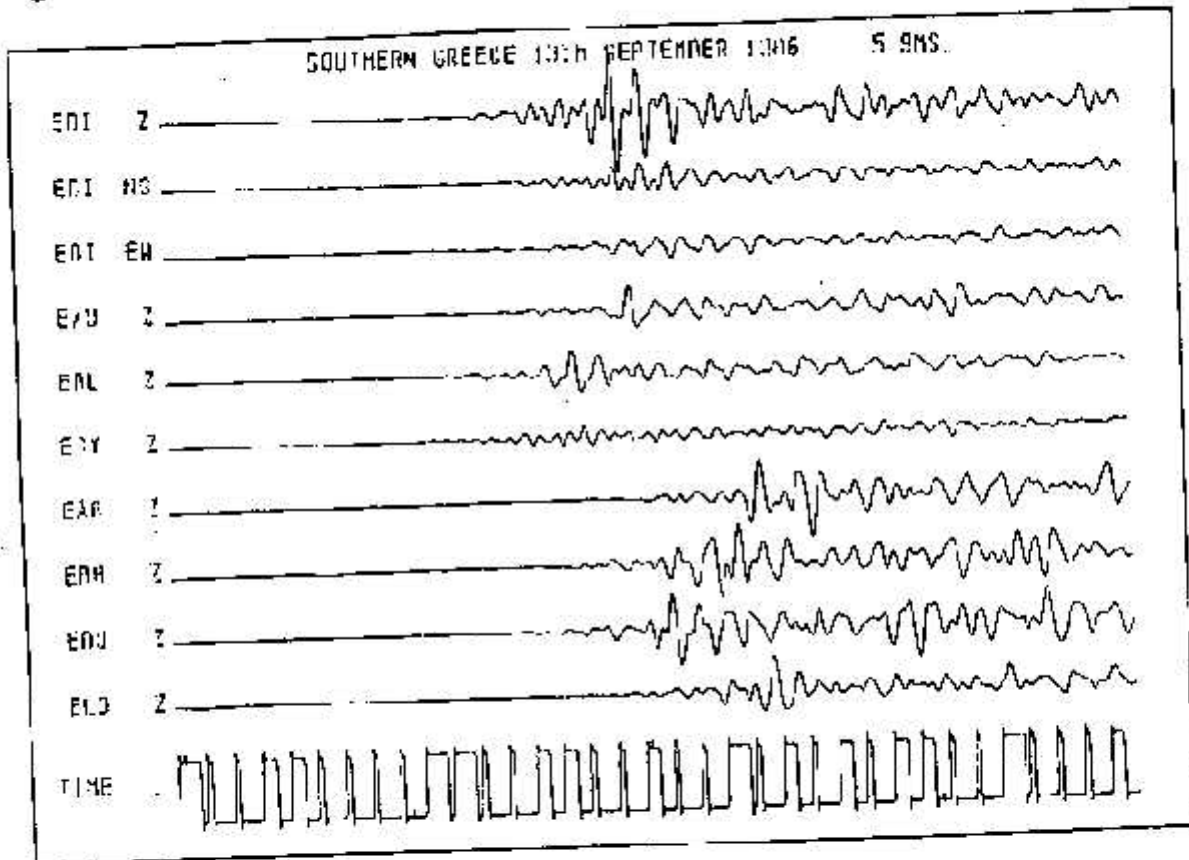


Figure 2. Records by the LOWNET in Scotland .

Figure 3. Strong motion records in Kalamata .



INSTITUTO TECNICO DE ENGENHARIA E ANTIESEISMICA (INSTITUTE OF ENGINEERING SEISMOLOGY AND EARTHQUAKE ENGINEERING)

13 Sept 1986, Kalamata, 7-storey bldg (basement)  $M_L = 5.7$

Direction	NOOE	pga (ag)
L	NOOE	24
V		22
T	NOOE	27

1 sec

15 Sept 1986, Kalamata, 7-storey bldg (basement)  $M_L = 4.9$

Direction	NOOE	pga (ag)
L	NOOE	23
V		11
T	NOOE	15

15 Sept 1986, Kalamata, 4-storey bldg (basement)  $M_L = 4.9$

Direction	NOOE	pga (ag)
L	N/SE	15
V		8
T	N/SE	25

## EEFIT. EARTHQUAKE ENGINEERING FIELD INVESTIGATION TEAM

1985/86 was EEFIT's first fully operational year. The main activity of the previous two years was the formation of the team, contacting colleagues in other earthquake-prone countries, introducing EEFIT to the profession in the U.K., and setting up a mechanism with the SERC Secretariat and Committees for rapid decision-making about funding reconnaissance missions. Thanks to this apparently unproductive background work, EEFIT was able to move quickly into action with a two-man mission to Chile following the March '85 earthquake, and again with a four-man mission to Mexico following the September '85 earthquake. A further two-man mission to El Salvador took place following the October '86 earthquake.

These missions contributed in numerous ways to the assessment of the events with local teams, in exploring and advising the authorities on U.K. aid for relief and reconstruction, and in developing proposals for co-operative research between U.K. and host-country institutions.

Much was learnt about planning and carrying out field missions from these two experiences, and some inadequacies in EEFIT's procedures were revealed. The lessons from them are still being assessed, and EEFIT's procedures for setting up field missions have been reviewed and improved.

During the year EEFIT was also responsible for two presentations to SECED ordinary meetings at the Institution of Civil Engineering; a paper on the Mexico earthquake was presented at the symposium on "Earthquakes and their Effects on Cities" in Mexico City September 1986.

Colin Taylor succeeded Robin Spence as Chairman in January 1986.

---

## EIGHTH EUROPEAN CONFERENCE ON EARTHQUAKE ENGINEERING LISBON 1986

The 8th European Conference was organised by the Laboratorio Nacional de Engenharia Civil (LNEC) and the Portuguese National Committee on Earthquake Engineering. It was attended by about 400 delegates (plus accompanying persons) from 40 countries, ie. twice the number of member countries in the Association. The 400 papers are available in 5 volumes and the sixth volume will contain discussion and the list of participants.

There were five parallel sessions all conducted in English. In each session 40-60% of the papers were presented by one or other of the authors.

A history of the Association was produced by Professor S Bubnov. This history had not been circulated in draft for comment and contains a number of contentious items although it did tackle some difficult issues.

During the conference two National Assemblies and two Executive Committee meetings were held. A meeting was also held of the Sub Committee of the EASMFE dealing with soils and earthquakes and of the International Network of Earthquake Engineering Centres (a UNESCO group).

A table was secured in the exhibition area and the SECED directory was put on show together with the book Earthquake Engineering in Britain and the EEFIT Mexico report.

As had been arranged I had a valuable meeting with Dr Horst Bossenmayer who is the EC official who is Chairman of the main EC8 committee in Brussels.