

## SECOND EARTHQUAKE IN 10 YEARS STRIKES ROMANIA

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Almost 10 years ago (4 March 1977) Romania and its capital city of Bucharest were struck by a magnitude 7.2 destructive earthquake, depth 110 km, that produced heavy losses and provided important lessons (unusually low attenuation, unusually long ground-motion periods, and experience with the performance of earthquake-resistant industrialized construction). The more recent event occurred on 31 August 1986, 00:28:55 local summer time (30 August, 21:28:55 GMT). The magnitude estimates

were 6.5 by the Center of Earth Physics and Seismology, Bucharest, and 6.7 by the National Earthquake Information Service, USA. The source depth was 140 km. The epicenter "E" (see map) was located at 45°30' N, 26°30' E. The epicenters of the fore-shock (F) and three other shocks ( $S_1, S_2, S_3$ ) determined for the 1977 event are located in the same zone. This source zone has provided two events of  $M > 7$ , 5 events of  $M > 6.5$  and 10 events of  $M > 6$ , all of intermediate depth, since 1900.

Some 70 strong motion accelerograms were obtained from operating networks. The peak ground accelerations and the MM intensity estimates, based on strong motion records from the INCERC network, are represented on the map. The geographic distribution of intensities was different from

that of 1977. While the radiation of energy was oriented dominantly towards the southwest in 1977, this time it was oriented in the ENE direction. The highest recorded PGA, 0.28 g, was recorded in Focsani, close to the epicenter. The most affected zones were those around the epicenter, namely southern Moldavia and southern Soviet Moldavia. High intensities occurred also in the Subcarpathian zone, west of the epicenter. The dominant ground-motion frequencies tended to be higher than in 1977 (see for comparison sections of the accelerograms and acceleration spectra recorded at INCERC, in 1977 and 1986). Dominant frequencies 2 to 4 Hz occurred in the epicentral Subcarpathian and southern Moldavia zones. The important influence of local conditions on spectral content was confirmed again.

### LEGENDA

- |                           |                                   |
|---------------------------|-----------------------------------|
| 1 BAC - Bacău             | 14 FCS - Focșani                  |
| 2 BIR - Birlad            | 15 GAL - Galați                   |
| 3 BOL - Bolintin Vale     | 16 GGD - Gheorghita Gheorghiu Dej |
| 4 BOT - Botoșani          | 17 GRG - Giurgiu                  |
| 5 BRA - Brăila            | 18 IAS - Iași                     |
| 6 BRN - Brănești          | 19 OTP - Otopeni                  |
| 7 BUC - București         | 20 PER - Peris                    |
| 8 CEV - Cernavodă         | 21 PIN - Piatra Neamț             |
| 9 CIN - Cîmpina           | 22 PLO - Ploiești                 |
| 10 CPL - Cîmpulung Muscel | 23 RMS - Rîmnicu Sărat            |
| 11 CON - Constanța        | 24 TRM - Turnu Măgurele           |
| 12 CRV - Craiova          | 25 VAS - Vaslui                   |
| 13 DEV - Deva             | 26 VLN - Vălenii de Munte         |

