



Magyarországi földrengések évkönyve  
Hungarian Earthquake Bulletin  
2010

Tóth L., Mónus P., Zsíros T., Bus Z., Kiszely M., Czifra T.



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Magyar Tudományos Akadémia  
Geodéziai és Geofizikai Kutatóintézet  
Szeizmológiai Főosztály



Hungarian Academy of Sciences  
Geodetic and Geophysical Research Institute  
Seismological Observatory

Budapest



# MAGYARORSZÁGI FÖLDRENGÉSEK ÉVKÖNYVE

## HUNGARIAN EARTHQUAKE BULLETIN

2010

TÓTH LÁSZLÓ, MÓNUS PÉTER, ZSÍROS TIBOR,  
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BUDAPEST ÁTTEKINTŐ MÉRNÖKSZEIZMOLÓGIAI TÉRKÉPE

Talajkategória térkép az MSZ EN 1998-1 (Eurocode 8) szerint,

S1 és S2 talajok nélkül

*Forrás: Győri et al., 2010*

**Back cover page:**

ENGINEERING SEISMOLOGICAL SUMMARY MAP OF BUDAPEST

Soil category map based on MSZ EN 1998-1 (Eurocode 8)

without S1 and S2 soils

*Source: Győri et al., 2010*

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# BEVEZETÉS

A Pannon-medencében a földrengés aktivitás a lemezperemi területekhez képest mérsékelt, a rengések epicentrumainak eloszlása pedig első pillantásra rendszertelennek látszik. Nehéz eldönteni, hogy a földrengések izolált területeken, vagy szeizmikusan aktív vonalak mentén keletkeznek. Mindenesetre felismerhető néhány terület, ahol viszonylag gyakran fordult elő a múltban földrengés. Ilyenek pl. Eger és környéke, ahol 70 év alatt legalább 16 földrengés és több mint 50 nagyobb utórengés történt. Komárom és Mór környékén, Jászberény, Kecskemét és Dunaharaszti közelében szintén jelentős volt az aktivitás egy-egy bizonyos időszakban. Az alacsony szeizmicitás nem feltétlenül jelenti a földrengések méretének csekélységét: komoly épületkárokat okozó földrengésekről van szó, néhány esetben talajfolyósodást is okozó gyorsulásokkal (pl. 1763 Komárom, M 6.2; 1911 Kecskemét, M 5.6), esetleg a felszínen is megjelenő töréssel (pl. 1834 Érmellék, M 6.2). Ezek a példák azt mutatják, hogy 6.0-6.5 magnitúdójú rengések lehetségesek, de nem gyakoriak a Pannon-medencében (Tóth et al., 2002a).

A földtudományi kutatás fontos eleme a szeizmicitás vizsgálata, annak megismerése, hogy milyen gyakorisággal, hol és mekkora földrengések keletkeznek, továbbá melyek azok a szeizmotektonikai folyamatok, melyek a földrengéseket létrehozzák.

Az általános ismeretszerzésen túlmenően a földrengés elleni védekezéshez is fontos segítséget nyújt a szeizmicitás pontos ismerete. Egy terület földrengés kockázatát csak komplex szeizmológiai, geofizikai, geológiai ismeretek alapján lehet meghatározni. A legfontosabb információ, mely mennyiségileg meghatározza a földrengéskockázatot, a terület földrengés története, illetve a jelenkori rengések ismerete. Ehhez nyújt kardinális fontosságú segítséget a földrengés monitorozás, a földrengések megfigyelése, mérése és paramétereinek meghatározása.

Magyarországon a földrengésmérő állomások száma és minősége 1995-ben érte el azt a szintet, hogy a lakosság által érzékelt valamennyi rengést a hálózat nagy valószínűséggel detektálja. Ez nagyrészt annak a szeizmikus megfigyelő hálózatnak köszönhető, melyet a Nemzetközi Atomenergia Ügynökség javaslatára a Paksi Atomerőmű Rt. létesített az atomerőmű telephely tágabb környezetében.

Jelen kiadványunk célja és tartalma pontosan az, amit a címe is jelez: évkönyv, melyben megtalálható minden olyan adat és ismeret, melyet az év során a magyarországi földrengésekkel kapcsolatban összegyűjtöttünk. A célterület a 45.5-49.0É szélesség és 16.0-23.0K hosszúság által határolt földrajzi tartomány. A teljesség kedvéért azonban a világ jelentős földrengéseinek listája is megtalálható a mellékletben. Reméljük, hogy hasznát látják munkánknak mindazok, akik földtudományi kutatásaikban felhasználói a szeizmicitás adatoknak, de azok is, akik csupán egy-egy földrengéssel kapcsolatos kérdésükre keresnek választ kiadványunkban.

# INTRODUCTION

Seismicity in the Pannonian basin is relatively low comparing to the peripherals and the distribution of earthquake epicenters shows a rather scattered pattern at the first glance. It is particularly difficult to decide whether the epicenters occur at isolated places or along elongated zones however, at several single places earthquakes occur repeatedly. For example, near to Eger (47.9N; 20.4E) at least sixteen earthquakes with more than fifty greater aftershocks occurred over a time interval of some 70 years. Komárom and Mór area (47.4-47.8N; 18.2E), Jászberény (47.5N; 20.0E), Kecskemét (46.9N; 19.7E) and Dunaharaszti (47.4; 19.0E) also produced significant activity over a certain but limited period of time. Moderate seismicity does not necessarily mean moderate size of earthquakes: reports of major earthquakes often refer to heavy building damage, liquefaction (e.g. 1763 Komárom earthquake, M 6.2; 1911 Kecskemét earthquake, M 5.6) and sometimes the possibility of surface fault rupture (e.g. 1834 Érmellék earthquake, M 6.2). These observations indicate that magnitude 6.0-6.5 earthquakes are possible but not frequent in the Pannonian basin (Tóth et al., 2002b).

The study of the recent seismicity is an important element of seismotectonic research. Earthquakes represent the sudden release of slowly accumulated strain energy and hence provide direct evidence of active tectonic processes. However, low and moderate seismicity at intraplate areas generally precludes reliable statistical correlation between epicenters and geological features.

Moreover, as one of the chief contributor to seismic hazard at a given area, detailed knowledge of seismicity also plays an important role in earthquake risk reduction. To be useful, accurately located earthquakes are required. While good information about larger historical earthquakes exists for about the past few hundred years, these are not well enough located. Only modern seismic monitoring networks, capable of locating small magnitude local earthquakes provide the necessary information to close this knowledge gap. The developing database of well-located earthquakes can be used, in one hand, to resolve the tectonic framework and required on the other hand to refine our understanding of the level of seismic risk.

1995 was a milestone in the history of Hungarian seismological observations. The Paks Nuclear Power Plant Ltd. installed a network of high quality digital seismographs, following the recommendations by the International Atomic Energy Agency (IAEA). For the first time, this network made it possible to detect and locate such small magnitude local seismic events that it is very unlikely so as to felt events go undetected in most parts of the country.

The present Earthquake Bulletin is a united annual summary report of all Hungarian earthquake monitoring projects. The information in the Bulletin is based on all available earthquake related data provided by different organizations. The geographic region covered is bounded by latitudes 45.5-49.0N and longitudes 16.0-23.0E.

# 1.

## ÖSSZEFOGLALÁS

A 2010. év szeizmikus szempontból kiemelkedően aktív időszaknak tekinthető Magyarországon. Az év folyamán 196 szeizmikus eseményről szereztünk tudomást a 45.5-49.0N szélességi és 16.0-23.0E hosszúsági koordináták által határolt területen, amelyek közül 134 volt természetes eredetű földrengés, 62 robbantás. Az események mérete a  $-0.5 \leq M_L \leq 3.2$  lokális magnitúdó tartományba esett.

Az évben összesen 20 olyan földrengés volt, melyet a lakosság is érzett, de részletesebb makroszeizmikus jelentés 14 eseményről áll rendelkezésre.

A legnagyobb földrengés intenzitás, melyet Magyarország területéről jelentettek 5 EMS fokozatú volt. Ez nagyon enyhe épületkárokat (jellemzően hajszálrepedések a vakolatban) jelentett.

A rengések mindegyike többé-kevésbé ismert forráshoz köthető.

A legnagyobb számú szeizmikus esemény 2010-ben is a Komárom – Berhida közé eső területen, a Móri-árok forráshozánában keletkezett. Ennek egyik, nem szeizmotektonikai magyarázata az állomáshálózat fokozott érzékenysége ezen a területen.

A Kapos-vonalhoz köthető a február 8-án, Várdán keletkezett ( $M_L$  2.7) rengés, melynek intenzitása az epicentrumban elérte az 5 EMS fokozatot.

A Békési-medencében is öt kisebb ( $M_L$  2.0-2.6) rengés pattant ki az év folyamán, valamint a Jászságban, Újszilváson is volt egy érezhető ( $M_L$  3.1, 5 EMS) rengés.

Az átlagosnál több rengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül többet a lakosság is érzett. A rengések augusztus közepén kezdődtek, s egészen december végéig tartottak.

Augusztus 17-én három földrengés ( $M_L$  2.6-3.0) volt érezhető Magyarország DNy-i részén, Sellye – Csányoszló környezetében, de károk nem keletkeztek.

Augusztus 26-án este Körmenten keltett riadalmat (4-5 EMS) egy  $M_L$  2.7 magnitúdójú földrengés.

November 21-én a Mecsek-hegységben, Máriakémenden volt érezhető (4-5 EMS) egy kisebb,  $M_L$  2.4 földrengés



# 1.

## SUMMARY

2010 was a remarkably active year for Hungarian seismicity. Out of the 196 seismic events ( $-0.5 \leq M_L \leq 3.2$ ) located within the area bounded by latitudes 45.5-49.0N and longitudes 16.0-23.0E 134 were identified as natural earthquakes, 62 were known quarry blasts.

All together twenty earthquakes were reported as felt but detailed macroseismic information is available only for fourteen events.

The highest magnitude assigned to a shock was 3.2  $M_L$  while the highest intensity reported during the year was 5 EMS. Very slight building damage (typically small cracks in walls) was reported during the year.

All detected and located earthquakes can be connected to more or less well-known source zones.

In 2010, significant number of seismic events was located in the Komárom – Berhida region, in the well-known source zone of Mór graben. In addition to the undoubted current activity of this area, the high number of detected low magnitude events is partly due to the increased sensitivity of the network here.

The  $M_L$  2.7 earthquake on 8<sup>th</sup> February was widely felt (5 EMS) in and around the locality of Várda and can be connected to the current tectonic activity of the Kapos-line

Five smaller (2.0-2.6  $M_L$ ) magnitude quakes burst off in the Békés Basin during the year, and there was also a noticeable earthquake ( $M_L$  3.1, 5 EMS) near Újszilvás in the Jászság region.

A bit unusually large number of earthquakes was generated at the foothill of Bükk Mountains, near Miskolc, several of which were felt by the population. The quakes began in mid-August and were held until late December.

Three earthquakes ( $M_L$  2.6-3.0) were felt in SW Hungary near to Sellye – Csányoszró on 17<sup>th</sup> August but no building damage was reported.

On 26<sup>th</sup> August late evening, an  $M_L$  2.7 earthquake alarmed the population of Körmend and produced reports of 4-5 EMS.

On November 21<sup>st</sup>, a 2.4  $M_L$  magnitude event was felt in a relatively small area and intensity 4-5 EMS were reported from the Mecsek mountains (Máriakéménd).

## 2.

# A MAGYARORSZÁGI FÖLDRENGÉS-MEGFIGYELŐ HÁLÓZAT

2010-ben 14 szeizmográf állomást működtetett Magyarországon az MTA Geodéziai és Geofizikai Kutatóintézet és a GeoRisk Földrengéskutató Intézet Kft. A két szervezet által kötött megállapodás értelmében az összes mért adatot korlátozás nélkül megosztják egymással. Az adatok együttes feldolgozásának köszönhetően a földrengések paraméterei jóval pontosabban, gyorsabban, megbízhatóbban határozhatók meg (2.1. Táblázat és 2.1. ábra).

### *Szélessávú állomások*

Az év folyamán 6 szélessávú szeizmológiai állomás működött (BEHE, BUD, PKSM, PSZ, SOP, TRPA), melyek mindegyikén az érzékelő egy 3 komponenses szélessávú Streckeisen STS-2 szeizmométer. Az érzékelő jele EarthData PS-6-24 digitalizáló egységen át jut a SeisComp szoftverrel felszerelt adatgyűjtő számítógépre. Mindegyik állomás internet összeköttetéssel rendelkezik, így az adatok közel valós időben, egy erre a célra kifejlesztett protokoll (SeedLink) felhasználásával jutnak el a budapesti adatközpontba, ahol a feldolgozás és archiválás történik. Az adatközpontban az adatok átlagos késése a valós időhöz képest 10 másodperc körüli. Az állomáson tárolt adatok bizonyos idő elteltével törlődnek.

### *Rövidperiódusú állomások*

Hét rövidperiódusú állomáson Lennartz LE-3D 1 s sajátperiódusú 3 komponenses szeizmométer és Lennartz MARS88 digitalizáló és adatgyűjtő működik, folyamatos regisztrálással. Egy állomáson (CSKK) az érzékelő három Kinometrics SS-1 rövidperiódusú szeizmométer, szintén folyamatos regisztrálással.

Öt rövidperiódusú állomáson (PKS2, PKS6, PKS7, PKS9, PKSN) az adatok átmeneti tárolása a helyszínen, magneto-optikai lemezeken történik. A lemezek havi cseréjével az adatok legalább két nap, legfeljebb egy hónap késéssel kerülnek az adatközpontba.

Két állomás (PKSG, PKST) működése eltér a többi rövidperiódusú állomásétól. Az érzékelő és digitalizáló ugyanaz, de az adatok a helyszínen működő SeisComp rendszerű számítógépbe jutnak, ahol annak merevlemezén tárolódnak. PKST állomás adatai az interneten keresztül eljutnak a budapesti adatközpontba, hasonlóan a szélessávú állomásokhoz. Azonban itt az alkalmazott konfiguráció és a működés részben eltér a szélessávú állomásokétól, ebből adódóan az adatok késése valamivel nagyobb, 10-30 perces. Az állomáson tárolt adatok bizonyos idő elteltével itt is automatikusan törlődnek (2.2. ábra).

A CSKK állomáson Kinometrics K2 adatgyűjtő és SeisComP PC biztosítja a helyszíni regisztrálást.

## 2.

### SEISMOGRAPH STATIONS IN HUNGARY

In 2010, there were 14 seismograph stations in Hungary operated by Geodetic and Geophysical Research Institute, Hungarian Academy of Sciences and GeoRisk Earthquake Research Institute Ltd. Based on an agreement, the two institutions shared all data recorded in all seismic stations without limitations and operated a common data centre (Table 2.1 and Fig. 2.1).

#### *Broadband stations*

Six broadband stations (BEHE, BUD, PKSM, PSZ, SOP, TRPA) were running during the year. All of these stations have Streckeisen STS-2 very broadband seismometers as sensors. Each station is equipped with EarthData PS-6-24 digitizer. Linux PC's with SeisComP software have been used as data acquisition systems. All stations are accessible via Internet in support of near real time data transfer. The average data latency at these stations is typically less than 10 s. SeedLink protocol is used for data collection and all continuous data is archived in the data centre.

#### *Short period stations*

Seven of the short period stations consist of a three component short period seismometer, a digital recorder and time signal receiver. The seismometers used are the LE-3D three directional compact size high sensitivity 1 Hz geophones. The digital acquisition system is the MARS88 recorder. Continuous data are recorded at each short period station. The new station CSKK has Kinometrics short period SS-1 sensors.

In case of five stations (PKS2, PKS6, PKS7, PKS9, PKSN) the data is recorded and temporarily stored on-site on rewritable magneto-optical disks, which are collected and transferred to the data center on a monthly basis.

The configuration at two stations (PKSG, PKST) is somewhat different from the rest of the short period stations. Having the same sensor and digitizer, continuous data is recorded on a SeisComP PC connected to the MARS88 data logger. The station PKST has near real-time data access via Internet using the SeedLink protocol. Data latency is between 10 and 30 minutes due to the operation schedule of the data converter (Fig. 2.2).

The station CSKK has local recording with Kinometrics K2 digitizer and SeisComP PC.

*Adatközpont (www.foldrenges.hu)*

Az összes mérőállomáson regisztrált adatot a budapesti adatközpontban gyűjtjük és dolgozzuk fel. Az adatközpont nem csak gyűjti a szeizmológiai adatokat, de több formában szolgáltatja is azokat, elsősorban elektronikusan az Interneten keresztül.

Minden állomás digitális adataiból napi szeizmogramok készülnek kép formátumban. A képi szeizmogramok egyrészt az érdeklődők tájékoztatását, másrészt a működés ellenőrzését szolgálják. A mérőállomással fennálló adatátviteli módtól függően ezek a szeizmogramok lehetnek közel valós idejűek, vagy a direkt kommunikációval nem rendelkező állomások esetében több napos késéssel készülők.

Az események fázisainak körültekintő manuális kimérése alapján állítjuk össze havonta a fázisadatokat (kimérési adatokat) tartalmazó jelentést. E jelentéseket elküldjük a szomszédos országok szeizmológiai intézményeinek, valamint a nemzetközi adatközpontoknak.

A fázisadatok felhasználásával – a saját adatokat kiegészítve a szomszédos országok szeizmológiai intézményeinek hasonló adataival – havonta eseménylista készül (Havi Jelentés), mely a helyi és regionális földrengések hipocentrum adatait tartalmazza.

Kétoldalú megállapodások alapján néhány szomszédos országgal, illetve nemzetközi adatközpontokkal (GEOFON, ORFEUS) zajlik valós idejű adatcsere. A valós idejű hullámforma adatok a budapesti adatközpont SeedLink szerverén keresztül érhetők el. Mód van azonban – bizonyos korlátokkal – múltbeli hullámforma adatok kiszolgáltatására is az adatközpontban működtetett AutoDRM rendszer segítségével (autodrm@seismology.hu).

A mérési adatok, szeizmogramok, a kiértékelés eredményei nagyrészt nyilvánosan elérhetők az interneten a [www.foldrenges.hu](http://www.foldrenges.hu) oldalon.

Átlagos zaj- (talajnyugtalanosság) viszonyokat feltételezve a magyarországi szeizmológiai hálózat észlelési képessége  $ML=1.0-2.0$  magnitúdó körül van (2.3. ábra). Ennek számítása azon feltételezésen alapul, hogy az eseményt legalább négy mérőállomás érzékeli, mely a helymeghatározáshoz szükséges minimális állomásszám. Az ország középső részén kissé alacsonyabb, a határok környékén kissé magasabb az érzékenység. Ez azt jelenti, hogy az ÉK-i területeket kivéve, a lakosság által érzékelt valamennyi rengést a hálózat nagy valószínűséggel detektálja.

*Virtuális szeizmológiai hálózat (HUNRENG)*

A kommunikáció fejlődése, a valós idejű adatátvitel és az azonos adatátviteli protokoll (SeedLink) Európa-szerte elterjedt használata lehetővé tette, hogy külföldi állomások adatait is fogadjuk közel valós időben ugyanúgy, mint a saját állomásainkét. A külföldi állomások mérési adatainak felhasználásával a földrengések paraméterei még pontosabban, megbízhatóbban számíthatók ki. Ezen kívül a nagyszámú állomás adataához való valós idejű hozzáférés lehetővé tette *automatikus földrengésjelző rendszerünk* elindítását. Ez a rendszer automatikusan képes felismerni a földrengéseket, és azok paramétereit néhány percen belül ki is számítja. A térképen és listán automatikusan megjelenített földrengés információ elsősorban gyors tájékoztatásul szolgál (2.2. Táblázat).

*Data Centre (www.foldrenges.hu)*

All recorded data is transmitted to and processed at the *Data Centre* in Budapest. The data that are collected by the *Data Centre* are published in a variety of formats and publications are available electronically via the Internet.

Using digitally recorded data, analogue “live seismograms” are calculated for each station. The main purposes of the “live seismograms” are feeding public interests in one hand, and rapid visualization of the operational status and quality check of the stations on the other. The delay of the “live seismograms” varies from near real time to several days depending on the communication category of the station.

A careful manual offline analysis is used for event identification and picking the phases on each recorded seismogram. Seismogram readings (phase data) are disseminated by email to partner institutions and international data centers.

Merging the phase data of the Hungarian network and the same kind of available data sets from neighbouring countries, preliminary event lists are calculated on monthly schedule. Based on technical and operational statistics of the stations, list of local and regional seismic events and their hypocenter information, *Monthly Reports* are compiled.

Real time data from broadband stations can be accessed through a SeedLink server operated at the data centre. Real time data are provided to international data centers (ORFEUS, GEOFON) and some other partner institutions. Waveform data is also available through an AutoDRM service (autodrm@seismology.hu).

The estimated detection capabilities of the present network with average noise conditions, supposing that at least four stations is needed for origin determination, is typically around 1.0-2.0  $M_L$ , somewhat lower in the middle of the country and a little higher towards the border regions. (See Fig. 2.3) This means that in most parts of the country, not including the NE territory, it is very unlikely that felt events go undetected.

*Virtual network (HUNRENG)*

Development in communication technology and standardized communication protocols, software packages made available to access near real time data of stations beyond the national network. SeedLink and SeisComP developed at GEOFON became a kind of standard all over Europe.

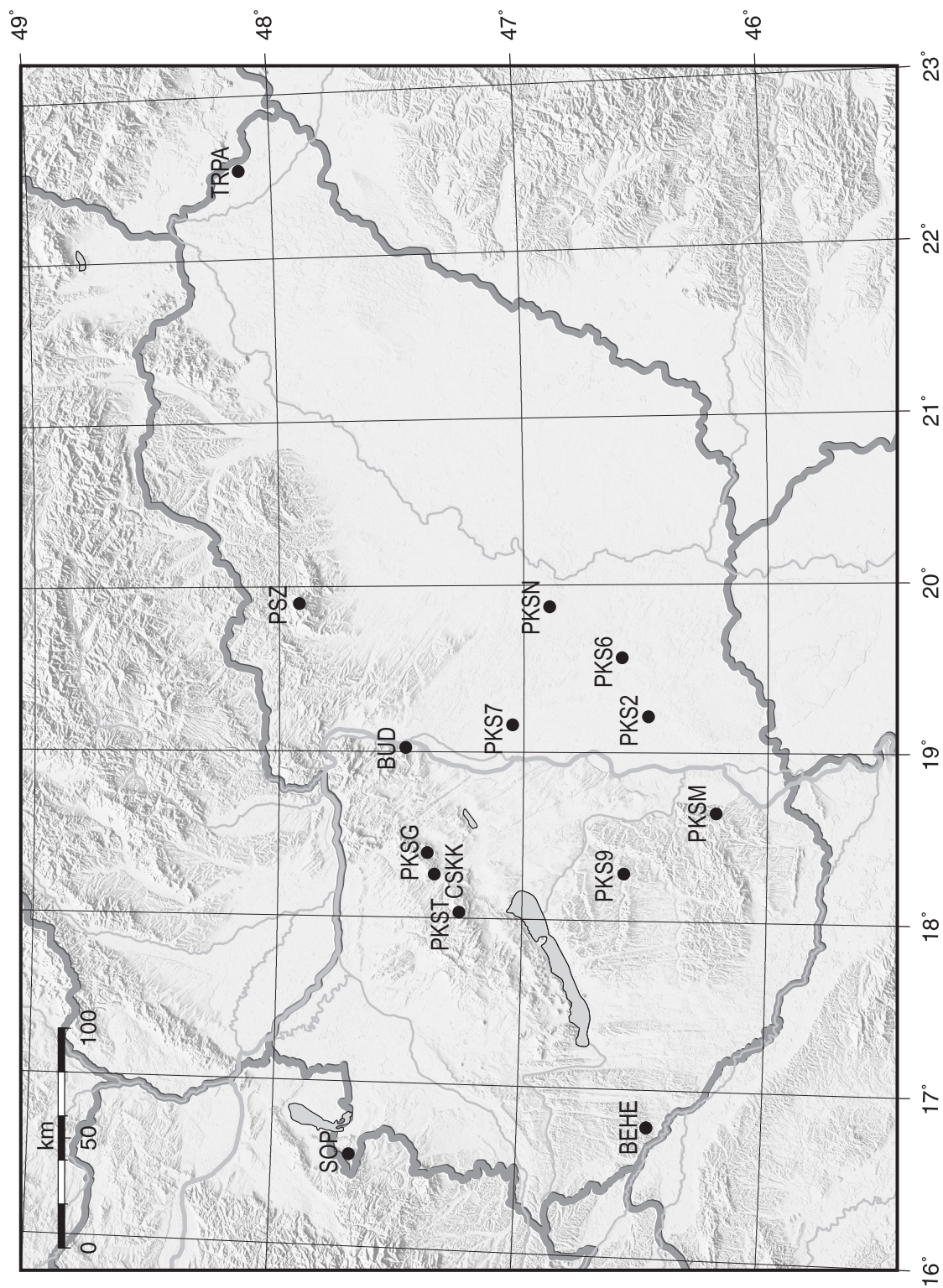
The larger pool of data provided by an extended, “virtual network” of seismic stations helps to have faster and more accurate earthquake locations and parameter determinations. In addition, near real time access to data from large number of stations makes possible to operate automatic rapid earthquake alarm systems. Automatically generated earthquake lists and epicenter maps are the main product of such systems.

The present configuration of the experimental virtual network *HUNRENG* is shown in Table 2.2.

**2.1. Táblázat** Szeizmológiai állomások, műszerek és alapkőzet  
**Table 2.1.** Seismic stations, instrumentation and lithology

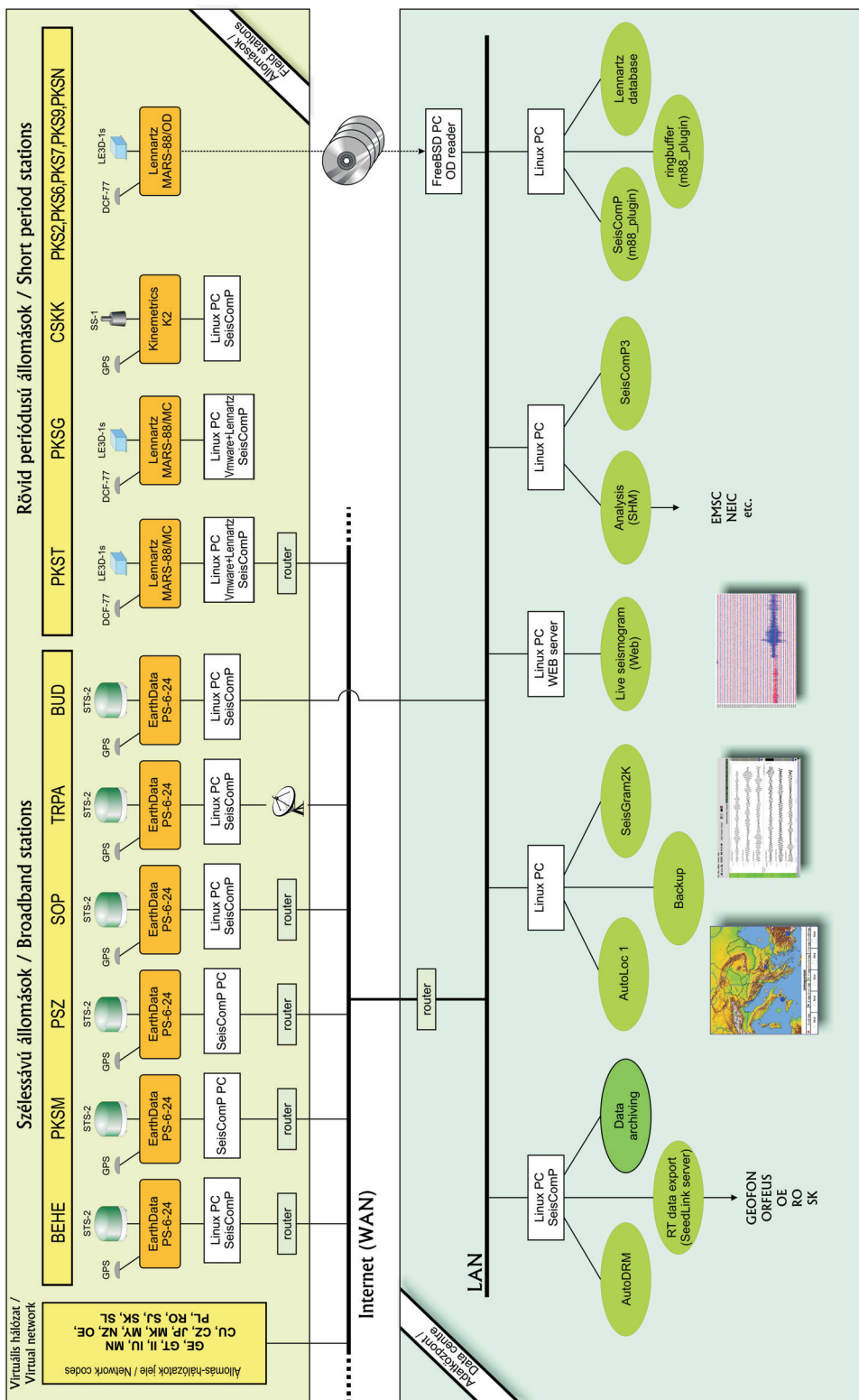
Kód Helység Code Location	Szélesség Latitude (N)	Hosszúság Longitude (E)	Magasság Elevation (m)	Alapkőzet Foundation	Állomás típusa Station type (1)	Érzékelő típusa Sensor type (2)	Regisztrálás Adatgyűjtő Recording mode Equipment (3)	Szerv. Org. (4)
BEHE Becsehely	46,4704	16,7757	298	üledék alluvium	3C BB	STS-2	D-C; PS-6-24+ SeisComp PC	GGKI
BUD Budapest	47,4836	19,0239	196	dolomit dolomite	3C BB	STS-2	D-C; PS-6-24+ SeisComp PC	GGKI
CSKK Csókakő	47,3631	18,2605	319	dolomit dolomite	3C SP	SS-1	D-C; K2+ SeisComp PC	GGKI
PKS2 Kecel	46,4920	19,2131	106	homok sand	3C SP	LE-3D	D-C; MARS-88OC	GR
PKS6 Bócsa	46,5998	19,5645	120	homok sand	3C SP	LE-3D	D-C; MARS-88OC	GR
PKS7 Kunszentmiklós	47,0473	19,1609	95	agyag mud	3C SP	LE-3D	D-C; MARS-88OC	GR
PKS9 Tamási	46,5870	18,2789	240	löss loess	3C SP	LE-3D	D-C; MARS-88OC	GR
PKSG Gánt	47,3918	18,3907	200	dolomit dolomite	3C SP	LE-3D	D-C; MARS-88MC+ SeisComp PC	GR
PKSM Mórág	46,2119	18,6413	170	gránit granite	3C BB	STS-2	D-C; PS-6-24+ SeisComp PC	GGKI/ GR
PKSN Nyárlőrinc	46,8970	19,8667	110	homok sand	3C SP	LE-3D	D-C; MARS-88OC	GR
PKST Tés	47,2590	18,0343	473	dolomit dolomite	3C SP	LE-3D	D-C; MARS-88MC+ SeisComp PC	GR
PSZ Piszkéstető	47,9184	19,8944	940	andezit andesite	3C BB	STS-2	D-C; PS-6-24+ SeisComp PC	GEO FON /GGKI
SOP Sopron	47,6833	16,5583	260	gneisz gneiss	3C BB	STS-2	D-C; PS-6-24+ SeisComp PC	GGKI
TRPA Tarpa	48,1304	22,5391	113	andezit andesite	3C BB	STS-2	D-C; PS-6-24+ SeisComp PC	GGKI

- (1) 3C – 3 komponenses szeizmométer / three component seismometer  
 SP – rövid periódusú szeizmométer / short period seismometer;  
 BB – széles sávú szeizmométer / broad band seismometer
- (2) STS-2 – Streckeisen széles sávú szeizmométer / Streckeisen broad band seismometer  
 LE-3D – Lennartz 3 komponenses 1Hz-es geofon / Lennartz three directional 1Hz geophone  
 SS-1 – Kinometrics SS-1 rövidperiódusú szeizmométer / Kinometrics SS-1 short period seismometer
- (3) D – digitális / digital; C – folyamatos felvétel / continuous recording; PS-6-24 – Earth Data digitalizáló / Earth Data digitizer  
 Q-380 – Quanterra adatgyűjtő rendszer / Quanterra data acquisition system;  
 SeisComp – GEOFON Seismological Communication Processor  
 MARS-88 – Lennartz adatgyűjtő / Lennartz data acquisition system  
 K2 – Kinometrics K2 adatgyűjtő / Kinometrics K2 data acquisition system
- (4) GGKI – MTA Geodéziai és Geofizikai Kutatóintézet / Geodetic and Geophysical Research Institute, HAS  
 GR – GeoRisk Földrengéskutató Intézet Kft. / GeoRisk Earthquake Research Institute Ltd.



2.1. ábra A magyarországi szeizmológiai állomáshálózat 2010-ben (részletek: 2.1. Táblázat)

Figure 2.1. Seismograph station network in Hungary in 2010 (See Table 2.1. for details)



2.2. ábra A magyarországi szeizmológiai hálózat felépítése

Figure 2.2. Structure of the Hungarian seismograph network





**2.2. Táblázat** HUNRENG virtuális szeizmológiai hálózathoz felhasznált fizikai hálózatok  
**Table 2.2.** Physical networks used in HUNRENG virtual seismic network

Hálózat kódja* Network code*	Az üzemeltető hálózat Operating network
CU	CariUSGS Caribbean Network USGS, Golden, CO
CZ	Czech Seismic Network Geophysical Institute, Czech Academy of Sciences
GE	GEOFON GEOForschungsNetz (Geo Research Network)
GT	Global Telemetered Southern Hemisphere Network USGS Albuquerque Seismological Laboratory
HU	Hungarian Seismological Network Geodetic and Geophysical Research Institute of Hungary
II	IRIS/IDA Network University of California, Scripps Institute of Oceanography
IU	IRIS/USGS Network USGS Albuquerque Seismological Laboratory
JP	Japan Meteorological Agency Seismic Network Japan Meteorological Agency Seismic, Tokyo Japan
MK	Seismological Observatory Skopje, Republic of Macedonia (MK)
MN	MEDNET Istituto Nazionale di Geofisica, Italy
MY	Malaysian National Seismic Network Malaysian Meteorological Service
NZ	New Zealand National Seismograph Network Institute of Geological & Nuclear Sciences, Wellington, New Zealand
OE	Austrian Seismic Network ZAMG - Central Institute for Meteorology and Geodynamics
PL	Polish Seismological Network Polish Academy of Sciences, Warsaw
RO	Romanian Seismic Network National Institute for Earth Physics, Romania
SJ	Serbian Seismological Network Seismological Survey of Serbia
SK	Slovak National Seismic Network Geophysical Institute, Slovak Academy of Sciences
SL	Slovenia Seismic Network Slovenia Geological Survey, Ljubljana

\*FDSN (International Federation of Digital Seismograph Networks) kód



### 3.

## ESEMÉNYLISTA ÉS FÖLDRENGÉS FÉSZEKPARAMÉTEREK

### A FÖLDRENGÉS FÉSZEKPARAMÉTEREK MEGHATÁROZÁSA

A fészekparaméterek rutinszerű kiszámításához a HYPO71PC programot használtuk (Lee and Lahr, 1975). A kimérés és magnitúdó meghatározás a K. Stammler által készített SeismicHandler program segítségével történt.

A fészekparaméterek meghatározásánál mind a magyarországi, mind a szomszédos országok állomásainak adatait felhasználtuk. A számításnál az egyes állomások kimérési adatait az epicentrumtól való távolsággal fordított arányban súlyoztuk. Néhány esetben, amikor elegendő P fázis adat állt rendelkezésre, az S fázis adatokat nem használtuk fel.

### SEBESSÉGMODELL

A számításnál felhasznált 3 rétegű sebességmodell több száz helyi és közeli földrengés kéregfázis adatain alapul (Mónus, 1995).

<i>Sebesség (<math>v_p</math>) [km/s]</i>	<i>Mélység [km]</i>	<i>Vastagság [km]</i>	$v_p/v_s$
5,60	0,0	20,0	1,78
6,57	20,0	11,0	
8,02	31,0	$\infty$	

### 3.

## LIST OF ORIGINS AND HYPOCENTER PARAMETERS

#### METHOD FOR HYPOCENTER PARAMETER DETERMINATION

HYPO71PC (Lee and Lahr, 1975) was used for the routine calculation of hypocenter parameters. SeismicHandler software package by K. Stammler has been used for phase picking and magnitude determination.

The hypocenter parameters have been calculated using phase readings of seismological stations from Hungary and from the adjoining countries. However, a distance weighting has been applied, phase data from stations with epicenter distance greater than 450 km have been weighted out. In some cases, when sufficient number of P readings were available, S phase readings were not used in the calculations.

#### CRUSTAL VELOCITY MODEL

The three-layer crustal velocity model used in the hypocenter calculations has been derived from crustal phase travel times of several hundreds of local earthquakes (Mónus, 1995).

<i>Velocity (<math>v_P</math>)</i> <i>[km/s]</i>	<i>Depth</i> <i>[km]</i>	<i>Thickness</i> <i>[km]</i>	$v_P/v_S$
5.60	0.0	20.0	1.78
6.57	20.0	11.0	
8.02	31.0	$\infty$	

## ESEMÉNYLISTA / LIST OF EVENTS

Nap	Kipattanási idő UTC óó pp mp	Földrajzi koordináták Lat Long	Mélys. (km)	ML	I <sub>MAX</sub> (EMS)	Helyszín
Day	Origin time UTC hr mn sec	Geographic coordinates Lat Long	Depth (km)	ML	I <sub>MAX</sub> (EMS)	Locality or Region
JANUÁR / JANUARY, 2010						
01	17:12:48.8	45.911N 16.043E	10	2.8	-	Croatia
10	2:35:59.9	47.314N 18.304E	10	-0.1	-	Söréd
10	3:10:17.8	47.318N 18.302E	10	0.0	-	Söréd
10	4:30:17.6	47.298N 18.317E	10	-0.2	-	Magyaralmás
10	5:20:10.8	47.456N 18.193E	4	1.0	-	Bokod
10	12:56:12.0	47.392N 18.248E	10	0.7	-	Mór
10	14:39:57.4	47.324N 18.292E	10	0.1	-	Söréd
10	14:40:50.4	47.367N 18.263E	11	0.0	-	Csókakó
11	3:40:43.3	47.319N 18.300E	10	0.3	-	Söréd
12	11:13:03.7	47.312N 18.453E	0	1.2	-	Pátka (expl.)
12	11:18:22.1	47.312N 18.431E	0	1.2	-	Zámoly (expl.)
13	11:04:36.4	47.614N 18.451E	0	1.0	-	Vérttestolna (expl.)
14	3:27:02.8	45.750N 21.941E	3	2.2	-	Romania
14	9:52:11.3	47.501N 18.350E	0	1.0	-	Vértessomló (expl.)
14	9:52:27.6	47.417N 18.440E	0	0.9	-	Csákvár (expl.)
14	9:57:27.4	47.482N 18.305E	0	1.2	-	Oroszlány (expl.)
18	14:58:45.1	47.315N 18.306E	10	0.1	-	Söréd
19	9:37:38.3	47.332N 18.455E	0	1.2	-	Zámoly (expl.)
19	9:37:51.2	47.458N 18.401E	0	1.2	-	Várgesztes (expl.)
21	14:25:44.0	47.113N 18.301E	0	1.0	-	Szabadbattyán (expl.)
22	13:12:43.7	47.306N 18.685E	0	1.0	-	Kajászó (expl.)
25	11:50:38.8	47.032N 17.878E	10	1.1	-	Veszprémfajsz
27	9:48:29.6	47.324N 18.427E	0	0.8	-	Zámoly (expl.)
27	9:53:37.8	47.444N 18.411E	0	1.0	-	Várgesztes (expl.)
27	12:21:00.6	47.421N 18.604E	0	0.7	-	Alcsútdoboz (expl.)
30	15:28:42.6	46.957N 20.793E	4	2.4	-	Gyomaendrőd
FEBRUÁR / FEBRUARY, 2010						
08	9:34:04.5	47.101N 18.091E	0	0.8	-	Papkeszi (expl.)
08	15:26:16.7	46.496N 17.645E	17	2.7	5	Várda
09	9:42:58.0	47.487N 18.430E	0	1.1	-	Várgesztes (expl.)
15	10:15:16.0	47.327N 18.429E	0	1.3	-	Zámoly (expl.)
15	10:15:27.3	47.465N 18.375E	0	1.3	-	Várgesztes (expl.)
MÁRCIUS / MARCH, 2010						
04	9:53:51.1	47.852N 19.813E	0	2.0	-	Gyöngyöspata (expl.)
24	8:14:08.3	47.341N 18.427E	0	0.9	-	Zámoly (expl.)
24	10:24:32.1	47.436N 18.365E	0	1.1	-	Oroszlány (expl.)
29	21:40:42.0	47.352N 18.263E	5	-0.1	-	Csókakó
30	22:20:27.9	47.332N 18.196E	5	-0.1	-	Bodajk
31	0:43:54.2	47.405N 18.218E	0	-0.1	-	Pusztavám
ÁPRILIS / APRIL, 2010						
01	10:53:31.9	47.254N 18.254E	13	0.5	-	Kincsesbánya
04	14:15:17.3	48.799N 21.768E	2	2.6	-	Slovakia
07	10:27:45.0	47.068N 17.966E	1	0.8	-	Szentkirályszabadja
08	7:33:11.8	47.335N 18.412E	0	1.1	-	Zámoly (expl.)
11	18:21:29.1	48.484N 22.862E	2	1.9	-	Ukraine
12	0:55:41.3	48.410N 17.282E	10	1.3	-	Slovakia

## Földrengés paraméterek

## Hypocenter Parameters

16	11:05:11.3	47.334N	18.463E	0	1.4	-	Lovasberény (expl.)
16	11:27:07.3	47.004N	17.974E	0	1.1	-	Felsőörs (expl.)
17	23:43:31.3	48.159N	18.626E	1	2.0	-	Slovakia
19	10:36:22.7	48.368N	19.834E	0	2.0	-	Slovakia (expl.)
20	3:08:28.4	47.295N	18.157E	8	0.4	-	Balinka
20	14:17:30.6	47.090N	18.324E	0	0.7	-	Kőszárhegy (expl.)
20	23:05:40.9	48.230N	22.589E	10	2.2	-	Ukraine
21	7:53:45.7	47.465N	18.375E	0	1.2	-	Várgesztes (expl.)
21	7:57:08.0	47.444N	18.379E	0	1.2	-	Várgesztes (expl.)
23	9:22:25.1	48.552N	20.847E	0	1.8	-	Hídvégardó (expl.)
27	11:00:48.0	47.245N	18.260E	0	0.2	-	Iszkaasztgyörgy(expl.)
29	10:19:19.1	47.329N	18.478E	0	1.7	-	Lovasberény (expl.)
29	10:19:31.3	47.472N	18.404E	0	1.2	-	Várgesztes (expl.)
30	12:43:07.4	48.315N	19.782E	0	1.7	-	Slovakia (expl.)

### MÁJUS / MAY, 2010

05	6:36:25.7	47.473N	18.364E	0	1.3	-	Oroszlány (expl.)
12	11:32:07.2	47.213N	18.274E	10	0.2	-	Iszkaasztgyörgy
14	1:40:11.9	47.389N	18.217E	0	-0.1	-	Mór
14	5:55:41.2	46.315N	16.774E	10	0.5	-	Croatia
18	18:24:57.0	47.348N	18.212E	9	1.0	-	Mór
18	18:29:19.1	47.256N	18.218E	0	0.1	-	Kincsesbánya
19	8:48:32.2	47.474N	18.402E	0	1.6	-	Várgesztes (expl.)
25	6:55:28.4	47.286N	19.943E	15	3.1	5	Újszilvás

### JÚNIUS / JUNE, 2010

03	17:55:58.3	46.044N	20.429E	2	2.2	-	Romania
04	14:00:04.7	47.295N	18.699E	0	0.9	-	Kajászó (expl.)
05	17:49:15.7	47.333N	18.295E	0	0.0	-	Söréd
05	17:49:53.6	47.364N	18.272E	1	-0.1	-	Csókakő
07	7:06:18.0	47.149N	18.106E	1	0.6	-	Öskü
10	0:57:51.4	47.208N	17.971E	3	0.9	-	Eplény
12	8:30:49.6	47.331N	18.280E	1	0.5	-	Söréd
12	8:33:09.8	47.362N	18.247E	5	0.1	-	Mór
13	1:00:54.4	47.396N	18.221E	1	-0.2	-	Mór
13	19:43:09.2	47.322N	18.282E	1	-0.1	-	Söréd
14	0:24:19.0	47.372N	18.254E	1	-0.2	-	Mór
14	7:54:54.6	48.493N	19.640E	0	1.9	-	Slovakia (expl.)
16	7:24:49.4	47.375N	18.250E	4	0.3	-	Mór
16	11:14:40.8	47.288N	18.191E	5	0.5	-	Isztimér
16	19:01:19.7	47.298N	18.151E	8	0.2	-	Balinka
17	18:08:52.8	47.357N	18.264E	2	-0.3	-	Csókakő
17	21:16:40.7	47.381N	18.216E	0	-0.4	-	Mór
19	20:05:36.7	47.336N	18.240E	1	0.0	-	Bodajk
20	19:28:09.9	47.357N	18.225E	0	0.1	-	Mór
20	19:29:05.6	47.350N	18.224E	10	-0.5	-	Mór
21	0:43:06.3	47.340N	18.238E	2	-0.1	-	Bodajk
21	0:46:00.9	47.377N	18.211E	0	-0.5	-	Mór
21	0:59:57.8	47.369N	18.229E	1	-0.4	-	Mór
21	13:02:33.8	47.359N	18.205E	1	-0.2	-	Mór
21	20:50:02.9	47.396N	18.250E	0	-0.3	-	Mór
21	20:50:06.7	47.350N	18.250E	8	-0.5	-	Csókakő
21	21:03:22.1	47.618N	17.940E	5	2.0	4	Bábolna
22	0:07:56.9	47.350N	18.268E	3	-0.3	-	Csókakő
23	8:13:41.8	47.471N	18.389E	0	1.0	-	Várgesztes (expl.)
23	8:17:54.3	47.453N	18.367E	0	1.3	-	Oroszlány (expl.)
28	0:58:52.3	47.352N	18.237E	1	-0.4	-	Mór
28	3:05:52.3	47.365N	18.229E	1	0.7	-	Mór
28	20:52:06.2	47.402N	18.222E	0	0.3	-	Pusztavám
28	21:13:20.3	47.393N	18.200E	0	-0.1	-	Mór
29	9:03:25.8	47.325N	18.197E	0	-0.1	-	Bodajk

### JÚLIUS / JULY, 2010

01	13:02:00.9	47.369N	18.251E	4	0.0	-	Mór
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**Hypocenter Parameters**

**Földrengés paraméterek**

01	23:00:09.5	47.352N	18.248E	4	-0.2	-	Csókakó
02	0:56:04.2	47.370N	18.255E	10	-0.4	-	Mór
02	5:16:26.2	47.325N	18.321E	10	0.4	-	Söréd
02	8:10:24.1	48.326N	19.965E	0	1.4	-	Slovakia (expl.)
03	19:11:56.8	47.272N	18.277E	0	0.0	-	Fehérvárcsurgó
04	22:06:02.6	47.343N	18.129E	4	-0.1	-	Nagyveleg
05	8:00:49.4	47.344N	18.485E	0	0.9	-	Lovasberény (expl.)
05	8:01:06.9	47.458N	18.368E	0	1.3	-	Oroszlány (expl.)
05	10:27:37.8	47.332N	18.322E	7	0.9	-	Söréd
06	21:21:11.9	47.475N	18.154E	10	0.2	-	Császár
07	19:53:38.8	47.274N	18.201E	0	1.3	-	Isztimér
09	23:12:58.5	47.361N	18.238E	1	-0.3	-	Mór
11	19:13:53.6	47.354N	18.254E	1	-0.2	-	Csókakó
11	22:27:06.9	47.370N	18.255E	0	-0.4	-	Mór
14	9:38:16.0	47.401N	18.225E	0	0.1	-	Mór
17	12:48:15.0	47.367N	18.170E	0	0.1	-	Nagyveleg
17	16:07:09.2	47.271N	18.378E	10	0.3	-	Sárkeresztes
22	9:34:34.7	47.355N	18.138E	5	0.2	-	Nagyveleg
23	7:01:37.0	47.984N	19.956E	10	0.9	-	Mátramindszent
25	15:12:36.7	48.777N	22.257E	10	2.2	-	Slovakia
30	2:22:47.3	47.053N	21.259E	1	2.6	-	Csökmő

**AUGUSZTUS / AUGUST, 2010**

05	2:57:51.7	47.011N	21.320E	5	2.0	-	Csökmő
10	10:55:48.9	48.588N	20.802E	0	1.5	-	Tornanádaska (expl.)
13	1:39:44.0	48.293N	21.744E	6	2.4	-	Bodroghalom
14	6:57:26.3	47.988N	20.802E	3	2.7	3-4	Miskolc
14	22:12:42.7	48.047N	20.781E	10	1.9	-	Miskolctapolca
17	3:25:03.9	45.840N	17.881E	6	2.6	4	Csányoszró
17	3:26:14.8	45.846N	17.866E	4	2.7	4	Csányoszró
17	5:32:43.0	47.994N	20.783E	10	2.4	4	Miskolc
17	20:11:04.1	45.898N	17.849E	7	3.0	4-5	Sellye
19	1:29:05.0	48.053N	20.782E	10	3.0	4-5	Miskolc
19	11:26:28.0	47.291N	18.620E	10	1.7	-	Pázmánd
19	14:48:06.9	48.041N	20.796E	2	2.4	4-5	Kistokaj
19	17:45:32.4	48.054N	20.786E	10	2.1	-	Szirma
19	22:24:20.9	47.996N	20.785E	10	2.1	-	Bükkaranyos
20	3:14:19.3	46.866N	16.449E	10	2.4	-	Ispánk
20	11:39:25.7	47.979N	20.772E	10	2.3	-	Bükkaranyos
20	16:06:54.9	47.985N	20.781E	10	2.3	-	Bükkaranyos
20	19:17:32.3	48.027N	20.847E	3	1.6	-	Kistokaj
20	21:10:52.2	46.871N	16.445E	4	2.3	-	Ispánk
21	4:58:48.1	48.032N	20.820E	3	2.4	-	Kistokaj
21	11:18:32.2	47.979N	20.816E	10	2.1	-	Bükkaranyos
26	22:29:57.3	47.039N	16.580E	13	2.7	4-5	Körmend
30	19:02:28.3	47.675N	17.965E	10	1.5	-	Bana
31	9:15:32.3	48.363N	19.812E	0	1.8	-	Slovakia (expl.)
31	23:14:26.9	47.398N	18.927E	10	1.9	4	Diósd

**SZEPTEMBER / SEPTEMBER, 2010**

01	4:18:51.2	47.404N	18.916E	9	2.0	-	Törökbálint
02	8:19:01.2	48.400N	20.910E	0	1.8	-	Gadna (expl.)
08	18:53:36.3	46.820N	20.619E	10	2.7	-	Csabacsúd
08	19:09:20.0	46.850N	20.600E	10	2.6	-	Csabacsúd
08	20:14:36.8	45.934N	20.708E	5	3.0	-	Romania
12	2:50:32.4	45.910N	20.672E	6	3.2	-	Romania
25	9:36:09.2	47.327N	19.046E	10	1.4	-	Taksony
26	5:02:14.6	48.049N	20.350E	7	1.8	-	Bélapátfalva

**OKTÓBER / OCTOBER, 2010**

04	9:37:59.8	48.368N	19.790E	0	1.9	-	Slovakia (expl.)
19	0:16:31.3	47.317N	18.203E	8	-0.4	-	Bodajk
19	0:31:00.5	47.396N	18.228E	0	0.3	-	Mór
20	8:23:04.7	47.439N	18.389E	0	1.6	-	Várgesztes (expl.)