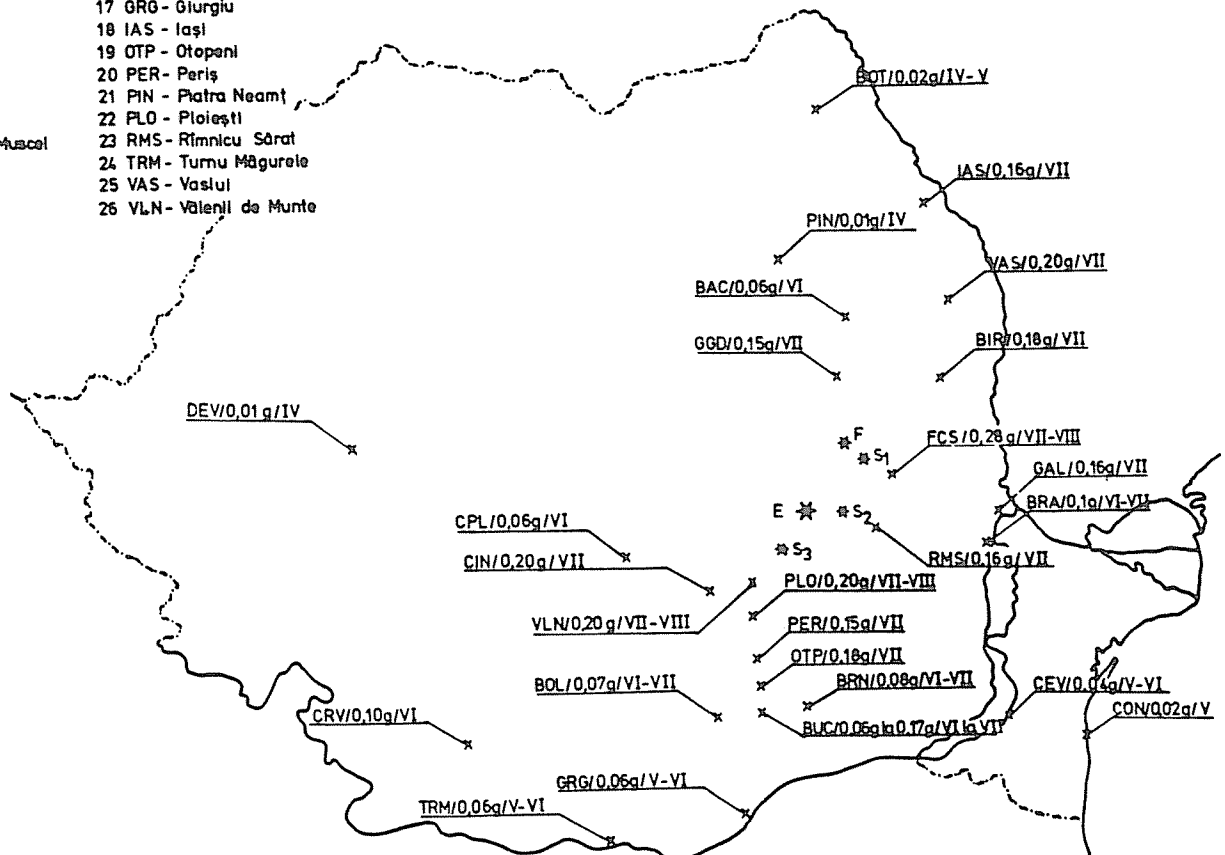


Fig. 1. Map of Romania

Except for the fallen roof of an old church there were no collapses recorded in Romania, and no victims due to building failures. Structural damage was observed mainly in old, low-rise

masonry buildings. Non-structural damage in new buildings was observed especially for partition walls and external walls of framed structures. Poor post-1977 repair work resulted, as

a rule, in new damage of structural and non-structural members. In some cases, hidden 1977 damage became apparent 1986 damage.

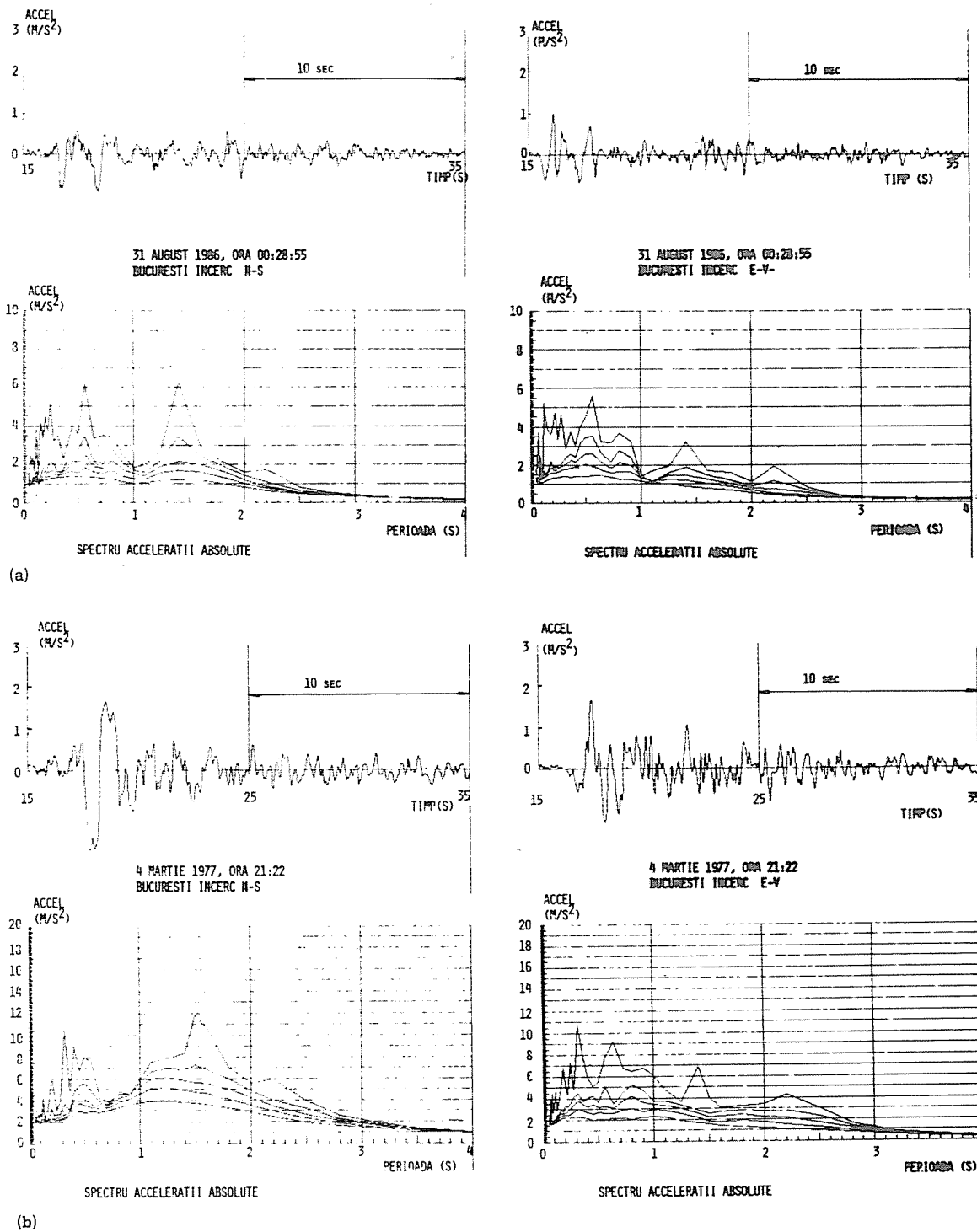


Fig. 2. (a,b). Sections of digitized accelerograms and acceleration response spectra for INCERC-Bucharest, horizontal directions, in 1977 and 1986.