## Földrengés paraméterek

## Hypocenter Parameters

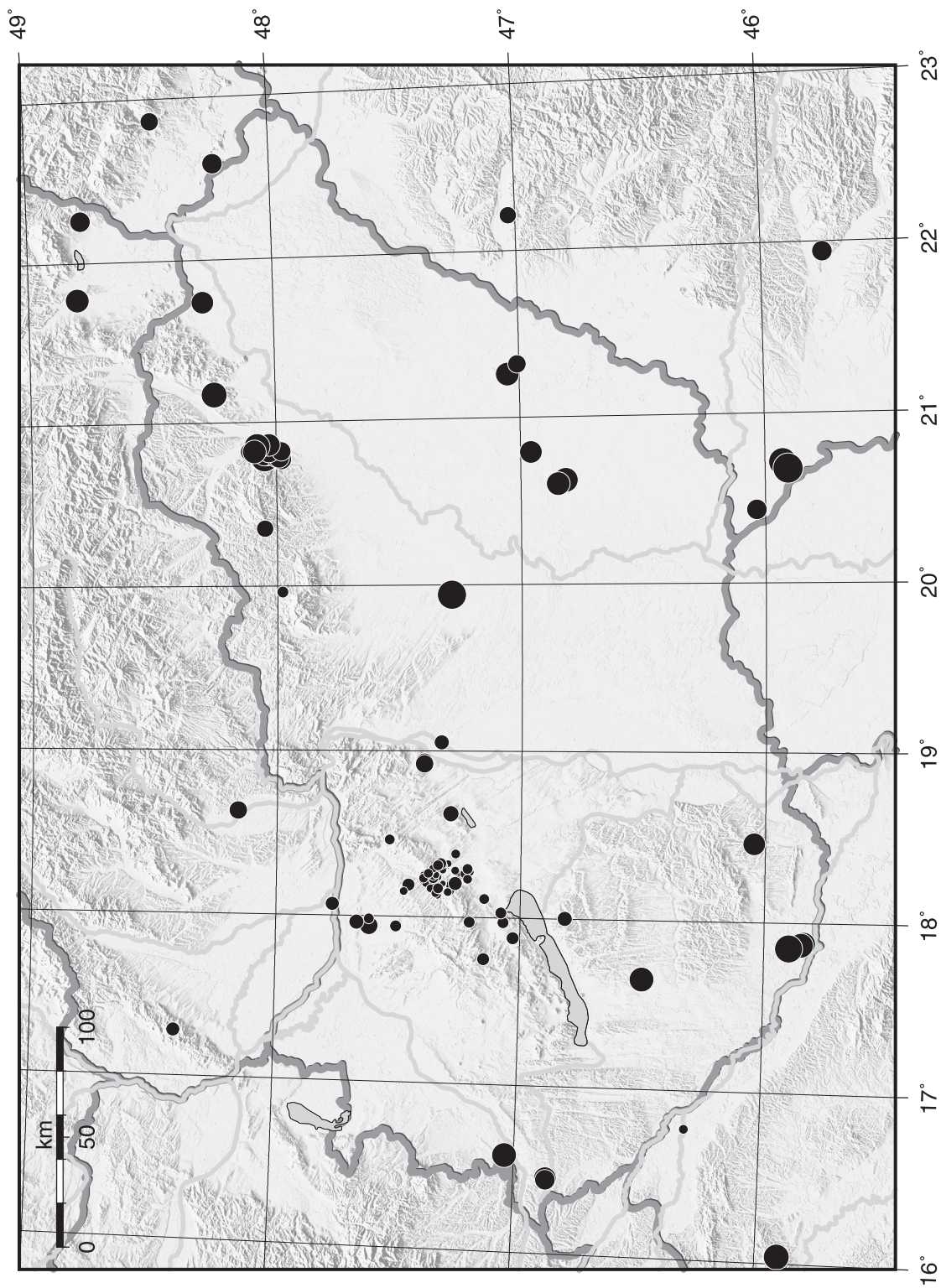
20	11:02:14.8	47.028N	22.213E	1	1.8	-	Romania
27	14:10:28.6	47.219N	18.279E	0	0.4	-	Iszkasztgyörgy (expl.)
27	18:47:25.0	47.360N	18.289E	14	0.0	-	Csókakő
28	7:52:55.8	47.436N	18.389E	0	0.9	-	Várgesztes (expl.)
28	7:59:02.0	47.329N	18.460E	0	1.2	-	Lovasberény (expl.)
30	21:24:49.0	48.250N	21.165E	0	2.8	4-5	Tállya

### NOVEMBER / NOVEMBER, 2010

05	10:05:03.3	48.523N	20.277E	0	1.6	-	Slovakia (expl.)
11	9:07:10.2	47.463N	18.368E	0	1.4	-	Oroszlány (expl.)
11	9:13:03.6	47.398N	18.352E	0	1.7	-	Gánt (expl.)
12	11:19:49.3	47.206N	18.274E	0	0.4	-	Csór (expl.)
15	9:38:48.6	48.362N	19.804E	0	1.7	-	Slovakia (expl.)
16	7:03:00.3	47.278N	18.328E	0	0.3	-	Magyaralmás (expl.)
17	12:25:02.9	47.232N	18.257E	10	0.5	-	Iszkaszentgyörgy
17	21:53:25.0	47.225N	18.229E	0	0.4	-	Iszkaszentgyörgy
18	7:45:27.0	47.441N	18.369E	0	1.2	-	Oroszlány (expl.)
18	7:50:48.4	47.443N	18.409E	0	1.3	-	Várgesztes (expl.)
18	11:10:17.6	47.215N	18.289E	9	0.6	-	Iszkaszentgyörgy
19	15:26:55.6	47.536N	18.461E	10	0.7	-	Szárliget
21	2:35:07.6	46.048N	18.456E	10	2.4	4-5	Máriakéménd
21	4:55:15.3	47.766N	18.069E	10	1.3	-	Komárom
22	7:50:37.6	47.078N	18.031E	10	0.8	-	Balatonfűzfő
23	8:49:50.7	47.453N	18.382E	0	1.2	-	Várgesztes (expl.)
23	8:50:06.8	47.336N	18.486E	0	1.2	-	Lovasberény (expl.)
25	8:14:35.2	47.451N	18.374E	0	1.1	-	Várgesztes (expl.)
25	8:15:11.9	47.463N	18.399E	0	1.0	-	Várgesztes (expl.)
25	8:20:37.6	47.324N	18.432E	0	1.5	-	Zámoly (expl.)
29	12:44:23.1	46.822N	18.002E	10	1.5	-	Balatonendréd

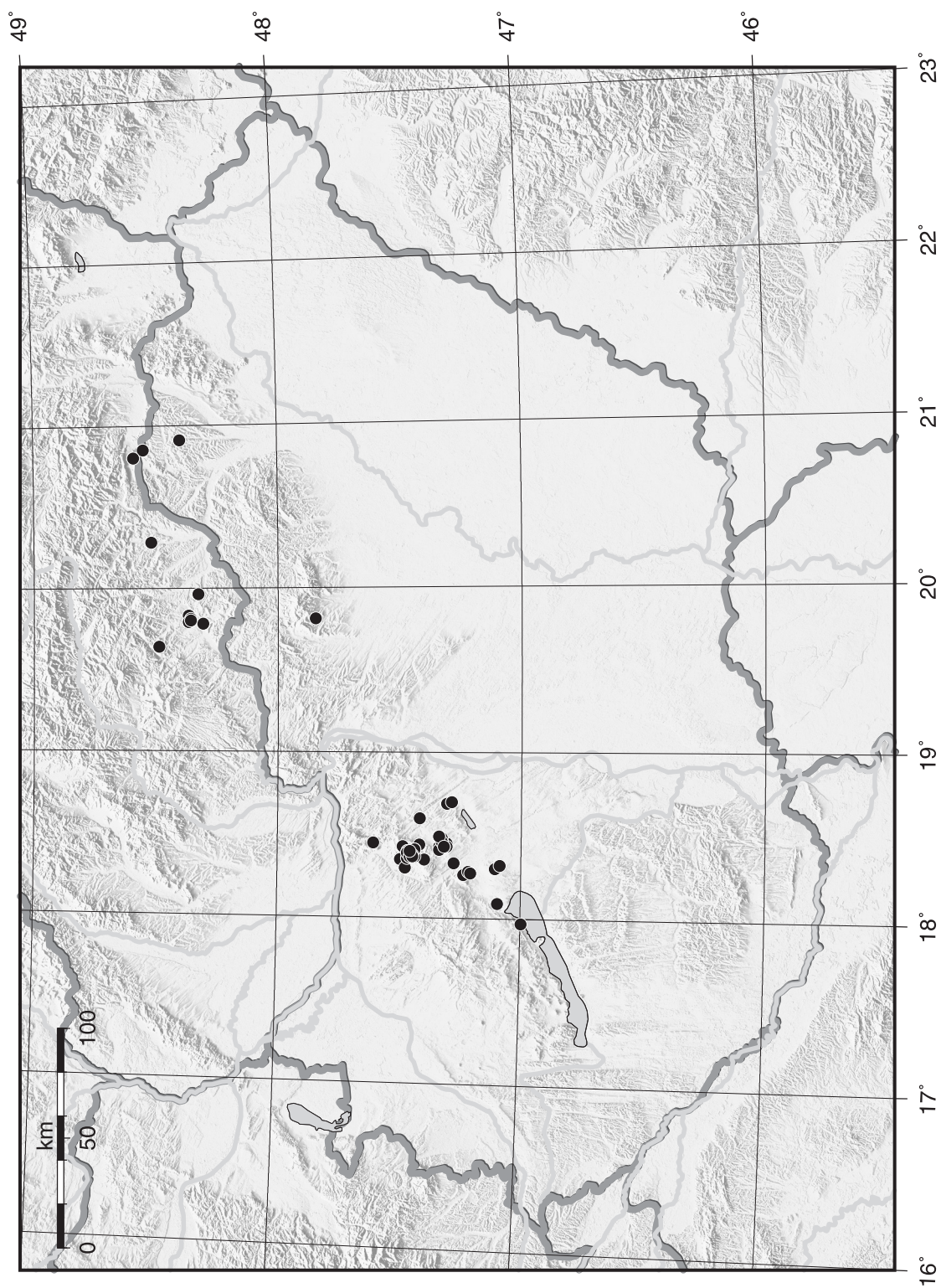
### DECEMBER / DECEMBER, 2010

09	20:15:35.3	47.375N	18.257E	9	0.3	-	Mór
10	7:45:06.5	47.345N	18.310E	10	0.6	-	Csákberény
11	13:52:43.7	47.342N	18.171E	10	0.6	-	Balinka
14	17:38:17.4	48.035N	20.864E	1	2.5	-	Sajópetri
14	21:29:03.7	48.075N	20.855E	1	2.8	4-5	Felsőzsolca
14	21:32:48.8	48.114N	20.816E	2	2.0	-	Felsőzsolca
14	23:07:22.9	48.092N	20.821E	2	2.6	-	Szirma
18	21:22:13.7	47.147N	17.748E	6	1.0	-	Herend
31	2:29:09.3	47.620N	17.979E	15	0.6	-	Bábolna
31	6:44:24.5	47.506N	17.937E	7	0.9	-	Kerékteleki



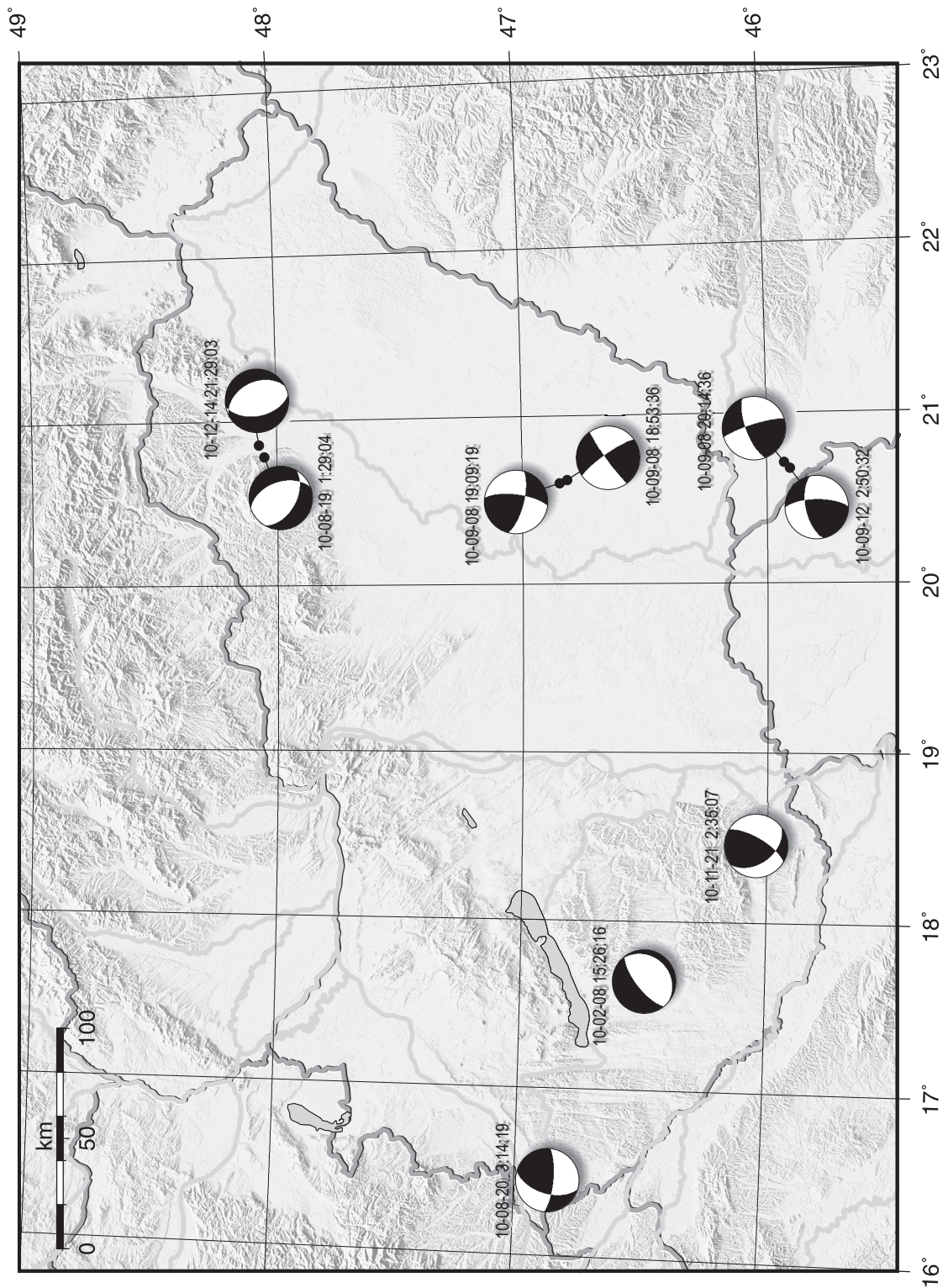
3.1. ábra A 2010-ben regisztrált földrengések epicentrumai

Figure 3.1. Epicenters of 2010 earthquakes



3.2. ábra A 2010-ben regisztrált robbantások epicentrumai

Figure 3.2. Epicenters of 2010 explosions



3.3. ábra A 2010-ben regisztrált földrengések fészekmechanizmusai

Figure 3.3. Fault plane solutions of 2010 earthquakes

## FÉSZEKPARAMÉTEREK ÉS FÁZISADATOK

A listában alkalmazott jelek és rövidítések magyarázata:

time:	Az esemény kipattanásának ideje (óra:perc:másodperc; UTC).
ML:	A rengés Richter-féle lokális magnitúdója.
lat:	Az esemény földrajzi szélessége (fok).
lon:	Az esemény földrajzi hosszúsága (fok).
h:	A fészek mélysége (km).
erh:	Horizontális hiba km-ben. ( $erh = \sqrt{SDX^2 + SDY^2}$ , ahol $SDX$ és $SDY$ az epicentrum földrajzi szélességének és hosszúságának meghatározási hibái.) Ha $erh = ---$ , a kevés rendelkezésre álló adat miatt $erh$ nem volt meghatározható.
erz:	A fészekmélység meghatározásának hibája (km). $erz = ---$ azt jelzi, hogy $erz$ nem volt meghatározható a kevés rendelkezésre álló adat miatt.
nr:	A számításnál felhasznált fázisadatok száma. Azonos állomásról származó P és S beérkezések 2 adatnak számítanak.
gap:	Az állomások közötti legnagyobb irányeltérés (fok).
rms:	A számított beérkezési idők átlagnégyzetes hibája (mp). ( $rms = \sqrt{\sum R_i^2 / nr}$ , ahol $R_i$ az $i$ -edik állomás időhibája (reziduál).)
Locality:	A rengés földrajzi helyének megnevezése, általában a legközelebbi település neve.
Comments:	Az eseménnyel kapcsolatos egyéb közlemény (pl. epicentrális intenzitás).
sta:	Az állomás neve. (L. 2. fejezet.)
dist:	Az állomás távolsága az epicentrumtól (km).
azm:	Az állomás irányszöge az epicentrumtól az északi iránytól számítva (fok).
phase:	Fázis azonosító; az első betű a kezdetet jellemzi: $e$ = lassan emelkedő $i$ = hirtelen kitérő; a második és harmadik betű a fázis megnevezése pl. Pn, Pg, Sn, Sg; a negyedik a kitérési irányt jelzi: C=kompresszió/fel, D=dilatáció/le.
hr mn sec:	A fázis beérkezési ideje (óra, perc, másodperc).
res:	Reziduál (másodperc). ( $res = T_{obs} - T_{cal}$ , ahol $T_{obs}$ a mért, és $T_{cal}$ a számított menetidő.)

Minden rengésnél, ahol elegendő számú első kitérési adat állt rendelkezésre, megkíséreltük a fészekmechanizmus meghatározását. Az ábrákon az alsó félteke sztereografikus képe látható, **P** a maximális, **T** a minimális feszültségtengely iránya. A fészekmechanizmusokat a 3.3. ábra foglalja össze.

## PHASE DATA

## Key to phase data encoding

time:	Time of occurrence of event in hours, mins and secs (UTC).
ML:	Richter local magnitude of the earthquake.
lat:	Latitude of the event in degrees.
lon:	Longitude of the event in degrees.
h:	Depth of the hypocenter in km.
erh:	Standard error of the epicenter in km. ( $erh = \sqrt{SDX^2 + SDY^2}$ , where $SDX$ and $SDY$ are the standard errors in latitude and longitude respectively, of the epicenter.) If $erh = ---$ , this means that $erh$ could not be computed because of insufficient data.
erz:	Standard error of the focal depth in km. If $erz = ---$ , this means that $erz$ could not be computed either because focal depth is fixed in the solution or because of insufficient data.
nr:	Number of station readings used in locating the earthquake. P and S arrivals for the same stations are regarded as 2 readings.
gap:	Largest azimuthal separation in degrees between stations.
rms:	Root mean square error of time residuals in seconds. ( $rms = \sqrt{\sum R_i^2 / nr}$ , where $R_i$ is the time residual of the $i^{th}$ station.
Locality:	A geographical indication of the epicenter area, usually the nearest settlement.
Comments:	Additional comments about the event, eg. maximum EMS intensity
sta:	Station name. (For details see Chapter 2.)
dist:	Distance from earthquake epicenter to station in km.
azm:	Azimuthal angle between epicenter to station measured from North in degrees.
phase:	Phase identifier; the first letter characterizes onset $e$ = emergent $i$ = impulsive, the second and third indicate the phase eg. Pn, Pg, Sn and Sg, the fourth indicates the polarity C=compression/up D=dilatation/down.
hr mn sec:	Arrival time of the phase from input data.
res:	Residual of the phase in secs. ( $res = T_{obs} - T_{cal}$ , where $T_{obs}$ is the observed and $T_{cal}$ is the calculated travel time respectively.

Fault plane solutions were attempted for each event where any information for the stress field could be drawn. Stereographic projections of the lower focal hemisphere are shown, **P** and **T** are the main compression and tension axes respectively. Strike, dip and slip values of the nodal planes are also indicated. Calculations were carried out by computer program FPFIT (Reasenber and Oppenheimer, 1985). The results are summarized in Fig. 3.3.

## Földrengés paraméterek

## Hypocenter Parameters

1.

2010-01-01 time: 17:12:48.78 UTC ML= 2.8  
 lat: 45.911N lon: 16.043E h= 10.0 km  
 erh= 2.9km erz= 1.7km  
 nr= 23 gap=153 rms=0.53  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
GCIS	32.6	261	iPgD	17:12:55.20	0.32
			iSg	12:59.80	0.17
GOLS	34.3	289	iPgD	17:12:55.40	0.24
CESS	45.5	279	iPg	17:12:57.40	0.30
			eSg	13:03.50	-0.09
CRES	46.5	258	iPgD	17:12:57.40	0.12
			iSg	13:03.80	-0.10
DOBS	51.7	301	iPg	17:12:58.50	0.31
LEGS	56.4	274	iPgD	17:12:59.20	0.18
			iSg	13:06.60	-0.40
KOGS	61.8	15	iPg	17:12:59.90	-0.07
			iSg	13:07.60	-1.09
BOJS	76.4	234	iPg	17:13:02.00	-0.55
PDKS	83.1	283	iPg	17:13:03.50	-0.23
BEHE	84.0	42	ePg	17:13:04.00	0.11
			eSg	13:14.60	-1.08
VISS	94.3	263	iPg	17:13:05.10	-0.61
PERS	107.7	318	iPn	17:13:07.30	-0.66
			iSn	13:20.90	-2.02
SOKA	115.5	318	Pn	17:13:08.40	-0.54
			Sn	13:25.20	0.55
LJU	118.4	277	iPn	17:13:09.20	-0.10
OBKA	133.1	300	Pn	17:13:12.00	0.86
			Sn	13:28.60	0.03
ARSA	154.1	345	Pn	17:13:14.30	0.54
			Sn	13:33.20	-0.04
VOJS	167.6	275	iPn	17:13:17.00	1.56
PKS9	188.1	66	ePnD	17:13:21.80	3.81
			eSn	13:45.20	4.43
SOP	200.9	11	ePnD	17:13:20.00	0.41
			eSn	13:46.40	2.78
MYKA	201.6	293	Pn	17:13:18.60	-1.08
			Sn	13:44.80	1.02
PKSM	203.8	81	ePn	17:13:19.30	-0.65
PKST	213.9	46	ePnD	17:13:20.80	-0.41
			eSn	13:52.50	6.00
CONA	224.7	356	Pn	17:13:20.60	-1.96
			Sn	13:47.70	-1.21
PKSG	243.7	48	ePn	17:13:26.80	1.87
			eSn	14:03.70	10.58
VRAC	380.0	6	iPn	17:13:42.10	0.18
KHC	403.3	333	ePn	17:13:46.10	1.28
			eSn	14:27.80	-0.73
PRU	467.0	346	ePn	17:13:53.40	0.63
			eSn	15:00.70	18.02
NKC	550.2	331	ePn	17:14:03.90	0.75
KWP	648.6	50	iPn	17:13:50.60	-24.81

2.

2010-01-10 time: 2:35:59.94 UTC ML=-0.1  
 lat: 47.314N lon: 18.304E h= 10.0 km  
 erh= 2.4km erz= 1.7km  
 nr= 6 gap=216 rms=0.08  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.3	329	ePgC	2:36:02.00	-0.06
			eSg	36:03.60	-0.11
PKSG	10.8	37	ePgD	2:36:02.60	0.03
			eSg	36:04.70	0.08
PKST	21.3	253	ePgC	2:36:04.10	-0.05
			eSg	36:07.60	0.17

3.

2010-01-10 time: 3:10:17.82 UTC ML= 0.0  
 lat: 47.318N lon: 18.302E h= 10.0 km  
 erh= 2.7km erz= 1.9km  
 nr= 6 gap=213 rms=0.07  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.0	328	ePgC	3:10:19.90	0.00
			eSg	10:21.40	-0.13
PKSG	10.6	39	ePgC	3:10:20.40	-0.03
			eSg	10:22.60	0.14
PKST	21.3	252	ePgD	3:10:22.00	-0.02
			eSg	10:25.40	0.10

4.

2010-01-10 time: 4:30:17.58 UTC ML=-0.2  
 lat: 47.298N lon: 18.317E h= 10.0 km  
 erh= 2.8km erz= 2.5km  
 nr= 6 gap=231 rms=0.15  
 Locality: Magyaralmás  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	8.4	329	ePgC	4:30:19.80	-0.12
			eSg	30:21.40	-0.34
PKSG	11.8	28	ePgC	4:30:20.40	0.05
			eSg	30:22.80	0.30
PKST	21.9	259	ePgC	4:30:21.90	0.03
			eSg	30:25.30	0.08

5.

2010-01-10 time: 5:20:10.80 UTC ML= 1.0  
 lat: 47.456N lon: 18.193E h= 4.2 km  
 erh= 3.2km erz= 3.0km  
 nr= 12 gap=219 rms=0.49  
 Locality: Bokod  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	11.5	154	ePgC	5:20:13.00	0.02
			eSg	20:14.60	-0.09
PKSG	16.5	115	ePgC	5:20:13.60	-0.25
			eSg	20:15.80	-0.42
PKST	24.9	209	ePgD	5:20:15.10	-0.21
			eSg	20:18.60	-0.24
PKS7	86.2	122	eSg	5:20:38.60	0.37
PKS9	96.8	176	ePgD	5:20:29.20	1.10
			eSg	20:42.60	1.00
PSZ	137.7	68	ePn	5:20:35.40	0.93
			eSn	20:52.40	-0.54
PKSM	142.5	166	ePnD	5:20:34.50	-0.56
			eSn	20:50.70	-3.29

6.

2010-01-10 time: 12:56:11.99 UTC ML= 0.7  
 lat: 47.392N lon: 18.248E h= 10.0 km  
 erh= 4.9km erz= 1.6km  
 nr= 8 gap=223 rms=0.33  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	3.4	164	ePgC	12:56:13.90	0.02
			eSg	56:15.50	0.15
PKSG	10.8	90	ePgC	12:56:14.50	-0.12
			eSg	56:16.60	-0.06
PKST	21.9	228	ePgD	12:56:16.00	-0.30
			eSg	56:19.80	0.15
PKSM	134.6	167	ePnD	12:56:35.30	0.77
			eSn	56:51.60	-0.51

## Hypocenter Parameters

## Földrengés paraméterek

7.  


---

 2010-01-10 time: 14:39:57.44 UTC ML= 0.1  
 lat: 47.324N lon: 18.292E h= 10.0 km  
 erh= 2.7km erz= 1.7km  
 nr= 6 gap=205 rms=0.07  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	5.0	332	ePgC	14:39:59.40			-0.03
			eSg	40:00.90			-0.09
PKSG	10.6	45	ePgD	14:40:00.10			0.06
			eSg	40:02.10			0.02
PKST	20.8	250	ePgD	14:40:01.50			-0.06
			eSg	40:04.90			0.13

8.  


---

 2010-01-10 time: 14:40:50.44 UTC ML= 0.0  
 lat: 47.367N lon: 18.263E h= 10.8 km  
 erh= 2.9km erz= 0.5km  
 nr= 6 gap=199 rms=0.05  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	0.4	200	ePgC	14:40:52.40			0.02
			eSg	40:53.90			0.01
PKSG	10.1	74	ePg	14:40:53.00			-0.08
			eSg	40:55.20			0.06
PKST	21.0	235	ePg	14:40:54.70			0.04
			eSg	40:57.90			-0.05

9.  


---

 2010-01-11 time: 3:40:43.28 UTC ML= 0.3  
 lat: 47.319N lon: 18.300E h= 10.0 km  
 erh= 3.0km erz= 2.0km  
 nr= 6 gap=211 rms=0.09  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	5.7	329	ePgC	3:40:45.30			-0.03
			eSg	40:46.80			-0.14
PKSG	10.6	40	ePgC	3:40:45.90			0.02
			eSg	40:48.00			0.09
PKST	21.2	252	ePgC	3:40:47.40			-0.06
			eSg	40:50.90			0.18

10.  


---

 2010-01-12 time: 11:13:03.70 UTC ML= 1.2  
 lat: 47.312N lon: 18.453E h= 0.0 km  
 erh= 4.9km erz= 638km  
 nr= 6 gap=287 rms=0.38  
 Locality: Pátka  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	10.1	332	ePgC	11:13:05.40			-0.10
			eSg	13:06.40			-0.50
CSKK	15.6	291	ePgC	11:13:06.70			0.21
			eSg	13:09.10			0.43
PKST	32.2	260	ePgC	11:13:09.70			0.25
			eSg	13:13.00			-0.94

11.  


---

 2010-01-12 time: 11:18:22.10 UTC ML= 1.2  
 lat: 47.312N lon: 18.431E h= 0.0 km  
 erh= 6.3km erz= 840km  
 nr= 6 gap=278 rms=0.50  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res

PKSG	9.4	341	ePgC	11:18:23.80			0.01
			eSg	18:24.50			-0.60
CSKK	14.1	294	ePgC	11:18:25.20			0.57
			eSg	18:26.80			0.21
PKST	30.6	259	ePgC	11:18:27.60			0.03
			eSg	18:30.50			-1.33

12.  


---

 2010-01-13 time: 11:04:36.42 UTC ML= 1.0  
 lat: 47.614N lon: 18.451E h= 0.0 km  
 erh=10.4km erz= 964km  
 nr= 6 gap=332 rms=0.56  
 Locality: Vértestolna  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	25.1	190	ePgC	11:04:41.30			0.39
			eSg	04:44.10			-0.31
CSKK	31.4	207	ePgC	11:04:42.50			0.48
			eSg	04:45.90			-0.49
PKST	50.5	219	ePgC	11:04:44.60			-0.83
			eSg	04:53.10			0.64

13.  


---

 2010-01-14 time: 3:27:02.84 UTC ML= 2.2  
 lat: 45.750N lon: 21.941E h= 3.4 km  
 erh= 2.9km erz= 3.5km  
 nr= 12 gap=116 rms=0.61  
 Locality: Romania  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
BZS	29.3	240	iPg	3:27:08.00			-0.11
SIRR	61.5	339	iPg	3:27:13.90			0.06
BANR	75.0	237	iPg	3:27:16.60			0.36
DEV	76.3	79	iPg	3:27:16.50			0.02
GZR	76.4	121	iPgD	3:27:16.10			-0.39
DRGR	130.1	27	iPn	3:27:24.90			-0.76
LOT	146.6	103	iPn	3:27:27.50			-0.22
MDB	194.1	77	iPnD	3:27:36.30			2.66
ARR	214.5	101	iPnD	3:27:37.20			1.01
VOIR	245.1	98	iPn	3:27:41.70			1.70
PKSM	260.8	281	iPn	3:27:40.90			-1.05
PSZ	287.2	327	iPn	3:27:44.60			-0.64
MLR	313.7	95	iPnD	3:27:49.20			0.66
BURB	325.3	50	iPn	3:27:50.90			0.91

14.  


---

 2010-01-14 time: 9:52:11.29 UTC ML= 1.0  
 lat: 47.501N lon: 18.350E h= 0.0 km  
 erh= 7.8km erz= 979km  
 nr= 6 gap=304 rms=0.57  
 Locality: Vértestolna  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	12.5	166	ePgC	9:52:13.60			0.07
			eSg	52:14.50			-0.77
CSKK	16.8	204	ePgC	9:52:15.10			0.82
			eSg	52:17.10			0.48
PKST	36.0	222	ePgC	9:52:17.10			-0.61
			eSg	52:22.50			-0.22

15.  


---

 2010-01-14 time: 9:52:27.65 UTC ML= 0.9  
 lat: 47.417N lon: 18.440E h= 0.0 km  
 erh=17.8km erz= 893km  
 nr= 6 gap=347 rms=0.52  
 Locality: Csákvár  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	4.7	234	ePgC	9:52:28.10			-0.39
			eSg	52:29.30			0.16



## Földrengés paraméterek

## Hypocenter Parameters

CSKK 14.8 246 ePgC 9:52:29.80 -0.50  
 eSg 52:32.30 -0.07  
 PKST 35.3 240 ePgC 9:52:34.90 0.93  
 eSg 52:38.90 0.01

16.

2010-01-14 time: 9:57:27.38 UTC ML= 1.2  
 lat: 47.482N lon: 18.305E h= 0.0 km  
 erh= \*\*\*km erz= \*\*\*km  
 nr= 6 gap=288 rms=0.80  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	12.0	147	ePgC	9:57:29.20	-0.31
			eSg	57:29.80	-1.38
CSKK	13.7	194	ePgD	9:57:30.70	0.88
			eSg	57:32.80	1.07
PKST	32.2	219	ePgC	9:57:33.20	0.08
			eSg	57:36.50	-1.10

17.

2010-01-18 time: 14:58:45.07 UTC ML= 0.1  
 lat: 47.315N lon: 18.306E h= 10.0 km  
 erh= 0.6km erz= 0.4km  
 nr= 6 gap=216 rms=0.06  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.3	327	ePgC	14:58:47.10	-0.09
			eSg	58:48.80	-0.04
PKSG	10.6	37	ePgC	14:58:47.70	0.02
			eSg	58:49.80	0.09
PKST	21.5	253	ePgD	14:58:49.30	-0.01
			eSg	58:52.70	0.09

18.

2010-01-19 time: 9:37:38.35 UTC ML= 1.2  
 lat: 47.332N lon: 18.455E h= 0.0 km  
 erh= 0.5km erz=58.9km  
 nr= 6 gap=292 rms=0.03  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.3	324	ePgC	9:37:39.80	-0.02
			eSg	37:41.00	0.02
CSKK	15.1	283	ePgC	9:37:41.10	0.05
			eSg	37:43.10	-0.05
PKST	32.8	256	ePgC	9:37:44.20	-0.02
			eSg	37:48.80	0.01

19.

2010-01-19 time: 9:37:51.22 UTC ML= 1.2  
 lat: 47.458N lon: 18.401E h= 0.0 km  
 erh= 2.8km erz= 332km  
 nr= 6 gap=315 rms=0.20  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	7.4	186	ePgC	9:37:52.40	-0.13
			eSg	37:53.60	0.04
CSKK	14.9	225	ePgC	9:37:53.80	-0.09
			eSg	37:56.00	0.03
PKST	35.5	231	ePgC	9:37:57.90	0.35
			eSg	38:02.20	-0.28

20.

2010-01-21 time: 14:25:44.03 UTC ML= 1.0  
 lat: 47.113N lon: 18.301E h= 0.0 km  
 erh= \*\*\*km erz= \*\*\*km  
 nr= 6 gap=296 rms=1.18  
 Locality: Szabadbattyán  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKST	25.9	309	ePg	14:25:49.40	0.75
			eSg	25:50.20	-2.06
CSKK	27.9	354	ePgD	14:25:49.90	0.89
			eSg	25:54.60	1.70
PKSG	31.7	12	ePgD	14:25:48.80	-0.89
			eSg	25:52.80	-1.30

21.

2010-01-22 time: 13:12:43.67 UTC ML= 1.0  
 lat: 47.306N lon: 18.685E h= 0.0 km  
 erh= 4.5km erz= 427km  
 nr= 6 gap=331 rms=0.25  
 Locality: Kajászó  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	24.2	293	ePgC	13:12:48.30	0.31
			eSg	12:51.10	-0.26
CSKK	32.7	281	ePgD	13:12:49.50	-0.01
			eSg	12:54.10	0.03
PKST	49.5	264	ePg	13:12:52.10	-0.41
			eSg	12:59.60	0.19

22.

2010-01-25 time: 11:50:38.81 UTC ML= 1.1  
 lat: 47.032N lon: 17.878E h= 10.0 km  
 erh=61.3km erz=97.8km  
 nr= 6 gap=341 rms=0.51  
 Locality: Veszprémfajsz  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	27.9	25	ePgD	11:50:44.30	0.20
			eSg	50:48.10	-0.13
CSKK	46.9	38	ePg	11:50:46.50	-0.87
			eSg	50:53.80	-0.25
PKSG	55.8	44	ePg	11:50:49.70	0.77
			eSg	50:56.90	0.08

23.

2010-01-27 time: 9:48:29.57 UTC ML= 0.8  
 lat: 47.324N lon: 18.427E h= 0.0 km  
 erh= 4.9km erz= 645km  
 nr= 6 gap=277 rms=0.38  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.0	340	ePgC	9:48:30.70	-0.29
			eSg	48:32.00	-0.11
CSKK	13.3	289	ePgC	9:48:32.10	0.15
			eSg	48:34.30	0.50
PKST	30.6	256	ePgC	9:48:35.30	0.27
			eSg	48:38.30	-0.99

24.

2010-01-27 time: 9:53:37.85 UTC ML= 1.0  
 lat: 47.444N lon: 18.411E h= 0.0 km  
 erh= 1.1km erz= 112km  
 nr= 5 gap=321 rms=0.05  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
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### Hypocenter Parameters

PKSG 6.0 195 ePgC 9:53:39.00 0.08  
 eSg 53:39.70 -0.07  
 CSKK 14.5 232 ePgD 9:53:40.40 -0.04  
 eSg 53:42.50 0.04  
 PKST 35.1 234 ePgC 9:53:44.10 -0.02  
 eSg 53:46.30 -2.72

25.

2010-01-27 time: 12:21:00.55 UTC ML= 0.7  
 lat: 47.421N lon: 18.604E h= 0.0 km  
 erh= 7.1km erz= 349km  
 nr= 6 gap=349 rms=0.20  
 Locality: Alcsútdoboz  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	16.4	259	ePgD	12:21:03.70	0.22
			eSg	21:05.80	0.03
CSKK	26.7	256	ePg	12:21:05.00	-0.32
			eSg	21:07.40	-1.64
PKST	46.7	247	ePgD	12:21:08.90	0.02
			eSg	21:15.40	0.02

26.

2010-01-30 time: 15:28:42.62 UTC ML= 2.4  
 lat: 46.957N lon: 20.793E h= 3.8 km  
 erh= 5.4km erz= 4.7km  
 nr= 19 gap=105 rms=1.23  
 Locality: Gyomaendrőd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSN	70.8	265	ePgC	15:28:55.20	-0.09
			eSg	29:07.00	1.83
PKS6	101.9	247	ePg	15:29:00.10	-0.73
			eSg	29:14.00	-1.03
PKS7	124.6	275	eSn	15:29:20.00	-1.92
PSZ	126.6	328	iPnD	15:29:03.70	-1.25
PSZ	126.6	328	eSn	15:29:18.30	-4.08
DRGR	147.4	97	iPn	15:29:06.50	-1.04
PKSM	184.6	243	eSn	15:29:36.20	0.97
PKSM	184.6	243	iPn	15:29:11.40	-0.78
TRPA	185.2	45	ePnC	15:29:13.30	1.04
			eSn	29:35.20	-0.18
PKSG	188.5	285	ePn	15:29:14.30	1.63
			eSn	29:37.20	1.10
PKS9	196.4	258	ePn	15:29:15.30	1.64
			eSn	29:39.80	1.94
CSKK	197.3	283	eSn	15:29:39.30	1.23
BMR	219.4	69	iPn	15:29:18.00	1.48
GZR	231.6	139	iPn	15:29:18.00	-0.05

27.

2010-02-08 time: 9:34:04.51 UTC ML= 0.8  
 lat: 47.101N lon: 18.091E h= 0.0 km  
 erh= 2.2km erz= 267km  
 nr= 6 gap=311 rms=0.16  
 Locality: Papkeszi  
 Comments: probably explosion

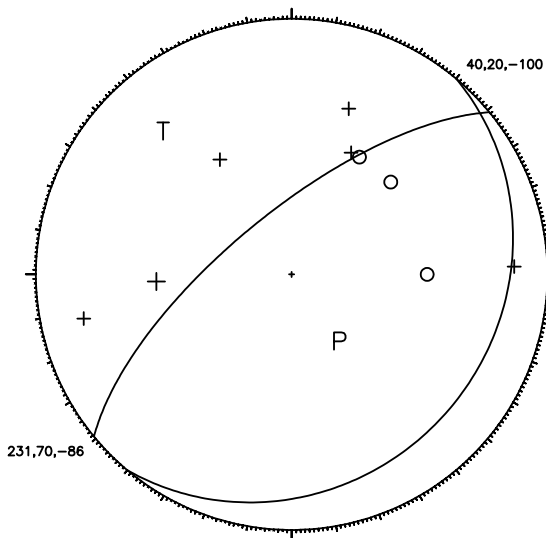
sta	dist	azm	phase	hr mn sec	res
PKST	18.1	346	ePgC	9:34:07.60	-0.14
			eSg	34:10.40	0.14
CSKK	31.9	24	ePg	9:34:10.20	0.00
			eSg	34:14.40	-0.24
PKSG	39.5	35	ePgC	9:34:11.80	0.23
			eSg	34:17.00	-0.07

### Földrengés paraméterek

28.

2010-02-08 time: 15:26:16.66 UTC ML= 2.7  
 lat: 46.496N lon: 17.645E h= 16.5 km  
 erh= 2.8km erz= 2.4km  
 nr= 35 gap=133 rms=0.99  
 Locality: Várda  
 Comments: felt 5 EMS

sta	dist	azm	phase	hr mn sec	res
PKS9	49.7	78	ePgC	15:26:25.30	-0.70
BEHE	66.8	268	ePgC	15:26:29.80	0.85
			eSg	26:39.70	1.16
PKSM	82.9	112	eP*	15:26:30.70	-0.77
			eS*	26:41.80	-1.22
PKST	89.9	19	eP*C	15:26:32.50	-0.03
			eS*	26:44.20	-0.72
CSKK	107.2	26	ePnC	15:26:35.20	0.25
			eSn	26:49.60	0.38
KOGS	107.3	267	iPnC	15:26:35.30	0.35
			iSn	26:49.60	0.37
PKSG	114.7	30	ePnD	15:26:36.10	0.22
			eSn	26:50.90	0.03
PKS2	120.4	90	ePnD	15:26:37.50	0.91
			eSn	26:52.90	0.76
BUD	151.9	44	ePn	15:26:40.40	-0.12
			eSn	27:00.40	1.27
SOP	155.7	328	ePnC	15:26:42.40	1.40
			eSn	27:00.20	0.22
GOLS	164.9	251	iPn	15:26:42.30	0.16
GCIS	170.7	246	iPn	15:26:43.10	0.23
DOBS	171.9	257	iPn	15:26:43.10	0.08
ARSA	182.3	297	Pn	15:26:42.40	-1.91
			Sn	27:03.00	-2.87
LEGS	189.6	251	iPn	15:26:45.50	0.28
			iSn	27:14.50	7.00
SOKA	201.3	276	Pn	15:26:44.70	-1.97
			Sn	27:07.60	-2.49
CONA	208.9	320	Pn	15:26:48.70	1.08
			Sn	27:09.80	-1.98
PSZ	232.5	47	ePnD	15:26:50.20	-0.37
			eSn	27:17.50	0.47
OBKA	237.7	270	Pn	15:26:49.20	-2.02
			Sn	27:22.40	4.22
VYHS	239.6	22	ePn	15:26:52.40	0.94
			eSn	27:18.50	-0.11
KECS	307.7	44	ePn	15:27:00.50	0.56
OKK	373.5	6	eSn	15:27:13.00	-35.31
STHS	421.6	40	e n	15:27:16.30	2.15
KHC	422.7	314	ePn	15:27:16.60	2.32
			eSn	28:13.10	13.87
DPC	439.7	347	eSn	15:27:45.50	-17.50



## Földrengés paraméterek

## Hypocenter Parameters

29.  


---

 2010-02-09 time: 9:42:57.95 UTC ML= 1.1  
 lat: 47.487N lon: 18.430E h= 0.0 km  
 erh= 4.9km erz= 504km  
 nr= 6 gap=326 rms=0.31  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	11.0	195	ePgC	9:43:00.10	0.18
			eSg	43:00.80	-0.66
CSKK	18.8	223	ePgC	9:43:01.40	0.09
			eSg	43:03.90	-0.03
PKST	39.2	230	ePgC	9:43:04.70	-0.25
			eSg	43:11.00	0.59

30.  


---

 2010-02-15 time: 10:15:16.03 UTC ML= 1.3  
 lat: 47.327N lon: 18.429E h= 0.0 km  
 erh= 5.9km erz= 787km  
 nr= 6 gap=278 rms=0.45  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	7.8	338	ePgC	10:15:17.40	-0.03
			eSg	15:18.10	-0.42
CSKK	13.4	288	ePgC	10:15:18.70	0.28
			eSg	15:20.80	0.51
PKST	30.8	256	ePgC	10:15:21.60	0.07
			eSg	15:24.20	-1.62

31.  


---

 2010-02-15 time: 10:15:27.31 UTC ML= 1.3  
 lat: 47.465N lon: 18.375E h= 0.0 km  
 erh= 2.9km erz= 355km  
 nr= 6 gap=303 rms=0.21  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.2	172	ePgC	10:15:28.70	-0.07
			eSg	15:29.90	-0.01
CSKK	14.2	217	ePgC	10:15:29.90	0.05
			eSg	15:32.10	0.28
PKST	34.4	228	ePgC	10:15:33.50	0.04
			eSg	15:37.40	-0.85

32.  


---

 2010-03-04 time: 9:53:51.07 UTC ML= 2.0  
 lat: 47.852N lon: 19.813E h= 0.0 km  
 erh= 7.9km erz= 6.1km  
 nr= 6 gap=268 rms=0.55  
 Locality: Gyöngyöspata  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	9.6	39	ePgD	9:53:52.40	-0.38
			eSg	53:54.30	0.19
VYHS	101.9	314	ePg	9:54:09.50	0.23
			eSg	54:23.00	-0.45
CRVS	169.0	46	ePn	9:54:21.00	1.83
			eSn	54:41.00	-0.09

33.  


---

 2010-03-24 time: 8:14:08.30 UTC ML= 0.9  
 lat: 47.341N lon: 18.427E h= 0.0 km  
 erh= 6.3km erz= 833km  
 nr= 6 gap=279 rms=0.48  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
-----	------	-----	-------	-----------	-----

PKSG	6.3	334	ePgC	8:14:09.40	-0.02
			eSg	14:10.00	-0.29
CSKK	12.8	281	ePgC	8:14:10.90	0.31
			eSg	14:13.00	0.63
PKST	31.1	253	ePg	8:14:13.80	-0.04
			eSg	14:16.70	-1.47

34.  


---

 2010-03-24 time: 10:24:32.09 UTC ML= 1.1  
 lat: 47.436N lon: 18.365E h= 0.0 km  
 erh= 5.4km erz= 642km  
 nr= 6 gap=286 rms=0.38  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	5.2	158	ePgC	10:24:32.90	-0.12
			eSg	24:33.60	-0.15
CSKK	11.3	225	ePgC	10:24:34.40	0.30
			eSg	24:36.30	0.63
PKST	31.8	232	ePgC	10:24:37.70	-0.07
			eSg	24:41.20	-0.99

35.  


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 2010-03-29 time: 21:40:42.02 UTC ML=-0.1  
 lat: 47.352N lon: 18.263E h= 5.0 km  
 erh= 2.3km erz= 0.9km  
 nr= 6 gap=174 rms=0.04  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.2	352	ePgC	21:40:43.00	0.06
			eSg	40:43.60	-0.07
PKSG	10.6	65	ePgC	21:40:44.10	-0.02
			eSg	40:45.80	0.05
PKST	20.1	239	ePgC	21:40:45.70	-0.02
			eSg	40:48.60	-0.01

36.  


---

 2010-03-30 time: 22:20:27.93 UTC ML=-0.1  
 lat: 47.332N lon: 18.196E h= 4.7 km  
 erh= 1.5km erz= 0.6km  
 nr= 6 gap=179 rms=0.03  
 Locality: Bodajk  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.0	55	ePgC	22:20:29.30	0.02
			eSg	20:30.30	-0.04
PKST	14.7	236	ePgD	22:20:30.70	0.02
			eSg	20:32.80	-0.03
PKSG	16.1	66	ePgD	22:20:30.90	-0.02
			eSg	20:33.30	0.04

37.  


---

 2010-03-31 time: 0:43:54.18 UTC ML=-0.1  
 lat: 47.405N lon: 18.218E h= 0.4 km  
 erh= 7.2km erz=93.2km  
 nr= 6 gap=236 rms=0.12  
 Locality: Pusztavám  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	5.6	145	ePgC	0:43:55.40	0.22
			eSg	43:55.80	-0.17
PKSG	13.1	96	ePgD	0:43:56.50	-0.02
			eSg	43:58.30	-0.05
PKST	21.3	221	ePgC	0:43:57.90	-0.08
			eSg	44:01.00	0.05

## Hypocenter Parameters

## Földrengés paraméterek

38.

2010-04-01 time: 10:53:31.92 UTC ML= 0.5  
 lat: 47.254N lon: 18.254E h= 12.6 km  
 erh= 5.6km erz= 4.8km  
 nr= 6 gap=238 rms=0.08  
 Locality: Kincsesbánya  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	12.1	2	ePgC	10:53:35.00	-0.05
			eSg	53:37.50	0.02
PKST	16.7	272	ePgC	10:53:35.60	-0.05
			eSg	53:38.70	0.14
PKSG	18.5	34	ePgD	10:53:36.00	0.09
			eSg	53:38.90	-0.12

39.

2010-04-04 time: 14:15:17.31 UTC ML= 2.6  
 lat: 48.799N lon: 21.768E h= 1.8 km  
 erh= 1.2km erz= 2.0km  
 nr= 16 gap= 92 rms=0.43  
 Locality: Slovakia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CRVS	25.3	297	ePg	14:15:22.00	0.16
			eSg	15:25.80	0.43
KOLS	39.9	68	ePg	14:15:23.90	-0.54
			eSg	15:29.30	-0.71
STHS	78.7	331	ePg	14:15:31.20	-0.16
			eSg	15:42.30	-0.02
TRPA	93.7	143	ePgD	14:15:33.90	-0.14
			eSg	15:47.30	0.21
KECS	100.8	250	ePg	14:15:35.10	-0.22
			eSg	15:47.90	-1.47
KWP	115.1	36	iPg	14:15:38.30	0.43
PSZ	169.9	235	ePn	14:15:45.60	0.30
			eSn	16:10.60	3.47
BMR	179.3	134	iPnD	14:15:46.90	0.43
VYHS	218.7	261	ePn	14:15:50.80	-0.58
			eSn	16:18.80	0.84
BURA	288.2	117	iPn	14:16:00.00	-0.04
BZS	354.0	182	iPnD	14:16:07.90	-0.34
PKSM	371.8	219	iPnD	14:16:13.00	2.53
GZR	386.3	169	iPn	14:16:14.60	2.33

40.

2010-04-07 time: 10:27:44.99 UTC ML= 0.8  
 lat: 47.068N lon: 17.966E h= 0.6 km  
 erh=26.0km erz= 719km  
 nr= 6 gap=332 rms=0.26  
 Locality: Szentkirályszabadja  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	21.9	14	ePg	10:27:48.70	-0.20
			eSg	27:51.80	-0.15
CSKK	39.7	34	ePg	10:27:52.50	0.42
			eSg	27:57.70	0.09
PKSG	48.3	42	ePg	10:27:53.40	-0.21
			eSg	28:00.50	0.16

41.

2010-04-08 time: 7:33:11.76 UTC ML= 1.1  
 lat: 47.335N lon: 18.412E h= 0.0 km  
 erh= 5.3km erz= 688km  
 nr= 6 gap=268 rms=0.41  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	6.5	346	ePgC	7:33:12.80	-0.12
			eSg	33:13.30	-0.52
CSKK	11.8	285	ePgC	7:33:14.20	0.33

			eSg	33:16.30	0.78
PKST	29.8	253	ePgC	7:33:17.10	0.03
			eSg	33:20.50	-0.72

42.

2010-04-11 time: 18:21:29.15 UTC ML= 1.9  
 lat: 48.484N lon: 22.862E h= 2.4 km  
 erh= 3.6km erz= 3.5km  
 nr= 13 gap=124 rms=0.72  
 Locality: Ukraine  
 Comments:

sta	dist	azm	phase	hr mn sec	res
TRPA	46.0	211	iPgD	18:21:38.30	0.92
KOLS	66.1	319	ePg	18:21:40.70	-0.27
			eSg	21:50.90	0.71
BMR	101.8	152	iPg	18:21:46.70	-0.64
CRVS	113.1	294	ePg	18:21:48.70	-0.66
			eSg	22:04.30	-0.82
KWP	128.1	355	iPnD	18:21:52.30	0.44
STHS	157.5	311	ePn	18:21:54.90	-0.62
			eSn	22:16.10	0.00
KECS	175.7	270	ePn	18:21:56.40	-1.39
			eSn	22:21.70	1.58
BURB	200.4	119	iPn	18:22:01.30	0.43
VYHS	297.6	270	ePn	18:22:11.90	-1.09
			eSn	22:46.50	-0.68

43.

2010-04-12 time: 0:55:41.26 UTC ML= 1.3  
 lat: 48.410N lon: 17.282E h= 10.0 km  
 erh= 4.6km erz= 3.2km  
 nr= 13 gap= 70 rms=1.18  
 Locality: Slovakia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
SMOL	15.9	43	ePg	0:55:44.40	-0.21
			eSg	55:46.70	-0.52
SOP	97.1	214	ePgC	0:55:58.30	-0.39
			eSg	56:12.40	0.11
VYHS	115.4	85	ePn	0:56:00.80	-0.60
			eSn	56:14.50	-2.61
CONA	118.3	243	Pn	0:56:01.80	0.03
			Sn	56:16.90	-0.86
PKSG	140.3	144	ePn	0:56:07.20	2.69
			eSn	56:24.40	1.76
TREC	164.4	307	eSn	0:56:28.30	0.31
DPC	226.8	342	eSn	0:56:45.00	3.16
PRU	265.9	311	eSn	0:56:57.10	6.58
PRA	277.7	312	eSn	0:56:51.70	-1.45

44.

2010-04-16 time: 11:05:11.30 UTC ML= 1.4  
 lat: 47.334N lon: 18.463E h= 0.0 km  
 erh= 2.3km erz= 199km  
 nr= 5 gap=296 rms=0.09  
 Locality: Lovasberény  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.4	319	ePgC	11:05:12.80	0.00
			eSg	05:13.60	-0.37
CSKK	15.7	282	ePgC	11:05:14.20	0.11
			eSg	05:16.30	0.02
PKST	33.5	255	ePgC	11:05:17.20	-0.08

45.

2010-04-16 time: 11:27:07.25 UTC ML= 1.1  
 lat: 47.004N lon: 17.974E h= 0.0 km  
 erh= 9.7km erz= 745km  
 nr= 6 gap=333 rms=0.44  
 Locality: Felsőörs  
 Comments: probably explosion

## Földrengés paraméterek

## Hypocenter Parameters

sta	dist	azm	phase	hr mn sec	res
PKST	28.8	9	ePg	11:27:12.40	0.01
			eSg	27:14.80	-1.60
CSKK	45.5	29	ePg	11:27:15.90	0.52
			eSg	27:21.80	0.08
PKSG	53.5	36	ePg	11:27:16.40	-0.40
			eSg	27:24.40	0.14

46.

2010-04-17 time: 23:43:31.30 UTC ML= 2.0  
 lat: 48.159N lon: 18.626E h= 0.5 km  
 erh= 2.3km erz= 2.5km  
 nr= 28 gap= 72 rms=1.05  
 Locality: Slovakia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
VYHS	40.4	23	ePg	23:43:39.20	0.68
			eSg	43:43.60	-0.55
BUD	80.7	158	ePg	23:43:44.80	-0.92
			eSg	43:55.10	-1.87
PKSG	87.1	192	ePgC	23:43:47.50	0.65
			eSg	43:58.30	-0.68
CSKK	92.6	197	ePgD	23:43:48.50	0.66
			eSg	43:59.60	-1.14
SMOL	97.2	294	ePg	23:43:49.50	0.85
			eSg	44:01.90	-0.29
PSZ	98.3	106	ePgC	23:43:48.30	-0.55
			eSg	43:59.70	-2.84
PKST	109.5	204	ePgC	23:43:50.80	-0.05
			eSg	44:04.60	-1.49
SOP	163.3	251	ePn	23:43:58.40	-0.23
			eSn	44:19.20	-0.75
PKSN	168.5	146	ePn	23:43:59.30	0.02
			eSn	44:21.40	0.29
PKS9	176.7	189	ePnD	23:44:00.50	0.20
			eSn	44:24.40	1.48
PKS6	187.2	158	eSn	23:44:26.50	1.24
PKS2	190.5	167	eSn	23:44:28.10	2.11
VRAC	196.7	311	iPnD	23:44:01.10	-1.70
PKSM	216.4	180	ePnC	23:44:04.30	-0.96
			eSn	44:34.10	2.36
CRVS	225.1	68	ePn	23:44:08.80	2.46
STHS	237.8	54	ePn	23:44:10.50	2.58
TREC	263.3	299	ePn	23:44:11.60	0.51
			eSn	44:37.70	-4.43
DRGR	343.4	116	iPn	23:44:23.90	2.82
BZS	363.1	141	iPn	23:44:19.80	-3.74
BMR	368.1	98	iPnD	23:44:26.10	1.94
KHC	387.4	286	ePn	23:44:27.00	0.43
			eSn	45:04.00	-5.68

47.

2010-04-19 time: 10:36:22.66 UTC ML= 2.0  
 lat: 48.368N lon: 19.834E h= 0.0 km  
 erh=20.4km erz=32.8km  
 nr= 7 gap=121 rms=1.24  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	50.1	175	ePgC	10:36:31.80	0.19
			eSg	36:38.40	-0.20
VYHS	75.2	281	ePg	10:36:36.50	0.42
			eSg	36:44.80	-1.75
CRVS	133.9	64	ePn	10:36:45.70	-0.68
			eSn	37:02.40	-2.49
STHS	155.9	42	eSn	10:37:12.70	2.93

48.

2010-04-20 time: 3:08:28.39 UTC ML= 0.4  
 lat: 47.295N lon: 18.157E h= 8.0 km  
 erh= 0.6km erz= 0.3km  
 nr= 6 gap=188 rms=0.09  
 Locality: Balinka  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	10.1	247	ePg	3:08:30.70	0.01
			eSg	08:32.40	-0.09
CSKK	10.9	46	ePgC	3:08:30.90	0.10
			eSg	08:32.70	0.02
PKSG	20.7	59	ePg	3:08:32.30	-0.05
			eSg	08:35.20	-0.23

49.

2010-04-20 time: 14:17:30.59 UTC ML= 0.7  
 lat: 47.090N lon: 18.324E h= 0.0 km  
 erh= 4.9km erz= 489km  
 nr= 6 gap=302 rms=0.30  
 Locality: Kőszárhegy  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKST	29.0	311	ePgC	14:17:35.90	0.14
			eSg	17:39.40	-0.39
CSKK	30.8	351	ePg	14:17:35.90	-0.19
			eSg	17:38.40	-1.98
PKSG	34.0	8	ePg	14:17:36.70	0.04
			eSg	17:41.90	0.51

50.

2010-04-20 time: 23:05:40.87 UTC ML= 2.2  
 lat: 48.230N lon: 22.589E h= 10.0 km  
 erh= 3.3km erz= 2.1km  
 nr= 13 gap=106 rms=0.63  
 Locality: Ukraine  
 Comments:

sta	dist	azm	phase	hr mn sec	res
TRPA	11.7	198	iPgD	23:05:43.90	0.28
KOLS	81.5	343	ePg	23:05:55.60	0.06
			eSg	06:06.80	-0.18
BMR	91.9	132	iPgD	23:05:56.40	-0.98
CRVS	111.8	312	ePn	23:06:00.30	-0.27
			eSn	06:15.00	-0.93
KWP	156.0	3	iPn	23:06:06.40	0.32
KECS	158.4	280	ePn	23:06:06.00	-0.37
DRGR	160.2	177	iPn	23:06:07.50	0.90
STHS	164.8	323	ePn	23:06:09.50	2.33
			eSn	06:27.30	-0.39
PSZ	203.7	260	iPnD	23:06:11.80	-0.23
BURB	208.0	109	iPnD	23:06:13.10	0.54
BZS	299.8	194	iPn	23:06:25.70	1.69
GZR	315.7	177	iPn	23:06:28.00	2.01

51.

2010-04-21 time: 7:53:45.74 UTC ML= 1.2  
 lat: 47.465N lon: 18.375E h= 0.0 km  
 erh= 5.2km erz= 441km  
 nr= 5 gap=303 rms=0.20  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.2	172	ePgC	7:53:47.20	-0.01
			eSg	53:47.80	-0.55
CSKK	14.2	217	ePgC	7:53:48.50	0.22
			eSg	53:50.50	0.24
PKST	34.4	228	ePgC	7:53:51.70	-0.19

## Hypocenter Parameters

## Földrengés paraméterek

52.

2010-04-21 time: 7:57:07.96 UTC ML= 1.2  
 lat: 47.444N lon: 18.379E h= 0.0 km  
 erh= 3.1km erz= 318km  
 nr= 6 gap=300 rms=0.19  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	5.9	172	ePgC	7:57:09.00			-0.01
			eSg	57:09.70			-0.13
CSKK	12.7	225	ePgD	7:57:10.40			0.17
			eSg	57:12.20			0.20
PKST	33.2	232	ePg	7:57:13.70			-0.19
			eSg	57:16.90			-1.62

53.

2010-04-23 time: 9:22:25.15 UTC ML= 1.8  
 lat: 48.552N lon: 20.847E h= 0.0 km  
 erh= 4.3km erz= 7.3km  
 nr= 12 gap=157 rms=0.83  
 Locality: Hidvégyardó  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
KECS	27.8	254	ePg	9:22:29.70			-0.42
			eSg	22:33.70			-0.29
CRVS	59.6	49	ePg	9:22:36.70			0.91
			eSg	22:43.30			-0.79
PSZ	99.9	225	ePgC	9:22:43.80			0.81
			eSg	22:55.80			-1.11
STHS	100.4	17	ePg	9:22:43.60			0.52
			eSg	22:56.30			-0.76
KOLS	113.1	68	ePg	9:22:45.60			0.26
			eSg	22:59.10			-1.99
VYHS	148.7	267	ePn	9:22:50.20			-0.53
			eSn	23:07.40			-3.28

54.

2010-04-27 time: 11:00:47.95 UTC ML= 0.2  
 lat: 47.245N lon: 18.260E h= 0.0 km  
 erh= \*\*\*km erz= \*\*\*km  
 nr= 6 gap=244 rms=0.61  
 Locality: Iszkaszentgyörgy  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
CSKK	13.2	0	ePgC	11:00:49.40			-0.90
			eSg	00:52.20			0.06
PKST	17.1	275	ePg	11:00:51.30			0.29
			eSg	00:53.50			0.10
PKSG	19.1	31	ePgC	11:00:51.70			0.33
			eSg	00:55.30			1.27

55.

2010-04-29 time: 10:19:19.15 UTC ML= 1.7  
 lat: 47.329N lon: 18.478E h= 0.0 km  
 erh= 4.3km erz= 444km  
 nr= 6 gap=300 rms=0.26  
 Locality: Lovasberény  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	9.6	316	ePgC	10:19:20.90			0.04
			eSg	19:22.20			0.01
CSKK	16.9	283	ePgD	10:19:21.90			-0.26
			eSg	19:24.70			0.19
PKST	34.5	257	ePg	10:19:25.60			0.29
			eSg	19:28.50			-1.61

56.

2010-04-29 time: 10:19:31.30 UTC ML= 1.2  
 lat: 47.472N lon: 18.404E h= 0.0 km  
 erh= 2.0km erz= 214km  
 nr= 6 gap=317 rms=0.12  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	8.9	187	ePgC	10:19:32.90			0.00
			eSg	19:34.20			0.06
CSKK	16.2	222	ePg	10:19:34.00			-0.20
			eSg	19:36.40			-0.06
PKST	36.6	230	ePg	10:19:38.00			0.16
			eSg	19:43.00			0.06

57.

2010-04-30 time: 12:43:07.42 UTC ML= 1.7  
 lat: 48.315N lon: 19.782E h= 0.0 km  
 erh= \*\*\*km erz= \*\*\*km  
 nr= 5 gap=144 rms=0.47  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PSZ	44.9	169	ePgC	12:43:15.50			0.07
			eSg	43:21.80			0.11
KECS	55.4	70	ePg	12:43:16.50			-0.81
			eSg	43:26.10			1.08
VYHS	72.8	286	eSg	12:43:30.70			0.14

58.

2010-05-05 time: 6:36:25.67 UTC ML= 1.3  
 lat: 47.473N lon: 18.364E h= 0.0 km  
 erh= 3.3km erz= 375km  
 nr= 6 gap=301 rms=0.22  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	9.2	167	ePgC	6:36:27.50			0.18
			eSg	36:28.10			-0.50
CSKK	14.4	213	ePgC	6:36:28.30			0.05
			eSg	36:30.30			0.03
PKST	34.4	226	ePg	6:36:31.60			-0.21
			eSg	36:38.00			1.40

59.

2010-05-12 time: 11:32:07.18 UTC ML= 0.2  
 lat: 47.213N lon: 18.274E h= 10.0 km  
 erh= 3.0km erz= 4.4km  
 nr= 6 gap=262 rms=0.15  
 Locality: Iszkaszentgyörgy  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	16.7	357	ePgD	11:32:10.50			-0.16
			eSg	32:13.10			-0.28
PKST	18.8	286	ePgD	11:32:11.00			0.02
			eSg	32:14.10			0.15
PKSG	21.8	24	ePgD	11:32:11.60			0.14
			eSg	32:14.90			0.10

60.

2010-05-14 time: 1:40:11.85 UTC ML=-0.1  
 lat: 47.389N lon: 18.217E h= 0.3 km  
 erh= 2.2km erz=24.5km  
 nr= 6 gap=225 rms=0.05  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	4.4	131	ePgD	1:40:12.70			0.06

## Földrengés paraméterek

## Hypocenter Parameters

eSg 40:13.20 -0.05  
 PKSG 13.1 89 ePgD 1:40:14.20 0.01  
 eSg 40:15.90 -0.12  
 PKST 20.0 224 ePgD 1:40:15.40 -0.03  
 eSg 40:18.20 -0.01

61.

2010-05-14 time: 5:55:41.15 UTC ML= 0.5  
 lat: 46.315N lon: 16.774E h= 10.0 km  
 erh= 9.9km erz=21.9km  
 nr= 7 gap=249 rms=0.65  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
BEHE	17.3	0	ePgD	5:55:44.80	0.09
			eSg	55:46.80	-0.69
KOGS	42.9	290	iPg	5:55:49.30	0.29
			iSg	55:54.20	-0.95
GOLS	95.0	249	iPg	5:55:56.60	-1.60
			iSg	56:12.10	0.60
DOBS	102.3	260	iPg	5:56:00.00	0.50

62.

2010-05-18 time: 18:24:56.97 UTC ML= 1.0  
 lat: 47.348N lon: 18.212E h= 9.0 km  
 erh= 2.5km erz= 0.8km  
 nr= 7 gap=163 rms=0.10  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	4.0	66	ePgC	18:24:58.60	-0.13
			eSg	25:00.10	-0.01
PKSG	14.3	70	ePgD	18:25:00.00	0.01
			eSg	25:02.50	0.15
PKST	16.7	233	ePgD	18:25:00.30	-0.06
			eSg	25:03.20	0.19
VYHS	135.6	20	ePn	18:25:19.80	0.04
			eSn	25:35.40	-2.14

63.

2010-05-18 time: 18:29:19.15 UTC ML= 0.1  
 lat: 47.256N lon: 18.218E h= 0.1 km  
 erh= 5.1km erz= 572km  
 nr= 5 gap=230 rms=0.18  
 Locality: Kincsesbánya  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	12.3	15	ePg	18:29:21.60	0.25
			eSg	29:22.70	-0.37
PKST	13.9	271	eSg	18:29:23.50	-0.07
PKSG	20.0	41	ePgD	18:29:22.70	-0.02
			eSg	29:25.30	-0.20

64.

2010-05-19 time: 8:48:32.19 UTC ML= 1.6  
 lat: 47.474N lon: 18.402E h= 0.0 km  
 erh= 3.6km erz= 358km  
 nr= 5 gap=316 rms=0.16  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	9.2	185	ePg	8:48:34.00	0.17
			eSg	48:34.80	-0.31
CSKK	16.3	221	ePgD	8:48:35.00	-0.10
			eSg	48:37.20	-0.17
PKST	36.6	229	eSg	8:48:44.00	0.17

65.

2010-05-25 time: 6:55:28.38 UTC ML= 3.1  
 lat: 47.286N lon: 19.943E h= 14.9 km  
 erh= 2.6km erz= 2.3km  
 nr= 22 gap= 67 rms=0.73  
 Locality: Újszilvás  
 Comments: felt 5 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	70.4	357	ePgC	6:55:41.20	-0.04
			eSg	55:50.60	-0.66
BUD	72.8	288	ePg	6:55:41.60	-0.06
			eSg	55:52.40	0.39
PKS2	104.3	212	ePnC	6:55:46.70	0.18
			eSn	55:59.70	-0.96
PKSG	117.9	276	ePn	6:55:48.00	-0.21
			eSn	56:02.40	-1.27
PKST	144.5	269	ePnD	6:55:51.40	-0.12
			eSn	56:08.90	-0.67
PKS9	148.6	238	ePnC	6:55:53.30	1.26
			eSn	56:11.40	0.90
PKSM	155.4	220	ePnD	6:55:51.50	-1.38
			eSn	56:13.60	1.60
VYHS	157.8	328	ePn	6:55:54.10	0.92
			eSn	56:13.00	0.47
TRPA	216.3	64	eSn	6:56:24.30	-1.21
DRGR	217.5	105	Pn	6:56:01.00	0.38
BZS	225.8	145	Pn	6:56:01.90	0.24
KOLS	252.3	43	ePn	6:56:05.30	0.33
STHS	255.8	22	ePn	6:56:08.60	3.19
SOP	258.9	280	eSn	6:56:35.30	0.33
OKC	313.2	335	ePn	6:56:13.10	0.54
			eSn	56:46.60	-0.42
CONA	315.0	283	Pn	6:56:13.10	0.31
ARSA	334.5	269	Pn	6:56:11.90	-3.32
BLY	350.4	218	Pn	6:56:15.10	-2.10
DIVS	354.3	179	Pn	6:56:17.70	0.01
DPC	432.2	322	ePn	6:56:28.40	0.99
			eSn	57:12.70	-0.74
UPC	459.8	321	ePn	6:56:31.20	0.36
KHC	515.7	293	ePn	6:56:38.80	0.99
			eSn	57:30.50	-1.45

66.

2010-06-03 time: 17:55:58.25 UTC ML= 2.2  
 lat: 46.044N lon: 20.429E h= 2.4 km  
 erh= 7.0km erz= 5.2km  
 nr= 17 gap= 89 rms=1.46  
 Locality: Romania  
 Comments:

sta	dist	azm	phase	hr mn sec	res
SIRR	98.2	75	iPg	17:56:14.90	-0.90
BZS	103.8	117	iPg	17:56:16.50	-0.28
PKS2	106.2	298	ePg	17:56:17.40	0.18
			eSg	56:32.40	0.39
PKSM	139.5	278	ePn	17:56:21.00	-1.37
			eSn	56:39.00	-2.18
PKS7	148.0	319	ePn	17:56:19.90	-3.54
			eSn	56:43.20	0.12
PKS9	176.3	290	ePn	17:56:27.70	0.74
			eSn	56:51.00	1.64
DRGR	194.1	65	iPn	17:56:28.70	-0.48
GZR	196.5	112	iPn	17:56:30.20	0.71
PSZ	212.3	349	iPnD	17:56:35.10	3.65
PKSG	216.2	314	ePnD	17:56:31.20	-0.74
			eSn	57:01.00	2.78
DIVS	219.0	189	iPn	17:56:35.40	3.12
PKST	227.7	306	ePnC	17:56:33.30	-0.08

## Hypocenter Parameters

## Földrengés paraméterek

67.  


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 2010-06-04 time: 14:00:04.72 UTC ML= 0.9  
 lat: 47.295N lon: 18.699E h= 0.0 km  
 erh= 6.4km erz= 533km  
 nr= 6 gap=331 rms=0.31  
 Locality: Kajászó  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	25.7	295	ePgC	14:00:09.60			0.30
			eSg	00:12.70			-0.17
CSKK	34.0	283	ePgC	14:00:10.60			-0.19
			eSg	00:14.50			-1.02
PKST	50.4	265	ePg	14:00:13.60			-0.12
			eSg	00:21.20			0.45

68.  


---

 2010-06-05 time: 17:49:15.70 UTC ML= 0.0  
 lat: 47.333N lon: 18.295E h= 0.0 km  
 erh= \*\*\*km erz= \*\*\*km  
 nr= 6 gap=200 rms=0.62  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	4.3	322	ePgC	17:49:15.90			-0.56
			eSg	49:16.50			-0.55
PKSG	9.7	48	ePgC	17:49:17.40			-0.04
			eSg	49:19.20			0.41
PKST	21.4	247	ePgC	17:49:20.50			0.98
			eSg	49:21.90			-0.59

69.  


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 2010-06-05 time: 17:49:53.60 UTC ML=-0.1  
 lat: 47.364N lon: 18.272E h= 0.7 km  
 erh= 9.3km erz= 5.7km  
 nr= 5 gap=170 rms=0.18  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	0.9	261	ePg	17:49:53.50			-0.30
			eSg	49:54.10			0.14
PKSG	9.5	71	ePg	17:49:55.30			0.01
			eSg	49:56.70			0.08
PKST	21.5	237	eSg	17:50:00.60			0.18

70.  


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 2010-06-07 time: 7:06:18.04 UTC ML= 0.6  
 lat: 47.149N lon: 18.106E h= 1.4 km  
 erh= 1.5km erz=19.6km  
 nr= 7 gap=177 rms=0.12  
 Locality: Öskü  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PKST	13.4	336	ePgD	7:06:20.40			-0.04
			eSg	06:22.50			0.19
CSKK	26.5	26	ePg	7:06:22.80			0.02
			eSg	06:27.10			0.63
PKSG	34.5	39	ePg	7:06:24.20			-0.01
			eSg	06:28.70			-0.32
PKSM	112.0	159	eSg	7:06:53.70			0.07

71.  


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 2010-06-10 time: 0:57:51.44 UTC ML= 0.9  
 lat: 47.208N lon: 17.971E h= 3.4 km  
 erh=14.9km erz=11.1km  
 nr= 6 gap=343 rms=0.28  
 Locality: Eplény  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
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PKST	7.5	40	ePgC	0:57:53.10			0.19
			eSg	57:53.80			-0.25
CSKK	27.9	52	ePg	0:57:56.10			-0.36
			eSg	57:58.30			-2.08
PKSG	37.8	57	ePg	0:57:58.40			0.19
			eSg	58:03.70			0.20

72.  


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 2010-06-12 time: 8:30:49.61 UTC ML= 0.5  
 lat: 47.331N lon: 18.280E h= 0.6 km  
 erh=18.7km erz= 147km  
 nr= 6 gap=196 rms=0.34  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	3.9	338	ePgC	8:30:50.20			-0.11
			eSg	30:50.70			-0.16
PKSG	10.8	51	ePgC	8:30:51.50			-0.04
			eSg	30:53.20			0.15
PKST	20.2	247	ePgC	8:30:53.70			0.48
			eSg	30:55.20			-0.84

73.  


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 2010-06-12 time: 8:33:09.84 UTC ML= 0.1  
 lat: 47.362N lon: 18.247E h= 4.7 km  
 erh= 4.0km erz= 0.6km  
 nr= 6 gap=198 rms=0.08  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	1.0	80	ePgC	8:33:10.80			0.10
			eSg	33:11.30			-0.08
PKSG	11.3	73	ePgC	8:33:12.10			0.07
			eSg	33:13.60			-0.14
PKST	19.7	235	ePgC	8:33:13.40			-0.06
			eSg	33:16.30			0.01

74.  


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 2010-06-13 time: 1:00:54.42 UTC ML=-0.2  
 lat: 47.396N lon: 18.221E h= 1.3 km  
 erh= 3.2km erz=10.1km  
 nr= 6 gap=229 rms=0.06  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	4.7	140	ePgC	1:00:55.40			0.11
			eSg	00:55.90			-0.07
PKSG	12.8	92	ePgD	1:00:56.70			-0.03
			eSg	00:58.50			-0.03
PKST	20.7	223	ePg	1:00:58.10			-0.03
			eSg	01:01.00			-0.02

75.  


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 2010-06-13 time: 19:43:09.17 UTC ML=-0.1  
 lat: 47.322N lon: 18.282E h= 0.9 km  
 erh= 1.4km erz= 8.4km  
 nr= 6 gap=203 rms=0.06  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	4.8	341	ePg	19:43:10.10			0.06
			eSg	43:10.70			-0.03
PKSG	11.3	47	ePgD	19:43:11.20			0.01
			eSg	43:12.70			-0.07
PKST	20.0	249	ePgC	19:43:12.80			0.06
			eSg	43:15.40			-0.13



## Földrengés paraméterek

## Hypocenter Parameters

76.

2010-06-14 time: 0:24:18.95 UTC ML=-0.2  
 lat: 47.372N lon: 18.254E h= 1.0 km  
 erh= 6.5km erz= 5.8km  
 nr= 5 gap=205 rms=0.08  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.1	152	ePgC	0:24:19.10	-0.11
			eSg	24:19.50	0.09
PKSG	10.6	78	ePgC	0:24:20.90	0.06
			eSg	24:22.30	-0.02
PKST	20.8	233	eSg	0:24:25.60	0.04

77.

2010-06-14 time: 7:54:54.59 UTC ML= 1.9  
 lat: 48.493N lon: 19.640E h= 0.0 km  
 erh= 2.1km erz= 2.0km  
 nr= 5 gap=245 rms=0.95  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	62.5	91	ePg	7:55:06.80	1.04
			eSg	55:14.00	-0.47
PSZ	66.7	163	ePgD	7:55:07.20	0.70
			eSg	55:14.10	-1.68
STHS	156.0	49	eSn	7:55:41.10	-0.65

78.

2010-06-16 time: 7:24:49.41 UTC ML= 0.3  
 lat: 47.375N lon: 18.250E h= 4.1 km  
 erh= 8.3km erz= 2.3km  
 nr= 6 gap=208 rms=0.16  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.5	150	ePgC	7:24:50.20	0.01
			eSg	24:50.60	-0.20
PKSG	10.8	80	ePgD	7:24:51.50	0.03
			eSg	24:53.20	0.13
PKST	20.8	232	ePg	7:24:53.00	-0.20
			eSg	24:56.50	0.35

79.

2010-06-16 time: 11:14:40.80 UTC ML= 0.5  
 lat: 47.288N lon: 18.191E h= 4.6 km  
 erh= 2.5km erz= 3.0km  
 nr= 6 gap=202 rms=0.04  
 Locality: Isztimér  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	9.9	32	ePgD	11:14:42.70	-0.04
			eSg	14:44.30	0.04
PKST	12.3	255	ePgD	11:14:43.20	0.06
			eSg	14:44.90	-0.07
PKSG	19.0	52	ePgc	11:14:44.30	0.01
			eSg	14:47.00	-0.01

80.

2010-06-16 time: 19:01:19.72 UTC ML= 0.2  
 lat: 47.298N lon: 18.151E h= 8.0 km  
 erh= 1.6km erz= 0.6km  
 nr= 5 gap=184 rms=0.20  
 Locality: Balinka  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	9.8	244	ePgc	19:01:22.00	0.02
			eSg	01:23.80	0.05

CSKK 11.0 49 ePgc 19:01:22.00 -0.15  
 eSg 01:23.90 -0.14  
 PKSG 20.9 60 eSg 19:01:27.40 0.57

81.

2010-06-17 time: 18:08:52.82 UTC ML=-0.3  
 lat: 47.357N lon: 18.264E h= 1.6 km  
 erh= 6.4km erz= 3.9km  
 nr= 5 gap=170 rms=0.15  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	0.7	339	ePgc	18:08:53.10	-0.05
			eSg	08:53.50	0.10
PKSG	10.3	68	ePgD	18:08:54.50	-0.19
			eSg	08:56.40	0.25
PKST	20.5	238	eSg	18:08:59.50	0.14

82.

2010-06-17 time: 21:16:40.70 UTC ML=-0.4  
 lat: 47.381N lon: 18.216E h= 0.5 km  
 erh= 4.8km erz=28.8km  
 nr= 5 gap=219 rms=0.07  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	3.9	120	ePgD	21:16:41.50	0.10
			eSg	16:41.90	-0.04
PKSG	13.2	85	ePg	21:16:43.00	-0.07
			eSg	16:44.90	-0.01
PKST	19.3	226	eSg	21:16:46.80	-0.04

83.

2010-06-19 time: 20:05:36.68 UTC ML= 0.0  
 lat: 47.336N lon: 18.240E h= 1.0 km  
 erh= ---km erz= ---km  
 nr= 4 gap=326 rms=0.00  
 Locality: Bodajk  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	3.4	27	ePgc	20:05:37.30	0.00
			eSg	05:37.80	0.01
PKSG	12.9	62	ePgc	20:05:39.00	0.00
			eSg	05:40.80	0.00

84.

2010-06-20 time: 19:28:09.93 UTC ML= 0.1  
 lat: 47.357N lon: 18.225E h= 0.1 km  
 erh= ---km erz= ---km  
 nr= 4 gap=357 rms=0.02  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	2.8	75	ePgc	19:28:10.40	-0.03
			eSg	28:10.80	-0.01
PKSG	13.1	73	ePgc	19:28:12.30	0.03
			eSg	28:14.10	0.00

85.

2010-06-20 time: 19:29:05.64 UTC ML=-0.5  
 lat: 47.350N lon: 18.224E h= 10.0 km  
 erh= ---km erz= ---km  
 nr= 4 gap=352 rms=0.13  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	3.1	62	ePgc	19:29:07.40	-0.11
			eSg	29:09.00	0.03

## Hypocenter Parameters

## Földrengés paraméterek

PKSG 13.4 70 ePgC 19:29:08.80 0.17  
eSg 29:10.80 -0.15

86.

2010-06-21 time: 0:43:06.28 UTC ML=-0.1  
lat: 47.340N lon: 18.238E h= 1.7 km  
erh= ---km erz= ---km  
nr= 4 gap=330 rms=0.00  
Locality: Bodajk  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	3.1	33	ePgC	0:43:06.90	-0.01
			eSg	43:07.40	0.01
PKSG	12.9	64	ePgD	0:43:08.60	0.00
			eSg	43:10.40	0.00

87.

2010-06-21 time: 0:46:00.95 UTC ML=-0.5  
lat: 47.377N lon: 18.211E h= 0.3 km  
erh= ---km erz= ---km  
nr= 4 gap=330 rms=0.09  
Locality: Mór  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	4.0	113	ePgC	0:46:01.60	-0.07
			eSg	46:02.30	0.07
PKSG	13.6	83	ePg	0:46:03.50	0.11
			eSg	46:05.20	-0.09

88.

2010-06-21 time: 0:59:57.85 UTC ML=-0.4  
lat: 47.369N lon: 18.229E h= 0.9 km  
erh= ---km erz= ---km  
nr= 4 gap=332 rms=0.02  
Locality: Mór  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	2.4	106	ePgC	0:59:58.30	-0.02
			eSg	59:58.70	0.02
PKSG	12.4	78	ePgC	0:60:00.10	0.02
			eSg	60:01.80	-0.02

89.

2010-06-21 time: 13:02:33.77 UTC ML=-0.2  
lat: 47.359N lon: 18.205E h= 0.6 km  
erh= ---km erz= ---km  
nr= 4 gap=352 rms=0.05  
Locality: Mór  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	4.2	84	ePgD	13:02:34.50	-0.03
			eSg	02:35.20	0.07
PKSG	14.5	75	ePgC	13:02:36.40	0.04
			eSg	02:38.30	-0.08

90.

2010-06-21 time: 20:50:02.90 UTC ML=-0.3  
lat: 47.396N lon: 18.250E h= 0.4 km  
erh= ---km erz= ---km  
nr= 4 gap=285 rms=0.08  
Locality: Mór  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	3.8	168	ePg	20:50:03.50	-0.08
			eSg	50:04.10	-0.01
PKSG	10.6	93	ePgD	20:50:04.90	0.10
			eSg	50:06.20	-0.08

91.

2010-06-21 time: 20:50:06.72 UTC ML=-0.5  
lat: 47.350N lon: 18.250E h= 7.6 km  
erh= ---km erz= ---km  
nr= 4 gap=322 rms=0.15  
Locality: Csókakő  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.7	28	ePgC	20:50:08.20	0.08
			eSg	50:09.00	-0.21
PKSG	11.6	66	ePgC	20:50:09.10	-0.10
			eSg	50:11.40	0.26

92.

2010-06-21 time: 21:03:22.13 UTC ML= 2.0  
lat: 47.618N lon: 17.940E h= 5.3 km  
erh= 2.1km erz= 1.6km  
nr= 23 gap=107 rms=0.60  
Locality: Bábolna  
Comments: felt 4 EMS

sta	dist	azm	phase	hr mn sec	res
CSKK	37.2	139	ePgC	21:03:28.70	-0.14
			eSg	03:34.60	0.53
PKSG	42.2	126	ePgC	21:03:29.60	-0.13
			eSg	03:36.00	0.35
BUD	82.9	100	ePg	21:03:36.60	-0.37
			eSg	03:47.10	-1.44
SOP	104.1	274	ePg	21:03:40.80	0.07
			eSg	03:52.30	-2.95
PKS7	112.0	124	ePg	21:03:42.60	0.46
			eSg	03:56.90	-0.85
PKS9	117.4	167	ePg	21:03:43.90	0.78
			eSg	04:01.50	2.01
PSZ	150.3	77	ePnC	21:03:47.80	0.58
			eSn	04:07.00	0.21
PKS2	158.2	142	eSn	21:04:07.80	-0.74
CONA	159.5	283	Pn	21:03:48.20	-0.17
			Sn	04:08.30	-0.53
PKSM	165.2	161	ePnD	21:03:48.80	-0.27
			eSn	04:10.90	0.81
KECS	212.8	63	ePn	21:03:54.50	-0.52
			eSn	04:22.30	1.63
TREC	260.2	316	ePn	21:04:03.20	2.28
			eSn	04:28.60	-2.59
DPC	326.2	339	eSn	21:04:49.00	3.18
PRU	363.1	317	eSn	21:05:00.40	6.38
KHC	364.3	298	ePn	21:04:13.70	-0.21
			eSn	04:49.90	-4.40

93.

2010-06-22 time: 0:07:56.87 UTC ML=-0.3  
lat: 47.350N lon: 18.268E h= 2.9 km  
erh= ---km erz= ---km  
nr= 4 gap=276 rms=0.11  
Locality: Csókakő  
Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.6	340	ePgC	0:07:57.40	-0.06
			eSg	07:58.00	0.08
PKSG	10.4	63	ePgC	0:07:58.90	0.11
			eSg	08:00.10	-0.20

94.

2010-06-23 time: 8:13:41.76 UTC ML= 1.0  
lat: 47.471N lon: 18.389E h= 0.0 km  
erh= 6.1km erz= 729km  
nr= 6 gap=310 rms=0.43  
Locality: Várgesztes  
Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
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## Földrengés paraméterek

PKSG 8.8 179 ePgC 8:13:43.60 0.27  
 eSg 13:44.30 -0.25  
 CSKK 15.4 219 ePgC 8:13:44.40 -0.11  
 eSg 13:45.70 -0.95  
 PKST 35.7 229 ePgC 8:13:48.10 -0.03  
 eSg 13:54.00 0.90

95.

2010-06-23 time: 8:17:54.29 UTC ML= 1.3  
 lat: 47.453N lon: 18.367E h= 0.0 km  
 erh= 4.1km erz= 516km  
 nr= 6 gap=296 rms=0.30  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	7.1	165	ePgC	8:17:55.80	0.25
			eSg	17:56.50	-0.04
CSKK	12.8	219	ePgC	8:17:56.40	-0.18
			eSg	17:57.90	-0.47
PKST	33.1	229	ePg	8:18:00.10	-0.10
			eSg	18:05.50	0.68

96.

2010-06-28 time: 0:58:52.34 UTC ML=-0.4  
 lat: 47.352N lon: 18.237E h= 0.5 km  
 erh= 9.2km erz=11.3km  
 nr= 6 gap=179 rms=0.27  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	2.1	55	ePgC	0:58:52.40	-0.33
			eSg	58:53.10	0.06
PKSG	12.4	69	ePg	0:58:54.80	0.25
			eSg	58:56.60	0.32
PKST	18.5	236	ePg	0:58:55.40	-0.25
			eSg	58:58.50	0.27

97.

2010-06-28 time: 3:05:52.27 UTC ML= 0.7  
 lat: 47.365N lon: 18.229E h= 0.6 km  
 erh= 6.9km erz=10.4km  
 nr= 6 gap=205 rms=0.22  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	2.4	94	ePgC	3:05:52.30	-0.41
			eSg	05:53.00	-0.05
PKSG	12.6	76	ePgD	3:05:54.60	0.08
			eSg	05:56.50	0.23
PKST	18.8	231	ePgD	3:05:55.70	0.07
			eSg	05:58.50	0.24

98.

2010-06-28 time: 20:52:06.24 UTC ML= 0.3  
 lat: 47.402N lon: 18.222E h= 0.2 km  
 erh= 6.8km erz= 165km  
 nr= 6 gap=234 rms=0.21  
 Locality: Pusztavám  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	5.2	146	ePgC	20:52:06.80	-0.38
			eSg	52:07.90	-0.01
PKSG	12.8	95	ePgC	20:52:08.60	0.08
			eSg	52:10.40	0.10
PKST	21.3	222	ePgC	20:52:10.10	0.05
			eSg	52:13.40	0.37

## Hypocenter Parameters

99.

2010-06-28 time: 21:13:20.25 UTC ML=-0.1  
 lat: 47.393N lon: 18.200E h= 0.3 km  
 erh= 7.3km erz=96.0km  
 nr= 5 gap=230 rms=0.10  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	5.6	126	ePgC	21:13:21.10	-0.15
			eSg	13:22.10	0.07
PKSG	14.4	90	ePgC	21:13:22.90	0.09
			eSg	13:24.80	-0.02
PKST	19.4	220	eSg	21:13:26.50	0.07

100.

2010-06-29 time: 9:03:25.81 UTC ML=-0.1  
 lat: 47.325N lon: 18.197E h= 0.1 km  
 erh= ---km erz= ---km  
 nr= 4 gap=345 rms=0.42  
 Locality: Bodajk  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.4	48	ePgC	9:03:26.80	-0.16
			eSg	03:27.20	-0.66
PKSG	16.4	63	ePgC	9:03:29.30	0.56
			eSg	03:30.90	-0.13

101.

2010-07-01 time: 13:02:00.94 UTC ML= 0.0  
 lat: 47.369N lon: 18.251E h= 4.0 km  
 erh= 5.3km erz= 0.8km  
 nr= 6 gap=203 rms=0.08  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	0.9	133	ePgC	13:02:01.70	0.02
			eSg	02:02.10	-0.16
PKSG	10.8	76	ePgC	13:02:03.00	0.00
			eSg	02:04.70	0.09
PKST	20.5	233	ePg	13:02:04.60	-0.07
			eSg	02:07.80	0.22

102.

2010-07-01 time: 23:00:09.54 UTC ML=-0.2  
 lat: 47.352N lon: 18.248E h= 3.7 km  
 erh= 4.0km erz= 1.4km  
 nr= 6 gap=170 rms=0.08  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.5	37	ePgC	23:00:10.30	0.04
			eSg	00:10.80	-0.01
PKSG	11.6	68	ePgD	23:00:11.70	-0.02
			eSg	00:13.40	-0.02
PKST	19.2	237	ePg	23:00:13.10	0.06
			eSg	00:15.50	-0.26

103.

2010-07-02 time: 0:56:04.18 UTC ML=-0.4  
 lat: 47.370N lon: 18.255E h= 10.0 km  
 erh= 2.5km erz= 0.6km  
 nr= 6 gap=203 rms=0.30  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	0.9	153	ePgC	0:56:05.60	-0.37
			eSg	56:06.10	-1.27
PKSG	10.5	77	ePgD	0:56:07.00	0.23

## Hypocenter Parameters

PKST 20.8 233 eSg 56:08.70 -0.09  
 ePgD 0:56:08.50 0.20  
 eSg 56:11.60 0.09

104.

2010-07-02 time: 5:16:26.19 UTC ML= 0.4  
 lat: 47.325N lon: 18.321E h= 10.0 km  
 erh= 4.2km erz= 3.0km  
 nr= 5 gap=216 rms=0.14  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.2	313	ePg	5:16:28.20	-0.09
			eSg	16:29.60	-0.33
PKSG	9.1	35	ePgC	5:16:28.60	0.00
			eSg	16:30.70	0.21
PKST	22.9	251	eSg	5:16:34.30	0.17

105.

2010-07-02 time: 8:10:24.14 UTC ML= 1.4  
 lat: 48.326N lon: 19.965E h= 0.0 km  
 erh= 0.2km erz= 0.1km  
 nr= 5 gap=211 rms=0.16  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	42.4	66	ePg	8:10:31.60	-0.10
			eSg	10:37.90	0.29
PSZ	45.6	187	ePgD	8:10:32.20	-0.08
			eSg	10:39.00	0.37
STHS	153.4	38	eSn	8:11:10.70	0.00

106.

2010-07-03 time: 19:11:56.84 UTC ML= 0.0  
 lat: 47.272N lon: 18.277E h= 0.3 km  
 erh= 0.3km erz=12.7km  
 nr= 5 gap=232 rms=0.04  
 Locality: Fehérvárcsurgó  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	10.2	353	ePgC	19:11:58.70	0.04
			eSg	12:00.00	-0.08
PKSG	15.8	33	ePgC	19:11:59.70	0.03
			eSg	12:01.80	-0.08
PKST	18.4	265	ePgC	19:12:00.10	-0.03

107.

2010-07-04 time: 22:06:02.60 UTC ML=-0.1  
 lat: 47.343N lon: 18.129E h= 4.0 km  
 erh= 6.6km erz= 5.1km  
 nr= 6 gap=217 rms=0.12  
 Locality: Nagyveleg  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	10.2	78	ePgC	22:06:04.40	-0.16
			eSg	06:06.10	0.02
PKST	11.8	217	ePgD	22:06:04.80	-0.03
			eSg	06:06.70	0.13
PKSG	20.5	75	ePgD	22:06:06.50	0.17
			eSg	06:09.20	-0.04

108.

2010-07-05 time: 8:00:49.36 UTC ML= 0.9  
 lat: 47.344N lon: 18.485E h= 0.0 km  
 erh= 2.3km erz= 236km  
 nr= 6 gap=308 rms=0.14  
 Locality: Lovasberény  
 Comments: probably explosion

## Földrengés paraméterek

sta	dist	azm	phase	hr mn sec	res
PKSG	8.9	307	ePgC	8:00:51.10	0.14
			eSg	00:52.00	-0.20
CSKK	17.1	277	ePgC	8:00:52.30	-0.12
			eSg	00:54.60	-0.20
PKST	35.4	255	ePgC	8:00:55.70	0.02
			eSg	01:01.00	0.39

109.

2010-07-05 time: 8:01:06.94 UTC ML= 1.3  
 lat: 47.458N lon: 18.368E h= 0.0 km  
 erh= 2.7km erz= 261km  
 nr= 5 gap=298 rms=0.12  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	7.6	167	ePgC	8:01:08.30	0.01
			eSg	01:09.20	-0.15
CSKK	13.4	217	ePg	8:01:09.50	0.18
			eSg	01:11.20	0.02
PKST	33.6	229	ePg	8:01:12.80	-0.13

110.

2010-07-05 time: 10:27:37.75 UTC ML= 0.9  
 lat: 47.332N lon: 18.322E h= 6.9 km  
 erh= 3.8km erz= 3.4km  
 nr= 6 gap=212 rms=0.26  
 Locality: Söréd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	5.8	307	ePgC	10:27:39.10	-0.27
			eSg	27:40.30	-0.33
PKSG	8.5	38	ePgC	10:27:39.80	0.09
			eSg	27:41.80	0.56
PKST	23.2	250	ePgD	10:27:42.10	0.03
			eSg	27:46.10	0.66

111.

2010-07-06 time: 21:21:11.85 UTC ML= 0.2  
 lat: 47.475N lon: 18.154E h= 10.0 km  
 erh= 1.9km erz= 3.1km  
 nr= 5 gap=277 rms=0.59  
 Locality: Császáz  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	14.9	147	ePgC	21:21:14.80	-0.25
			eSg	21:15.40	-2.14
PKSG	20.1	118	ePgC	21:21:16.40	0.53
			eSg	21:18.10	-0.90
PKST	25.7	201	eSg	21:21:20.90	0.28

112.

2010-07-07 time: 19:53:38.83 UTC ML= 1.3  
 lat: 47.274N lon: 18.201E h= 0.3 km  
 erh= 0.7km erz= 1.3km  
 nr= 10 gap=122 rms=0.16  
 Locality: Isztimér  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	10.9	25	ePgD	19:53:40.60	-0.18
			eSg	53:42.50	0.21
PKST	12.7	262	ePgD	19:53:41.10	0.00
			eSg	53:42.90	0.03
PKSG	19.4	48	ePgD	19:53:42.30	0.00
			eSg	53:45.10	0.09
PKSM	122.8	164	ePg	19:54:00.90	0.13
			eSg	54:17.70	-0.18
PSZ	146.1	61	ePn	19:54:05.30	1.24
			eSn	54:23.90	0.17

## Földrengés paraméterek

## Hypocenter Parameters

113.

2010-07-09 time: 23:12:58.50 UTC ML=-0.3  
 lat: 47.361N lon: 18.238E h= 1.5 km  
 erh= 5.2km erz= 1.0km  
 nr= 6 gap=200 rms=0.10  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.7	81	ePgC	23:12:58.80	-0.11
			eSg	12:59.40	0.18
PKSG	12.0	73	ePgC	23:13:00.70	0.03
			eSg	13:02.50	0.14
PKST	19.1	234	ePgC	23:13:01.90	-0.02
			eSg	13:05.20	0.61

114.

2010-07-11 time: 19:13:53.57 UTC ML=-0.2  
 lat: 47.354N lon: 18.254E h= 1.3 km  
 erh= 6.1km erz= 4.2km  
 nr= 6 gap=169 rms=0.08  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	1.1	27	ePgC	19:13:53.80	-0.08
			eSg	13:54.30	0.18
PKSG	11.1	68	ePgC	19:13:55.60	0.02
			eSg	13:57.10	-0.04
PKST	19.7	237	ePg	19:13:57.10	0.00
			eSg	14:00.20	0.35

115.

2010-07-11 time: 22:27:06.94 UTC ML=-0.4  
 lat: 47.370N lon: 18.255E h= 0.4 km  
 erh= 4.6km erz= 8.5km  
 nr= 6 gap=204 rms=0.08  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	0.9	154	ePgC	22:27:07.00	-0.11
			eSg	27:07.40	0.15
PKSG	10.5	77	ePgD	22:27:08.80	-0.01
			eSg	27:10.40	0.12
PKST	20.8	233	ePgD	22:27:10.70	0.05
			eSg	27:13.60	0.05

116.

2010-07-14 time: 9:38:15.98 UTC ML= 0.1  
 lat: 47.401N lon: 18.225E h= 0.5 km  
 erh= 3.4km erz=28.5km  
 nr= 5 gap=232 rms=0.47  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	4.9	147	ePgC	9:38:16.40	-0.47
			eSg	38:16.70	-0.86
PKSG	12.5	94	ePgD	9:38:18.50	0.28
			eSg	38:20.20	0.23
PKST	21.4	223	eSg	9:38:23.40	0.63

117.

2010-07-17 time: 12:48:14.98 UTC ML= 0.1  
 lat: 47.367N lon: 18.170E h= 0.4 km  
 erh=11.6km erz=87.9km  
 nr= 6 gap=220 rms=0.34  
 Locality: Nagyveleg  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.8	93	ePgD	12:48:15.80	-0.41

			eSg	48:17.10	-0.06
PKST	15.8	221	ePgD	12:48:17.80	0.00
			eSg	48:19.80	-0.20
PKSG	16.9	80	ePg	12:48:18.50	0.50
			eSg	48:20.80	0.45

118.

2010-07-17 time: 16:07:09.18 UTC ML= 0.3  
 lat: 47.271N lon: 18.378E h= 10.0 km  
 erh= 8.5km erz=11.4km  
 nr= 6 gap=263 rms=0.59  
 Locality: Sárkeresztes  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	13.5	4	ePgC	16:07:12.50	0.32
			eSg	07:14.90	0.39
CSKK	13.6	319	ePgC	16:07:11.40	-0.79
			eSg	07:13.80	-0.74
PKST	26.1	267	ePg	16:07:14.60	0.43
			eSg	07:18.90	0.84

119.

2010-07-22 time: 9:34:34.70 UTC ML= 0.2  
 lat: 47.355N lon: 18.138E h= 5.0 km  
 erh=18.0km erz=12.2km  
 nr= 5 gap=222 rms=0.49  
 Locality: Nagyveleg  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	9.3	84	ePgC	9:34:36.00	-0.59
			eSg	34:38.60	0.54
PKST	13.2	216	ePgC	9:34:37.00	-0.22
			eSg	34:39.50	0.31
PKSG	19.5	78	ePgC	9:34:38.90	0.60

120.

2010-07-23 time: 7:01:36.97 UTC ML= 0.9  
 lat: 47.984N lon: 19.956E h= 10.0 km  
 erh= 5.0km erz= 9.2km  
 nr= 5 gap=177 rms=0.31  
 Locality: Mátramindszent  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	8.6	212	ePgD	7:01:39.00	-0.33
			eSg	01:41.60	0.43
KECS	68.0	35	ePg	7:01:49.50	0.24
			eSg	01:58.50	-0.33
VYHS	100.7	304	eSg	7:02:09.30	0.17

121.

2010-07-25 time: 15:12:36.65 UTC ML= 2.2  
 lat: 48.777N lon: 22.257E h= 10.0 km  
 erh= 5.8km erz= 4.5km  
 nr= 10 gap=117 rms=0.86  
 Locality: Slovakia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
KOLS	17.4	4	ePg	15:12:40.10	-0.13
			eSg	12:43.10	0.08
TRPA	74.9	164	ePg	15:12:49.30	-0.84
			eSg	13:00.50	-0.16
KECS	134.6	256	ePn	15:12:58.40	-0.79
			eSn	13:15.50	-1.27
PSZ	199.5	241	iPn	15:13:08.80	1.52
DRGR	223.4	171	iPn	15:13:10.70	0.45
VYHS	254.1	263	ePn	15:13:13.60	-0.49
BURB	255.2	120	iPn	15:13:15.50	1.28
OKC	321.3	292	eSn	15:14:07.90	9.69
BZS	354.7	188	iPn	15:13:29.30	2.67

## Hypocenter Parameters

## Földrengés paraméterek

122.

2010-07-30 time: 2:22:47.25 UTC ML= 2.6  
 lat: 47.053N lon: 21.259E h= 1.0 km  
 erh= 4.3km erz= 5.4km  
 nr= 27 gap= 75 rms=1.33  
 Locality: Csökmő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
SIRR	92.6	161	iPg	2:23:03.20	-0.58
DRGR	114.4	105	iPg	2:23:07.30	-0.37
PSZ	140.8	313	ePnC	2:23:10.70	-1.00
			eSn	23:28.00	-2.78
TRPA	153.7	39	ePn	2:23:12.50	-0.81
			eSn	23:34.00	0.36
PKS7	159.4	270	eSn	2:23:36.20	1.29
BZS	162.1	170	iPnD	2:23:12.90	-1.45
PKS2	168.2	248	eSn	2:23:36.90	0.03
BUD	175.8	286	ePn	2:23:19.40	3.34
			eSn	23:39.10	0.56
DEV	181.3	136	iPn	2:23:17.50	0.75
BMR	182.6	68	iPn	2:23:17.80	0.89
PKSG	220.5	280	ePn	2:23:20.70	-0.94
			eSn	23:51.80	3.34
PKSM	221.2	245	ePnC	2:23:19.10	-2.63
			eSn	23:51.30	2.68
KOLS	222.3	20	ePn	2:23:23.80	1.93
			eSn	23:53.80	4.93
CSKK	229.8	279	ePn	2:23:27.40	4.60
			eSn	23:52.40	1.88
VYHS	242.1	311	ePn	2:23:23.80	-0.54
			eSn	23:48.40	-4.87
PKST	245.6	275	ePn	2:23:23.60	-1.17
			eSn	23:58.60	4.56
MDB	259.8	113	iPn	2:23:27.80	1.26
LOT	263.3	133	iPn	2:23:26.70	-0.28
BURB	305.6	78	iPn	2:23:33.00	0.75
DIVS	343.0	197	iPnD	2:23:36.10	-0.82
VOIR	343.1	122	iPnD	2:23:37.80	0.87
MLR	400.8	116	iPnD	2:23:45.30	1.18
MORC	409.2	318	iPnD	2:23:45.00	-0.16
VRAC	428.1	306	iPn	2:23:47.50	-0.02
TREC	496.4	300	ePn	2:23:52.90	-3.14
			eSn	24:40.30	-9.40
DPC	516.2	315	ePn	2:23:58.80	0.29
			eSn	24:49.50	-4.60
KHC	617.1	292	ePn	2:24:09.30	-1.79

123.

2010-08-05 time: 2:57:51.74 UTC ML= 2.0  
 lat: 47.011N lon: 21.320E h= 5.2 km  
 erh= 5.3km erz= 6.7km  
 nr= 14 gap= 75 rms=1.03  
 Locality: Csökmő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
DRGR	108.8	103	iPg	2:58:11.10	-0.09
PSZ	147.4	313	ePnC	2:58:14.40	-2.09
TRPA	154.6	36	ePn	2:58:16.60	-0.79
			eSn	58:37.80	0.41
BZS	156.7	172	iPn	2:58:16.90	-0.75
KECS	175.2	339	ePn	2:58:20.40	0.44
			eSn	58:41.70	-0.27
BMR	180.2	66	iPn	2:58:21.30	0.72
GZR	212.1	148	iPn	2:58:25.00	0.44
PKSM	223.6	247	ePnC	2:58:27.50	1.50
			eSn	58:55.30	2.58
PKSG	226.0	281	ePn	2:58:28.00	1.71
			eSn	58:55.10	1.86
VYHS	248.8	312	eSn	2:59:00.30	2.01
BURB	302.2	77	iPnD	2:58:36.90	1.11
ARR	314.4	126	iPn	2:58:38.10	0.79
VOIR	336.8	121	iPnD	2:58:41.00	0.90

124.

2010-08-10 time: 10:55:48.92 UTC ML= 1.5  
 lat: 48.588N lon: 20.802E h= 0.0 km  
 erh= 6.4km erz= 4.2km  
 nr= 6 gap=316 rms=0.31  
 Locality: Tornanádaska  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	26.2	243	ePg	10:55:53.50	-0.26
			eSg	55:57.90	0.37
PSZ	100.5	222	ePgC	10:56:07.10	0.19
			eSg	56:20.50	-0.44
VYHS	145.6	266	ePn	10:56:13.20	0.00
			eSn	56:30.20	-1.94

125.

2010-08-13 time: 1:39:44.05 UTC ML= 2.4  
 lat: 48.293N lon: 21.744E h= 5.7 km  
 erh= 2.8km erz= 3.0km  
 nr= 13 gap=146 rms=0.72  
 Locality: Bodroghalom  
 Comments:

sta	dist	azm	phase	hr mn sec	res
TRPA	61.8	107	ePgD	1:39:54.40	-0.74
			eSg	40:04.60	0.82
KOLS	81.1	29	ePg	1:39:59.20	0.63
			eSg	40:10.10	0.20
KECS	95.6	283	ePg	1:40:01.80	0.65
			eSg	40:13.40	-1.08
STHS	130.2	344	ePn	1:40:07.00	0.41
			eSn	40:23.30	-0.87
PSZ	143.9	253	ePnD	1:40:08.10	-0.20
			eSn	40:26.90	-0.32
VYHS	216.5	276	ePn	1:40:17.30	-0.05
			eSn	40:46.80	3.48
PKS7	238.4	234	eSn	1:40:53.40	5.22
BURB	270.2	106	iPn	1:40:24.70	0.66

126.

2010-08-14 time: 6:57:26.34 UTC ML= 2.7  
 lat: 47.988N lon: 20.802E h= 3.3 km  
 erh= 4.0km erz= 4.2km  
 nr= 24 gap= 50 rms=1.45  
 Locality: Miskolc  
 Comments: felt 3-4 EMS

sta	dist	azm	phase	hr mn sec	res
KECS	59.8	337	ePg	6:57:36.70	-0.34
			eSg	57:43.40	-1.98
PSZ	68.2	263	ePgC	6:57:39.00	0.46
			eSg	57:48.00	-0.05
TRPA	130.5	83	ePnD	6:57:49.10	-0.11
			eSn	58:05.40	-1.65
BUD	144.7	247	eSn	6:58:10.20	-0.01
KOLS	151.2	46	ePn	6:57:54.00	2.20
			eSn	58:12.40	0.73
VYHS	156.5	291	ePn	6:57:52.40	-0.05
			eSn	58:10.50	-2.32
PKS7	162.0	230	eSn	6:58:16.40	2.36
STHS	162.1	12	ePn	6:57:54.30	1.14
			eSn	58:13.10	-0.98
PKS6	180.5	211	eSn	6:58:16.80	-1.37
PKSG	192.8	250	eSn	6:58:24.40	3.51
DRGR	196.2	133	iPn	6:57:57.80	0.39
SIRR	202.1	161	iPn	6:57:58.60	0.45
CSKK	203.1	250	ePn	6:57:54.70	-3.57
PKS2	205.3	216	eSn	6:58:21.90	-1.76
PKS9	246.4	231	ePnD	6:58:09.60	5.93
PKSM	256.7	220	ePnD	6:58:04.50	-0.46
			eSn	58:32.30	-2.78
OKC	283.1	317	ePn	6:58:14.60	6.36
			eSn	58:48.30	7.37
MORC	311.0	310	iPn	6:58:15.00	3.28
BURB	333.3	97	iPnD	6:58:15.00	0.49

## Földrengés paraméterek

VOIR 431.2 131 iPnD 6:58:26.30 -0.41  
 KHC 548.2 283 ePn 6:58:44.00 2.71  
 eSn 59:38.00 -1.76

127.

2010-08-14 time: 22:12:42.65 UTC ML= 1.9  
 lat: 48.047N lon: 20.781E h= 10.0 km  
 erh= 3.6km erz= 3.6km  
 nr= 11 gap=124 rms=0.76  
 Locality: Miskolctapolca  
 Comments:

sta	dist	azm	phase	hr mn sec	res
KECS	53.2	336	ePg	22:12:52.10	-0.22
			eSg	12:58.80	-1.06
PSZ	67.7	258	ePg	22:12:54.70	-0.18
			eSg	13:04.70	0.28
TRPA	131.3	86	ePn	22:13:04.90	0.12
			eSn	13:20.80	-1.24
VYHS	152.7	289	ePn	22:13:08.30	0.85
			eSn	13:26.10	-0.69
STHS	156.0	13	ePn	22:13:10.70	2.83
			eSn	13:28.60	1.07
DRGR	201.7	134	iPn	22:13:13.30	-0.26

128.

2010-08-17 time: 3:25:03.89 UTC ML= 2.6  
 lat: 45.840N lon: 17.881E h= 5.9 km  
 erh= 3.3km erz= 2.1km  
 nr= 23 gap=212 rms=0.69  
 Locality: Csányosrő  
 Comments: felt 4 EMS

sta	dist	azm	phase	hr mn sec	res
PKSM	72.0	55	ePgD	3:25:16.80	0.01
			eSg	25:25.10	-1.74
PKS9	88.5	20	ePgD	3:25:19.70	-0.04
			eSg	25:31.70	-0.40
BEHE	110.4	309	ePgD	3:25:24.30	0.66
			eSg	25:38.80	-0.24
PKS2	125.9	55	ePnD	3:25:26.60	0.74
			eSn	25:40.30	-2.70
KOGS	143.0	298	iPn	3:25:27.80	-0.19
PKS6	155.0	57	eSn	3:25:50.70	1.25
PKST	158.2	4	ePn	3:25:29.50	-0.39
			eSn	25:46.20	-3.96
PKS7	166.4	36	eSn	3:25:53.60	1.61
CRES	188.3	270	iPn	3:25:33.50	-0.15
DOBS	190.0	280	iPn	3:25:33.60	-0.25
GROS	196.3	291	iPn	3:25:34.40	-0.24
SOP	228.5	334	ePn	3:25:39.00	0.35
VISS	236.4	269	iPn	3:25:39.60	-0.04
SOKA	238.5	293	Pn	3:25:39.80	-0.11
			Sn	26:07.20	-0.80
ARSA	239.3	311	Pn	3:25:40.20	0.19
PSZ	277.4	34	ePn	3:25:42.60	-2.15
			eSn	26:24.60	7.97
CONA	278.5	326	Pn	3:25:45.10	0.21
			ePn	3:25:48.30	0.25
VYHS	303.8	14	eSn	25:55.30	-27.19

129.

2010-08-17 time: 3:26:14.82 UTC ML= 2.7  
 lat: 45.846N lon: 17.866E h= 3.8 km  
 erh= 4.9km erz= 3.4km  
 nr= 28 gap=212 rms=1.15  
 Locality: Csányosrő  
 Comments: felt 4 EMS

sta	dist	azm	phase	hr mn sec	res
PKSM	72.5	56	ePgD	3:26:27.90	0.12
			eSg	26:36.20	-1.69
BEHE	109.2	309	ePg	3:26:35.40	1.08
			eSg	26:50.20	0.66
PKS2	126.4	55	ePnC	3:26:37.90	0.77
			eSn	26:53.40	-1.13

## Hypocenter Parameters

KOGS	141.7	298	iPn	3:26:38.90	-0.13
PKS6	155.5	57	ePn	3:26:41.50	0.74
			eSn	27:02.30	1.30
PKST	157.6	5	ePn	3:26:38.70	-2.32
			eSn	27:00.50	-0.96
PKS7	166.5	37	ePn	3:26:44.40	2.27
			eSn	27:04.30	0.86
CSKK	171.3	10	ePn	3:26:39.10	-3.63
			eSn	26:59.20	-5.31
G CIS	173.9	271	iPn	3:26:43.00	-0.05
GOLS	174.9	276	iPn	3:26:43.10	-0.07
CRES	187.2	269	iPn	3:26:44.60	-0.12
DOBS	188.8	280	iPn	3:26:44.60	-0.31
GROS	195.0	291	iPn	3:26:45.50	-0.19
BUD	202.5	26	eSn	3:27:14.00	2.59
SOP	227.4	334	ePn	3:26:49.60	-0.12
			eSn	27:20.50	3.55
SOKA	237.3	293	Pn	3:26:50.80	-0.15
			Sn	27:12.40	-6.74
ARSA	238.1	311	Pn	3:26:51.20	0.15
CONA	277.4	327	Pn	3:26:56.20	0.24
			Sn	27:27.90	-0.14
PSZ	277.4	34	ePn	3:26:54.50	-1.46
			eSn	27:33.90	5.84
VYHS	303.4	14	ePn	3:26:58.80	-0.40
			eSn	27:06.80	-27.02
MOA	353.6	309	Pn	3:27:06.50	1.04
TREC	423.2	335	ePn	3:27:21.10	6.96
			eSn	28:08.70	8.30
KHC	487.7	318	ePn	3:27:22.40	0.22
			eSn	28:11.50	-3.22
DPC	513.9	347	ePn	3:27:25.60	0.16
			eSn	28:16.90	-3.63
PRU	523.4	332	ePn	3:27:26.40	-0.23
			eSn	28:18.20	-4.43

130.

2010-08-17 time: 5:32:43.02 UTC ML= 2.4  
 lat: 47.994N lon: 20.783E h= 10.0 km  
 erh= 3.5km erz= 3.9km  
 nr= 16 gap=130 rms=0.67  
 Locality: Miskolc  
 Comments: felt 4 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	66.9	263	ePgD	5:32:54.90	-0.20
			eSg	33:02.70	-1.82
TRPA	131.8	83	ePn	5:33:05.20	-0.01
			eSn	33:20.90	-1.61
KOLS	151.8	47	ePn	5:33:08.20	0.49
			eSn	33:26.00	-0.96
VYHS	154.9	291	ePn	5:33:08.70	0.60
			eSn	33:27.10	-0.56
LANS	161.2	323	ePn	5:33:09.60	0.73
			eSn	33:28.60	-0.43
STHS	161.8	12	ePn	5:33:10.30	1.35
			eSn	33:29.30	0.12
NIE	162.2	348	Pn	5:33:09.00	0.00
DRGR	197.6	133	eSn	33:28.50	-0.77
			iPn	5:33:13.40	-0.02
BMR	206.3	100	iPnD	5:33:14.60	0.10
BURB	334.8	97	iPn	5:33:31.10	0.58

131.

2010-08-17 time: 20:11:04.05 UTC ML= 3.0  
 lat: 45.898N lon: 17.849E h= 6.9 km  
 erh= 2.0km erz= 1.9km  
 nr= 37 gap= 63 rms=0.66  
 Locality: Sellye  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr mn sec	res
PKSM	70.6	60	ePgD	20:11:16.20	-0.51
			eSg	11:24.50	-2.09
PKS9	83.5	23	ePgD	20:11:19.10	0.09
			eSg	11:31.80	1.13
BEHE	104.5	308	ePgD	20:11:23.60	0.86

**Hypocenter Parameters**

**Földrengés paraméterek**

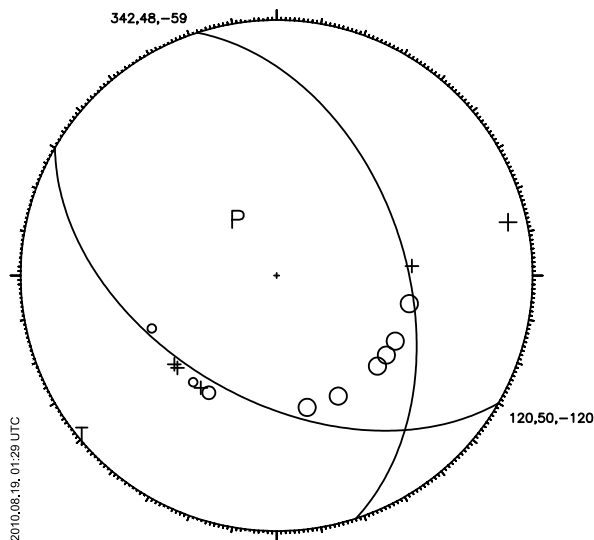
		eSg	11:38.20	0.87
PKS2	124.3	58	ePnD 20:11:25.30	-0.40
		eSn	11:42.10	-0.49
BLY	134.0	203	Pn 20:11:28.30	1.39
KOGS	137.8	296	iPn 20:11:27.30	-0.08
		eSn	11:46.70	1.13
PKST	152.0	5	ePnC 20:11:28.90	-0.25
		eSn	11:48.70	-0.03
PKS6	153.6	59	ePnD 20:11:28.90	-0.46
		eSn	11:49.50	0.41
PKS7	162.7	38	ePnD 20:11:31.90	1.41
		eSn	11:52.60	1.48
GCIS	172.5	269	iPn 20:11:31.30	-0.41
GOLS	172.9	274	iPn 20:11:31.50	-0.26
CESS	185.2	273	iPn 20:11:33.00	-0.29
CRES	185.9	268	iPn 20:11:32.90	-0.48
DOBS	186.4	279	iPn 20:11:32.90	-0.54
GROS	191.7	289	iPn 20:11:33.80	-0.31
LEGS	196.4	272	iPn 20:11:34.30	-0.39
BUD	197.9	27	ePnD 20:11:38.40	3.52
SOP	221.6	334	ePnD 20:11:38.10	0.27
		eSn	12:08.20	4.02
PKKS	221.8	275	iPn 20:11:37.50	-0.36
PERS	226.0	291	iPn 20:11:38.10	-0.28
ARSA	233.2	310	Pn 20:11:39.70	0.42
SOKA	233.7	292	Pn 20:11:39.20	-0.14
VISS	234.0	267	iPn 20:11:39.10	-0.28
DIVS	261.8	140	iPn 20:11:42.40	-0.45
OBKA	263.6	285	Pn 20:11:43.00	-0.07
CEY	266.5	266	iPn 20:11:43.20	-0.24
CONA	271.8	326	Pn 20:11:44.50	0.41
PSZ	273.4	35	ePn 20:11:43.60	-0.69
BZS	294.8	96	iPn 20:11:46.70	-0.26
VYHS	298.2	15	ePn 20:11:47.10	-0.28
		eSn	12:30.10	8.92
SKDS	301.1	263	iPn 20:11:47.60	-0.15
		iSn	12:20.10	-1.74
VOJS	307.4	273	iPn 20:11:48.10	-0.43
CADS	320.3	277	iPn 20:11:49.80	-0.34
MOA	348.8	308	Pn 20:11:54.90	1.21
DRGR	387.3	75	iPn 20:11:59.60	1.11
GZR	388.3	98	iPn 20:11:59.20	0.59
VRAC	390.8	346	iPn 20:11:58.70	-0.22
MORC	431.9	357	iPn 20:12:04.50	0.45
OKC	438.6	3	ePn 20:12:04.70	-0.19
		eSn	12:49.00	-3.35
STHS	467.0	33	ePn 20:12:09.00	0.57
		eSn	12:47.30	-11.35
KHC	482.4	318	ePn 20:12:11.00	0.65
		eSn	12:59.80	-2.26
DPC	507.9	347	ePn 20:12:13.40	-0.14
		eSn	13:04.70	-3.03
PRU	517.6	331	ePn 20:12:14.20	-0.54
		eSn	13:06.50	-3.38
SKO	522.9	147	Pn 20:12:18.80	3.40
PRA	529.4	331	ePn 20:12:12.40	-3.81
		eSn	13:02.30	-10.20

132.

2010-08-19 time: 1:29:04.97 UTC ML= 3.0  
 lat: 48.053N lon: 20.782E h= 10.0 km  
 erh= 5.6km erz= 5.0km  
 nr= 29 gap= 57 rms=1.81  
 Locality: Miskolc  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	67.9	257	ePgC	1:29:16.30	-0.93
			eSg	29:25.80	-0.99
TRPA	131.2	86	ePnC	1:29:25.20	-1.88
			eSn	29:42.50	-1.83
BUD	146.2	244	ePn	1:29:28.70	-0.25
			eSn	29:47.50	-0.16
KOLS	147.4	48	ePn	1:29:28.40	-0.70
			eSn	29:47.70	-0.23
VYHS	152.5	289	ePn	1:29:29.70	-0.04
			eSn	29:48.10	-0.96
STHS	155.4	13	ePn	1:29:31.70	1.60

		eSn	29:50.60	0.90
PKS7	165.5	227	ePnC 1:29:32.30	0.94
		eSn	29:53.80	1.85
PKS6	186.0	210	ePnD 1:29:33.40	-0.51
		eSn	29:54.10	-2.38
DRGR	202.2	134	iPn 1:29:35.00	-0.93
BMR	207.5	102	iPnD 1:29:41.70	5.10
PKS2	210.3	214	ePnC 1:29:39.60	2.66
		eSn	29:58.90	-2.98
PKST	224.5	247	ePnD 1:29:38.60	-0.11
		eSn	30:04.90	-0.14
PKS9	249.8	229	ePnC 1:29:46.80	4.93
		eSn	30:17.30	6.65
PKSM	261.3	218	ePnD 1:29:41.70	-1.60
		eSn	30:10.00	-3.21
OKC	276.8	316	ePn 1:29:47.70	2.46
		eSn	30:17.00	0.35
BZS	278.3	167	iPnD 1:29:50.60	5.18
SOP	318.7	263	ePn 1:29:49.40	-1.06
		eSn	30:23.30	-2.64
GZR	332.7	153	iPnD 1:29:52.20	-0.01
BURB	335.6	98	iPn 1:29:52.80	0.23
VRAC	338.5	294	iPn 1:29:54.20	1.26
BEHE	350.6	240	ePn 1:29:53.00	-1.44
		eSn	30:34.20	1.17
LOT	368.8	142	iPn 1:30:04.00	7.29
ARSA	405.0	257	Pn 1:30:00.50	-0.73
		Sn	30:42.20	-2.91
DPC	413.4	308	ePn 1:30:04.10	1.83
ARR	419.4	135	iPn 1:29:58.00	-5.02
VOIR	437.0	132	iPnD 1:30:04.60	-0.61
UPC	441.5	308	ePn 1:29:57.50	-8.28
DIVS	443.8	188	iPn 1:30:05.00	-1.07
SOKA	460.4	251	Pn 1:30:07.60	-0.53
MLR	486.5	126	iPnD 1:30:09.80	-1.58
FLOR	509.4	119	iPnD 1:30:13.90	-0.34
KHC	544.8	283	ePn 1:30:19.40	0.75
		eSn	31:26.10	9.98



133.

2010-08-19 time: 11:26:28.02 UTC ML= 1.7  
 lat: 47.291N lon: 18.620E h= 10.0 km  
 erh= 3.4km erz= 2.6km  
 nr= 9 gap=124 rms=0.53  
 Locality: Pázmánd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
BUD	37.3	55	eSg	11:26:39.90	-0.38
PKST	44.5	265	ePgC	11:26:36.50	0.34
			eSg	26:41.90	-0.60
PSZ	118.5	54	ePn	11:26:48.80	0.25
			eSn	27:04.60	0.03



## Földrengés paraméterek

PKSM 120.0 179 ePn 11:26:49.00 0.27  
 eSn 27:03.70 -1.18  
 VYHS 134.8 7 ePn 11:26:51.20 0.63  
 eSn 27:06.30 -1.87

134.

2010-08-19 time: 14:48:06.92 UTC ML= 2.4  
 lat: 48.041N lon: 20.796E h= 1.8 km  
 erh= 4.2km erz= 3.8km  
 nr= 14 gap= 85 rms=0.96  
 Locality: Kistokaj  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	68.7	259	ePgC	14:48:19.20	0.01
			eSg	48:29.00	0.25
CRVS	107.7	27	ePg	14:48:26.00	-0.15
			eSg	48:38.90	-2.25
TRPA	130.3	86	iPnD	14:48:29.80	-0.17
KOLS	147.6	48	ePn	14:48:34.10	1.97
			eSn	48:53.60	1.82
VYHS	154.0	289	ePn	14:48:32.40	-0.52
			eSn	48:51.90	-1.31
STHS	156.5	12	ePn	14:48:34.60	1.36
			eSn	48:53.40	-0.37
PKS7	165.4	228	eSn	14:48:56.80	1.06
DRGR	200.5	134	iPnD	14:48:37.80	-0.93
PKSM	260.9	219	iPnD	14:48:44.80	-1.46
GZR	331.0	153	iPn	14:48:55.10	0.10
BURB	334.4	98	iPn	14:48:53.90	-1.53

135.

2010-08-19 time: 17:45:32.37 UTC ML= 2.1  
 lat: 48.054N lon: 20.786E h= 10.0 km  
 erh= 5.5km erz= 6.0km  
 nr= 12 gap= 99 rms=0.95  
 Locality: Szirma  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	68.3	257	ePgD	17:45:44.70	0.01
			eSg	45:53.40	-0.90
CRVS	106.8	28	eP*	17:45:51.00	-0.42
			eS*	46:04.20	-2.08
TRPA	130.8	86	iPn	17:45:55.30	0.86
			eSn	46:10.70	-0.96
KOLS	147.1	48	ePn	17:45:59.10	2.63
			eSn	46:16.40	1.13
VYHS	152.8	289	ePn	17:45:57.30	0.12
			eSn	46:16.90	0.36
DRGR	201.9	134	iPn	17:46:02.40	-0.90
BZS	278.2	167	iPn	17:46:13.10	0.28

136.

2010-08-19 time: 22:24:20.86 UTC ML= 2.1  
 lat: 47.996N lon: 20.785E h= 10.0 km  
 erh= 2.9km erz= 2.8km  
 nr= 16 gap= 49 rms=0.75  
 Locality: Bükkaranyos  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	67.0	263	ePg	22:24:32.70	-0.26
			eSg	24:41.90	-0.50
TRPA	131.6	83	iPn	22:24:42.20	-0.83
KOLS	151.6	47	ePn	22:24:46.20	0.68
			eSn	25:05.10	0.35
VYHS	155.0	291	ePn	22:24:45.70	-0.23
			eSn	25:04.90	-0.59
LANS	161.0	323	ePn	22:24:47.30	0.61
			eSn	25:05.90	-0.94
PKS7	161.5	229	ePn	22:24:47.80	1.06
			eSn	25:09.50	2.57
STHS	161.6	12	ePn	22:24:47.90	1.14
			eSn	25:06.80	-0.17
PKS6	180.5	211	eSn	22:25:10.70	-0.47

## Hypocenter Parameters

DRGR 197.7 133 iPn 22:24:51.00 -0.26  
 PKS9 245.9 230 ePn 22:25:02.90 5.63  
 eSn 25:33.30 7.63  
 BZS 272.0 166 iPn 22:25:00.90 0.38  
 GZR 327.0 152 iPn 22:25:07.20 -0.18  
 ABTA 640.0 257 Pn 22:25:48.20 1.79

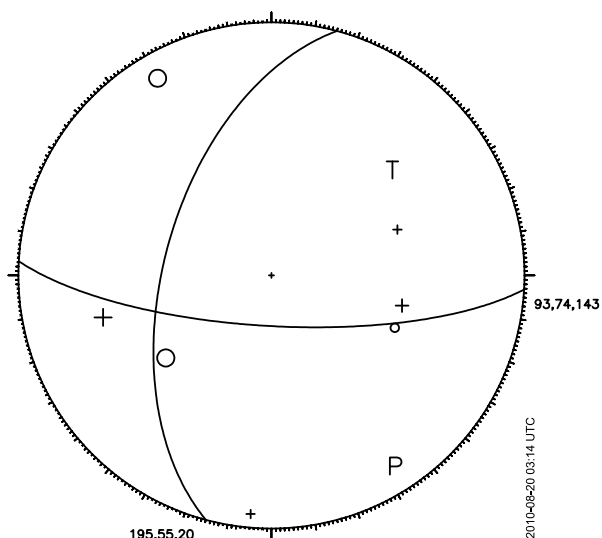
137.

2010-08-20 time: 3:14:19.34 UTC ML= 2.4  
 lat: 46.866N lon: 16.449E h= 10.0 km  
 erh= 1.8km erz= 1.6km  
 nr= 44 gap= 48 rms=0.81  
 Locality: Ispánk  
 Comments: felt

sta	dist	azm	phase	hr mn sec	res
KOGS	48.9	198	iPg	3:14:28.40	0.15
BEHE	50.6	150	ePgD	3:14:28.70	0.15
			eSg	14:35.80	0.06
ARSA	82.3	301	Pg	3:14:34.20	0.05
			Sg	14:46.30	0.60
GROS	85.4	238	iPg	3:14:34.10	-0.59
SOP	91.2	5	ePgC	3:14:35.30	-0.42
			eSg	14:46.60	-1.90
BISS	103.9	256	iP*	3:14:36.90	-1.05
PERS	105.0	256	iP*C	3:14:37.10	-1.02
DOBS	109.6	223	iPn	3:14:38.30	-0.46
SOKA	110.2	259	Pn	3:14:37.90	-0.94
GOLS	114.3	214	iPn	3:14:39.30	-0.04
			iSn	14:53.40	-1.55
CESS	124.9	217	iPn	3:14:41.10	0.43
			iSn	14:56.90	-0.40
CONA	126.2	339	Pn	3:14:41.40	0.58
			Sn	14:58.90	1.32
GCIS	127.8	210	iPn	3:14:40.80	-0.23
			iSn	14:57.70	-0.25
PKST	128.1	70	ePnC	3:14:40.90	-0.16
			eSn	14:57.10	-0.91
LEGS	134.1	220	iPn	3:14:42.10	0.29
			eSn	14:59.90	0.56
CRES	138.6	213	iPn	3:14:42.40	0.02
			eSn	15:00.10	-0.24
PDKS	141.7	232	iPnD	3:14:43.70	0.93
			eSn	15:01.50	0.46
PKS9	143.3	103	ePnC	3:14:44.30	1.34
			eSn	15:02.80	1.42
OBKA	150.7	255	Pn	3:14:44.70	0.81
			Sn	15:05.40	2.37
VISS	171.3	226	iPn	3:14:47.00	0.55
BOJS	177.4	211	iPn	3:14:47.70	0.49
PKSM	183.2	113	ePnD	3:14:46.90	-1.04
			eSn	15:06.30	-3.94
SMOL	197.4	22	ePn	3:14:47.70	-2.01
			eSn	15:06.10	-7.29
CEY	200.0	231	iPn	3:14:51.10	1.07
PKS7	207.4	84	ePn	3:14:55.20	4.25
CADS	219.8	251	iPn	3:14:53.50	1.00
SKDS	238.5	232	iPn	3:14:55.60	0.77
VYHS	254.7	45	ePn	3:14:56.00	-0.85
			eSn	15:37.00	10.89
PSZ	285.2	66	ePn	3:15:01.10	0.45
			eSn	15:33.70	0.82
KHC	330.7	320	ePn	3:15:08.80	2.48
			eSn	15:44.20	1.23
PRU	374.8	338	eSn	3:15:52.00	-0.76
PRA	386.2	337	ePn	3:15:11.90	-1.35
UPC	406.2	355	ePn	3:15:11.30	-4.44

### Hypocenter Parameters

### Földrengés paraméterek



140.

2010-08-20 time: 19:17:32.29 UTC ML= 1.6  
 lat: 48.027N lon: 20.847E h= 2.6 km  
 erh= 5.1km erz= 3.6km  
 nr= 10 gap=176 rms=0.78  
 Locality: Kistokaj  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	72.1	260	ePgC	19:17:45.30	0.13
			eSg	17:54.40	-0.82
CRVS	107.4	25	ePg	19:17:51.80	0.32
			eSg	18:05.00	-1.45
TRPA	126.6	85	eSn	19:18:11.90	-0.42
KOLS	145.9	46	eSn	19:18:16.40	-0.19
STHS	157.3	11	ePn	19:18:01.50	2.90
			eSn	18:19.70	0.58
VYHS	158.1	289	ePn	19:17:59.20	0.51
			eSn	18:18.30	-0.99

141.

2010-08-20 time: 21:10:52.15 UTC ML= 2.3  
 lat: 46.871N lon: 16.445E h= 4.0 km  
 erh= 1.4km erz= 1.2km  
 nr= 44 gap= 60 rms=0.63  
 Locality: Ispánk  
 Comments: felt

sta	dist	azm	phase	hr mn sec	res
KOGS	49.3	198	iPg	21:11:01.80	0.82
BEHE	51.3	150	ePgC	21:11:02.10	0.77
			eSg	11:09.10	0.61
ARSA	81.7	301	Pg	21:11:07.20	0.44
			Sg	11:18.60	0.44
GROS	85.4	238	iPg	21:11:07.30	-0.11
SOP	90.7	5	ePgC	21:11:08.50	0.14
			eSg	11:19.80	-1.20
BISS	103.7	256	iPg	21:11:10.30	-0.38
PERS	104.8	256	ePg	21:11:10.40	-0.48
			eSg	11:26.00	0.51
DOBS	109.8	223	iPg	21:11:11.50	-0.26
			eSg	11:27.30	0.25
SOKA	110.0	259	Pg	21:11:11.20	-0.60
			Sg	11:25.80	-1.33
GOLS	114.6	213	iPg	21:11:12.50	-0.11
			eSg	11:27.00	-1.58
CESS	125.1	217	ePn	21:11:14.30	0.02
			eSn	11:30.10	-1.44
CONA	125.5	340	Pn	21:11:14.80	0.48
			Sn	11:32.10	0.48
GCIS	128.1	209	iPn	21:11:14.50	-0.15
PKST	128.2	70	ePn	21:11:14.10	-0.56
			eSn	11:30.40	-1.82
LEGS	134.3	220	iPn	21:11:15.40	-0.01
			eSn	11:33.10	-0.46
CRES	138.9	213	iPn	21:11:15.90	-0.09
			eSn	11:33.50	-1.09
PDKS	141.8	232	iPn	21:11:17.00	0.65
			eSn	11:35.00	-0.24
PKS9	143.7	103	ePnC	21:11:15.80	-0.79
			eSn	11:36.30	0.64
CSKK	148.2	68	ePnC	21:11:12.30	-4.86
			eSn	11:31.50	-5.17
OBKA	150.5	254	Pn	21:11:17.90	0.46
			Sn	11:36.90	-0.27
VISS	171.4	226	iPn	21:11:20.30	0.26
			iSn	11:42.20	0.40
PKSM	183.7	114	ePnD	21:11:20.20	-1.38
			eSn	11:39.90	-4.64
GORS	197.2	252	iPn	21:11:24.10	0.83
CEY	200.1	231	iPn	21:11:24.40	0.78
PKS2	215.9	101	ePn	21:11:29.10	3.50
			eSn	11:58.00	6.31
VOJS	217.5	245	iPn	21:11:26.20	0.41
CADS	219.7	251	ePn	21:11:26.80	0.74
PSZ	285.3	66	ePn	21:11:34.50	0.26
			eSn	12:05.90	-1.18

138.

2010-08-20 time: 11:39:25.72 UTC ML= 2.3  
 lat: 47.979N lon: 20.772E h= 10.0 km  
 erh= 3.5km erz= 3.3km  
 nr= 14 gap=132 rms=0.52  
 Locality: Bükkaranyos  
 Comments: felt

sta	dist	azm	phase	hr mn sec	res
PSZ	65.9	264	ePg	11:39:37.60	-0.03
			eSg	39:46.40	-0.52
TRPA	132.8	83	ePn	11:39:47.70	-0.33
			eSn	40:03.60	-1.84
KOLS	153.5	46	ePn	11:39:51.10	0.48
			eSn	40:10.10	0.05
VYHS	154.8	292	ePn	11:39:51.30	0.52
			eSn	40:09.60	-0.72
LANS	162.0	324	ePn	11:39:52.20	0.53
			eSn	40:10.80	-1.12
STHS	163.6	12	ePn	11:39:52.80	0.93
			eSn	40:11.50	-0.77
NIE	163.6	348	Pn	11:39:52.00	0.12
DRGR	197.1	132	Pn	11:39:56.40	0.34

139.

2010-08-20 time: 16:06:54.86 UTC ML= 2.3  
 lat: 47.985N lon: 20.781E h= 10.0 km  
 erh= 4.1km erz= 4.3km  
 nr= 16 gap= 87 rms=0.80  
 Locality: Bükkaranyos  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	66.6	264	ePgC	16:07:06.70	-0.19
			eSg	07:15.50	-0.78
CRVS	113.7	26	ePn	16:07:13.60	-1.20
			eSn	07:26.70	-3.64
TRPA	132.1	83	ePn	16:07:16.80	-0.28
			eSn	07:33.80	-0.61
KOLS	152.6	46	eSn	16:07:38.90	-0.08
VYHS	155.2	291	ePn	16:07:20.30	0.34
			eSn	07:38.70	-0.84
LANS	161.8	323	ePn	16:07:21.60	0.81
			eSn	07:40.50	-0.52
STHS	162.8	12	ePn	16:07:22.80	1.89
			eSn	07:41.10	-0.14
NIE	163.1	348	Pn	16:07:22.40	1.45
DRGR	197.1	132	iPn	16:07:25.50	0.31
PKSM	255.5	219	iPn	16:07:32.50	0.03

## Földrengés paraméterek

## Hypocenter Parameters

KHC	330.0	320	ePn	21:11:42.40	2.58
			eSn	12:27.30	10.29
PRU	374.1	338	ePn	21:11:47.30	1.97
			eSn	12:38.70	11.90
DPC	387.0	359	ePn	21:11:49.20	2.28
			eSn	12:42.10	12.45
UPC	405.6	355	ePn	21:11:45.10	-4.15
			eSn	12:20.60	-13.19

BEHE	65.0	167	ePgC	22:30:08.80	-0.36
			eSg	30:18.50	0.11
KOGS	70.4	201	iPg	22:30:10.10	0.00
			iSg	30:21.50	1.44
SOP	71.6	359	ePgD	22:30:09.60	-0.72
			eSg	30:22.10	1.64
ARSA	83.5	286	Pg	22:30:11.80	-0.62
			Sg	30:23.20	-0.99
GROS	104.5	232	iPn	22:30:15.30	-0.44
			iSn	30:29.10	-1.00
CONA	112.7	331	Pn	22:30:16.60	-0.17
			Sn	30:31.90	-0.03
PKST	113.0	78	ePnD	22:30:16.00	-0.80
			eSn	30:30.50	-1.50
SOKA	124.6	251	Pn	22:30:17.50	-0.75
			Sn	30:33.60	-0.98
DOBS	130.5	221	iPn	22:30:19.30	0.32
GOLS	135.8	213	iPn	22:30:19.90	0.25
			iSn	30:37.20	0.14

142.

2010-08-21 time: 4:58:48.12 UTC ML= 2.4  
 lat: 48.032N lon: 20.820E h= 3.5 km  
 erh= 3.0km erz= 2.8km  
 nr= 23 gap= 81 rms=1.01  
 Locality: Kistokaj  
 Comments: felt

sta	dist	azm	phase	hr mn sec	res
PSZ	70.3	260	ePg	4:59:00.40	-0.29
			eSg	59:10.30	-0.18
CRVS	107.7	26	ePg	4:59:07.60	0.23
			eSg	59:20.40	-1.98
TRPA	128.5	85	ePn	4:59:10.20	-0.54
			eSn	59:27.00	-1.38
KOLS	146.9	47	ePn	4:59:15.40	1.67
			eSn	59:32.60	0.15
BUD	147.9	246	eSn	4:59:32.00	-0.67
VYHS	156.0	289	ePn	4:59:14.60	0.44
			eSn	59:32.30	-2.18
STHS	157.1	11	ePn	4:59:16.20	1.90
			eSn	59:35.20	0.48
LANS	159.4	321	ePn	4:59:15.40	0.81
			eSn	59:34.00	-1.24
PKS7	166.1	229	eSn	4:59:37.80	1.08
DRGR	198.5	134	iPnD	4:59:19.50	0.04
BMR	204.3	101	iPn	4:59:19.90	-0.28
PKS2	210.0	215	eSn	4:59:52.30	5.83
PKST	226.3	248	ePn	4:59:23.30	0.37
			eSn	59:48.90	-1.18
PKSM	261.3	219	ePn	4:59:26.00	-1.30
			eSn	59:54.20	-3.65
BURB	332.5	98	iPnD	4:59:36.90	0.73

143.

2010-08-21 time: 11:18:32.17 UTC ML= 2.1  
 lat: 47.979N lon: 20.816E h= 10.0 km  
 erh= 8.2km erz= 8.4km  
 nr= 14 gap=132 rms=1.35  
 Locality: Bükkaranyos  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	69.1	264	ePg	11:18:44.10	-0.54
			eSg	18:53.00	-1.37
CRVS	113.3	25	ePn	11:18:50.80	-1.25
			eSn	19:03.80	-3.75
TRPA	129.6	83	eSn	11:19:10.20	-0.98
KOLS	151.3	45	ePn	11:18:59.50	2.71
			eSn	19:16.80	0.81
VYHS	157.8	291	ePn	11:18:58.20	0.60
			eSn	19:15.90	-1.54
STHS	163.0	11	ePn	11:18:59.30	1.06
			eSn	19:18.40	-0.19
LANS	163.9	323	ePn	11:18:58.80	0.44
NIE	164.4	347	ePn	11:19:00.60	2.18
DRGR	194.7	133	ePn	11:19:02.80	0.60

144.

2010-08-26 time: 22:29:57.33 UTC ML= 2.7  
 lat: 47.039N lon: 16.580E h= 12.9 km  
 erh= 2.1km erz= 1.8km  
 nr= 35 gap= 46 rms=0.97  
 Locality: Körmend  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr mn sec	res
-----	------	-----	-------	-----------	-----

PKS9	139.1	111	ePnC	22:30:21.70	1.64
GCIS	149.4	209	iPn	22:30:21.20	-0.14
OBKA	165.9	249	Pn	22:30:24.50	1.10
			Sn	30:45.80	2.06
SMOL	175.9	21	ePn	22:30:27.10	2.46
			eSn	30:47.50	1.55
PKSM	182.7	120	ePnD	22:30:24.60	-0.90
			eSn	30:44.70	-2.77
BUD	191.5	75	ePnD	22:30:29.70	3.11
			eSn	30:56.20	6.79
PKS7	196.2	90	ePnC	22:30:30.60	3.43
MOA	196.4	297	Pn	22:30:27.70	0.50
VYHS	234.0	46	ePn	22:30:31.10	-0.80
			eSn	30:56.80	-2.06
KBA	245.8	271	Pn	22:30:33.00	-0.37
			Sn	31:01.50	0.02
PSZ	268.3	69	ePnD	22:30:34.10	-2.07
MORC	312.7	13	iPnD	22:30:46.40	4.70
LANS	318.4	43	ePn	22:30:44.20	1.78
KHC	322.7	316	ePn	22:30:45.10	2.15
			eSn	31:18.70	0.17
OKC	332.1	20	ePn	22:30:45.90	1.78
			eSn	31:20.00	-0.62
KRLC	338.0	3	ePn	22:30:46.40	1.55
			eSn	31:21.30	-0.62
GOPC	346.1	337	ePn	22:30:47.70	1.84
			eSn	31:23.20	-0.52
PRU	360.9	335	ePn	22:30:49.10	1.39
			eSn	31:26.60	-0.41
DPC	368.7	357	ePn	22:30:50.30	1.62
			eSn	31:27.90	-0.84
PRA	372.5	335	ePn	22:30:58.90	9.74
			eSn	31:43.60	14.02
UPC	387.9	354	ePn	22:30:52.40	1.32
			eSn	31:32.00	-1.01
PVCC	415.2	339	eSn	22:31:55.50	16.44
BZS	418.9	112	iPn	22:30:54.60	-0.34
DIVS	421.7	141	iPn	22:30:54.10	-1.19
STHS	435.9	53	ePn	22:31:00.50	3.44
NKC	467.9	319	ePn	22:31:02.00	0.95
			eSn	32:10.10	19.34
DRGR	467.9	93	iPn	22:31:04.10	3.04
GZR	512.0	111	iPnD	22:31:08.30	1.75
BURB	656.0	84	iPn	22:31:28.60	4.08

145.

2010-08-30 time: 19:02:28.33 UTC ML= 1.5  
 lat: 47.675N lon: 17.965E h= 10.0 km  
 erh= 2.8km erz= 2.7km  
 nr= 11 gap=138 rms=0.39  
 Locality: Bana  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	46.5	174	ePgC	19:02:36.90	0.07
			eSg	02:43.20	-0.26
ZST	86.7	312	ePg	19:02:44.20	0.29
			eSg	02:55.80	-0.26
SMOL	101.5	337	eSg	19:03:00.70	-0.04

## Hypocenter Parameters

VYHS 111.9 35 ePn 19:02:47.80 -0.23  
 eSn 03:01.10 -2.30  
 PSZ 147.1 79 ePn 19:02:52.90 0.47  
 eSn 03:11.50 0.28  
 PKSM 170.6 162 ePn 19:02:55.40 0.04  
 eSn 03:14.50 -1.94

146.

2010-08-31 time: 9:15:32.34 UTC ML= 1.8  
 lat: 48.363N lon: 19.812E h= 0.0 km  
 erh= 2.3km erz= 6.3km  
 nr= 9 gap=108 rms=0.78  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PSZ	49.9	173	ePgC	9:15:41.40			0.15
			eSg	15:48.50			0.30
KECS	51.6	75	ePg	9:15:40.90			-0.66
			eSg	15:47.40			-1.35
VYHS	73.7	281	ePg	9:15:46.00			0.50
			eSg	15:54.90			-0.85
LANS	91.1	344	ePg	9:15:49.30			0.69
			eSg	16:00.20			-1.10
KOLS	192.1	71	eSn	9:16:29.90			2.40

147.

2010-08-31 time: 23:14:26.90 UTC ML= 1.9  
 lat: 47.398N lon: 18.927E h= 10.0 km  
 erh= 4.8km erz= 2.3km  
 nr= 13 gap=148 rms=0.84  
 Locality: Diósd  
 Comments: felt 4 EMS

sta	dist	azm	phase	hr	mn	sec	res
BUD	12.0	37	ePgD	23:14:29.80			0.11
			eSg	14:31.70			-0.17
PKS7	42.8	156	ePgC	23:14:33.50			-1.25
PSZ	92.9	51	ePgC	23:14:43.30			-0.29
			eSg	14:56.10			-0.50
PKS9	102.8	209	ePgD	23:14:46.40			1.06
			eSg	14:58.60			-1.12
VYHS	122.1	357	ePn	23:14:49.00			1.12
			eSn	15:03.00			-1.24
PKSM	133.7	189	ePn	23:14:48.90			-0.42
			eSn	15:06.70			-0.11
KECS	167.7	44	ePn	23:14:54.90			1.33
			eSn	15:16.90			2.54

148.

2010-09-01 time: 4:18:51.20 UTC ML= 2.0  
 lat: 47.404N lon: 18.916E h= 8.9 km  
 erh= 1.1km erz= 1.2km  
 nr= 21 gap= 99 rms=0.43  
 Locality: Törökbálint  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
BUD	12.1	43	ePgD	4:18:53.80			-0.08
			eSg	18:55.60			-0.37
PKS7	43.8	155	ePg	4:18:59.40			0.22
			eSg	19:05.50			0.10
PKST	68.5	256	ePg	4:19:04.00			0.46
			eSg	19:12.60			-0.57
PSZ	93.2	52	ePg	4:19:07.60			-0.31
			eSg	19:20.20			-0.75
PKS6	102.1	151	eSg	4:19:23.90			0.12
PKS9	102.9	208	ePg	4:19:09.60			-0.05
			eSg	19:23.90			-0.14
PKS2	103.9	167	eSg	4:19:24.40			0.06
VYHS	121.4	357	ePn	4:19:13.00			0.78
			eSn	19:26.40			-2.22
PKSM	134.2	189	ePn	4:19:13.30			-0.52
			eSn	19:30.50			-0.97
ZST	161.9	303	ePn	4:19:17.10			-0.18
			eSn	19:37.40			-0.22

## Földrengés paraméterek

KECS 167.8 44 ePn 4:19:18.80 0.78  
 eSn 19:40.70 1.77  
 CONA 236.6 284 Pn 4:19:27.20 0.61

149.

2010-09-02 time: 8:19:01.16 UTC ML= 1.8  
 lat: 48.400N lon: 20.910E h= 0.0 km  
 erh= 7.6km erz= 5.5km  
 nr= 7 gap=214 rms=0.90  
 Locality: Gadna  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
KECS	32.7	286	ePg	8:19:07.50			0.49
			eSg	19:11.50			-0.07
STHS	115.7	12	ePg	8:19:21.80			-0.03
			eSg	19:32.50			-5.44
KOLS	116.6	59	eSg	8:19:38.90			0.66
VYHS	153.8	274	ePn	8:19:27.10			-0.27
			eSn	19:46.80			-1.01

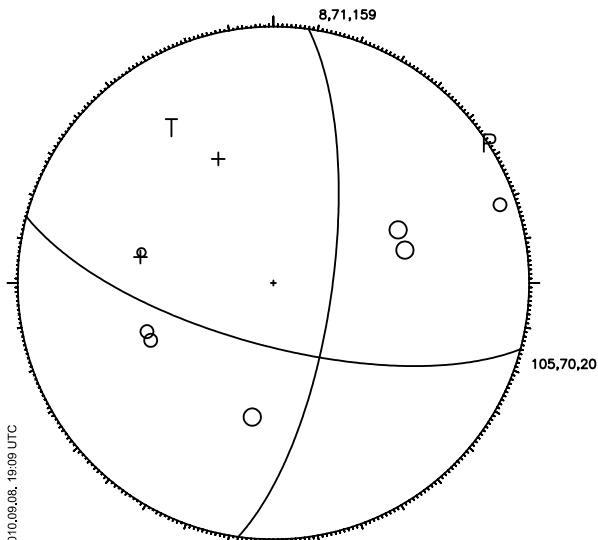
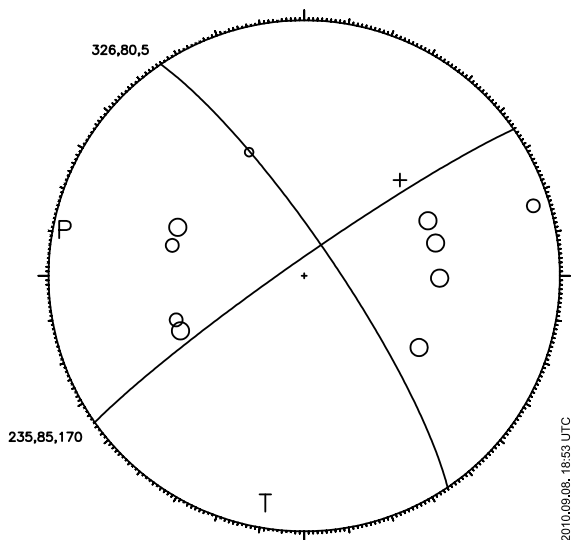
150.

2010-09-08 time: 18:53:36.25 UTC ML= 2.7  
 lat: 46.820N lon: 20.619E h= 10.0 km  
 erh= 3.0km erz= 3.1km  
 nr= 25 gap= 80 rms=0.82  
 Locality: Csabacsúd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PKS6	84.2	253	ePgD	18:53:51.30			-0.10
			eSg	54:03.40			0.18
PKS2	113.6	251	ePnD	18:53:55.90			-0.27
			eSn	54:11.50			-0.21
PKS7	113.9	283	ePnD	18:53:56.30			0.09
			eSn	54:11.00			-0.77
PSZ	133.8	336	ePnD	18:53:58.90			0.21
			eSn	54:15.50			-0.69
BZS	154.4	150	iPn	18:54:02.10			0.84
DRGR	159.8	91	iPnD	18:54:01.40			-0.53
BANR	164.7	166	iPn	18:54:02.50			-0.05
PKSM	166.1	246	ePnD	18:54:00.90			-1.82
			eSn	54:24.80			1.43
PKSG	180.7	291	ePnD	18:54:05.70			1.16
			eSn	54:28.00			1.40
PKST	202.4	284	ePn	18:54:06.70			-0.54
			eSn	54:33.50			2.08
TRPA	205.4	45	ePnC	18:54:11.20			3.58
CJR	227.9	93	iPn	18:54:10.70			0.27
VYHS	229.3	324	ePn	18:54:10.30			-0.30
GZR	230.2	134	iPn	18:54:10.80			0.09
BMR	237.6	66	iPnD	18:54:10.90			-0.74
ARCR	285.9	84	iPn	18:54:20.40			2.75
LOT	287.3	122	iPnD	18:54:17.50			-0.34
STHS	292.4	9	ePn	18:54:18.70			0.23
DIVS	306.5	189	iPn	18:54:20.00			-0.22
BURB	359.3	76	iPnD	18:54:27.20			0.38

### Földrengés paraméterek

### Hypocenter Parameters



151.

152.

2010-09-08 time: 19:09:19.95 UTC ML= 2.6  
 lat: 46.850N lon: 20.600E h= 10.0 km  
 erh= 2.4km erz= 2.4km  
 nr= 23 gap= 95 rms=0.65  
 Locality: Csabacsúd  
 Comments:

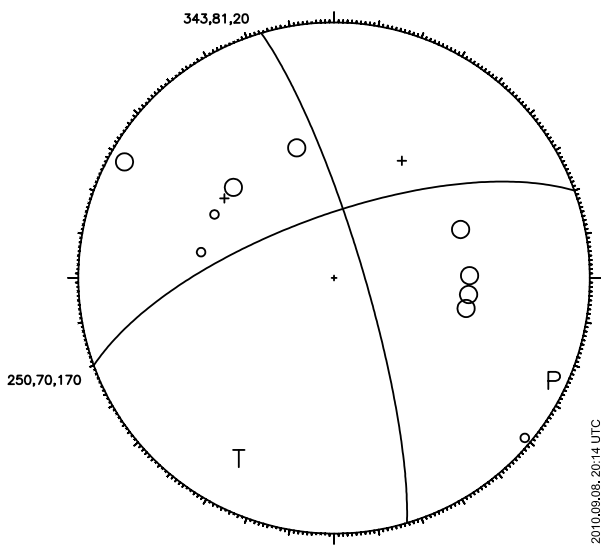
2010-09-08 time: 20:14:36.83 UTC ML= 3.0  
 lat: 45.934N lon: 20.708E h= 5.2 km  
 erh= 1.6km erz= 1.2km  
 nr= 20 gap=129 rms=0.30  
 Locality: Romania  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS6	83.9	251	ePgD	19:09:35.10	0.06
			eSg	09:47.20	0.39
PKS7	111.7	281	ePnC	19:09:40.10	0.46
			eSn	09:55.10	0.10
PKS2	113.3	249	ePnD	19:09:39.70	-0.14
			eSn	09:55.10	-0.25
PSZ	130.2	336	ePnC	19:09:42.50	0.56
			eSn	09:59.30	0.20
BZS	157.9	150	iPn	19:09:45.50	0.10
DRGR	161.2	92	iPn	19:09:46.00	0.19
PKSM	166.2	245	ePnD	19:09:44.70	-1.73
			eSn	10:08.80	1.73
PKSG	178.2	290	ePn	19:09:48.40	0.48
			eSn	10:08.90	-0.84
PKST	200.2	283	ePnD	19:09:50.50	-0.17
			eSn	10:12.80	-1.83
TRPA	204.0	46	ePn	19:09:50.40	-0.75
			eSn	10:12.10	-3.38
VYHS	225.8	324	ePn	19:09:54.10	0.24
CJR	229.5	94	iPn	19:09:55.00	0.68
GZR	233.5	134	iPn	19:09:54.30	-0.52
BMR	237.6	67	iPnD	19:09:55.00	-0.33
STHS	289.4	10	ePn	19:10:02.40	0.61
			eSn	10:52.70	18.27
DIVS	309.5	189	iPnD	19:10:03.40	-0.90
BURB	359.8	76	iPnD	19:10:11.50	0.93
VOIR	378.0	115	iPn	19:10:13.20	0.37

sta	dist	azm	phase	hr mn sec	res
TIM	45.4	119	iPgD	20:14:45.50	0.50
BANR	69.7	151	iPg	20:14:49.30	-0.02
BZS	78.9	117	iPg	20:14:50.70	-0.26
PKS6	115.2	310	ePgD	20:14:57.60	0.18
			eSg	15:13.00	-0.47
PKS2	131.0	298	ePnD	20:14:59.60	0.07
			eSn	15:17.50	0.26
PKSM	162.9	281	ePnD	20:15:03.10	-0.41
			eSn	15:24.90	0.59
DEV	170.4	92	iPn	20:15:04.50	0.06
PKS7	171.6	316	ePn	20:15:04.50	-0.09
			eSn	15:29.00	2.76
GZR	172.0	110	iPn	20:15:04.10	-0.54
DRGR	181.2	58	iPn	20:15:05.80	0.00
PSZ	229.2	344	ePnD	20:15:11.90	0.13
			eSn	15:36.50	-2.52
CJR	238.8	69	iPnD	20:15:13.30	0.33
PKSG	240.3	312	ePnD	20:15:13.20	0.04
LOT	244.5	103	iPnD	20:15:13.50	-0.18
PKST	252.4	306	ePnC	20:15:15.00	0.33
TRPA	281.1	30	ePnC	20:15:18.00	-0.24
BMR	287.6	48	iPn	20:15:18.40	-0.65
VYHS	318.0	334	ePn	20:15:23.40	0.55
VOIR	342.7	99	iPn	20:15:27.00	1.08
KOLS	353.8	19	ePn	20:15:28.20	0.89
DOPR	362.9	89	iPnD	20:15:29.90	1.45
STHS	389.3	6	ePn	20:15:34.20	2.46
BURB	391.8	62	iPn	20:15:33.90	1.85
MLR	410.7	97	iPnD	20:15:35.20	0.79
ARSA	423.5	290	Pn	20:15:35.50	-0.50
VRI	467.2	91	iPn	20:15:41.40	-0.05

### Hypocenter Parameters

### Földregés paraméterek

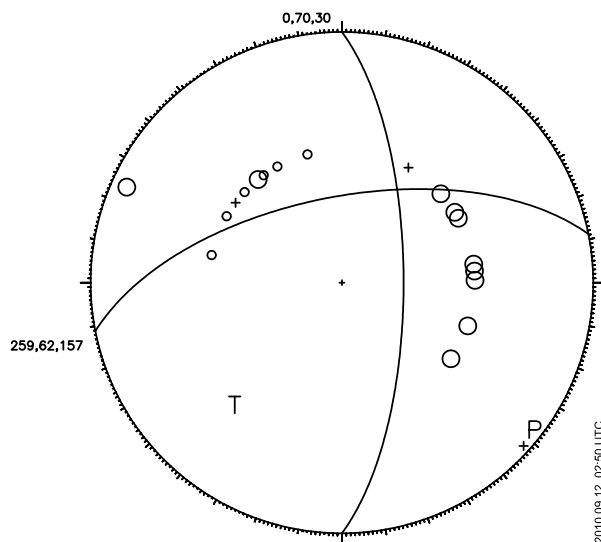


153.

2010-09-12 time: 2:50:32.42 UTC ML= 3.2  
 lat: 45.910N lon: 20.672E h= 5.6 km  
 erh= 2.9km erz= 2.0km  
 nr= 29 gap=134 rms=0.68  
 Locality: Romania  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
TIM	46.8	114	iPgD	2:50:41.00			0.16
BANR	68.8	148	iPg	2:50:44.80			0.04
BZS	80.4	114	iPg	2:50:46.30			-0.51
PKS6	114.8	312	ePgC	2:50:53.50			0.55
			eSg	51:08.50			-0.46
PKSN	126.0	331	ePnD	2:50:55.20			0.74
			eSn	51:13.10			1.46
PKS2	129.9	300	ePnD	2:50:55.00			0.06
			eSn	51:11.90			-0.60
PKSM	160.7	282	ePnD	2:50:58.50			-0.28
			eSn	51:16.80			-2.54
PKS7	171.6	317	eSn	2:51:26.30			4.53
DEV	173.2	91	iPn	2:51:00.10			-0.24
GZR	173.8	109	iPnD	2:51:00.30			-0.12
DRGR	185.0	58	iPnD	2:51:01.20			-0.62
RMGR	210.5	131	iPn	2:51:05.60			0.60
BUD	215.7	324	ePnD	2:51:05.80			0.17
			eSn	51:40.80			9.26
PSZ	231.0	345	ePnD	2:51:07.40			-0.15
PKSG	240.1	313	ePnD	2:51:08.90			0.22
			eSn	51:42.70			5.74
SRE	242.3	125	iPnD	2:51:09.70			0.74
CJR	242.4	68	iPn	2:51:08.60			-0.37
LOT	246.7	102	iPn	2:51:08.90			-0.61
PKST	251.7	307	ePnC	2:51:10.60			0.47
			eSn	51:39.10			-0.45
SIBR	272.3	92	iPn	2:51:13.60			0.90
TRPA	284.8	30	ePnC	2:51:13.50			-0.75
			eSn	51:42.50			-4.37
MDB	288.3	85	iPnD	2:51:14.40			-0.29
BMR	291.4	48	iPnD	2:51:15.60			0.52
BEHE	307.2	282	ePn	2:51:17.20			0.15
			eSn	51:49.00			-2.86
VYHS	319.2	334	ePn	2:51:18.90			0.35
VOIR	345.1	99	iPn	2:51:22.30			0.52
KOLS	357.2	20	ePn	2:51:23.60			0.32
DOPR	365.8	89	iPnD	2:51:24.90			0.54
LANS	371.5	346	ePn	2:51:27.60			2.53
SMOL	379.7	320	ePn	2:51:21.20			-4.89
			eSn	52:06.80			-1.15
GCIS	391.6	269	iPn	2:51:27.10			-0.47
STHS	392.3	6	ePn	2:51:29.50			1.84
BURB	395.6	61	iPnD	2:51:27.50			-0.57
CRES	405.1	269	iPn	2:51:28.60			-0.65

MLR	413.3	96	iPn	2:51:30.70			0.42
ARSA	421.9	291	Pn	2:51:31.40			0.05
			Sn	52:13.80			-3.51
CSNA	429.9	301	Pn	2:51:32.90			0.56
			Sn	52:16.50			-2.58
SOKA	442.9	281	Pn	2:51:33.30			-0.67
			Sn	52:19.00			-2.97
SULR	458.8	107	iPn	2:51:36.60			0.64
PLOR	464.1	91	iPn	2:51:36.90			0.29
TESR	466.1	82	iPnD	2:51:35.90			-0.96
VRI	470.1	91	iPn	2:51:37.80			0.44
OKC	475.8	337	ePn	2:51:38.10			0.03
VRAC	486.7	321	iPnD	2:51:39.60			0.18
MORC	489.6	331	iPn	2:51:40.00			0.20
MOA	533.8	294	Pn	2:51:46.60			1.29
			Sn	52:41.30			-0.86
KRLC	546.7	328	ePn	2:51:47.70			0.79
			eSn	52:44.60			-0.40
KBA	577.4	283	Sn	2:52:49.50			-2.32
CFR	588.6	98	iPn	2:51:53.80			1.67
DPC	590.5	327	ePn	2:51:52.80			0.43
			eSn	52:52.30			-2.42
UPC	617.5	326	ePn	2:51:56.00			0.26
GOPC	625.9	315	ePn	2:51:56.90			0.11
			eSn	52:59.10			-3.50
KHC	643.2	304	ePn	2:51:59.20			0.25
			eSn	53:03.00			-3.44
PRU	644.5	315	ePn	2:51:59.20			0.09
			eSn	53:02.10			-4.62
WATA	714.5	283	Pn	2:52:09.40			1.57
MOTA	750.0	282	Pn	2:52:13.10			0.84



154.

2010-09-25 time: 9:36:09.18 UTC ML= 1.4  
 lat: 47.327N lon: 19.046E h= 10.0 km  
 erh=13.9km erz=15.7km  
 nr= 8 gap=150 rms=0.52  
 Locality: Taksony  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
BUD	17.5	355	ePg	9:36:12.30			-0.48
			eSg	36:15.20			-0.39
PKSG	50.0	278	ePg	9:36:19.30			1.01
			eSg	36:25.70			0.31
PKST	76.9	264	eSg	9:36:33.30			-0.52
PSZ	91.6	44	ePg	9:36:26.00			0.36
			eSg	36:38.20			-0.28
PKSM	127.8	194	eSn	9:36:47.50			-0.28

## Földrengés paraméterek

## Hypocenter Parameters

155.

2010-09-26 time: 5:02:14.59 UTC ML= 1.8  
 lat: 48.049N lon: 20.350E h= 7.0 km  
 erh= 3.4km erz= 2.1km  
 nr= 14 gap=141 rms=0.74  
 Locality: Bélapátfalva  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	37.0	247	ePgD	5:02:21.10	-0.21
			eSg	02:26.90	0.34
KECS	49.4	12	ePg	5:02:23.10	-0.39
			eSg	02:30.00	-0.43
VYHS	122.8	294	ePn	5:02:36.10	0.05
			eSn	02:51.00	-1.79
PKSN	133.1	196	eSn	5:02:55.10	0.03
LANS	138.7	332	ePn	5:02:40.00	1.96
			eSn	02:56.30	-0.02
PKS7	142.9	219	eSn	5:02:57.20	-0.04
PKSG	164.2	244	eSn	5:03:03.00	1.03
STHS	165.7	23	ePn	5:02:44.10	2.70
PKS6	171.7	200	eSn	5:03:02.70	-0.93
KOLS	172.8	55	eSn	5:03:04.10	0.21

156.

2010-10-04 time: 9:37:59.75 UTC ML= 1.9  
 lat: 48.368N lon: 19.790E h= 0.0 km  
 erh= 3.7km erz= 710km  
 nr= 6 gap=186 rms=0.41  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	50.7	171	ePgC	9:38:08.70	-0.10
			eSg	38:15.80	-0.05
VYHS	72.0	281	ePg	9:38:13.20	0.60
			eSg	38:22.10	-0.52
LANS	90.1	345	ePg	9:38:16.10	0.25
			eSg	38:27.40	-1.00

157.

2010-10-19 time: 0:16:31.29 UTC ML=-0.4  
 lat: 47.317N lon: 18.203E h= 7.7 km  
 erh= 8.0km erz= 4.2km  
 nr= 6 gap=183 rms=0.13  
 Locality: Bodajk  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	6.7	40	ePgC	0:16:33.20	0.08
			eSg	16:33.80	-0.74
PKST	14.3	243	ePgD	0:16:34.10	-0.10
			eSg	16:36.60	0.13
PKSG	16.4	60	ePgC	0:16:34.60	0.07
			eSg	16:36.80	-0.25

158.

2010-10-19 time: 0:31:00.53 UTC ML= 0.3  
 lat: 47.396N lon: 18.228E h= 0.4 km  
 erh= 2.9km erz=28.1km  
 nr= 6 gap=228 rms=0.05  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	4.4	146	ePgC	0:31:01.40	0.08
			eSg	31:01.80	-0.14
PKSG	12.3	92	ePgD	0:31:02.70	-0.03
			eSg	31:04.40	-0.04
PKST	21.1	224	ePgD	0:31:04.30	0.00
			eSg	31:07.20	-0.04

159.

2010-10-20 time: 8:23:04.72 UTC ML= 1.6  
 lat: 47.439N lon: 18.389E h= 0.0 km  
 erh= 1.3km erz= 143km  
 nr= 6 gap=306 rms=0.09  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	5.2	179	ePgC	8:23:05.70	0.05
			eSg	23:06.20	-0.18
CSKK	12.8	229	ePgC	8:23:07.00	-0.02
			eSg	23:09.00	0.19
PKST	33.4	233	ePg	8:23:10.70	0.00
			eSg	23:15.20	-0.15

160.

2010-10-20 time: 11:02:14.79 UTC ML= 1.8  
 lat: 47.028N lon: 22.213E h= 1.4 km  
 erh= 2.5km erz= 2.5km  
 nr= 12 gap=165 rms=0.48  
 Locality: Romania  
 Comments:

sta	dist	azm	phase	hr mn sec	res
DRGR	46.2	125	iPg	11:02:22.10	-0.93
SIRR	94.5	207	iPgD	11:02:31.80	0.13
CJR	111.3	108	iPgD	11:02:34.50	-0.16
BMR	120.7	54	iPgD	11:02:36.60	0.27
TRPA	125.0	11	iPg	11:02:37.10	-0.01
DEV	137.8	157	iPnD	11:02:38.50	-0.32
ARCR	162.8	88	iPn	11:02:42.40	0.47
BZS	163.4	196	iPn	11:02:41.50	-0.52
GZR	186.8	167	iPn	11:02:45.70	0.77
LOT	212.7	146	iPnD	11:02:49.00	0.84
BURB	236.3	74	iPn	11:02:51.50	0.40
VOIR	281.3	129	iPn	11:02:57.00	0.28

161.

2010-10-27 time: 14:10:28.60 UTC ML= 0.4  
 lat: 47.219N lon: 18.279E h= 0.0 km  
 erh= 2.5km erz= 3.4km  
 nr= 5 gap=260 rms=0.08  
 Locality: Iszkaszentgyörgy  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
CSKK	16.1	355	ePgC	14:10:31.90	-0.09
			eSg	10:34.60	-0.03
PKST	19.1	284	ePg	14:10:32.50	0.05
			eSg	10:35.50	0.04
PKSG	21.0	24	eSg	14:10:36.10	0.10

162.

2010-10-27 time: 18:47:24.99 UTC ML= 0.0  
 lat: 47.360N lon: 18.289E h= 13.7 km  
 erh= 3.5km erz= 0.8km  
 nr= 6 gap=175 rms=0.05  
 Locality: Csókakő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	2.2	280	ePgD	18:47:27.50	0.03
			eSg	47:29.30	-0.11
PKSG	8.5	65	ePgD	18:47:27.90	0.03
			eSg	47:30.10	-0.01
PKST	22.3	240	ePgD	18:47:29.60	-0.06
			eSg	47:33.40	0.09

## Hypocenter Parameters

## Földrengés paraméterek

163.  


---

 2010-10-28 time: 7:52:55.76 UTC ML= 0.9  
 lat: 47.436N lon: 18.389E h= 0.0 km  
 erh= 3.0km erz= 8.8km  
 nr= 6 gap=305 rms=0.08  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	4.9	179	ePgC	7:52:56.70			0.02
			eSg	52:57.30			-0.10
CSKK	12.7	230	ePgC	7:52:58.00			-0.03
			eSg	52:59.70			-0.11
PKST	33.3	234	ePg	7:53:01.70			0.00
			eSg	53:06.60			0.26

164.  


---

 2010-10-28 time: 7:59:02.02 UTC ML= 1.2  
 lat: 47.329N lon: 18.460E h= 0.0 km  
 erh= 1.8km erz= 206km  
 nr= 6 gap=293 rms=0.11  
 Locality: Lovasberény  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	8.7	323	ePgC	7:59:03.60			0.03
			eSg	59:04.20			-0.59
CSKK	15.5	284	ePgD	7:59:04.90			0.11
			eSg	59:07.00			0.04
PKST	33.1	256	ePgC	7:59:07.80			-0.14
			eSg	59:12.60			0.05

165.  


---

 2010-10-30 time: 21:24:49.05 UTC ML= 2.8  
 lat: 48.250N lon: 21.165E h= 0.3 km  
 erh= 2.5km erz= 2.5km  
 nr= 17 gap=114 rms=0.95  
 Locality: Tállya  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr	mn	sec	res
PSZ	101.6	249	ePgD	21:25:06.10			-1.10
			eSg	25:20.60			-0.75
TRPA	103.0	97	ePgD	21:25:06.40			-1.05
			eSg	25:19.30			-2.50
KOLS	111.6	47	ePg	21:25:09.00			0.03
			eSg	25:23.60			-0.91
STHS	129.8	3	ePn	21:25:13.10			0.87
			eSn	25:29.70			-0.62
PKSN	179.4	213	ePn	21:25:19.60			1.19
			eSn	25:41.70			0.39
BMR	185.6	110	iPnD	21:25:20.00			0.81
DRGR	199.6	144	iPnD	21:25:21.50			0.56
PKS7	201.4	228	ePn	21:25:21.90			0.74
			eSn	25:46.00			-0.20
SIRR	223.6	170	iPn	21:25:25.20			1.28
CJR	250.7	133	iPnD	21:25:28.50			1.20
BZS	294.8	173	iPn	21:25:33.70			0.90
BURB	310.9	103	iPnD	21:25:35.20			0.39
MORC	314.7	303	iPnD	21:25:36.20			0.91
GZR	340.6	159	iPn	21:25:39.30			0.79
LOT	369.5	147	iPnD	21:25:42.10			-0.02
DOPR	408.9	128	iPn	21:25:47.60			0.57
ARR	415.7	140	iPnD	21:25:47.80			-0.08

166.  


---

 2010-11-05 time: 10:05:03.25 UTC ML= 1.6  
 lat: 48.523N lon: 20.277E h= 0.0 km  
 erh= 3.1km erz= 801km  
 nr= 8 gap=167 rms=0.57  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
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PSZ	73.0	203	ePgD	10:05:16.30			0.01
			eSg	05:26.10			-0.37
LANS	91.6	320	ePg	10:05:20.60			0.99
			eSg	05:31.60			-0.78
VYHS	106.5	268	ePg	10:05:22.70			0.42
			eSg	05:34.80			-2.31
STHS	122.0	35	ePg	10:05:24.90			-0.14
			eSg	05:41.60			-0.43

167.  


---

 2010-11-11 time: 9:07:10.23 UTC ML= 1.4  
 lat: 47.463N lon: 18.368E h= 0.0 km  
 erh= ---km erz= ---km  
 nr= 4 gap=300 rms=0.10  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	8.1	168	ePgC	9:07:11.80			0.12
			eSg	07:12.70			-0.11
CSKK	13.7	216	eSg	9:07:14.60			0.00
PKST	33.9	228	ePg	9:07:16.20			-0.09

168.  


---

 2010-11-11 time: 9:13:03.63 UTC ML= 1.7  
 lat: 47.398N lon: 18.352E h= 0.0 km  
 erh= 2.6km erz= 642km  
 nr= 8 gap=136 rms=0.46  
 Locality: Gánt  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	3.0	103	ePgC	9:13:03.80			-0.37
			eSg	13:04.80			0.22
CSKK	7.9	241	ePg	9:13:05.10			0.05
			eSg	13:06.70			0.55
PKST	28.5	237	ePgC	9:13:08.90			0.17
			eSg	13:11.60			-1.11
VYHS	127.1	17	ePg	9:13:27.00			0.66
			eSg	13:43.50			-0.55

169.  


---

 2010-11-12 time: 11:19:49.26 UTC ML= 0.4  
 lat: 47.206N lon: 18.274E h= 0.0 km  
 erh= 4.4km erz= 369km  
 nr= 5 gap=265 rms=0.17  
 Locality: Csór  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
CSKK	17.5	357	ePgC	11:19:52.50			0.12
			ePgD	11:19:52.80			0.14
PKST	19.1	288	eSg	19:55.00			-0.32
			ePgC	11:19:53.10			-0.17
PKSG	22.5	23	eSg	19:56.50			0.10

170.  


---

 2010-11-15 time: 9:38:48.62 UTC ML= 1.7  
 lat: 48.362N lon: 19.804E h= 0.0 km  
 erh= 2.0km erz= 3.4km  
 nr= 8 gap=130 rms=0.29  
 Locality: Slovakia  
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PSZ	49.8	172	ePgD	9:38:57.40			-0.11
			eSg	39:04.40			-0.05
VYHS	73.1	282	ePg	9:39:01.90			0.23
			eSg	39:11.40			-0.45
LANS	91.1	344	ePg	9:39:05.30			0.41
			eSg	39:16.90			-0.68
STHS	157.8	42	ePn	9:39:15.60			0.27
			eSn	39:35.90			-0.27



## Földrengés paraméterek

## Hypocenter Parameters

171.  


---

 2010-11-16 time: 7:03:00.34 UTC ML= 0.3  
 lat: 47.278N lon: 18.328E h= 0.0 km  
 erh= 3.0km erz= 502km  
 nr= 6 gap=244 rms=0.30  
 Locality: Magyaralmás  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
CSKK	10.7	332	ePgC	7:03:02.60	0.35
			eSg	03:03.60	-0.14
PKSG	13.5	21	ePgC	7:03:02.60	-0.14
			eSg	03:04.40	-0.22
PKST	22.3	264	ePgC	7:03:04.60	0.27
			eSg	03:06.80	-0.64

172.  


---

 2010-11-17 time: 12:25:02.87 UTC ML= 0.5  
 lat: 47.232N lon: 18.257E h= 10.0 km  
 erh= 6.1km erz= 7.3km  
 nr= 6 gap=250 rms=0.09  
 Locality: Iszkaszentgyörgy  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	14.6	1	ePgD	12:25:06.10	0.08
			eSg	25:08.10	-0.38
PKST	17.1	280	ePgC	12:25:06.40	0.00
			eSg	25:09.20	0.04
PKSG	20.4	30	ePgC	12:25:06.90	-0.03
			eSg	25:10.10	0.00

173.  


---

 2010-11-17 time: 21:53:24.98 UTC ML= 0.4  
 lat: 47.225N lon: 18.229E h= 0.1 km  
 erh= 1.5km erz= 183km  
 nr= 6 gap=251 rms=0.22  
 Locality: Iszkaszentgyörgy  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	15.2	284	ePgD	21:53:27.80	0.11
			eSg	53:29.40	-0.40
CSKK	15.6	9	ePgD	21:53:27.80	0.04
			eSg	53:29.60	-0.32
PKSG	22.2	33	ePgD	21:53:29.20	0.25
			eSg	53:31.90	-0.15

174.  


---

 2010-11-18 time: 7:45:27.01 UTC ML= 1.2  
 lat: 47.441N lon: 18.369E h= 0.0 km  
 erh= 3.5km erz= 429km  
 nr= 6 gap=292 rms=0.26  
 Locality: Oroszlány  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	5.7	163	ePgC	7:45:28.00	-0.03
			eSg	45:28.60	-0.22
CSKK	11.9	224	ePgC	7:45:29.30	0.16
			eSg	45:31.20	0.40
PKST	32.4	231	ePgC	7:45:32.80	0.01
			eSg	45:36.60	-0.70

175.  


---

 2010-11-18 time: 7:50:48.41 UTC ML= 1.3  
 lat: 47.443N lon: 18.409E h= 0.0 km  
 erh= 2.1km erz= 228km  
 nr= 5 gap=319 rms=0.10  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
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PKSG	5.9	193	ePgC	7:50:49.50	0.04
			eSg	50:50.20	-0.08
CSKK	14.3	231	ePgC	7:50:50.90	-0.06
			eSg	50:52.90	-0.05
PKST	34.9	234	eSg	7:50:59.80	0.29

176.  


---

 2010-11-18 time: 11:10:17.63 UTC ML= 0.6  
 lat: 47.215N lon: 18.289E h= 8.8 km  
 erh= 2.0km erz= 2.3km  
 nr= 5 gap=174 rms=0.07  
 Locality: Iszkaszentgyörgy  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	16.6	352	ePgC	11:10:20.90	-0.08
			eSg	10:23.70	0.10
PKST	19.9	284	ePgC	11:10:21.50	-0.02
			eSg	10:24.60	0.04
PKSM	114.8	166	eSn	11:10:53.70	0.08

177.  


---

 2010-11-19 time: 15:26:55.62 UTC ML= 0.7  
 lat: 47.536N lon: 18.461E h= 10.0 km  
 erh=21.6km erz=24.6km  
 nr= 6 gap=332 rms=0.27  
 Locality: Szárliget  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	16.9	198	ePgD	15:26:58.90	-0.23
			eSg	27:02.20	0.34
CSKK	24.5	218	ePgC	15:27:00.20	-0.14
			eSg	27:03.80	-0.23
PKST	44.6	226	ePgD	15:27:04.20	0.42
			eSg	27:10.00	-0.15

178.  

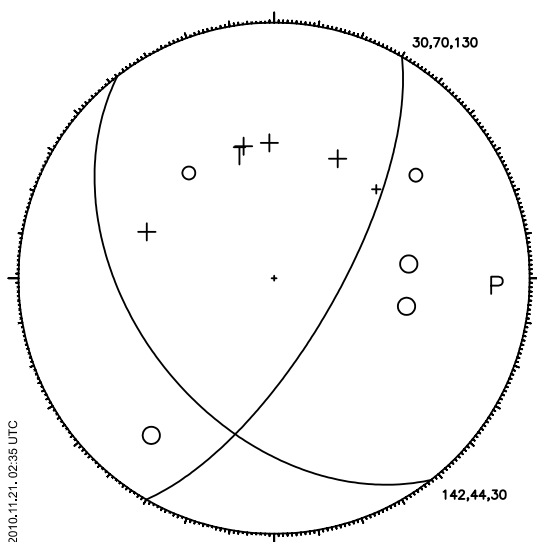

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 2010-11-21 time: 2:35:07.64 UTC ML= 2.4  
 lat: 46.048N lon: 18.456E h= 10.0 km  
 erh= 2.5km erz= 2.0km  
 nr= 28 gap= 66 rms=0.73  
 Locality: Máriakémed  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr mn sec	res
PKSM	23.2	38	ePgD	2:35:12.20	0.05
			eSg	35:15.40	-0.27
PKS6	105.1	54	eP*D	2:35:25.60	-0.84
			eS*	35:41.00	-0.11
BEHE	137.9	290	ePnC	2:35:30.70	0.12
			eSn	35:47.30	-1.18
PKST	138.5	347	ePnC	2:35:30.90	0.24
			eSn	35:49.00	0.38
PKSN	143.7	49	ePnC	2:35:32.80	1.48
			eSn	35:52.00	2.21
CSKK	147.0	354	ePn	2:35:32.20	0.47
			eSn	35:49.20	-1.31
PKSG	149.5	358	ePnC	2:35:32.10	0.06
			eSn	35:49.00	-2.07
BUD	165.4	15	eSn	2:35:56.50	1.90
BLY	171.9	215	iPn	2:35:35.20	0.37
KOGS	175.9	285	iPn	2:35:34.90	-0.42
SOP	232.4	321	ePnD	2:35:42.80	0.43
			eSn	36:08.10	-1.37
GROS	232.4	281	iPn	2:35:41.80	-0.58
			iSn	36:06.70	-2.77
PSZ	235.0	28	ePnC	2:35:41.90	-0.80
DIVS	248.1	151	iPn	2:35:44.50	0.17
SIRR	248.6	84	iPnD	2:35:47.10	2.70
BZS	250.2	101	iPn	2:35:44.20	-0.39
ARSA	261.4	301	iPn	2:35:46.60	0.62
VYHS	273.5	6	ePn	2:35:48.10	0.60
			eSn	36:15.90	-2.69
DRGR	337.4	76	iPn	2:35:56.30	0.84
GZR	344.1	102	iPnD	2:35:55.70	-0.60

## Hypocenter Parameters

OKC	422.0	357	eSn	2:36:49.40	-2.15
KRLC	464.9	344	ePn	2:36:13.30	1.93
			eSn	37:00.10	-0.97
KHC	502.2	313	ePn	2:36:18.10	2.09
			eSn	37:08.30	-1.04
DPC	504.1	342	ePn	2:36:17.30	1.06



179.

2010-11-21 time: 4:55:15.29 UTC ML= 1.3  
 lat: 47.766N lon: 18.069E h= 10.0 km  
 erh= 3.3km erz= 3.4km  
 nr= 9 gap=291 rms=0.32  
 Locality: Komárom  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	47.0	162	ePgC	4:55:23.90	0.02
			eSg	55:30.70	0.13
PKSG	48.1	150	ePgD	4:55:24.50	0.43
			eSg	55:31.30	0.39
PKST	56.4	183	ePgD	4:55:25.50	-0.02
			eSg	55:32.80	-0.70
BUD	78.3	114	eSg	4:55:40.10	-0.28
PKSM	178.1	166	ePnC	4:55:43.10	-0.16
			eSn	56:07.30	2.22

180.

2010-11-22 time: 7:50:37.58 UTC ML= 0.8  
 lat: 47.078N lon: 18.031E h= 10.0 km  
 erh=30.2km erz=53.6km  
 nr= 5 gap=323 rms=0.35  
 Locality: Balatonfűzfő  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	20.1	1	ePgC	7:50:41.50	-0.09
			eSg	50:44.70	-0.02
CSKK	36.2	29	eSg	7:50:50.10	0.59
PKSG	44.3	38	ePgC	7:50:45.80	0.11
			eSg	50:51.40	-0.61

181.

2010-11-23 time: 8:49:50.72 UTC ML= 1.2  
 lat: 47.453N lon: 18.382E h= 0.0 km  
 erh= 1.9km erz= 235km  
 nr= 6 gap=304 rms=0.14  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
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## Földrengés paraméterek

PKSG	6.8	174	ePgC	8:49:51.90	-0.03
			eSg	49:52.80	-0.08
CSKK	13.5	223	ePgD	8:49:53.20	0.06
			eSg	49:55.30	0.28
PKST	34.0	231	ePg	8:49:56.80	0.02
			eSg	50:01.20	-0.32

182.

2010-11-23 time: 8:50:06.77 UTC ML= 1.2  
 lat: 47.336N lon: 18.486E h= 0.0 km  
 erh= 2.3km erz= 277km  
 nr= 6 gap=305 rms=0.17  
 Locality: Lovasberény  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	9.5	311	ePgC	8:50:08.50	0.03
			eSg	50:09.50	-0.29
CSKK	17.3	280	ePgC	8:50:09.80	-0.06
			eSg	50:12.60	0.33
PKST	35.2	256	ePg	8:50:13.20	0.14
			eSg	50:17.80	-0.16

183.

2010-11-25 time: 8:14:35.20 UTC ML= 1.1  
 lat: 47.451N lon: 18.374E h= 0.0 km  
 erh= 2.9km erz= 363km  
 nr= 6 gap=299 rms=0.22  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	6.7	169	ePgC	8:14:36.50	0.09
			eSg	14:37.10	-0.25
CSKK	13.0	221	ePgC	8:14:37.80	0.27
			eSg	14:39.20	-0.14
PKST	33.4	230	ePgC	8:14:40.90	-0.27
			eSg	14:46.00	0.18

184.

2010-11-25 time: 8:15:11.95 UTC ML= 1.0  
 lat: 47.463N lon: 18.399E h= 0.0 km  
 erh= 3.1km erz= 368km  
 nr= 6 gap=314 rms=0.22  
 Locality: Várgesztes  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.0	185	ePgC	8:15:13.60	0.22
			eSg	15:14.30	-0.19
CSKK	15.3	223	ePgC	8:15:14.90	0.21
			eSg	15:16.80	-0.02
PKST	35.7	231	ePgC	8:15:18.00	-0.34
			eSg	15:23.30	-0.01

185.

2010-11-25 time: 8:20:37.56 UTC ML= 1.5  
 lat: 47.324N lon: 18.432E h= 0.0 km  
 erh= 2.4km erz= 323km  
 nr= 6 gap=279 rms=0.19  
 Locality: Zámoly  
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	8.1	337	ePgC	8:20:38.90	-0.11
			eSg	20:39.90	-0.24
CSKK	13.7	288	ePgC	8:20:40.20	0.20
			eSg	20:42.20	0.30
PKST	31.0	256	ePgC	8:20:43.10	0.02
			eSg	20:47.10	-0.29

## Földrengés paraméterek

## Hypocenter Parameters

186.

---

2010-11-29 time: 12:44:23.13 UTC ML= 1.5  
 lat: 46.822N lon: 18.002E h= 10.0 km  
 erh= 2.8km erz= 2.0km  
 nr= 5 gap=344 rms=0.64  
 Locality: Balatonendréd  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PKST	48.6	3	ePgC	12:44:32.20			0.20
			eSg	44:38.30			-0.61
CSKK	63.3	18	ePg	12:44:35.30			0.73
			eSg	44:43.40			-0.09
VYHS	196.2	19	ePn	12:44:51.80			-1.55
			eSn	45:11.70			-5.22

187.

---

2010-12-09 time: 20:15:35.30 UTC ML= 0.3  
 lat: 47.375N lon: 18.257E h= 8.7 km  
 erh= 3.3km erz= 1.6km  
 nr= 7 gap=246 rms=0.20  
 Locality: Mór  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	1.4	169	ePgC	20:15:36.80			-0.08
			eSg	15:37.20			-0.90
PKST	21.2	232	ePgC	20:15:39.40			0.00
			eSg	15:42.50			-0.10
SUKH	31.0	119	ePg	20:15:41.40			0.36
			eSg	15:45.40			-0.12
PKSM	132.7	167	eSn	20:16:15.10			-0.18

188.

---

2010-12-10 time: 7:45:06.46 UTC ML= 0.6  
 lat: 47.345N lon: 18.310E h= 10.0 km  
 erh= 2.5km erz= 2.3km  
 nr= 6 gap=177 rms=0.16  
 Locality: Csákbéreny  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	4.3	299	ePgD	7:45:08.40			0.00
			eSg	45:09.90			-0.01
PKST	22.9	245	ePgD	7:45:10.80			-0.12
			eSg	45:14.50			0.10
SUKH	25.8	116	ePg	7:45:11.70			0.30
			eSg	45:15.00			-0.26

189.

---

2010-12-11 time: 13:52:43.69 UTC ML= 0.6  
 lat: 47.342N lon: 18.171E h= 10.0 km  
 erh= 2.0km erz= 1.8km  
 nr= 6 gap=202 rms=0.13  
 Locality: Balinka  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
CSKK	7.2	70	ePgC	13:52:46.00			0.11
			eSg	52:47.50			-0.10
PKST	13.8	228	ePgD	13:52:46.80			0.06
			eSg	52:49.00			-0.12
SUKH	35.4	108	ePgC	13:52:50.10			-0.17
			eSg	52:55.60			0.20

190.

---

2010-12-14 time: 17:38:17.44 UTC ML= 2.5  
 lat: 48.035N lon: 20.864E h= 0.6 km  
 erh= 3.3km erz= 3.1km  
 nr= 15 gap= 60 rms=0.98  
 Locality: Sajópetri  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PSZ	73.5	260	ePgC	17:38:30.10			-0.47
			eSg	38:39.40			-1.40
TRPA	125.3	85	ePgC	17:38:39.90			0.09
			eSg	38:55.90			-1.37
KOLS	144.4	46	ePn	17:38:43.60			1.20
			eSn	39:00.30			-1.57
PKSN	147.1	211	eSn	17:39:03.70			1.23
STHS	156.2	10	ePn	17:38:45.70			1.82
			eSn	39:04.50			0.00
LANS	161.2	320	ePn	17:38:44.90			0.39
			eSn	39:03.60			-2.02
PKS7	168.8	229	eSn	17:39:08.80			1.51
DRGR	196.3	135	iPn	17:38:48.50			-0.38
SIRR	205.5	163	iPnD	17:38:49.70			-0.33
PKSM	263.6	220	ePn	17:38:55.70			-1.57
			eSn	39:23.60			-4.74
GZR	328.0	154	iPn	17:39:06.00			0.70

191.

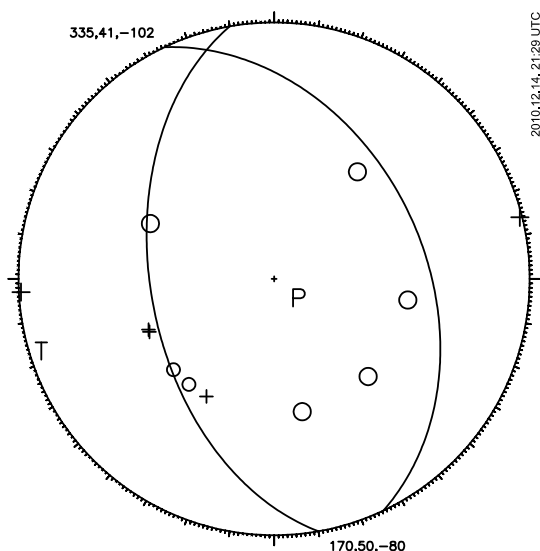
---

2010-12-14 time: 21:29:03.69 UTC ML= 2.8  
 lat: 48.075N lon: 20.855E h= 1.3 km  
 erh= 3.1km erz= 2.4km  
 nr= 23 gap=115 rms=0.86  
 Locality: Felsőzsolca  
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr	mn	sec	res
PSZ	73.8	256	ePgC	21:29:16.40			-0.46
			eSg	29:25.60			-1.53
TRPA	125.6	87	ePgC	21:29:25.90			-0.22
			eSg	29:43.80			0.18
KOLS	141.7	48	ePn	21:29:28.10			-0.12
			eSn	29:46.10			-1.26
PKSN	150.7	210	ePnC	21:29:30.10			0.77
			eSn	29:50.10			0.76
STHS	151.9	11	ePn	21:29:31.90			2.41
			eSn	29:50.60			0.99
BUD	152.2	244	ePn	21:29:30.80			1.28
			eSn	29:48.70			-0.98
PKS7	171.2	228	ePnD	21:29:32.60			0.70
			eSn	29:53.80			-0.10
BMR	202.7	103	iPn	21:29:35.20			-0.62
CSKK	210.1	248	ePnC	21:29:36.90			0.15
			eSn	30:04.40			1.86
KWP	220.1	38	iPnD	21:29:39.20			1.21
PKST	230.5	247	ePnC	21:29:38.90			-0.38
			eSn	30:05.40			-1.65
CJR	256.6	126	iPn	21:29:41.30			-1.24
PKSM	266.7	219	ePnD	21:29:42.20			-1.60
			eSn	30:09.70			-5.39
BZS	279.4	168	iPnD	21:29:44.80			-0.59
BURB	330.5	99	iPnD	21:29:52.20			0.44
GZR	332.4	154	iPn	21:29:52.00			0.01
VRAC	342.4	294	iPnD	21:29:52.80			-0.44
DPC	416.0	307	ePn	21:30:03.40			0.98
			eSn	30:45.50			-2.74
ARR	417.2	136	iPnD	21:30:02.70			0.12
KHC	549.4	282	ePn	21:30:19.30			0.25

## Hypocenter Parameters

## Földrengés paraméterek



192.

2010-12-14 time: 21:32:48.83 UTC ML= 2.0  
 lat: 48.114N lon: 20.816E h= 2.4 km  
 erh= 4.7km erz= 3.7km  
 nr= 8 gap=130 rms=0.70  
 Locality: Felsőzsolca  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	72.1	252	ePgC	21:33:01.70	-0.02
			eSg	33:11.20	-0.57
TRPA	128.3	89	ePn	21:33:11.40	-0.15
			eSn	33:27.80	-1.47
LANS	152.2	319	ePn	21:33:16.90	2.37
			eSn	33:34.40	-0.17
PKSN	153.1	208	eSn	21:33:35.00	0.23
PKS7	172.0	226	eSn	21:33:39.10	0.12

193.

2010-12-14 time: 23:07:22.85 UTC ML= 2.6  
 lat: 48.092N lon: 20.821E h= 1.6 km  
 erh= 5.4km erz= 5.2km  
 nr= 16 gap= 64 rms=1.15  
 Locality: Szirma  
 Comments: felt

sta	dist	azm	phase	hr mn sec	res
PSZ	71.8	254	ePgC	23:07:35.60	-0.07
			eSg	07:45.10	-0.57
TRPA	128.0	88	ePnC	23:07:44.50	-1.14
			eSn	08:01.60	-1.82
KOLS	142.4	49	ePn	23:07:47.40	-0.03
			eSn	08:04.80	-1.81
STHS	150.6	12	ePn	23:07:50.90	2.44
			eSn	08:10.10	1.67
PKSN	151.0	208	eSn	23:08:09.00	0.47
PKS7	170.6	227	ePn	23:07:49.60	-1.35
			eSn	08:13.00	0.13
BMR	205.5	103	iPn	23:07:56.90	1.59
KWP	220.2	39	iPnD	23:07:57.40	0.26
PKSM	266.5	218	iPn	23:08:04.30	1.39
OKC	275.7	315	ePn	23:08:05.30	1.24
BZS	281.8	168	iPn	23:08:07.00	2.19
BURB	333.2	99	iPnD	23:08:11.50	0.27
GZR	335.1	154	iPn	23:08:11.50	0.03

194.

2010-12-18 time: 21:22:13.71 UTC ML= 1.0  
 lat: 47.147N lon: 17.748E h= 6.4 km  
 erh= 9.2km erz= 9.3km  
 nr= 8 gap=272 rms=0.46  
 Locality: Herend  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	25.0	60	ePgD	21:22:17.90	-0.42
			eSg	22:22.40	0.49
CSKK	45.6	58	ePg	21:22:21.40	-0.53
			eSg	22:29.30	0.95
SUKH	66.6	81	ePg	21:22:26.20	0.53
			eSg	22:34.80	-0.19
PKSM	124.4	147	ePnC	21:22:35.70	0.26
			eSn	22:52.30	-0.09

195.

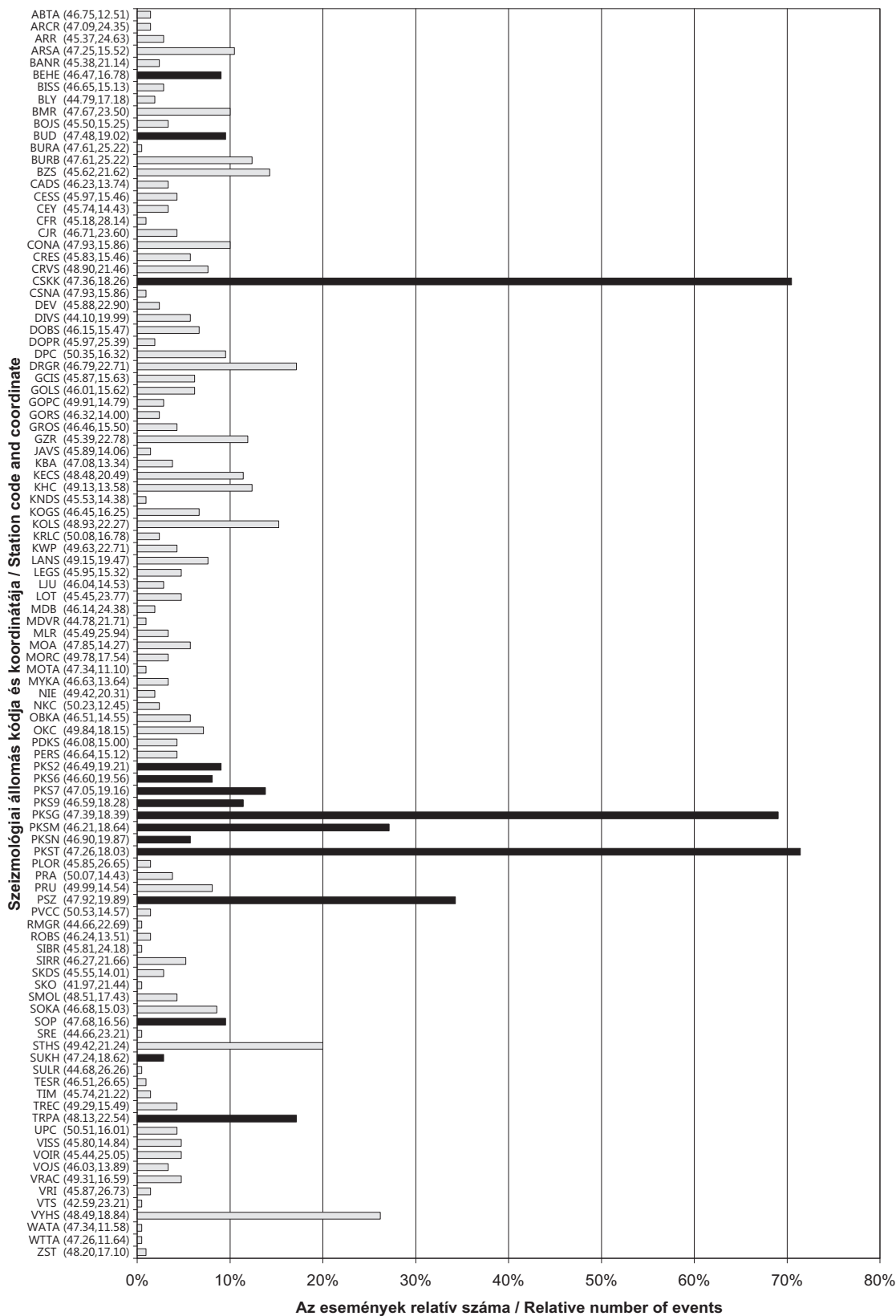
2010-12-31 time: 2:29:09.30 UTC ML= 0.6  
 lat: 47.620N lon: 17.979E h= 15.1 km  
 erh= 3.2km erz= 1.4km  
 nr= 8 gap=317 rms=0.24  
 Locality: Bábolna  
 Comments:

sta	dist	azm	phase	hr mn sec	res
CSKK	35.6	143	ePg	2:29:16.00	-0.20
			eSg	29:21.90	0.31
PKST	40.4	174	ePgC	2:29:17.00	0.00
			eSg	29:23.10	0.09
SUKH	63.8	131	ePg	2:29:21.40	0.38
			eSg	29:29.60	-0.55
PKSM	164.5	162	ePnD	2:29:35.00	0.08
			eSn	29:54.50	-0.40

196.

2010-12-31 time: 6:44:24.50 UTC ML= 0.9  
 lat: 47.506N lon: 17.937E h= 6.6 km  
 erh= 2.3km erz= 5.5km  
 nr= 7 gap=315 rms=0.27  
 Locality: Kerékteleki  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKST	28.5	165	ePgC	6:44:29.80	0.08
			eSg	44:33.50	-0.28
CSKK	29.1	123	ePgD	6:44:29.80	-0.03
			eSg	44:33.80	-0.19
SUKH	59.1	120	ePg	6:44:35.00	-0.12
			eSg	44:43.80	0.40
PKSM	153.6	160	ePn	6:44:52.10	2.26



3.4. ábra Az egyes állomások részvétele a hipocentrum meghatározásban

Figure 3.4. Contribution of individual stations to the hypocenter determination

## 4.

### JELENTŐS FÖLDRENGÉSEK 2010-BEN (Magyarországon érezhető földrengések)

2010. február 8.	–	Várda
2010. május 25.	–	Újszilvás
2010. június 21.	–	Bábolna
2010. augusztus 14.	–	Miskolc
2010. augusztus 17.	–	Csányoszró
2010. augusztus 17.	–	Miskolc
2010. augusztus 17.	–	Sellye
2010. augusztus 19.	–	Miskolc
2010. augusztus 19.	–	Kistokaj
2010. augusztus 26.	–	Körmend
2010. augusztus 31.	–	Diósd
2010. október 30.	–	Tállya
2010. november 21.	–	Máriakéménd
2010. december 14.	–	Felsőzsolca

#### **A MAKROSZEIZMIKUS INTENZITÁS MEGHATÁROZÁSA**

A földrengés érezhető és az épített környezetben okozott hatásainak felmérése kérdőívek segítségével történt. Az összegyűjtött válaszok alapján került meghatározásra az intenzitás értéke (Zsíros et al, 1990 és Zsíros, 1994).

Az intenzitás leírása az *Európai Makroszeizmikus Skála (EMS)* szerint történik, mely részletesen megtalálható Grünthal (1998) munkájában. (*A Melléklet*)

## 4.

### SIGNIFICANT EARTHQUAKES IN 2010 (Earthquakes felt in Hungary)

8 February 2010	–	Várda
25 May 2010	–	Újszilvás
21 June 2010	–	Bábolna
14 August 2010	–	Miskolc
17 August 2010	–	Csányosrót
17 August 2010	–	Miskolc
17 August 2010	–	Sellye
19 August 2010	–	Miskolc
19 August 2010	–	Kistokaj
26 August 2010	–	Körmend
31 August 2010	–	Diósd
30 October 2010	–	Tállya
21 November 2010	–	Máriakéménd
14 December 2010	–	Felsőzsolca

#### **METHOD USED FOR ESTIMATION OF INTENSITY**

The earthquake effects (macroseismic observations) were evaluated by questionnaires. Based on these reports the intensity values were estimated by a computer algorithm (Zsíros et al, 1990 and Zsíros, 1994).

The assigned intensities correspond to the *European Macroseismic Scale 1998 (EMS)* edited by Grünthal (1998). (APPENDIX A)

**2010. február 8. - Várda / 8 February 2010 - Várda****FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/02/08
Kipattanási idő / Origin Time:	15:26:16.66 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.496 N 17.645 E (S.D. 2.8 km)
Mélység / Depth:	16.5 km (S.D. 2.4 km)
Magnitúdó / Magnitude:	2.7 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

**LEÍRÁS**

Február 8-án koradélután 2.7  $M_L$  magnitúdójú földrengés keletkezett Somogy megyében, Kaposvár környékén. A rengés intenzitása 5 EMS fokra becsülhető az epicentrum térségében, Várda, Somogyjád, Somogysárd településeken. A rengés kb. 350 km<sup>2</sup> területen volt érezhető.

Az esemény szeizmogramja a 4.1. ábrán látható.

A rengés intenzitás eloszlását a 4.1. táblázat tartalmazza és a 4.2. ábra mutatja.

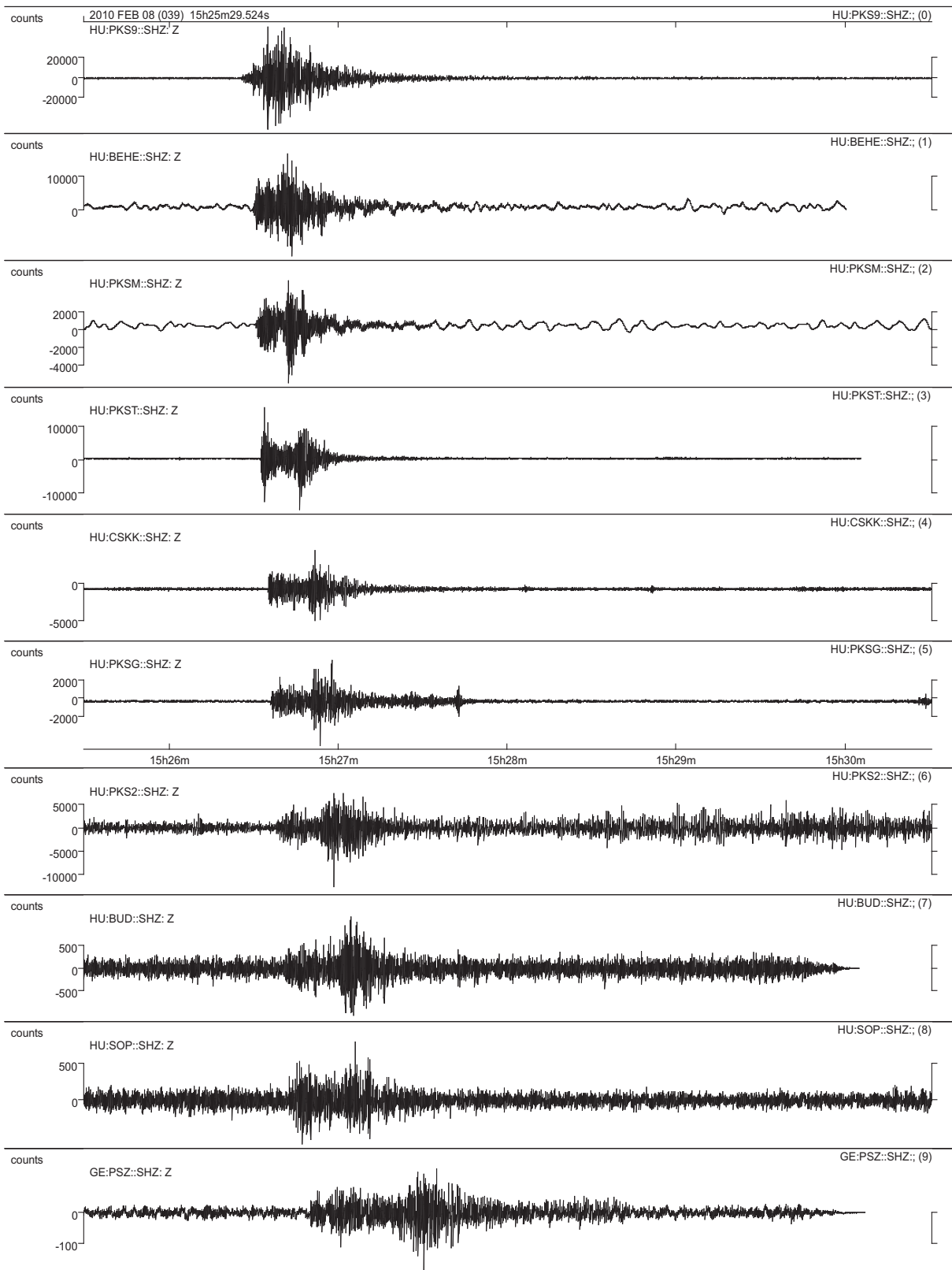
**DISCUSSION**

On early afternoon of February 8<sup>th</sup>, a 2.7  $M_L$  magnitude earthquake was reported from Somogy County near Kaposvár. The shock was felt in an area of about 350 km<sup>2</sup> and produced reports of 5 EMS in a few villages (Várda, Somogyjád, Somogysárd) in the epicenter.

Seismograms of the event are shown in Figure 4.1.

The intensity distribution of the event is shown in Table 4.1 and Figure 4.2.





4.1. ábra A 2010. február 8-i, várdai földrengés (15:26 UTC) szeizmogramjai

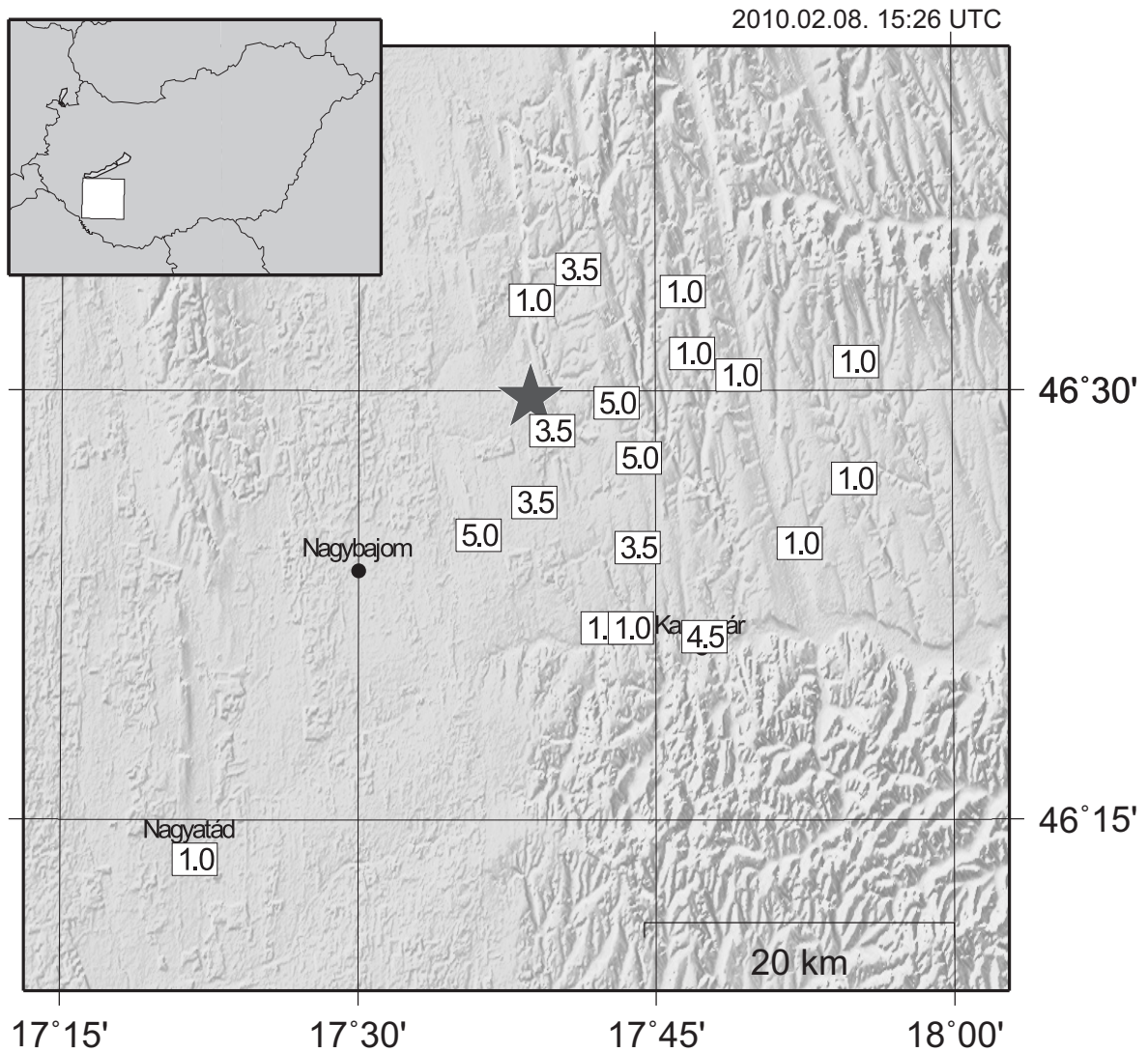
Figure 4.1. Seismograms of the Várda earthquake 8<sup>th</sup> February 2009 (15:26 UTC)

**4.1. Táblázat**

A 2010. február 8-i, várdai földrengés (15:26 UTC) intenzitás eloszlása

**Table 4.1.**Intensity distribution of the Várda earthquake 8<sup>th</sup> February 2010 (15:26 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Bodrog	46.477	17.663	3.5	38%	1
2	Juta	46.409	17.735	3.5	39%	1
3	Mernye	46.509	17.820	1.0	0%	1
4	Kaposmérő	46.362	17.706	1.0	0%	1
5	Kaposújlak	46.362	17.729	1.0	0%	1
6	Kaposvár	46.357	17.791	4.5	33%	3
7	Mezőcsokonya	46.435	17.648	3.5	36%	1
8	Nagyatád	46.227	17.363	1.0	0%	1
9	Orci	46.411	17.871	1.0	0%	1
10	Pamuk	46.553	17.646	1.0	0%	1
11	Patalom	46.449	17.917	1.0	0%	1
12	Polány	46.558	17.773	1.0	0%	1
13	Rákosi	46.517	17.919	1.0	0%	1
14	Somogygeszti	46.522	17.781	1.0	0%	1
15	Somogyjád	46.493	17.717	5.0	48%	2
16	Somogyárd	46.416	17.601	5.0	25%	1
17	Somogyvámos	46.571	17.685	3.5	36%	1
18	Várda	46.461	17.736	5.0	26%	2



**4.2. ábra** A 2010. február 8-i, várdai földrengés (15:26 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.2.** Intensity distribution of the Várda earthquake 8<sup>th</sup> February 2010 (15:26 UTC) (star - instrumental epicentre)

**2010. május 25. - Újszilvás / 25 May 2010 - Újszilvás****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/05/25
Kipattanási idő / Origin Time:	6:55:28.38 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.286 N 19.943 E (S.D. 2.6 km)
Mélység / Depth:	14.9 km (S.D. 2.3 km)
Magnitúdó / Magnitude:	3.1 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	5 EMS

**LEÍRÁS**

Május 25-én reggel 3.1 M<sub>L</sub> magnitúdójú földrengés pattant ki a Jászságban, Újszilvás környékén. A rengés csak nagyon kis területen volt érezhető, de Újszilváson az intenzitása 5 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.3. ábrán látható.

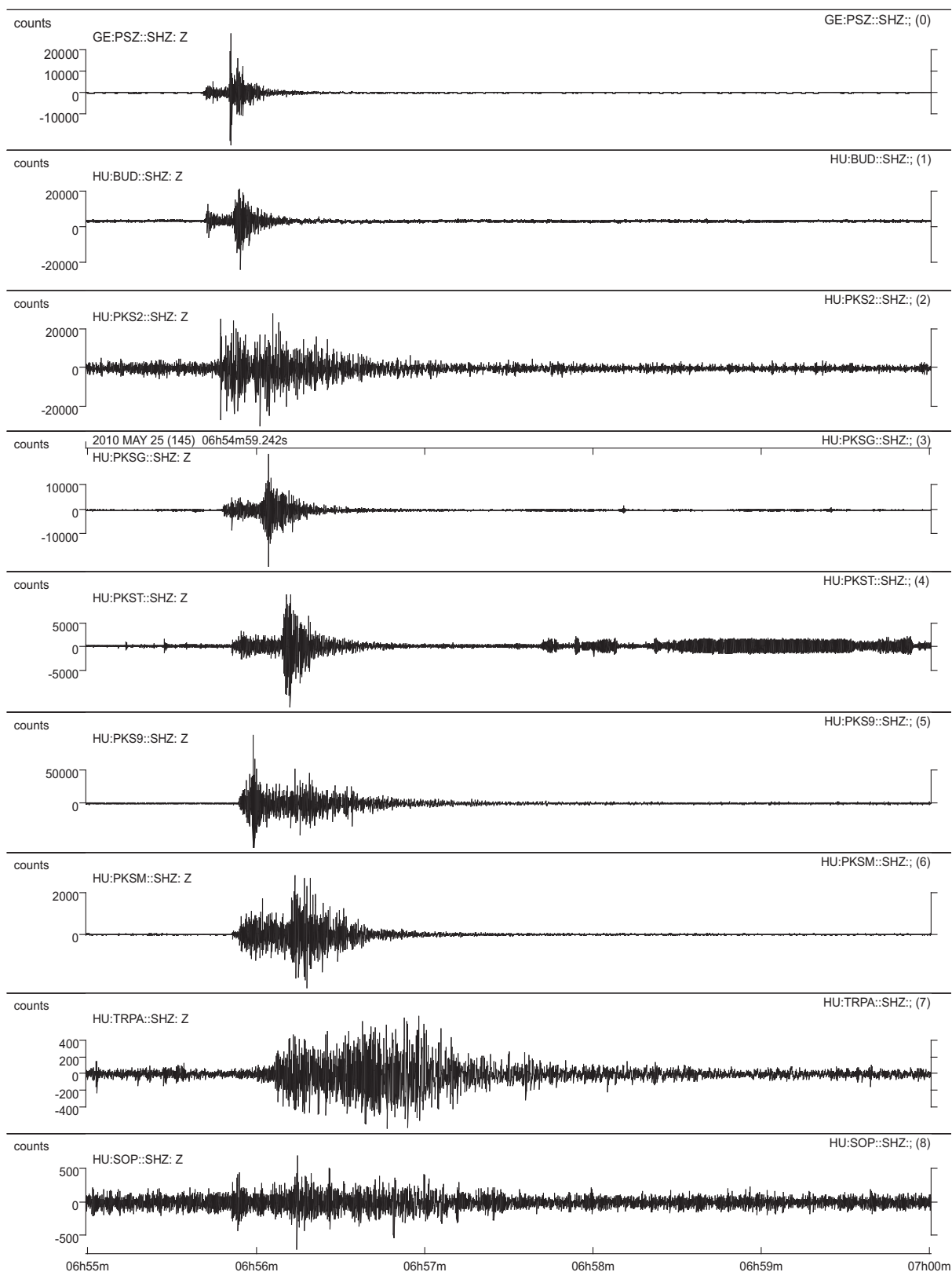
A rengés intenzitás eloszlását a 4.2. táblázat tartalmazza és a 4.4. ábra mutatja.

**DISCUSSION**

On May 25<sup>th</sup> morning, an earthquake of 3.1 M<sub>L</sub> was detected in the Jászság region near to Újszilvás. The shock was felt only in a small area but 5 EMS was reported from Újszilvás.

Seismograms of the event are shown in Figure 4.3.

The intensity distribution of the event is shown in Table 4.2 and Figure 4.4.



4.3. ábra A 2010. május 25-i, újszilvási földrengés (06:55 UTC) szeizmogramjai

Figure 4.3. Seismograms of the Újszilvás earthquake 25 May 2010 (06:55 UTC)

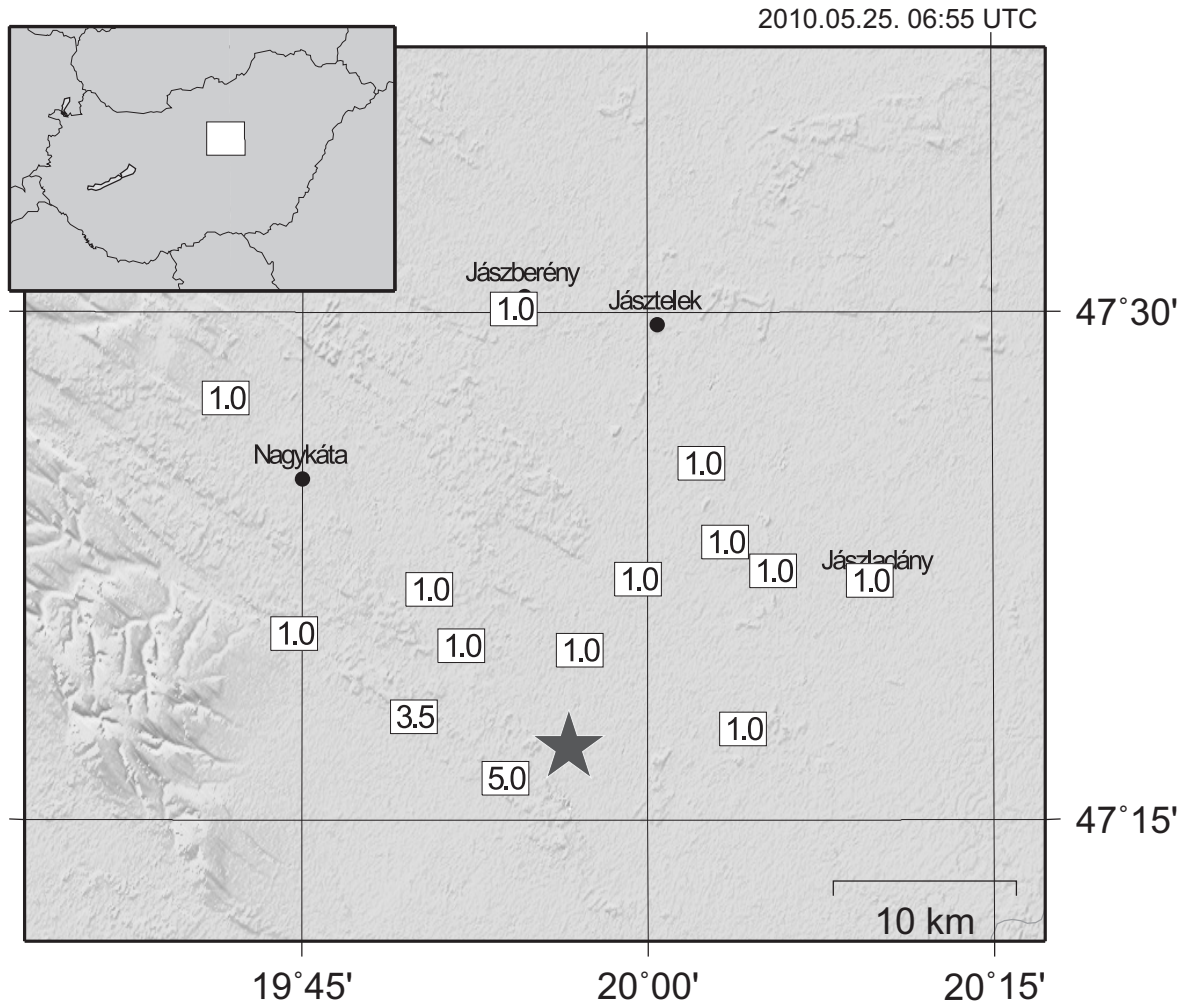
**4.2. Táblázat**

A 2010. május 25-i, újszilvási földrengés (06:55 UTC) intenzitás eloszlása

**Table 4.2.**

Intensity distribution of the Újszilvás earthquake 25<sup>th</sup> May 2010 (06:55 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Alattyan	47.426	20.039	1.0	0%	2
2	Farmos	47.364	19.842	1.0	0%	1
3	Jánoshida	47.387	20.056	1.0	0%	1
4	Jászsószentgyörgy	47.373	20.091	1.0	0%	1
5	Jászberény	47.502	19.903	1.0	0%	1
6	Jászboldogháza	47.369	19.993	1.0	0%	2
7	Jászladány	47.368	20.161	1.0	0%	1
8	Szentmártonkáta	47.458	19.694	1.0	0%	1
9	Tápiógyörgye	47.334	19.951	1.0	0%	2
10	Tápiószele	47.336	19.865	1.0	0%	1
11	Tápiószentmárton	47.342	19.744	1.0	0%	1
12	Tápiószőlős	47.301	19.831	3.5	36%	2
13	Újszász	47.295	20.069	1.0	0%	2
14	Újszilvás	47.271	19.897	5.0	41%	3



**4.4. ábra** A 2010. május 25-i, újszilvási földrengés (06:55 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.4.** Intensity distribution of the Újszilvás earthquake 25<sup>th</sup> May 2010 (06:55 UTC) (star - instrumental epicentre)

**2010. június 21. - Bábolna / 21 June 2010 - Bábolna****FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/06/21
Kipattanási idő / Origin Time:	21:03:22.1 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.618 N 17.940 E (S.D. 5.3 km)
Mélység / Depth:	14.9 km (S.D. 1.6 km)
Magnitúdó / Magnitude:	2.0 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4 EMS

**LEÍRÁS**

Egy 2.0 M<sub>L</sub> magnitúdójú földrengés éppen elérte az érezhetőséget Bábolnán június 21-én este. A rengés epicentrális intenzitása 4 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.5. ábrán látható.

A rengés intenzitás eloszlását a 4.3. táblázat tartalmazza és a 4.6. ábra mutatja.

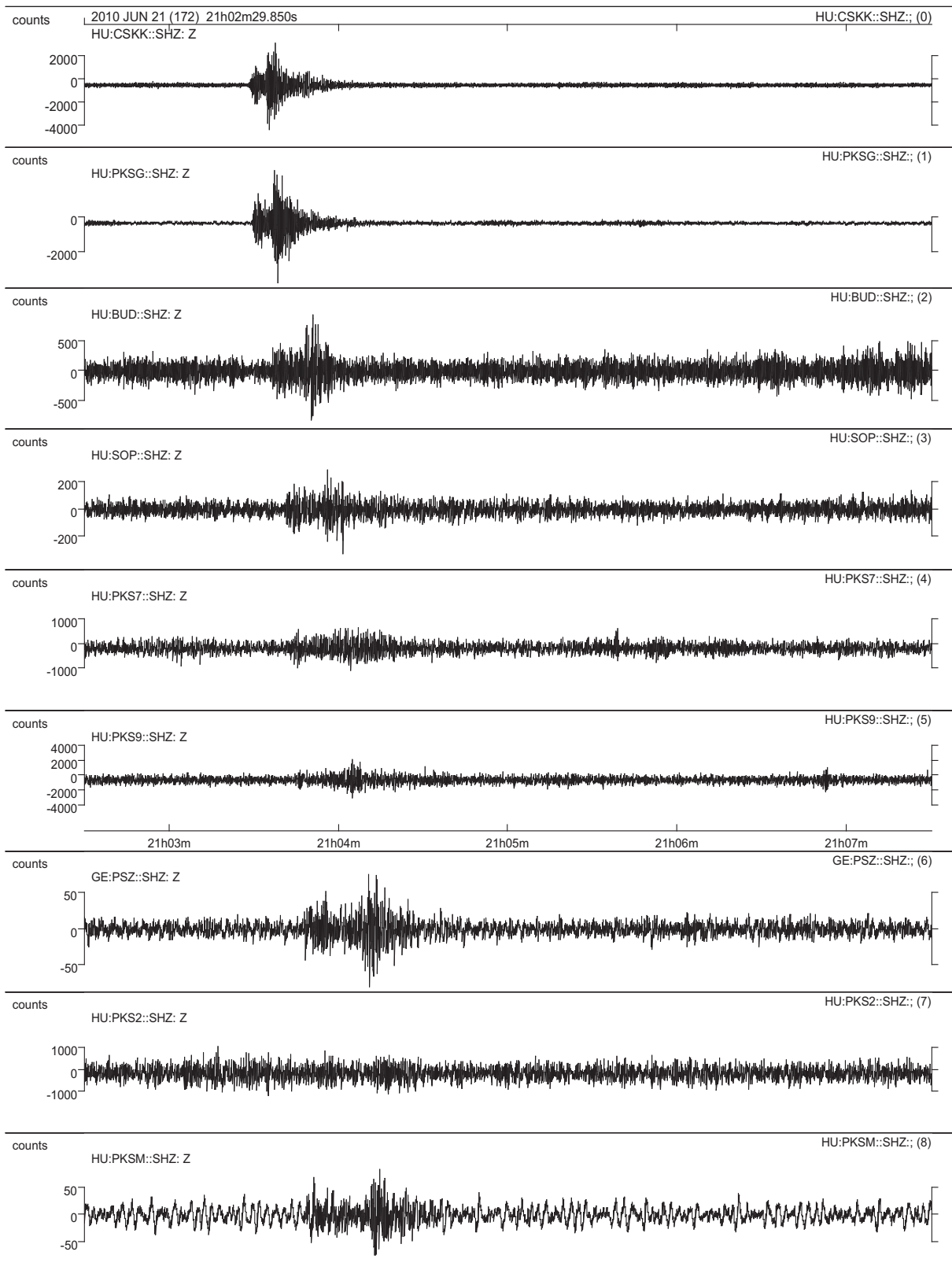
**DISCUSSION**

A 2.0 M<sub>L</sub> magnitude earthquake just triggered a report from Bábolna on 21<sup>st</sup> June. The shock was felt (EMS 4) only at the epicenter at Bábolna.

Seismograms of the event are shown in Figure 4.5.

The intensity distribution of the event is shown in Table 4.3 and Figure 4.6.





4.5. ábra A 2010. június 21-i, bábolnai földrengés (21:03 UTC) szeizmogramjai

Figure 4.5. Seismograms of the Bábolna earthquake 21 June 2010 (21:03 UTC)

**4.3. Táblázat**

A 2010. június 21-i, bábolnai földrengés (21:03 UTC) intenzitás eloszlása

**Table 4.3.**

Intensity distribution of the Bábolna earthquake 21<sup>st</sup> June 2010 (21:03 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Ács	47.714	18.014	1.0	0%	1
2	Bábolna	47.644	17.979	4.0	52%	1
3	Bársonyos	47.520	17.917	1.0	0%	1
4	Csép	47.578	18.070	1.0	0%	1
5	Kérékteleki	47.517	17.946	1.0	0%	1
6	Kisigmánd	47.655	18.106	1.0	0%	1
7	Kocs	47.610	18.224	1.0	0%	1
8	Komárom	47.755	18.124	1.0	0%	1
9	Mezőörs	47.573	17.887	1.0	0%	1
10	Mocsa	47.671	18.194	1.0	0%	1
11	Nagyigmánd	47.640	18.081	1.0	0%	1
12	Pázmándfalu	47.574	17.787	1.0	0%	1
13	Rétalap	47.606	17.918	1.0	0%	1
14	Szőny	47.729	18.174	1.0	0%	1



**2010. augusztus 14. - Miskolc / 14 August 2010 - Miskolc****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/14
Kipattanási idő / Origin Time:	6:57:26.34 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.988 N 20.802 E (S.D. 4.0 km)
Mélység / Depth:	3.3 km (S.D. 4.2 km)
Magnitúdó / Magnitude:	2.7 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	3-4 EMS

**LEÍRÁS**

Az év folyamán legalább 16 kis-közepes földrengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül hatot (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29) a lakosság is érzett. A rengések közül az első érezhető augusztus 14-én reggel jelentették Miskolc – Kistokaj környékéről. A 2.7 M<sub>L</sub> magnitúdójú rengés epicentrális intenzitása 3-4 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.7. ábrán látható.

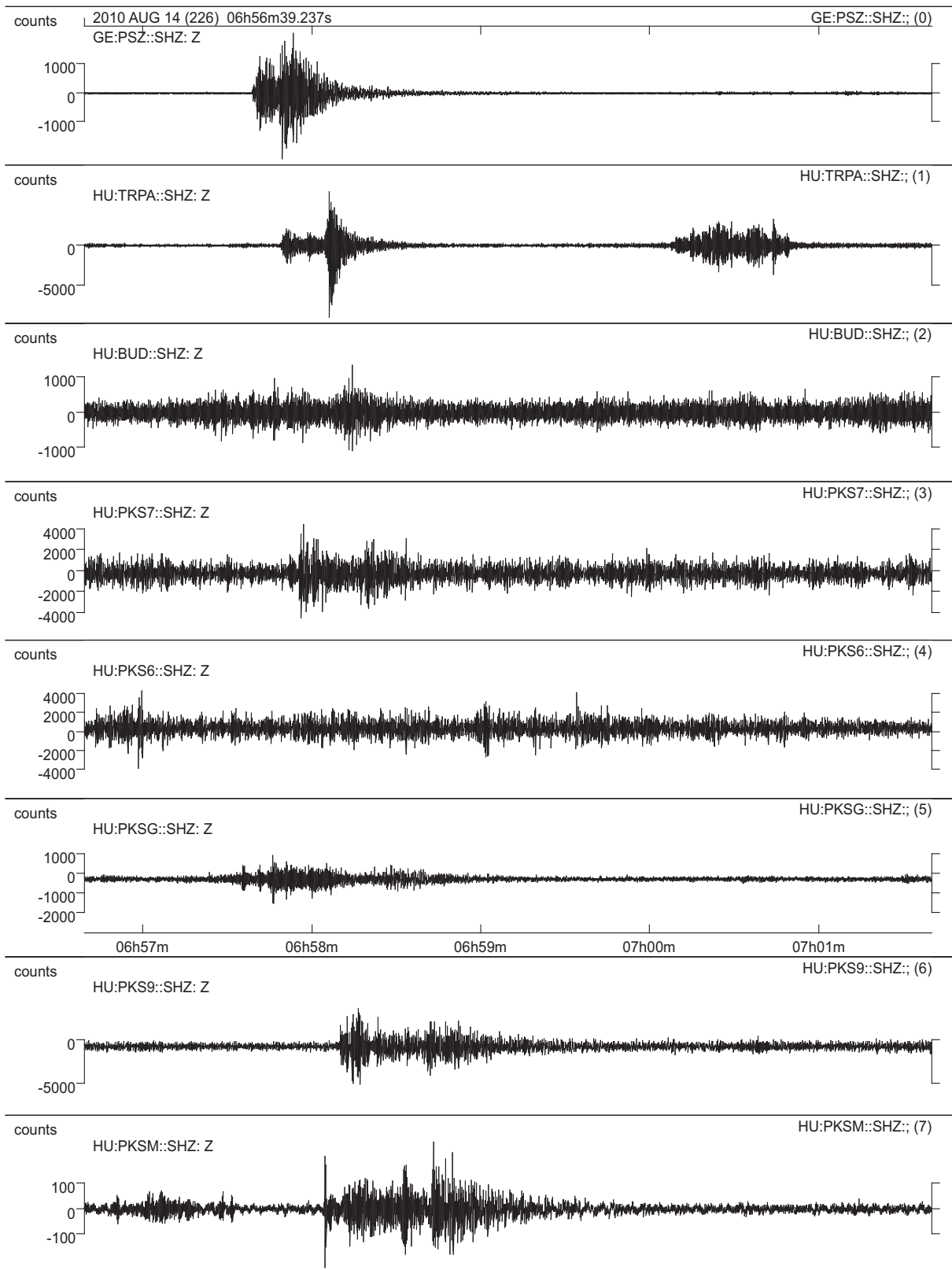
A rengés intenzitás eloszlását a 4.4. táblázat tartalmazza és a 4.8. ábra mutatja.

**DISCUSSION**

At least sixteen small to medium magnitude earthquakes were recorded at the foothill of Bükk Mountains, in the vicinity of Miskolc. Six of the shocks were felt by the population (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29). The first quake was reported on August 14<sup>th</sup> morning, from Miskolc – Kistokaj. The 2.7 M<sub>L</sub> shock was felt (EMS 3-4) only at the epicentral area.

Seismograms of the event are shown in Figure 4.7.

The intensity distribution of the event is shown in Table 4.4 and Figure 4.8.



4.7. ábra A 2010. augusztus 14-i, miskolci földrengés (06:57 UTC) szeizmogramjai

Figure 4.7. Seismograms of the Miskolc earthquake 14 August 2010 (06:57 UTC)

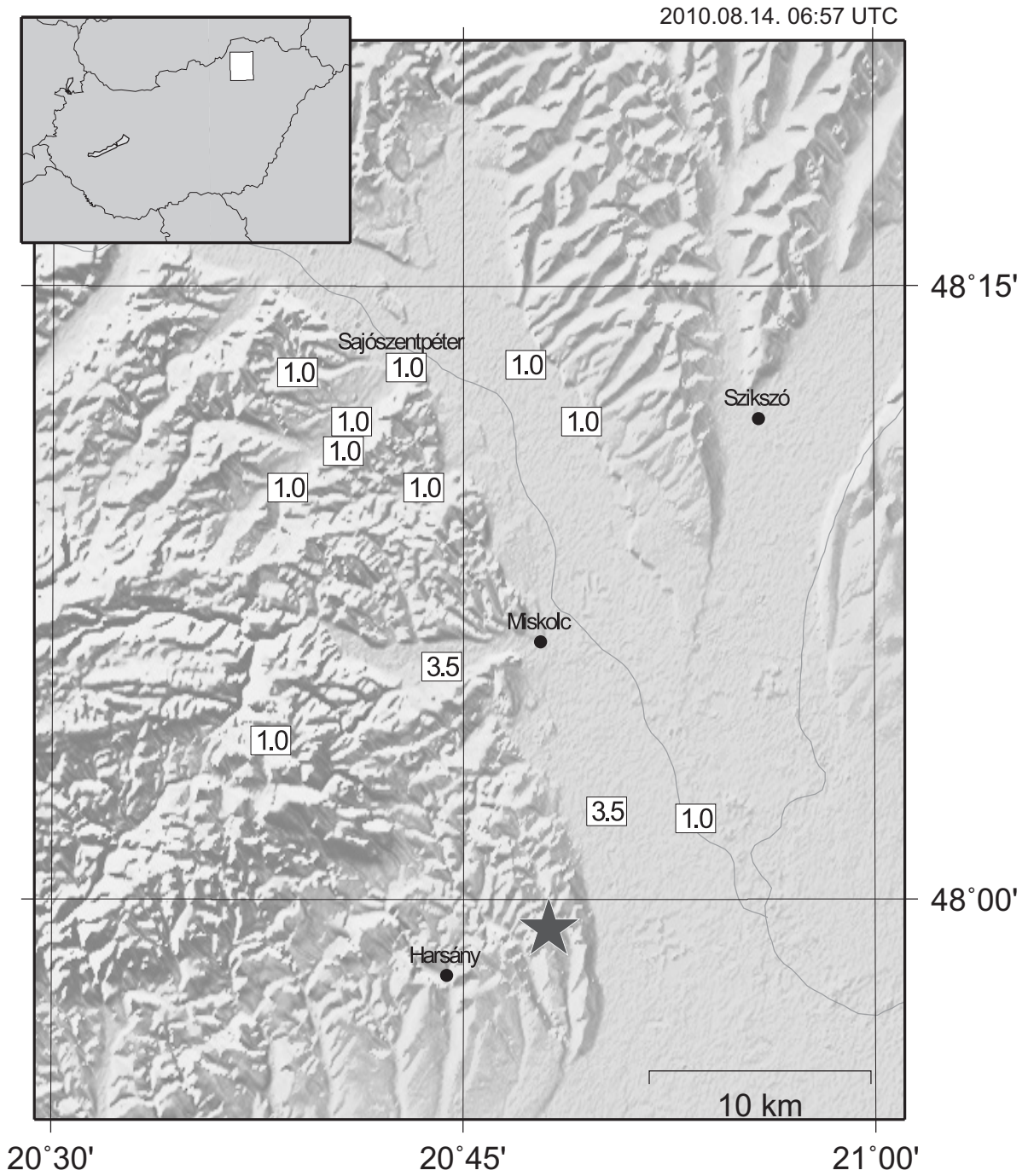
**4.4. Táblázat**

A 2010. augusztus 14-i, miskolci földrengés (06:57 UTC) intenzitás eloszlása

**Table 4.4.**

Intensity distribution of the Miskolc earthquake 14<sup>th</sup> August 2010 (06:57 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Alacska	48.215	20.649	1.0	0%	1
2	Boldva	48.218	20.788	1.0	0%	1
3	Bükkszentkereszt	48.065	20.633	1.0	0%	1
4	Kistokaj	48.036	20.837	3.5	33%	1
5	Miskolc	48.095	20.737	3.5	35%	3
6	Parasznya	48.168	20.643	1.0	0%	1
7	Sajóbábony	48.168	20.726	1.0	0%	1
8	Sajókápolna	48.195	20.682	1.0	0%	1
9	Sajólászlófalva	48.183	20.677	1.0	0%	1
10	Sajópetri	48.033	20.891	1.0	0%	1
11	Sajósenye	48.195	20.822	1.0	0%	1
12	Sajószentpéter	48.217	20.715	1.0	0%	1



**4.8. ábra** A 2010. augusztus 14-i, miskolci földrengés (06:57 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.8.** Intensity distribution of the Miskolc earthquake 14<sup>th</sup> August 2010 (06:57 UTC) (star - instrumental epicentre)

**2010. augusztus 17. - Csányoszró / 17 August 2010 - Csányoszró****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/17
Kipattanási idő / Origin Time:	3:26:14.82 UTC
Szélesség és hosszúság / Latitude and Longitude:	45.846 N 17.866 E (S.D. 4.9 km)
Mélység / Depth:	3.8 km (S.D. 3.4 km)
Magnitúdó / Magnitude:	2.7 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4 EMS

**LEÍRÁS**

Augusztus 17-én három földrengés volt érezhető Magyarország DNy-i részén, a Baranya megyei Sellye – Csányoszró környezetében. Az első két rengés a hajnali órákban keletkezett, alig több mint egy perc eltéréssel. A 2.6 és 2.7 M<sub>L</sub> magnitúdójú földrengést Csányoszró környékén érezték, intenzitása 4 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.9. ábrán látható.

A rengés intenzitás eloszlását a 4.5. táblázat tartalmazza és a 4.10. ábra mutatja.

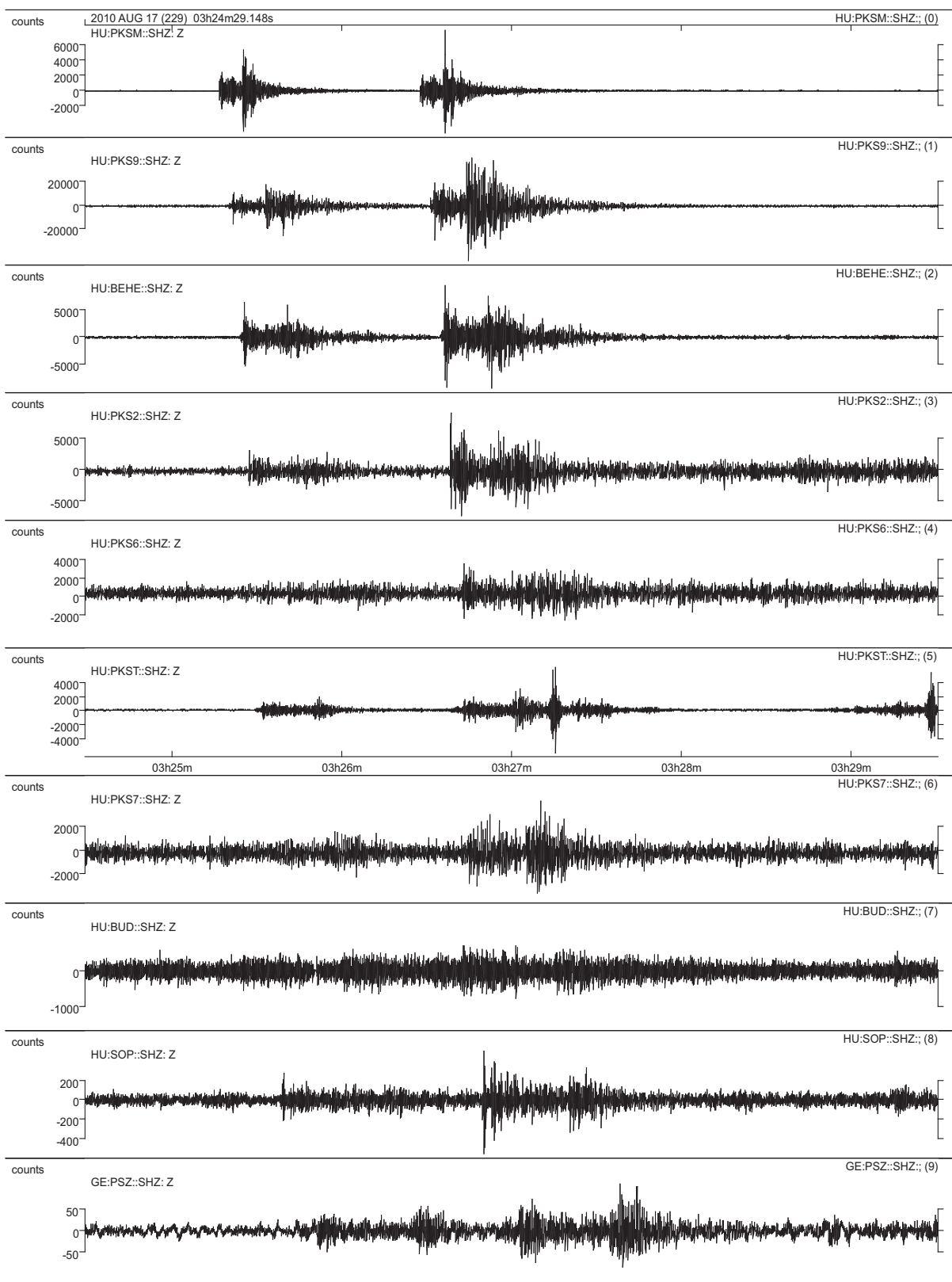
**DISCUSSION**

On 17<sup>th</sup> August three earthquakes were felt at Sellye – Csányoszró, Baranya County, SW Hungary. The first two shocks ruptured in early morning with some one minute differences in their origin time. The 2.6 and 2.7 2.8 M<sub>L</sub> earthquakes were reported from Csányoszró (EMS 4).

Seismograms of the event are shown in Figure 4.9.

The intensity distribution of the event is shown in Table 4.5 and Figure 4.10.





4.9. ábra A 2010. augusztus 17-i, csányoszrói földrengés (03:25 UTC) szeizmogramjai

Figure 4.9. Seismograms of the Csányoszró earthquake 17 August 2010 (03:25 UTC)

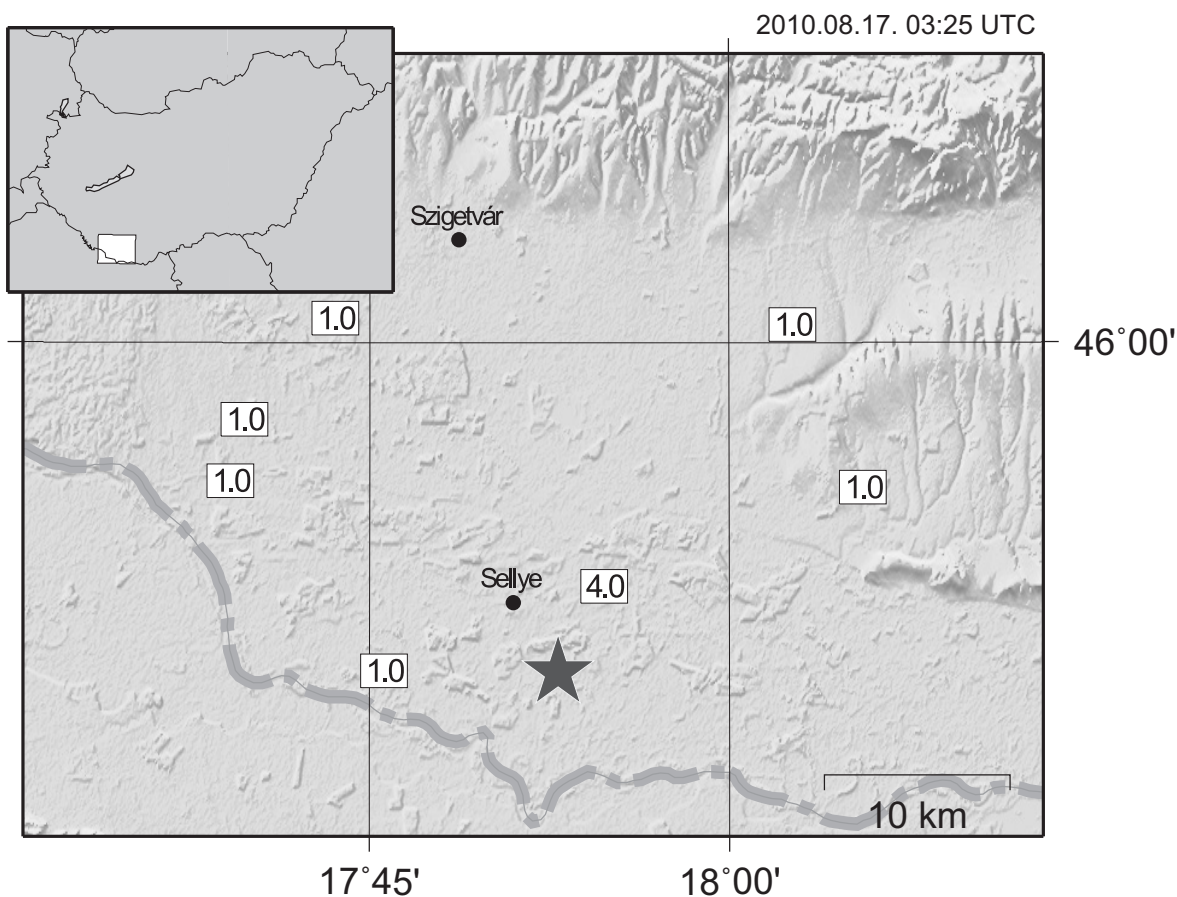
**4.5. Táblázat**

A 2010. augusztus 17-i, csányoszrói földrengés (03:25 és 03:26 UTC) intenzitás eloszlása

**Table 4.5.**

Intensity distribution of the Csányoszró earthquake 17<sup>th</sup> August 2010 (03:25 and 03:26 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Csányoszró	45.882	17.913	4.0	39%	1
2	Drávakeresztúr	45.841	17.760	1.0	0%	1
3	Kistamási	46.012	17.726	1.0	0%	1
4	Potony	45.933	17.653	1.0	0%	1
5	Szabadszentkirály	46.009	18.044	1.0	0%	1
6	Tengeri	45.930	18.093	1.0	0%	1
7	Zádor	45.963	17.663	1.0	0%	1



**4.10. ábra** A 2010. augusztus 17-i, csányoszrói földrengés (03:25 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.10.** Intensity distribution of the Csányoszró earthquake 17<sup>th</sup> August 2010 (03:25 UTC) (star - instrumental epicentre)

**2010. augusztus 17. - Miskolc / 17 August 2010 - Miskolc****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/17
Kipattanási idő / Origin Time:	5:32:43.02 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.994 N 20.783 E (S.D. 3.5 km)
Mélység / Depth:	10.0 km (S.D. 3.9 km)
Magnitúdó / Magnitude:	2.4 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4 EMS

**LEÍRÁS**

Az év folyamán legalább 16 kis-közepes földrengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül hatot (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29) a lakosság is érzett. A rengések közül a második érezhető augusztus 17-én reggel jelentették Miskolcra. A 2.4 M<sub>L</sub> magnitúdójú rengés epicentrális intenzitása Miskolcon 4 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.11. ábrán látható.

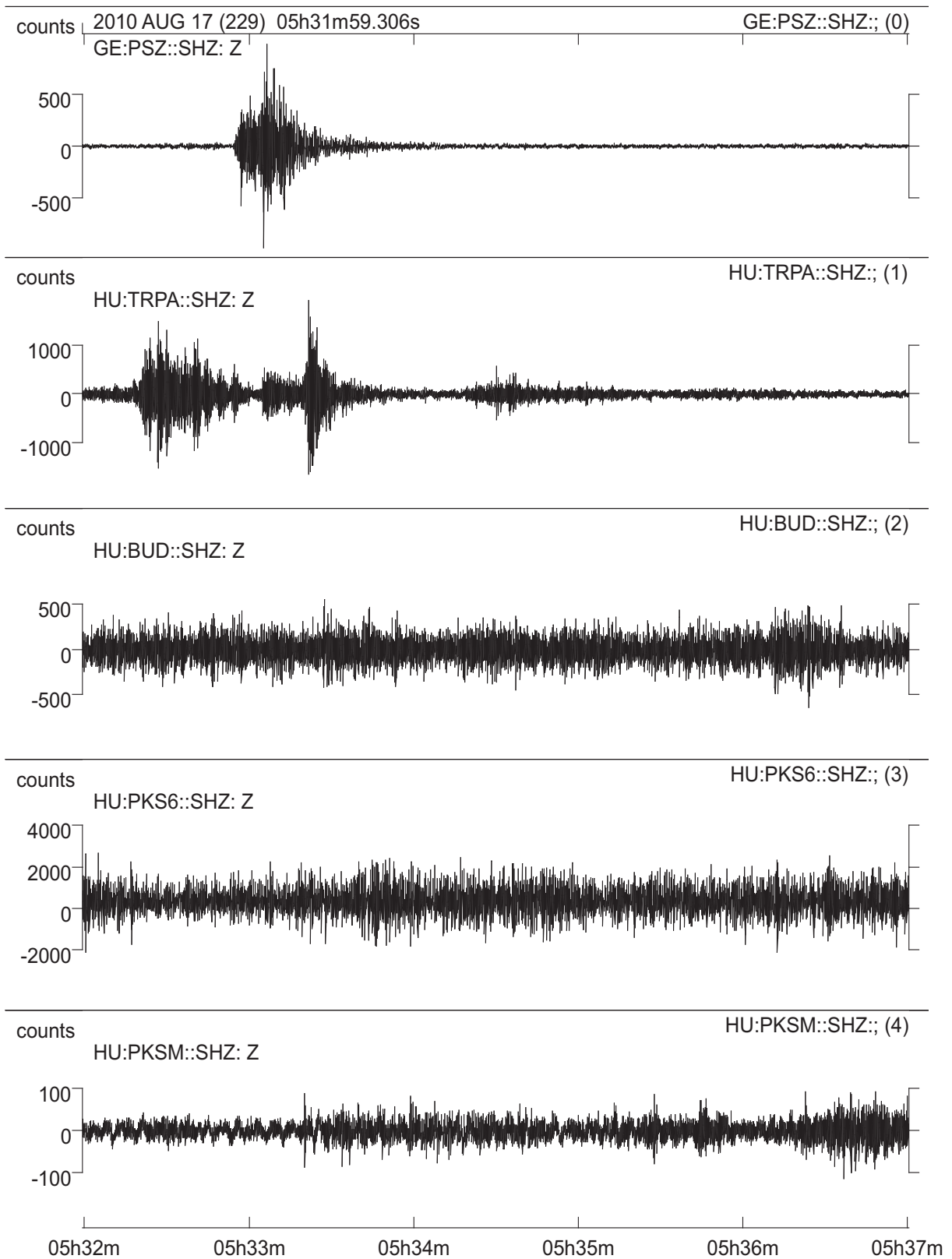
A rengés intenzitás eloszlását a 4.6. táblázat tartalmazza és a 4.12. ábra mutatja.

**DISCUSSION**

At least sixteen small to medium magnitude earthquakes were recorded at the foothill of Bükk Mountains, in the vicinity of Miskolc. Six of the shocks were felt by the population (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29). The second felt quake was reported on August 17<sup>th</sup> morning, from Miskolc. The 2.4 M<sub>L</sub> shock was felt (EMS 4) only in Miskolc.

Seismograms of the event are shown in Figure 4.11.

The intensity distribution of the event is shown in Table 4.6 and Figure 4.12.



4.11. ábra A 2010. augusztus 17-i, miskolci földrengés (05:32 UTC) szeizmogramjai

Figure 4.11. Seismograms of the Miskolc earthquake 17 August 2010 (05:32 UTC)

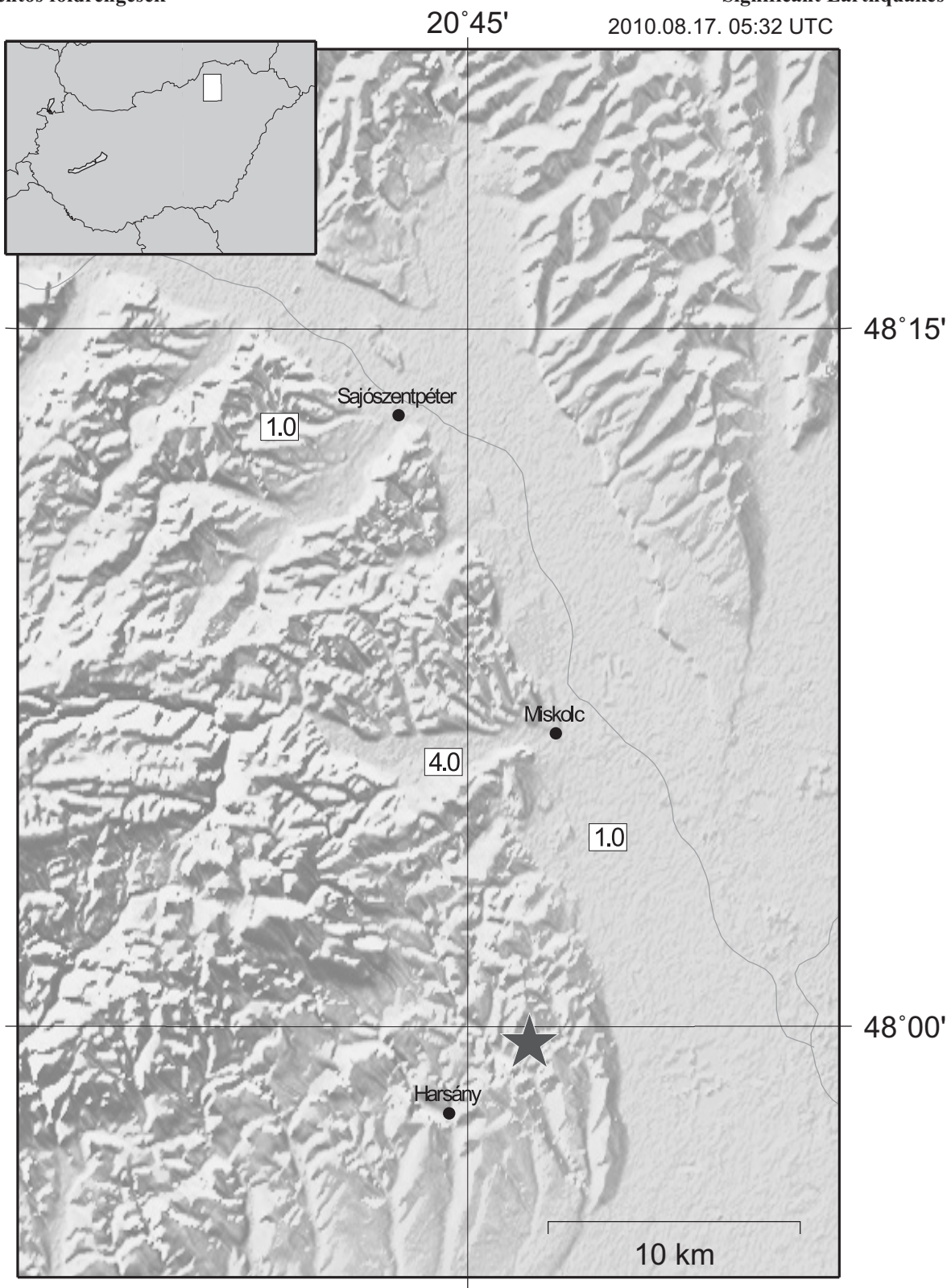
**4.6. Táblázat**

A 2010. augusztus 17-i, miskolci földrengés (05:32 UTC) intenzitás eloszlása

**Table 4.6.**

Intensity distribution of the Miskolc earthquake 17<sup>th</sup> August 2010 (05:32 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Alacska	48.215	20.649	1.0	0%	1
2	Miskolc	48.095	20.737	4.0	51%	1
3	Szirma	48.068	20.825	1.0	0%	1



**4.12. ábra** A 2010. augusztus 17-i, miskolci földrengés (05:32 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.12.** Intensity distribution of the Miskolc earthquake 17<sup>th</sup> August 2010 (05:32 UTC) (star - instrumental epicentre)

**2010. augusztus 17. - Sellye / 17 August 2010 - Sellye****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/17
Kipattanási idő / Origin Time:	20:11:04.05 UTC
Szélesség és hosszúság / Latitude and Longitude:	45.898 N 17.849 E (S.D. 2.0 km)
Mélység / Depth:	6.9 km (S.D. 1.9 km)
Magnitúdó / Magnitude:	3.0 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Augusztus 17-én három földrengés volt érezhető Magyarország DNy-i részén, a Baranya megyei Sellye – Csányoszró környezetében. A hajnalban keletkezett két rengést egy valamivel nagyobb, 3.0 M<sub>L</sub> magnitúdójú követte az esti órákban. Ezt a földrengést legerősebben Sellye – Sósvertike – Nagycsány környékén érezték, intenzitása 4-5 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.13. ábrán látható.

A rengés intenzitás eloszlását a 4.7. táblázat tartalmazza és a 4.14. ábra mutatja.

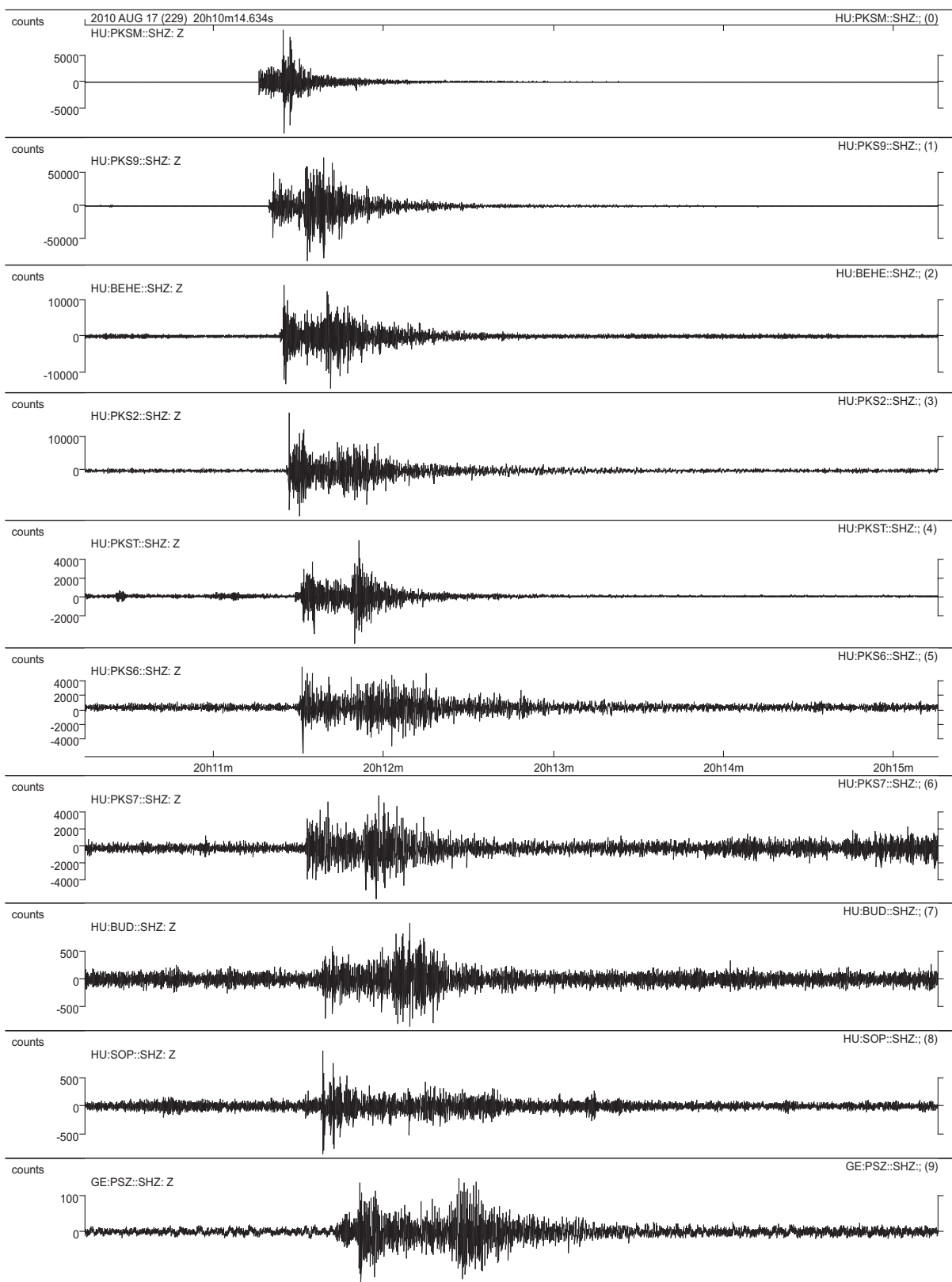
**DISCUSSION**

On 17<sup>th</sup> August three earthquakes were felt at Sellye – Csányoszró, Baranya County, SW Hungary. Following the first two shocks ruptured in early morning, a somewhat larger 3.0 M<sub>L</sub> quake alarmed people in Sellye – Sósvertike – Nagycsány area in the evening. Based on the macroseismic reports EMS 4-5 can be assigned to the shock.

Seismograms of the event are shown in Figure 4.13.

The intensity distribution of the event is shown in Table 4.7 and Figure 4.14.





4.13. ábra A 2010. augusztus 17-i, sellyei földrengés (20:11 UTC) szeizmogramjai

Figure 4.13. Seismograms of the Sellye earthquake 17 August 2010 (20:11 UTC)

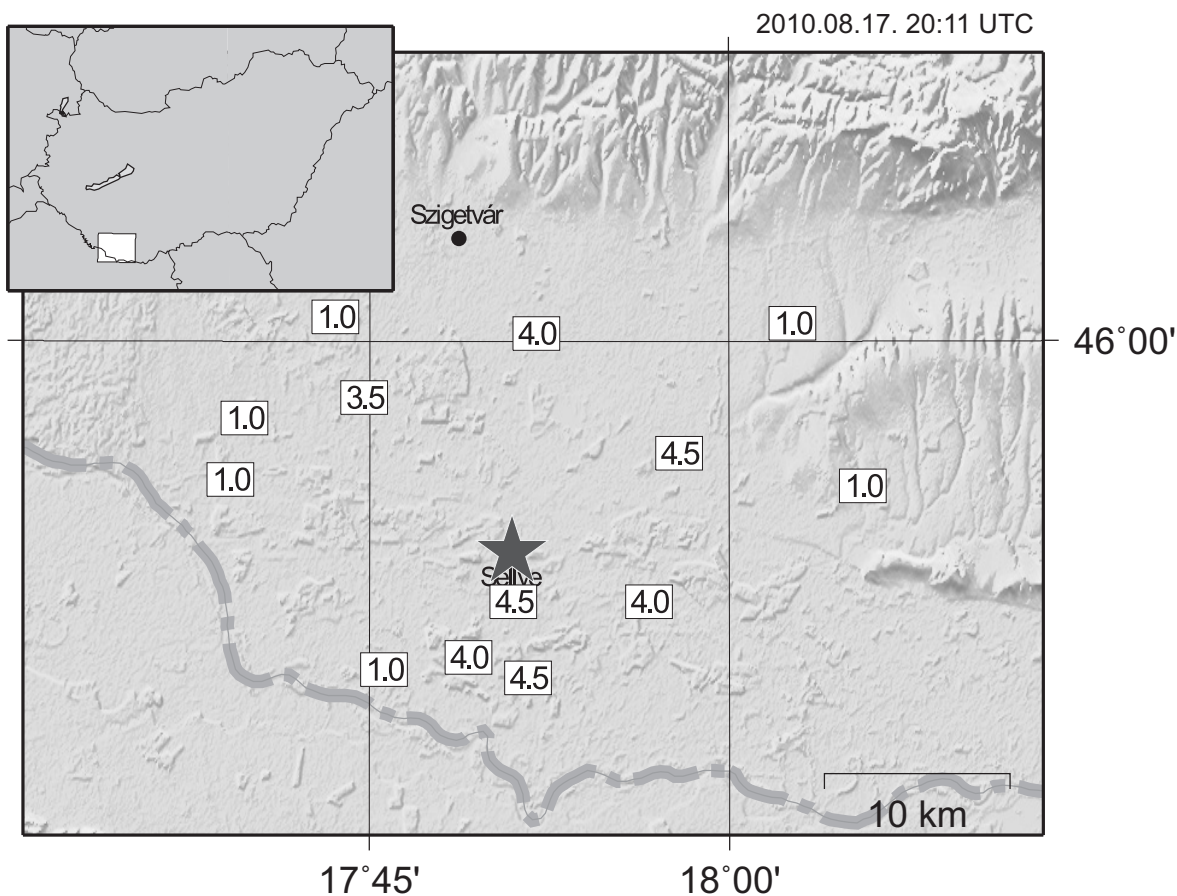
**4.7. Táblázat**

A 2010. augusztus 17-i, sellyei földrengés (20:11 UTC) intenzitás eloszlása

**Table 4.7.**

Intensity distribution of the Sellye earthquake 17<sup>th</sup> August 2010 (20:11 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Drávaiványi	45.847	17.819	4.0	35%	1
2	Drávakeresztúr	45.841	17.760	1.0	0%	1
3	Katádfa	46.004	17.866	4.0	39%	1
4	Kistamási	46.012	17.726	1.0	0%	1
5	Magyarmecske	45.946	17.965	4.5	38%	1
6	Nagycsány	45.874	17.944	4.0	46%	1
7	Potony	45.933	17.653	1.0	0%	1
8	Sellye	45.874	17.850	4.5	36%	1
9	Sósvertike	45.837	17.860	4.5	33%	1
10	Szabadszentkirály	46.009	18.044	1.0	0%	1
11	Tengeri	45.930	18.093	1.0	0%	1
12	Várad	45.973	17.746	3.5	40%	1
13	Zádor	45.963	17.663	1.0	0%	1



**4.14. ábra** A 2010. augusztus 17-i, sellyei földrengés (20:11 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.14.** Intensity distribution of the Sellye earthquake 17<sup>th</sup> August 2010 (20:11 UTC) (star - instrumental epicentre)

**2010. augusztus 19. - Miskolc / 19 August 2010 - Miskolc****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/19
Kipattanási idő / Origin Time:	1:29:04.97 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.053 N 20.782 E (S.D. 5.6 km)
Mélység / Depth:	10.0 km (S.D. 5.0 km)
Magnitúdó / Magnitude:	3.0 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Az év folyamán legalább 16 kis-közepes földrengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül hatot (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29) a lakosság is érzett. A rengések közül a harmadik érezhető augusztus 19-én hajnalban jelentették Miskolc – Sajópetri – Kisgyőr térségből. A 3.0 M<sub>L</sub> magnitúdójú rengés epicentrális intenzitása 4-5 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.15. ábrán látható.

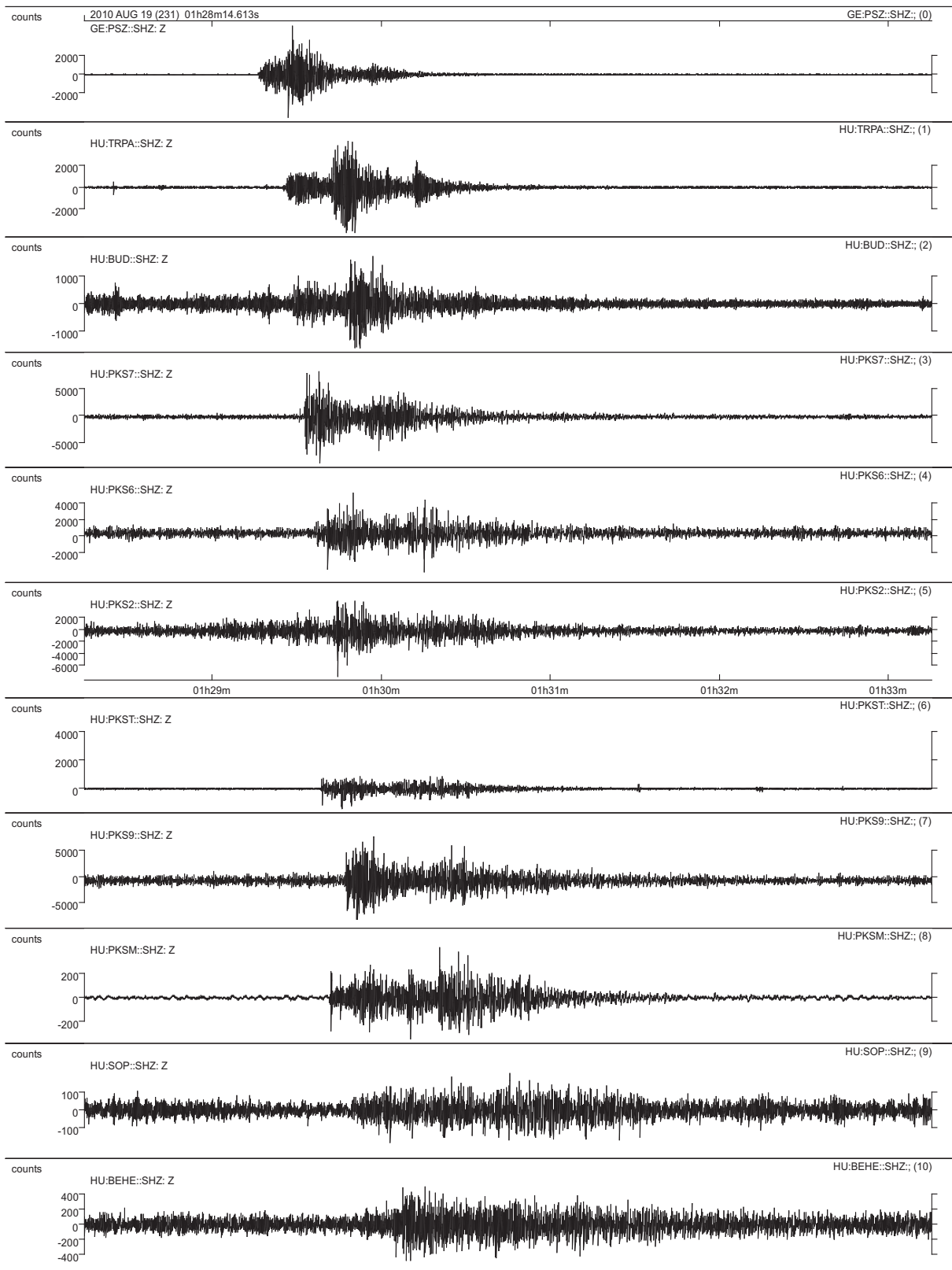
A rengés intenzitás eloszlását a 4.8. táblázat tartalmazza és a 4.16. ábra mutatja.

**DISCUSSION**

At least sixteen small to medium magnitude earthquakes were recorded at the foothill of Bükk Mountains, in the vicinity of Miskolc. Six of the shocks were felt by the population (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29). The third felt quake was reported on August 19<sup>th</sup> early morning, from Miskolc – Sajópetri – Kisgyőr. The 3.0 M<sub>L</sub> shock was felt (EMS 4-5) at the epicentral area.

Seismograms of the event are shown in Figure 4.15.

The intensity distribution of the event is shown in Table 4.8 and Figure 4.16.



4.15. ábra A 2010. augusztus 19-i, miskolci földrengés (01:29 UTC) szeizmogramjai

Figure 4.15. Seismograms of the Miskolc earthquake 19 August 2010 (01:29 UTC)

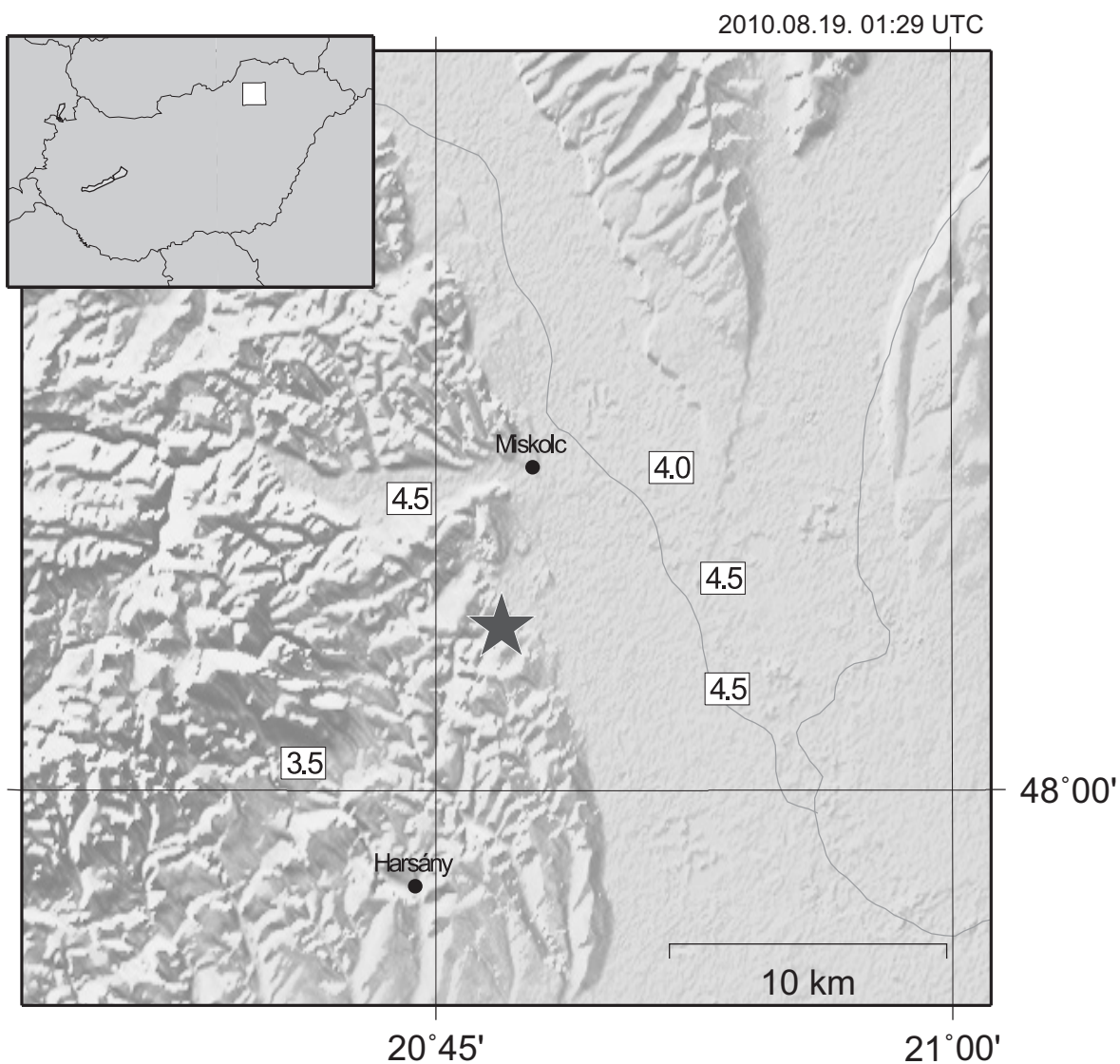
**4.8. Táblázat**

A 2010. augusztus 19-i, miskolci földrengés (01:29 UTC) intenzitás eloszlása

**Table 4.8.**

Intensity distribution of the Miskolc earthquake 19<sup>th</sup> August 2010 (01:29 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Alsózsolca	48.069	20.889	4.5	33%	1
2	Felsőzsolca	48.105	20.864	4.0	48%	1
3	Kisgyőr	48.009	20.686	3.5	36%	1
4	Miskolc	48.095	20.737	4.5	31%	2
5	Sajópetri	48.033	20.891	4.5	32%	1



**4.16. ábra** A 2010. augusztus 19-i, miskolci földrengés (01:29 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.16.** Intensity distribution of the Miskolc earthquake 19<sup>th</sup> August 2010 (01:29 UTC) (star - instrumental epicentre)

**2010. augusztus 19. - Kistokaj / 19 August 2010 - Kistokaj****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/19
Kipattanási idő / Origin Time:	14:48:06.92 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.041 N 20.796 E (S.D. 4.2 km)
Mélység / Depth:	1.8 km (S.D. 3.8 km)
Magnitúdó / Magnitude:	2.4 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Az év folyamán legalább 16 kis-közepes földrengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül hatot (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29) a lakosság is érzett. A rengések közül a negyedik érezhető augusztus 19-én délután jelentették Kistokajról. A 2.4 M<sub>L</sub> magnitúdójú rengés epicentrális intenzitása 4-5 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.17. ábrán látható.

A rengés intenzitás eloszlását a 4.9. táblázat tartalmazza és a 4.18. ábra mutatja.

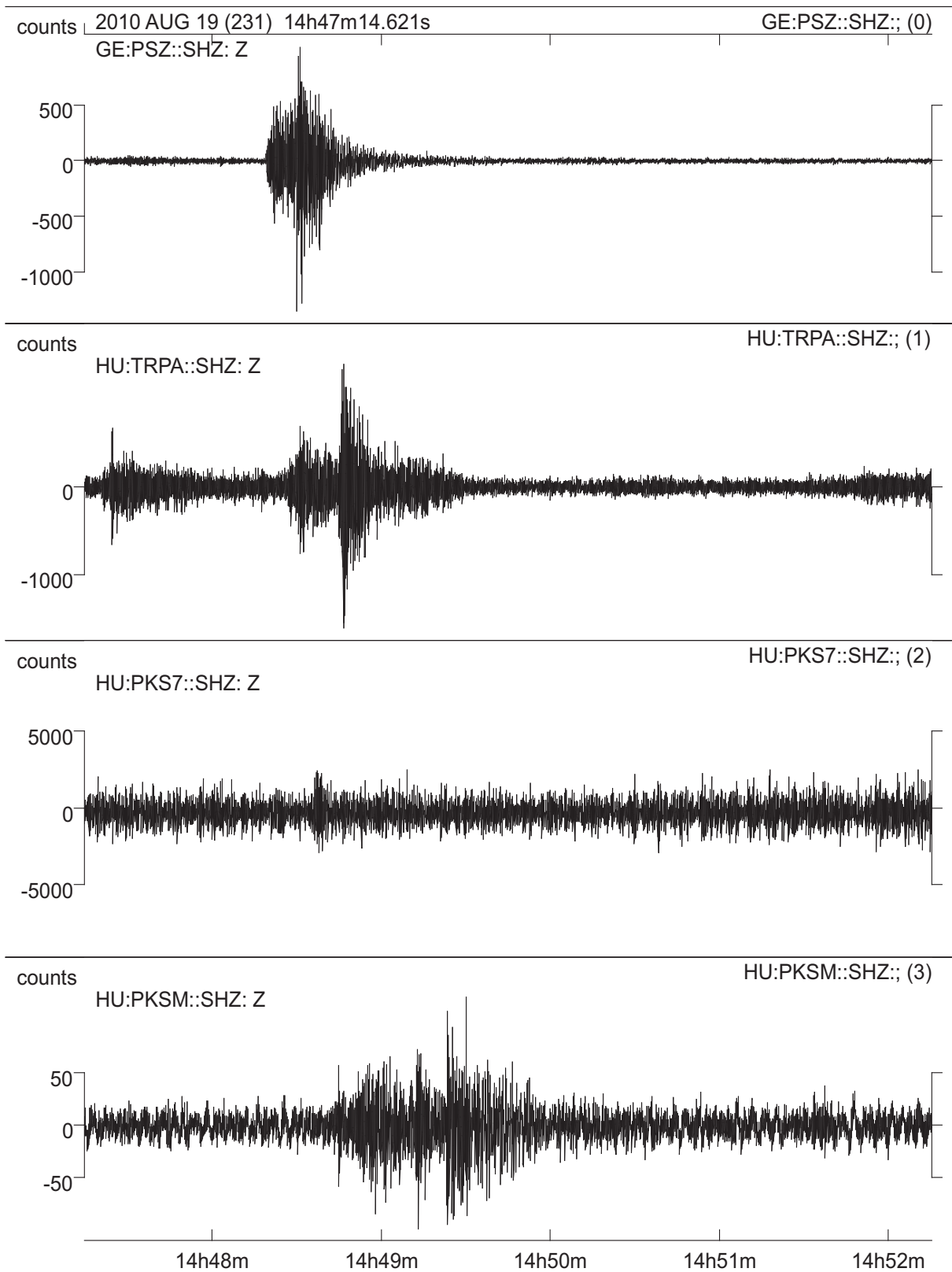
**DISCUSSION**

At least sixteen small to medium magnitude earthquakes were recorded at the foothill of Bükk Mountains, in the vicinity of Miskolc. Six of the shocks were felt by the population (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29). The fourth quake was reported on August 19<sup>th</sup> afternoon, from Kistokaj. The 2.4 M<sub>L</sub> shock was felt (EMS 4-5) only at the epicentral area.

Seismograms of the event are shown in Figure 4.17.

The intensity distribution of the event is shown in Table 4.9 and Figure 4.18.





4.17. ábra A 2010. augusztus 19-i, kistokaji földrengés (14:48 UTC) szeizmogramjai

Figure 4.17. Seismograms of the Kistokaj earthquake 19 August 2010 (14:48 UTC)

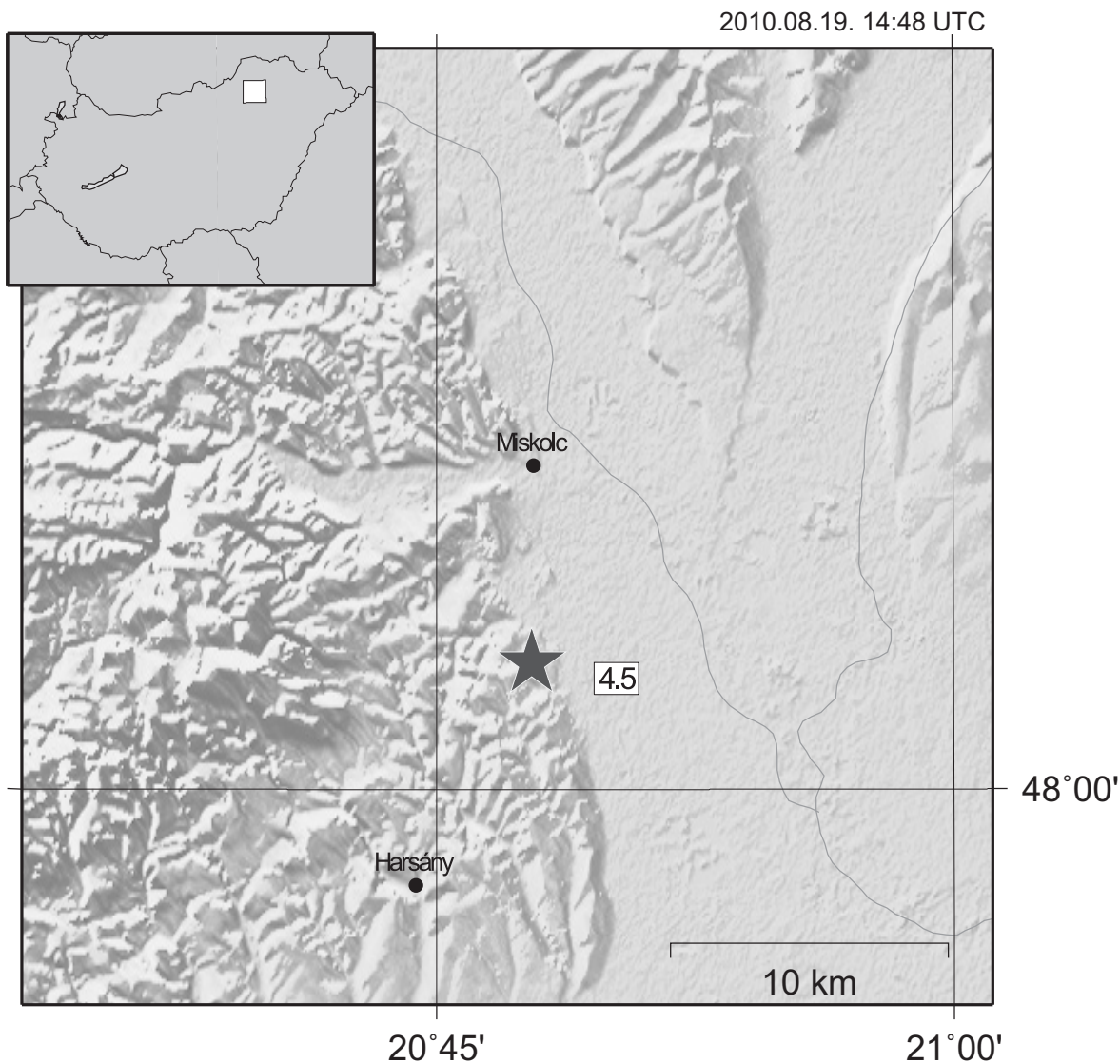
**4.9. Táblázat**

A 2010. augusztus 19-i, kistokaji földrengés (14:48 UTC) intenzitás eloszlása

**Table 4.9.**

Intensity distribution of the Kistokaj earthquake 19<sup>th</sup> August 2010 (14:48 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Kistokaj	48.036	20.837	4.5	34%	1



**4.18. ábra** A 2010. augusztus 19-i, kistokaji földrengés (14:48 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.18.** Intensity distribution of the Kistokaj earthquake 19<sup>th</sup> August 2010 (14:48 UTC) (star - instrumental epicentre)

**2010. augusztus 26. - Körmend / 26 August 2010 - Körmend****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/26
Kipattanási idő / Origin Time:	22:29:57.33 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.039 N 16.580 E (S.D. 2.1 km)
Mélység / Depth:	12.9 km (S.D. 1.8 km)
Magnitúdó / Magnitude:	2.7 ML
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Augusztus 26-án 2.7  $M_L$  magnitúdójú földrengés keletkezett a Vas megyei Körmend közelében, mely érezhető volt mintegy 250 km<sup>2</sup> területen. Az esemény legjobban Körmend, Molnasszecsőd, Vasalja településeken volt érezhető, a legnagyobb intenzitás 4-5 EMS-re tehető.

Az esemény szeizmogramja a 4.19. ábrán látható.

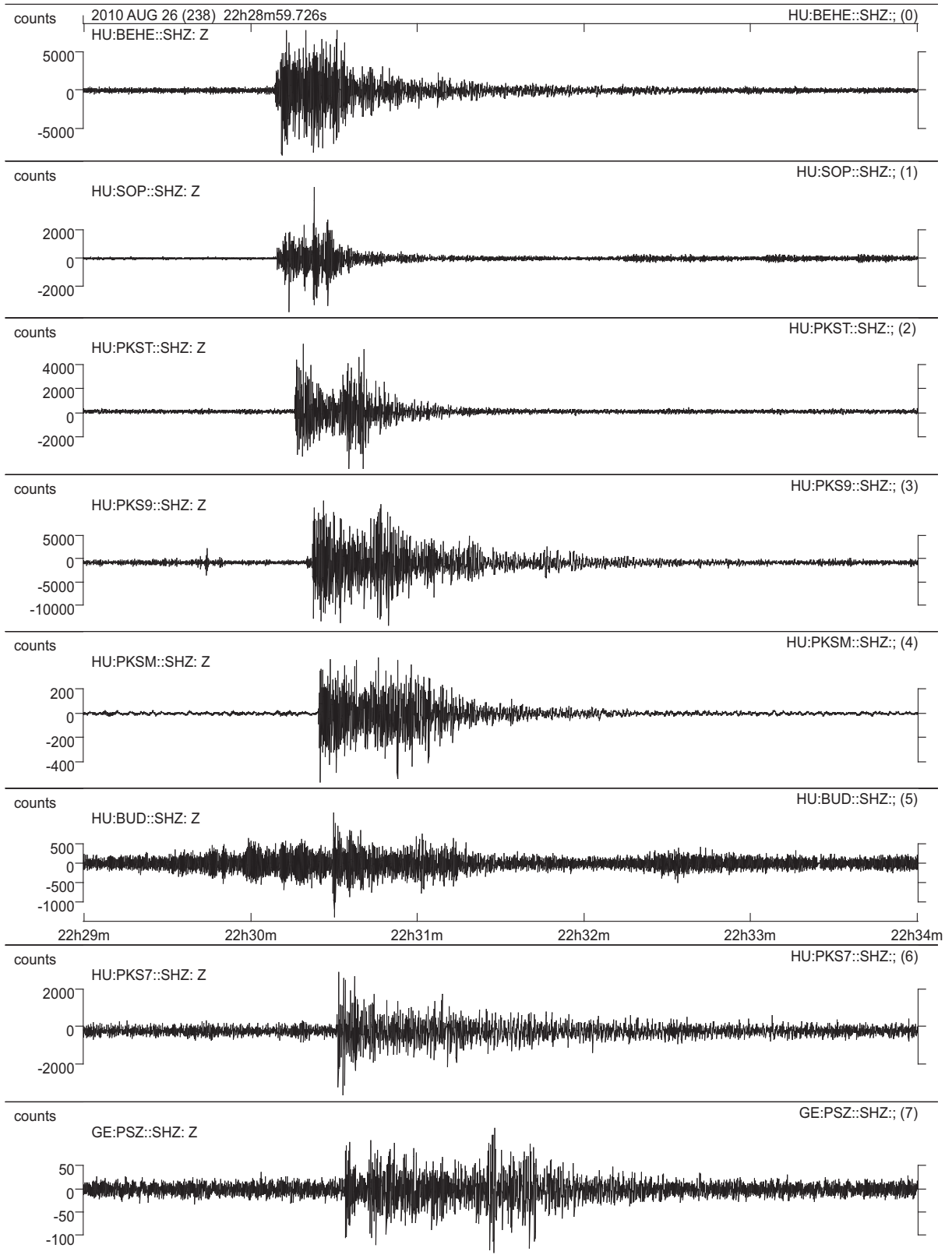
A rengés intenzitás eloszlását a 4.10. táblázat tartalmazza és a 4.20. ábra mutatja.

**DISCUSSION**

On August 26<sup>th</sup>, a 2.7  $M_L$  event was felt at about 250 km<sup>2</sup> area near to Körmend in Vas County and produced reports of max intensity 4-5 EMS. The earthquake was mostly felt at Körmend, Molnasszecsőd, Vasalja.

Seismograms of the event are shown in Figure 4.19.

The intensity distribution of the event is shown in Table 4.10 and Figure 4.20.



4.19. ábra A 2010. augusztus 26-i, körmendi földrengés (22:29 UTC) szeizmogramjai

Figure 4.19. Seismograms of the Körmend earthquake 26 August 2010 (22:29 UTC)

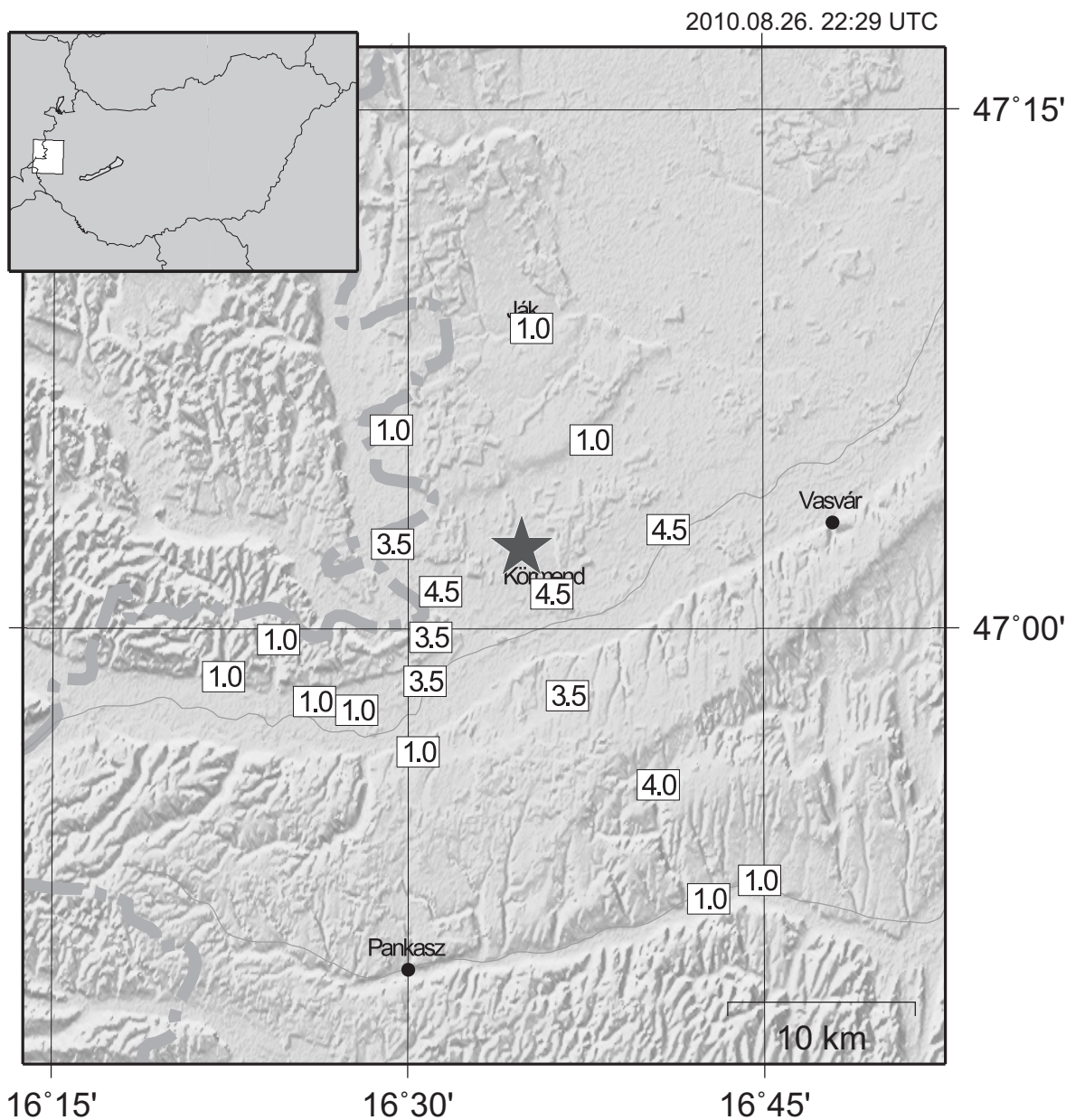
**4.10. Táblázat**

A 2010. augusztus 26-i, körmendi földrengés (22:29 UTC) intenzitás eloszlása

**Table 4.10.**

Intensity distribution of the Körment earthquake 26<sup>th</sup> August 2010 (22:29 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Bagod	46.879	16.747	1.0	0%	1
2	Csákánydoroszló	46.975	16.512	3.5	42%	2
3	Egyházaskróc	47.091	16.629	1.0	0%	1
4	Gasztony	46.961	16.464	1.0	0%	1
5	Ivác	46.941	16.507	1.0	0%	2
6	Ják	47.145	16.587	1.0	0%	2
7	Kemestaródfa	46.996	16.516	3.5	32%	1
8	Körment	47.017	16.601	4.5	34%	1
9	Molnászezsőd	47.048	16.683	4.5	32%	1
10	Nádasd	46.968	16.612	3.5	42%	1
11	Nemesmedves	46.995	16.409	1.0	0%	1
12	Ozmánbük	46.925	16.676	4.0	41%	2
13	Pinkamindszent	47.041	16.489	3.5	35%	1
14	Rátót	46.965	16.434	1.0	0%	1
15	Rönök	46.977	16.370	1.0	0%	1
16	Szentpéterfa	47.096	16.488	1.0	0%	1
17	Vasalja	47.018	16.523	4.5	35%	1
18	Zalászentgyörgy	46.870	16.711	1.0	0%	1



**4.20. ábra** A 2010. augusztus 26-i, körmendi földrengés (22:29 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.20.** Intensity distribution of the Körmend earthquake 26<sup>th</sup> August 2010 (22:29 UTC) (star - instrumental epicentre)

**2010. augusztus 31. - Diósd / 31 August 2010 - Diósd****FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/08/31
Kipattanási idő / Origin Time:	23:14:26.90 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.398 N 18.927 E (S.D. 4.8 km)
Mélység / Depth:	10.0 km (S.D. 2.3 km)
Magnitúdó / Magnitude:	1.9 ML
Maximális intenzitás / Maximum Intensity:	4 EMS

**LEÍRÁS**

Augusztus 31-én éjjel Diósd – Érd közelében mozdult meg a föld, egy egészen kicsi,  $M_L$  1.9 rengés volt érezhető egy szűk területen. Az epicentrális intenzitás 4 EMS.

Az esemény szeizmogramja a 4.21. ábrán látható.

A rengés intenzitás eloszlását a 4.11. táblázat tartalmazza és a 4.22. ábra mutatja.

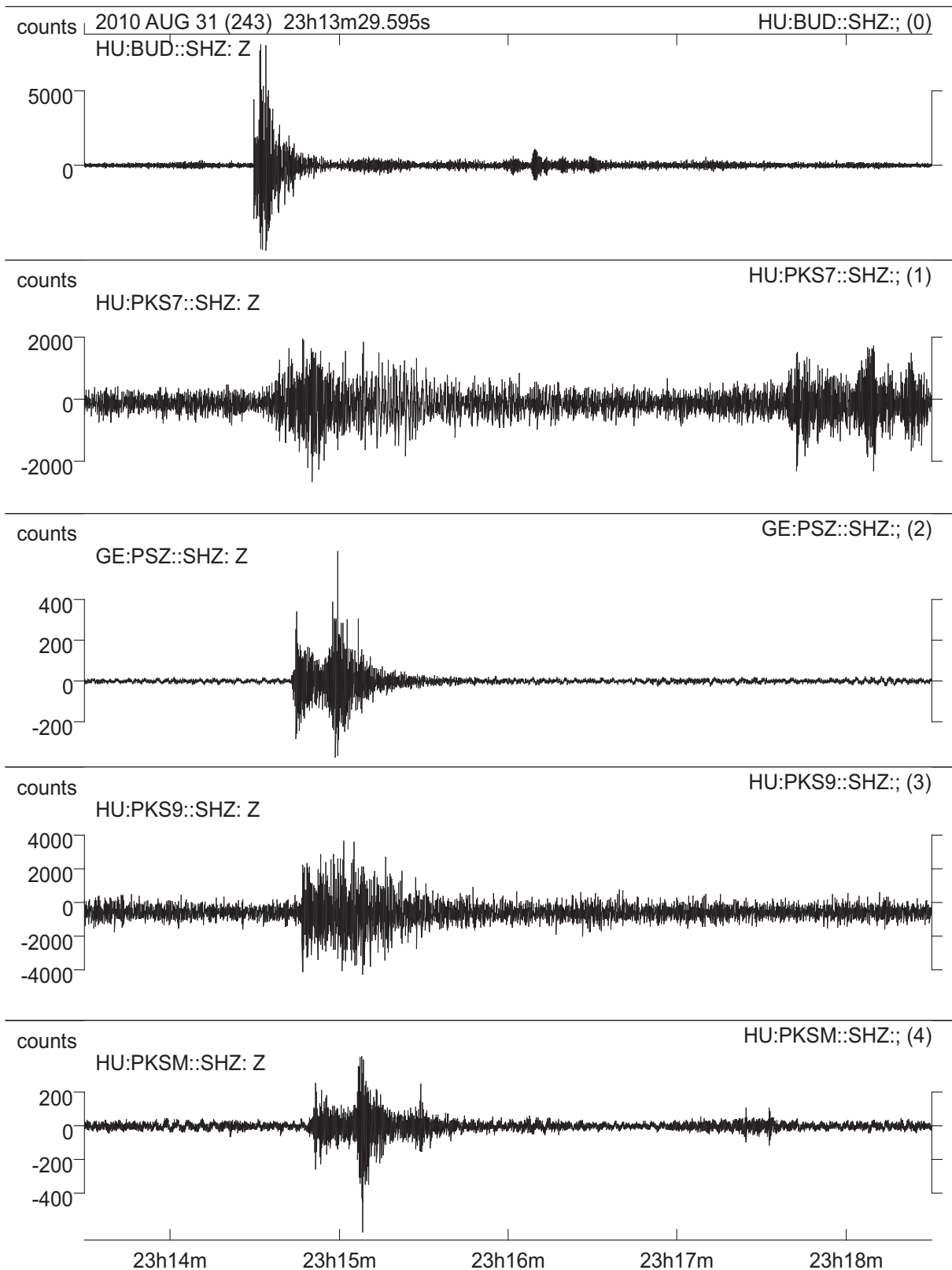
**DISCUSSION**

On August 31<sup>st</sup>, an earthquake of magnitude as small as 1.9  $M_L$  was felt in a minor area and produced reports of 4 EMS from Diósd – Érd.

Seismograms of the event are shown in Figure 4.21.

The intensity distribution of the event is shown in Table 4.11 and Figure 4.22.





4.21. ábra A 2010. augusztus 31-i, diósdí földrengés (23:14 UTC) szeizmogramjai

Figure 4.21. Seismograms of the Diósd earthquake 31 August 2010 (23:14 UTC)

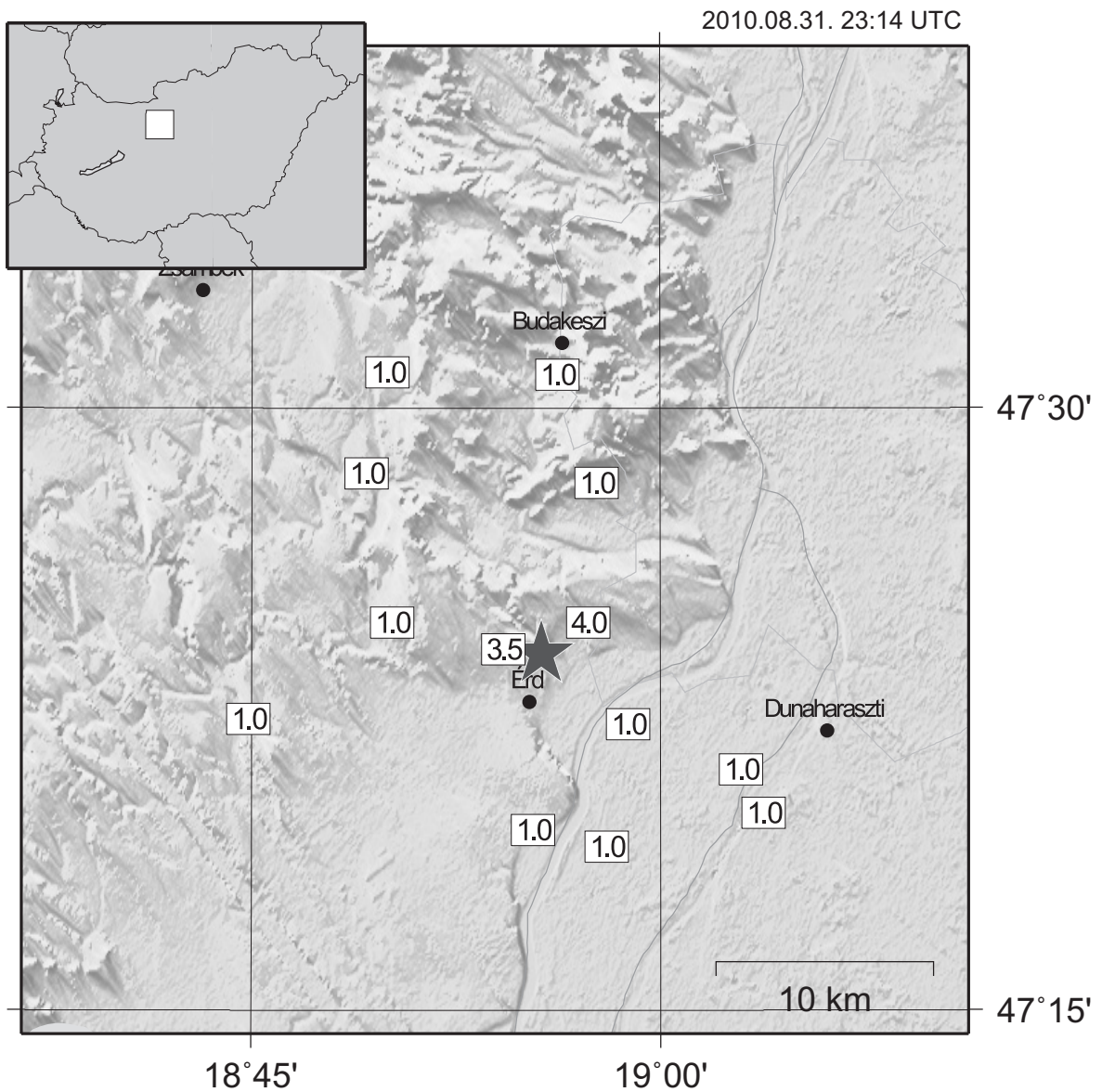
**4.11. Táblázat**

A 2010. augusztus 31-i, diósdai földrengés (23:14 UTC) intenzitás eloszlása

**Table 4.11.**

Intensity distribution of the Diósd earthquake 31<sup>st</sup> August 2010 (23:14 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Biatorbágy	47.473	18.820	1.0	0%	2
2	Budakeszi	47.514	18.937	1.0	0%	2
3	Budaörs	47.469	18.961	1.0	0%	1
4	Diósd	47.411	18.956	4.0	30%	2
5	Érd	47.400	18.904	3.5	41%	4
6	Gyúró	47.371	18.748	1.0	0%	1
7	Halásztelek	47.369	18.980	1.0	0%	1
8	Páty	47.515	18.833	1.0	0%	1
9	Sóskút	47.411	18.836	1.0	0%	2
10	Százhalombatta	47.325	18.922	1.0	0%	1
11	Szigetszentmiklós	47.350	19.049	1.0	0%	1
12	Taksony	47.332	19.063	1.0	0%	1
13	Tököl	47.318	18.967	1.0	0%	1



**4.22. ábra** A 2010. augusztus 31-i, diósd-i földrengés (23:14 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.22.** Intensity distribution of the Diósd earthquake 31<sup>st</sup> August 2010 (23:14 UTC) (star - instrumental epicentre)

**2010. október 30. - Tállya / 30 October 2010 - Tállya****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/10/30
Kipattanási idő / Origin Time:	21:24:49.05 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.250 N 21.165 E (S.D. 2.5 km)
Mélység / Depth:	0.3 km (S.D. 2.5 km)
Magnitúdó / Magnitude:	2.8 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Az év folyamán legalább 16 kis-közepes földrengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül hatot (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29) a lakosság is érzett. A rengések közül az ötödik érezhetőt október 30-án este jelentették Monok – Tállya – Erdőbénye környékéről. A 2.8 M<sub>L</sub> magnitúdójú rengés epicentrális intenzitása 4-5 EMS fokra becsülhető, epicentruma az előző rengésektől mintegy 30 km-rel ÉK-re tehető.

Az esemény szeizmogramja a 4.23. ábrán látható.

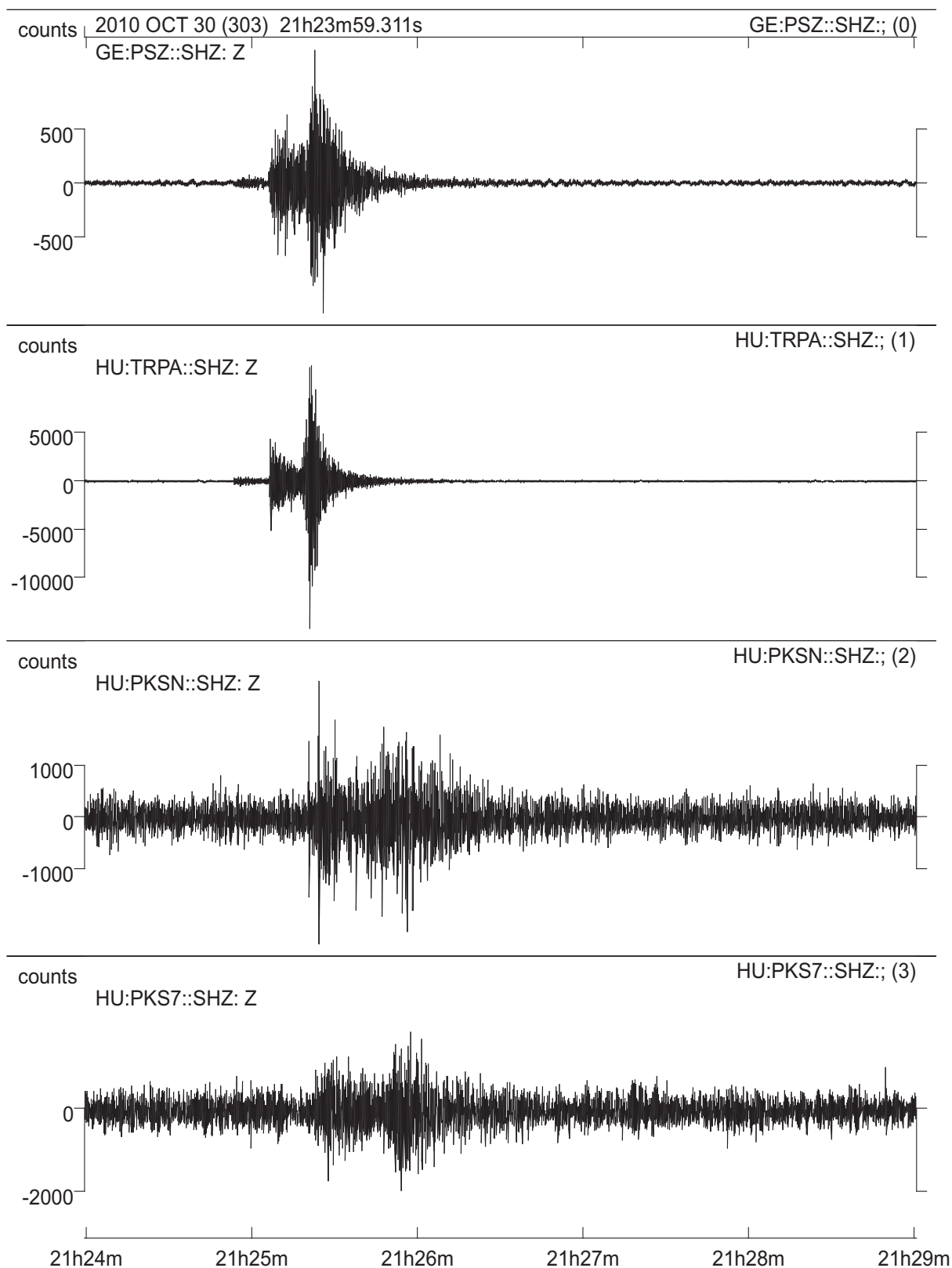
A rengés intenzitás eloszlását a 4.12. táblázat tartalmazza és a 4.24. ábra mutatja.

**DISCUSSION**

At least sixteen small to medium magnitude earthquakes were recorded at the foothill of Bükk Mountains, in the vicinity of Miskolc. Six of the shocks were felt by the population (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29). The fifth in the series of the felt quakes was reported on October 30<sup>th</sup> night, from Monok – Tállya – Erdőbénye. The epicenter of the 2.8 M<sub>L</sub> shock was some 30 km NE from the previous quakes and was felt (EMS 4-5) at the epicentral area.

Seismograms of the event are shown in Figure 4.23.

The intensity distribution of the event is shown in Table 4.12 and Figure 4.24.



4.23. ábra A 2010. október 30-i, tállyai földrengés (21:24 UTC) szeizmogramjai

Figure 4.23. Seismograms of the Tállya earthquake 30 October 2010 (21:24 UTC)

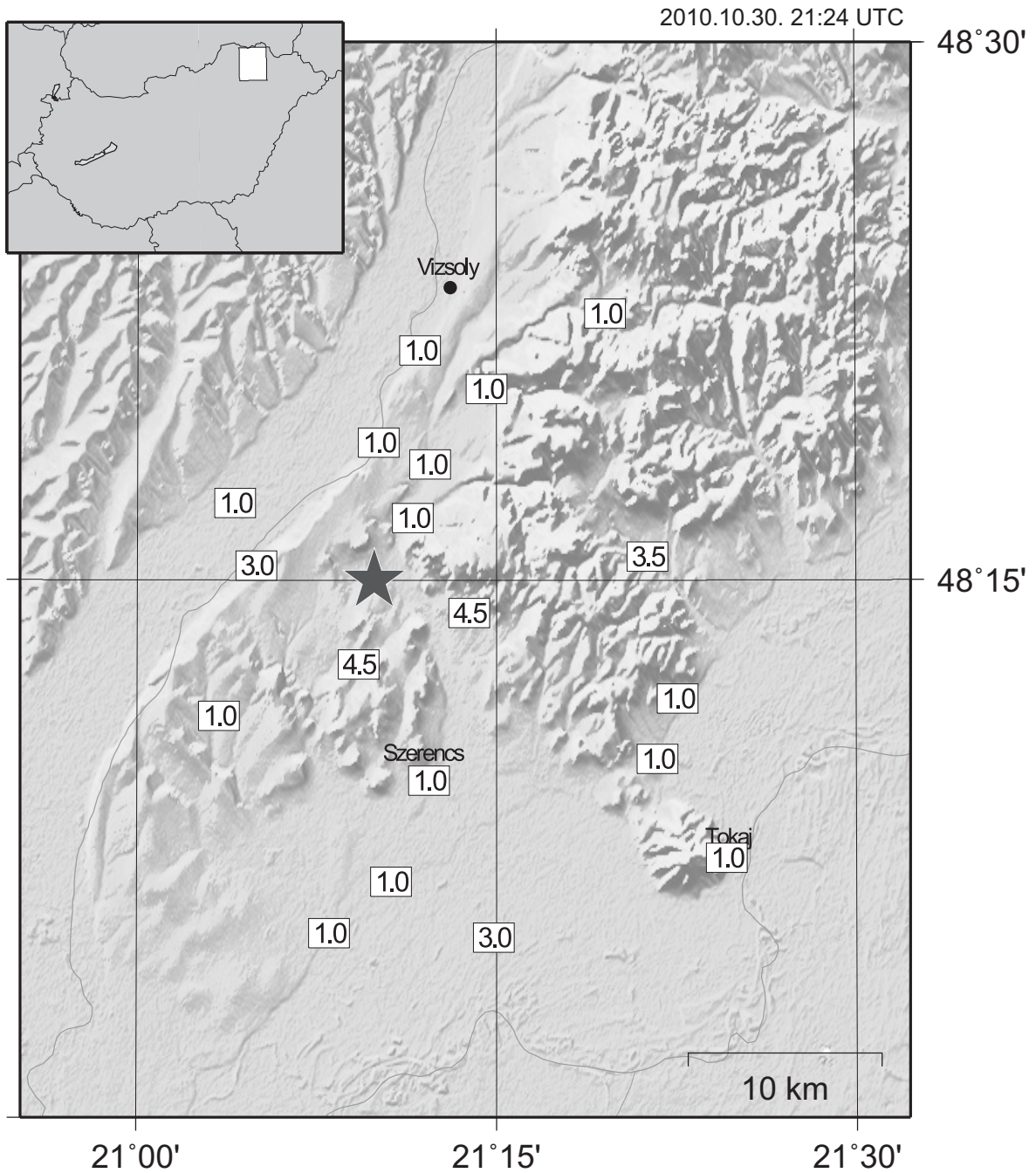
**4.12. Táblázat**

A 2010. október 30-i, tállyai földrengés (21:24 UTC) intenzitás eloszlása

**Table 4.12.**

Intensity distribution of the Tállya earthquake 30<sup>th</sup> October 2010 (21:24 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Abaújkér	48.304	21.204	1.0	0%	1
2	Abaújszántó	48.279	21.192	1.0	0%	1
3	Bodrogkeresztúr	48.167	21.362	1.0	0%	1
4	Boldogkőváralja	48.339	21.243	1.0	0%	1
5	Erdőbénye	48.261	21.355	3.5	45%	1
6	Felsődobza	48.257	21.083	3.0	30%	1
7	Gibárt	48.314	21.168	1.0	0%	1
8	Hernádcéce	48.357	21.197	1.0	0%	1
9	Ináncs	48.286	21.068	1.0	0%	1
10	Megyaszó	48.187	21.057	1.0	0%	1
11	Mogyoróska	48.374	21.326	1.0	0%	1
12	Monok	48.211	21.154	4.5	35%	1
13	Prügy	48.084	21.248	3.0	25%	2
14	Szegi	48.195	21.376	1.0	0%	1
15	Szerencs	48.157	21.203	1.0	0%	1
16	Taktaharkány	48.086	21.134	1.0	0%	1
17	Taktaszada	48.110	21.177	1.0	0%	1
18	Tállya	48.235	21.231	4.5	36%	1
19	Tokaj	48.121	21.410	1.0	0%	1



**4.24. ábra** A 2010. október 30-i, tállyai földrengés (21:24 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.24.** Intensity distribution of the Tállya earthquake 30<sup>th</sup> October 2010 (21:24 UTC) (star - instrumental epicentre)

**2010. november 21. - Máriakéménd / 21 November 2010 - Máriakéménd****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/11/21
Kipattanási idő / Origin Time:	2:35:07.64 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.048 N 18.456 E (S.D. 2.5 km)
Mélység / Depth:	10.0 km (S.D. 2.0 km)
Magnitúdó / Magnitude:	2.4 ML
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

November 10-én hajnalban kisebb (2.4  $M_L$ ) földrengést éreztek és jelentettek Baranya megyéből, Máriakéménd – Szederkény – Liptód környékéről. Az esemény nagyon kis területen volt érezhető, a legnagyobb intenzitás 4-5 EMS volt.

Az esemény szeizmogramja a 4.25. ábrán látható.

A rengés intenzitás eloszlását a 4.13. táblázat tartalmazza és a 4.26. ábra mutatja.

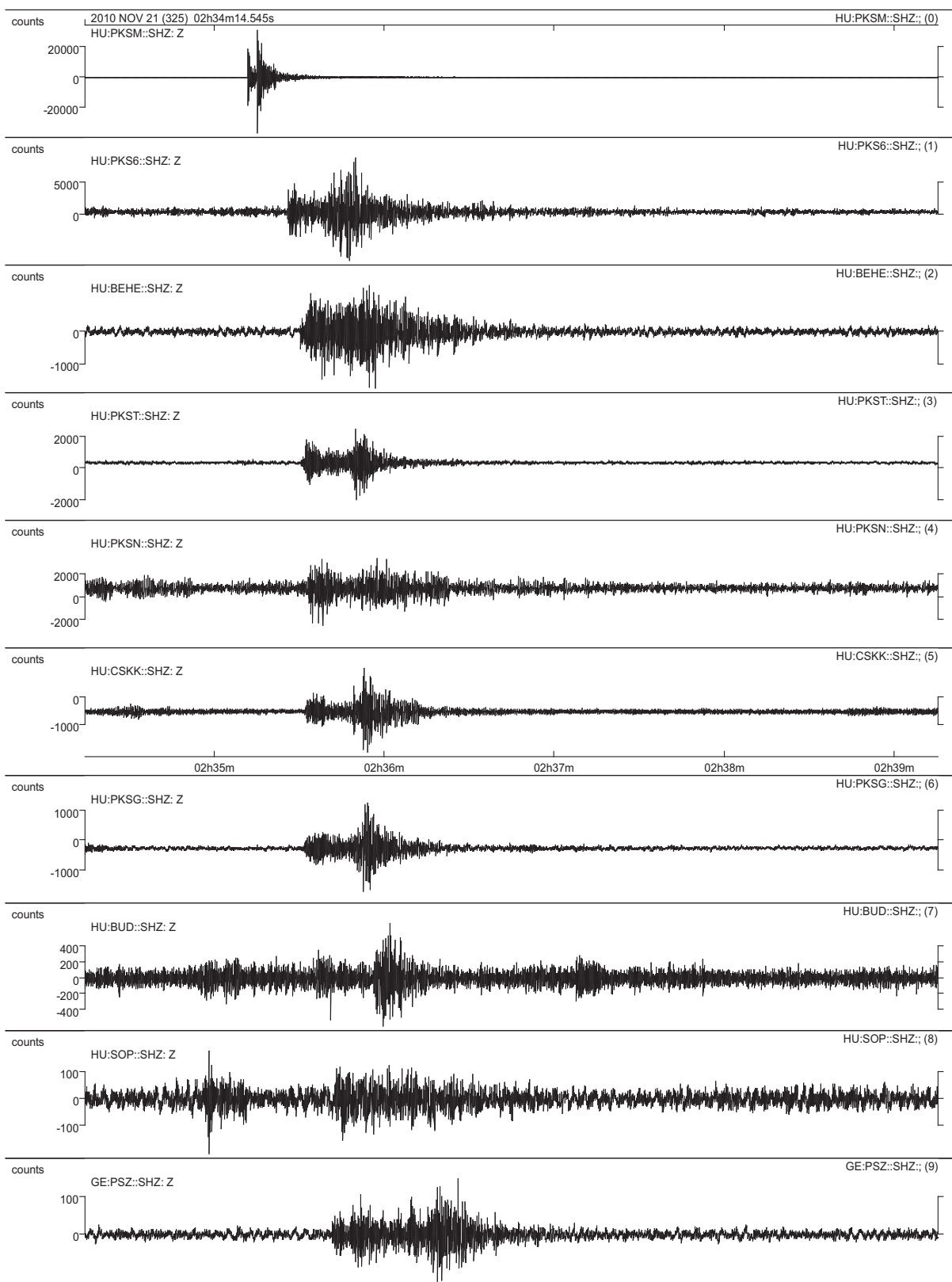
**DISCUSSION**

On early morning November 10<sup>th</sup>, a small magnitude (2.4  $M_L$ ) event was felt in Baranya County and produced reports of intensity 4-5 EMS from a very small epicentral area at Máriakéménd – Szederkény – Liptód.

Seismograms of the event are shown in Figure 4.25.

The intensity distribution of the event is shown in Table 4.13 and Figure 4.26.





4.25. ábra A 2010. november 21-i, máriakéméndi földrengés (02:35 UTC) szeizmogramjai

Figure 4.25. Seismograms of the Mária-kéménd earthquake 21 November 2010 (02:35 UTC)

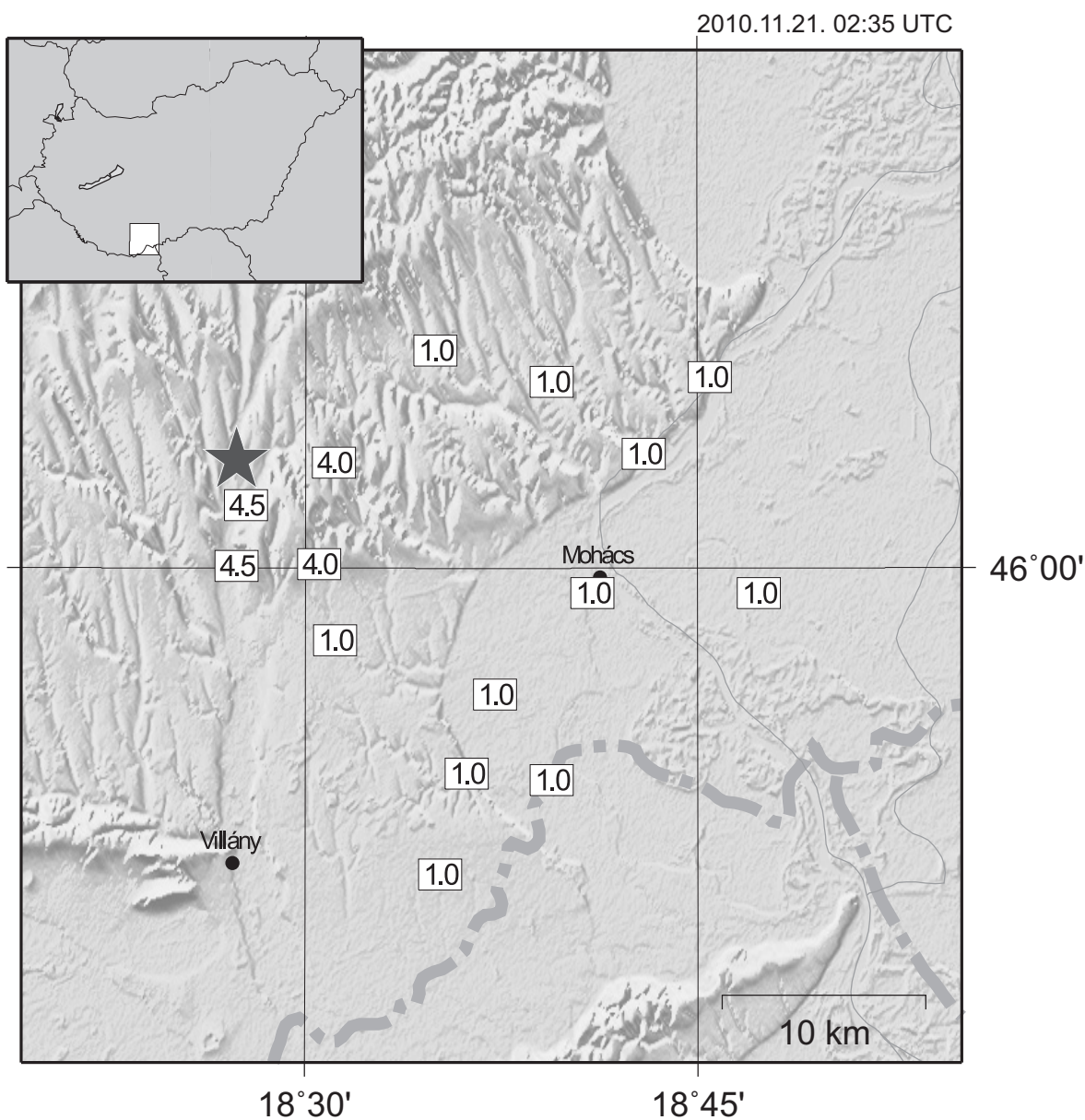
**4.13. Táblázat**

A 2010. november 21-i, máriakéeméendi földrengés (02:35 UTC) intenzitás eloszlása

**Table 4.13.**

Intensity distribution of the Máriakéeméend earthquake 21<sup>st</sup> November 2010 (02:35 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Bár	46.051	18.716	1.0	0%	1
2	Bezedek	45.864	18.586	1.0	0%	1
3	Dunaszekcső	46.085	18.758	1.0	0%	2
4	Bóly	45.968	18.519	1.0	0%	1
5	Homorúd	45.989	18.789	1.0	0%	1
6	Liptód	46.047	18.518	4.0	49%	2
7	Majs	45.909	18.603	1.0	0%	1
8	Máriakéeméend	46.028	18.462	4.5	35%	2
9	Mohács	45.989	18.683	1.0	0%	2
10	Sátorhely	45.944	18.621	1.0	0%	1
11	Somberek	46.083	18.657	1.0	0%	1
12	Szederkény	46.001	18.456	4.5	33%	1
13	Szúr	46.097	18.583	1.0	0%	1
14	Udvar	45.906	18.657	1.0	0%	1
15	Versend	46.002	18.509	4.0	50%	1



**4.26. ábra** A 2010. november 21-i, máriakémeti földrengés (02:35 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.26.** Intensity distribution of the Máriakémet earthquake 21<sup>st</sup> November 2010 (02:35 UTC) (star - instrumental epicentre)

**2010. december 14. - Felsőzsolca / 14 December 2010 - Felsőzsolca****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2010/12/14
Kipattanási idő / Origin Time:	21:29:03.69 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.075 N 20.855 E (S.D. 3.1 km)
Mélység / Depth:	1.3 km (S.D. 2.4 km)
Magnitúdó / Magnitude:	2.8 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Az év folyamán legalább 16 kis-közepes földrengés volt a Bükk-hegység lábánál, Miskolc környékén, melyek közül hatot (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29) a lakosság is érzett. A rengések közül az utolsó érezhető december 14-én éjjel jelentették Felsőzsolca – Bükkszentkereszt környékéről. A 2.8 M<sub>L</sub> magnitúdójú rengés epicentrális intenzitása 4-5 EMS fokra becsülhető.

Az esemény szeizmogramja a 4.27. ábrán látható.

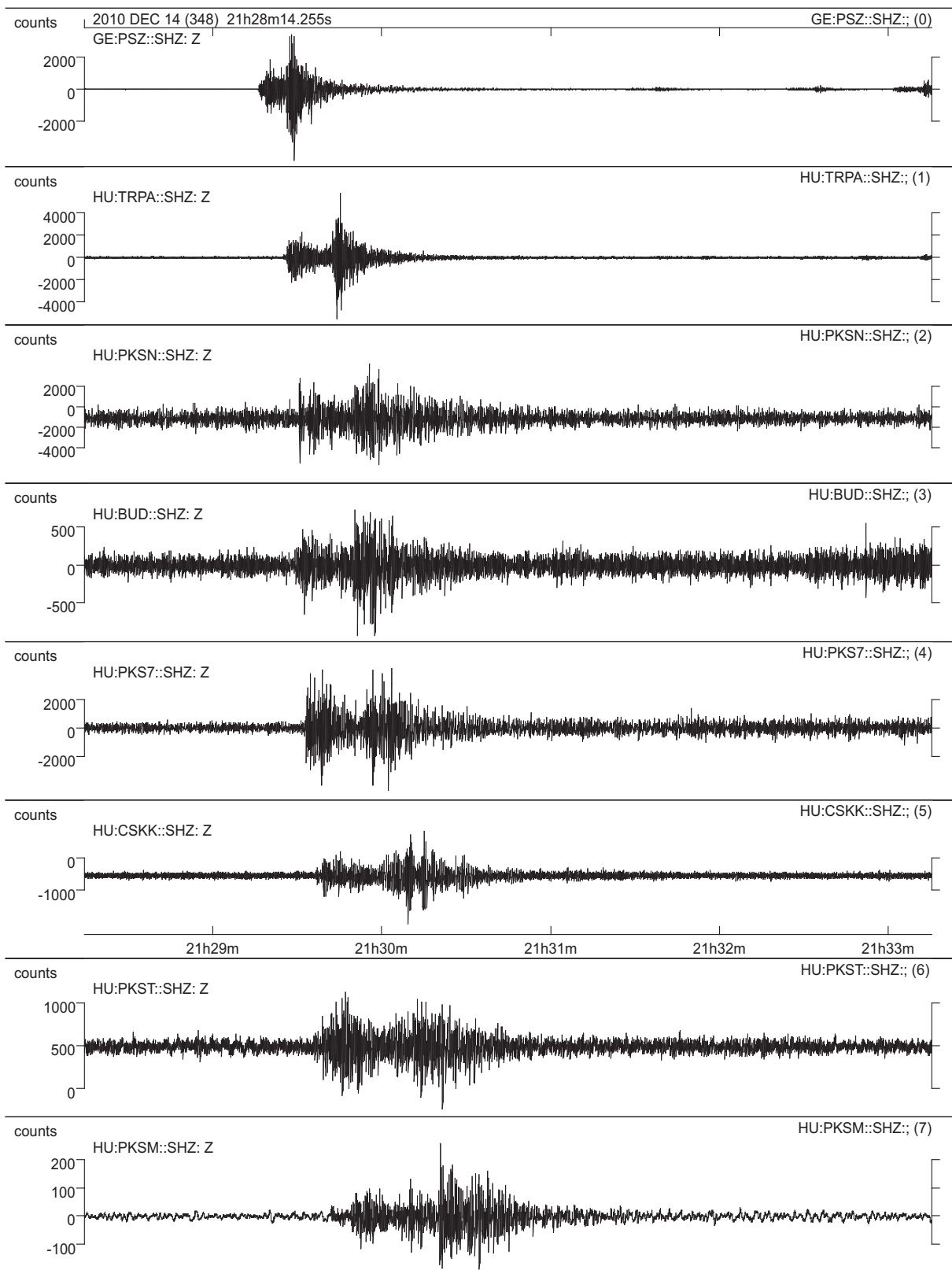
A rengés intenzitás eloszlását a 4.14. táblázat tartalmazza és a 4.28. ábra mutatja.

**DISCUSSION**

At least sixteen small to medium magnitude earthquakes were recorded at the foothill of Bükk Mountains, in the vicinity of Miskolc. Six of the shocks were felt by the population (08/14 06:57, 08/17 05:32, 08/19 01:29, 08/19 14:48, 10/30 21:24, 12/14 21:29). The last in the series of the felt quakes was reported on December 14<sup>th</sup> night, from Felsőzsolca – Bükkszentkereszt. The 2.8 M<sub>L</sub> shock was felt (EMS 4-5) at the epicentral area.

Seismograms of the event are shown in Figure 4.27.

The intensity distribution of the event is shown in Table 4.14 and Figure 4.28.



4.27. ábra A 2010. december 14-i, felsőzsolcai földrengés (21:29 UTC) szeizmogramjai

Figure 4.27. Seismograms of the Felsőzsolca earthquake 14 December 2010 (21:29 UTC)

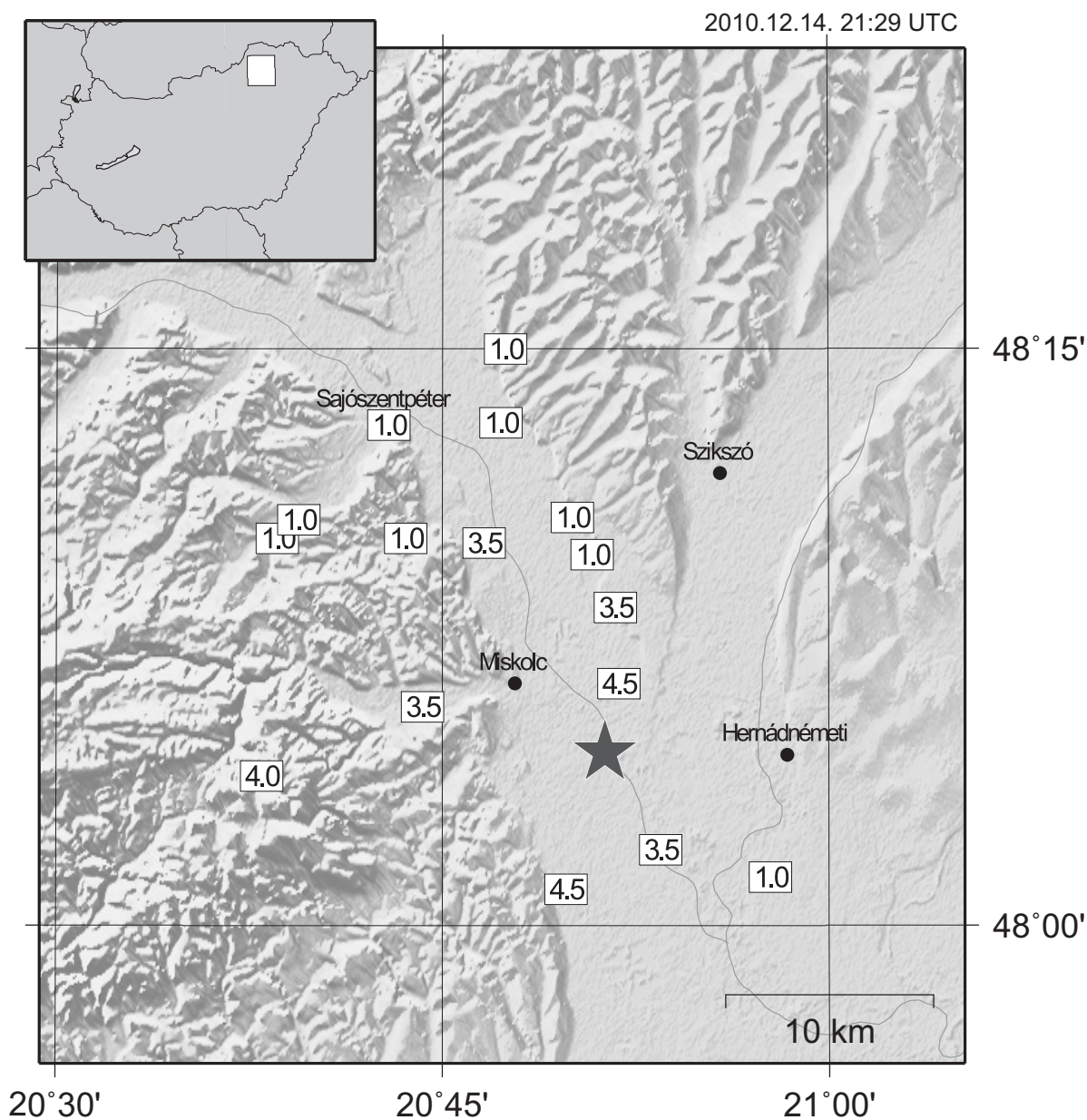
**4.14. Táblázat**

A 2010. december 14-i, felsőzsolcai földrengés (21:29 UTC) intenzitás eloszlása

**Table 4.14.**

Intensity distribution of the Felsőzsolca earthquake 14<sup>th</sup> December 2010 (21:29 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Arnót	48.138	20.862	3.5	33%	1
2	Berzék	48.021	20.962	1.0	0%	1
3	Boldva	48.218	20.788	1.0	0%	2
4	Bükkszentkereszt	48.065	20.633	4.0	52%	1
5	Felsőzsolca	48.105	20.864	4.5	34%	1
6	Mályi	48.016	20.830	4.5	38%	1
7	Miskolc	48.095	20.737	3.5	39%	3
8	Parasznya	48.168	20.643	1.0	0%	1
9	Radostyán	48.176	20.657	1.0	0%	1
10	Sajóbábony	48.168	20.726	1.0	0%	1
11	Sajókeresztúr	48.166	20.777	3.5	39%	1
12	Sajópálfala	48.161	20.847	1.0	0%	1
13	Sajópetri	48.033	20.891	3.5	34%	1
14	Sajószentpéter	48.217	20.715	1.0	0%	1
15	Sajóvámos	48.177	20.834	1.0	0%	1
16	Ziliz	48.250	20.791	1.0	0%	1



**4.28. ábra** A 2010. december 14-i, felsőzsolcai földrengés (21:29 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.28.** Intensity distribution of the Felsőzsolca earthquake 14<sup>th</sup> December 2010 (21:29 UTC) (star - instrumental epicentre)

## HIVATKOZÁSOK / REFERENCES

- Grünthal, G. (editor), 1998. European Macroseismic Scale 1998. Conseil de L'Europe, Luxembourg, 1998. pp. 99.
- Győri, E., Tóth, L., Mónus P., Bus Z., 2010. Budapest földrengés-veszélyeztetettsége, "Új utak a földtudományban" előadássorozat, Óriásvárosok: mélyebbre hatolni, biztonságosabban építkezni. Budapest, MÁELGI, 2010. december 15.
- Lee, W.H.K. and J.C. Lahr, 1975. HYPO71 (Revised): A computer program for determining hypocenter, magnitude, and first motion pattern of local earthquakes. U. S. Geological Survey Open-file report 75-311.
- Mónus, P., 1995. Travel time curves and crustal velocity model for the Pannonian basin. MTA GGKI Technical report
- Reasenber, P.A. and D. Oppenheimer, 1985. FPFIT, FPLOT and FPPAGE: Fortran computer programs for calculating and displaying earthquake fault-plane solutions, USGS Open File Report No. 85-739.
- Tóth, L. and P. Mónus, 1997. The micro-seismic monitoring network of the Paks NPP, in: Seismic Safety of the Paks Nuclear Power Plant, Akadémiai Kiadó, Budapest, 1997, pp. 113-121.
- Tóth, L., P. Mónus, T. Zsíros and M. Kiszely, 2002a. A Pannon-medence szeizmicitása, Földtani Közlöny 132/különszám, 327-337
- Tóth, L., P. Mónus, T. Zsíros and M. Kiszely, 2002b. Seismicity in the Pannonian Region - earthquake data, EGU Stephan Mueller Special Publication Series, 3, 9-28
- Tóth L., Mónus P., Bus Z., Győri E., 2008. Seismicity of the Pannonian Basin, In: E.S. Husebye (ed.), Earthquake Monitoring and Seismic Hazard Mitigation in Balkan Countries, Springer Verlag, NATO ARW Series, Vol. 81, p. 97-108.
- Zsíros, T., P. Mónus and L. Tóth, 1990. Computer estimation of intensities; the 1985 Berhida, Hungary, earthquake, PAGEOPH, 132, 533-543.
- Zsíros, T., 1994. Macroseismic observations in Hungary (1989-1993), Seismological Observatory, Geodetic and Geophysical Research Institute, Budapest, 1994. pp. 44.





# A MELLÉKLET

## EURÓPAI MAKROSZEIZMIKUS SKÁLA (EMS)

### 1 ☞ **Nem érezhető**

Nem érezhető, még a legkedvezőbb körülmények között sem.

### 2 ☞ **Alig érezhető**

A rezgést csak egy-egy, elsősorban fekvő ember érzi, különösen magas épületek felsőbb emeletein.

### 3 ☞ **Gyenge**

A rezgés gyenge, néhány ember érzi, főleg épületen belül. A fekvő emberek lengést vagy gyenge remegést éreznek.

### 4 ☞ **Széles körben érezhető**

A rezgést épületen belül sokan érzik, a szabadban kevesen. Néhány ember felébred. A rezgés mértéke nem ijesztő. Ablakok, ajtók, edények megcsörrennek, felfüggesztett tárgyak lengenek.

### 5 ☞ **Erős**

A rezgést épületen belül a legtöbben érzik, a szabadban csak néhányan. Sok alvó ember felébred, néhányan a szabadba menekülnek. Az egész épület remeg, a felfüggesztett tárgyak nagyon lengenek. Tányérok, poharak összekoccannak. A rezgés erős. Felül nehéz tárgyak felborulnak. Ajtók, ablakok kinyílnak vagy bezáródnak.

### 6 ☞ **Kiseb károkat okozó**

Épületen belül szinte mindenki, szabadban sokan érzik. Épületben tartózkodók közül sokan megijednek, és a szabadba menekülnek. Kiseb tárgyak leesnek. Hagyományos épületek közül sokban keletkezik kiseb kár, hajszálrepedés a vakolatban, kiseb vakolatdarabok lehullanak.

### 7 ☞ **Károkat okozó**

A legtöbb ember megrémül, és a szabadba menekül. Bútorok elmozdulnak, a polcokról sok tárgy leesik. Sok hagyományos épület szenved mérsékelt sérülést: kiseb repedések keletkeznek a falakban, kémények ledőlnek.

### 8 ☞ **Súlyos károkat okozó**

Bútorok felborulnak. Sok hagyományos épület megsérül: kémények ledőlnek, a falakban nagy repedések keletkeznek, néhány épület részlegesen összedől.

### 9 ☞ **Pusztító**

Oszlopok, műemlékek ledőlnek vagy elferdülnek. Sok hagyományos épület részlegesen, néhány teljesen rombadől.

### 10 ☞ **Nagyon pusztító**

Sok hagyományos épület összedől.

### 11 ☞ **Elsőpró**

A legtöbb épület összedől.

### 12 ☞ **Teljesen elsőpró**

Gyakorlatilag minden építmény megsemmisül.

(Részletesen lásd: Grünthal, 1998)

# APPENDIX A

## EUROPEAN MACROSEISMIC SCALE (EMS)

- 1 ☞ Not felt**

Not felt, even the most favourable circumstances.
- 2 ☞ Scarcely felt**

Vibration is felt only by individual people at rest in houses, especially on upper floors of buildings.
- 3 ☞ Weak**

The vibration is weak and is felt indoors by a few people. People at rest feel a swaying or light trembling.
- 4 ☞ Largely observed**

The earthquake is felt indoors by many people, outdoors by very few. A few people are awakened. The level of vibration is not frightening. Windows, doors and dishes rattle. Hanging objects swing.
- 5 ☞ Strong**

The earthquake is felt indoors by most, outdoors by few. Many sleeping people awake. A few run outdoors. Buildings tremble throughout. Hanging objects swing considerably. China and glasses clatter together. The vibration is strong. Top heavy objects topple over. Doors and windows swing open or shut.
- 6 ☞ Slightly damaging**

Felt by most indoors and many outdoors. Many people in buildings are frightened and run outdoors. Small objects fall. Slight damage to many ordinary buildings eg. fine cracks in plaster and small pieces of plaster fall.
- 7 ☞ Damaging**

Most people are frightened and run outdoors. Furniture is shifted and objects fall from shelves in large numbers. Many ordinary buildings suffer moderate damage: small cracks in walls, partial collapse of chimneys.
- 8 ☞ Heavily damaging**

Furniture may be overturned. Many ordinary buildings suffer damage: chimneys fall, large cracks appear in walls and few buildings may partially collapse.
- 9 ☞ Destructive**

Monuments and columns fall or are twisted. Many ordinary buildings partially collapse and few collapse completely.
- 10 ☞ Very destructive**

Many ordinary buildings collapse.
- 11 ☞ Devastating**

Most ordinary buildings collapse.
- 12 ☞ Completely devastating**

Practically all structures above and below ground are heavily damaged or destroyed.

(For details see Grünthal, 1998)

## B MELLÉKLET

# A VILÁG JELENTŐS FÖLDRENGÉSEI

2010

Forrás:

*U.S. Geological Survey  
National Earthquake Information Center  
(USGS - NEIC)*

## APPENDIX B

# SIGNIFICANT EARTHQUAKES OF THE WORLD

2010

Source:

*U.S. Geological Survey  
National Earthquake Information Center  
(USGS - NEIC)*

## Halálos áldozatot követelő földrengések a világon 2010-ben

## Deaths from Earthquakes in 2010

Dátum Date	Ország, terület Region	Magnitúdó Magnitude	Áldozatok száma Number killed
2010 01 10	Java, Indonesia	5.1	1
2010 01 12	Haiti region	7.0	222.570
2010 01 17	Guizhou, China	4.4	8
2010 01 30	Eastern Sichuan, China	5.1	1
2010 02 27	Offshore Bio-Bio, Chile	8.8	577
2010 02 27	Salta, Argentina	6.3	2
2010 03 08	Eastern Turkey	6.1	51
2010 04 04	Baja California, Mexico	7.2	2
2010 04 13	Southern Qinghai, China	6.9	2.968
2010 04 18	Central Afghanistan	5.6	11
2010 05 14	Northern Algeria	5.2	2
2010 06 16	Indonesia	7.0	17
2010 06 30	Oaxaca, Mexico	6.3	1
2010 07 20	Southern Iran	5.8	1
2010 08 27	Northern Iran	5.7	3
2010 09 27	Southern Iran	5.8	1
2010 10 10	Pakistan	5.2	1
2010 10 25	Indonesia	7.8	670
2010 11 03	Serbia	5.3	2
2010 12 20	Southeastern Iran	6.7	7
<b>Összesen / Total</b>			<b>226.896</b>

## A 7.0 vagy annál nagyobb magnitúdójú földrengések a világon 2010-ben

## Earthquakes of magnitude 7.0 and greater in 2010

	Év Year	Hónap Month	Nap Day	Idő Time (UTC)	Szélesség Latitude	Hosszúság Longitude	Mélység Depth (km)	Magnitúdó Magnitude	Ország, terület Region
1.	2010	01	03	22:36:27.9	-8.799	157.346	25	7.1	Solomon Islands
2.	2010	01	12	21:53:10.0	18.443	-72.571	13	7.0	Haiti region
3.	2010	02	26	20:31:26.9	25.930	128.425	25	7.0	Ryukyu Islands, Japan
4.	2010	02	27	06:34:11.5	-36.122	-72.898	23	8.8	Offshore Bio-Bio, Chile
5.	2010	04	04	22:40:43.1	32.297	-115.278	4	7.2	Baja California, Mexico
6.	2010	04	06	22:15:01.5	2.383	97.048	31	7.8	Northern Sumatra, Indonesia
7.	2010	05	09	05:59:41.6	3.748	96.018	38	7.2	Northern Sumatra, Indonesia
8.	2010	05	27	17:14:46.5	-13.698	166.643	31	7.1	Vanuatu
9.	2010	06	12	19:26:50.4	7.881	91.936	35	7.5	India region
10.	2010	06	16	03:16:27.5	-2.174	136.543	18	7.0	Papua, Indonesia
11.	2010	07	18	13:34:59.3	-5.931	150.590	35	7.3	New Britain region, P.N.G.
12.	2010	07	23	22:08:11.2	6.718	123.409	607	7.3	Philippines
13.	2010	07	23	22:51:12.4	6.486	123.467	586	7.6	Philippines
14.	2010	07	23	23:15:10.1	6.776	123.259	641	7.4	Philippines
15.	2010	08	04	22:01:43.6	-5.746	150.765	44	7.0	New Britain Region, P.N.G.
16.	2010	08	10	05:23:44.9	-17.541	168.069	25	7.3	Vanuatu
17.	2010	08	12	11:54:15.5	-1.266	-77.306	207	7.1	Ecuador
18.	2010	09	03	16:35:47.7	-43.522	171.830	12	7.0	South Island of New Zealand
19.	2010	09	29	17:11:25.9	-4.963	133.760	26	7.0	Indonesia
20.	2010	10	25	14:42:22.5	-3.486	100.088	20	7.8	Indonesia
21.	2010	12	21	17:19:41.1	26.901	143.701	17	7.4	Bonin Islands, Japan region
22.	2010	12	25	13:16:36.9	-19.733	167.896	12	7.3	Vanuatu region

**A 6.5 vagy annál nagyobb magnitúdójú,  
és a jelentősebb károkat okozó földrengések a világon 2010-ben**

**Earthquakes of magnitude 6.5 or greater  
or ones that caused fatalities, injuries or substantial damage in 2010**

DÁTUM	IDŐ ÓÓ MM SEC	KOORDINÁTA SZÉL LONG	MÉLYS. MAG	ÁLL. SZÁM	RÉGIÓ, TOVÁBBI MAGNITÚDÓK, MEGJEGYZÉSEK
DATE UTC	ORIGIN TIME UTC HR MN SEC	GEOGRAPHIC COORDINATES LAT LONG	DEPTH MAG SD	NO. STA USED	REGION, ADDITIONAL MAGNITUDES AND COMMENTS
JAN 03	21 48 05.3	8.743 S 157.477 E	26 G 6.6	1.2 284	SOLOMON ISLANDS. MW 6.6 (UCMT), 6.6 (GCMT), 6.5 (WCMT). mb 6.0 (GS). MS 6.4 (GS). Mo $9.5 \cdot 10^{18}$ Nm (UCMT), $1.0 \cdot 10^{19}$ Nm (GCMT), $7.9 \cdot 10^{18}$ Nm (WCMT), $1.4 \cdot 10^{19}$ Nm (PPT). Felt at Gizo and Honiara. A small tsunami with a wave height (peak-to-trough) of less than 2 cm was recorded at Honiara.
JAN 03	22 36 27.9	8.799 S 157.346 E	25 G 7.1	1.1 380	SOLOMON ISLANDS. MW 7.1 (GCMT), 7.1 (WCMT), 7.0 (UCMT). mb 6.4 (GS). MS 7.1 (GS). Mo $5.3 \cdot 10^{19}$ Nm (GCMT), $6.3 \cdot 10^{19}$ Nm (WCMT), $4.3 \cdot 10^{19}$ Nm (UCMT), $5.9 \cdot 10^{19}$ Nm (PPT). Sixteen homes destroyed, at least 60 damaged and 1,000 people left homeless on Rendova. Some of the damage was caused by a tsunami, with a runup height of 2-3 m on Rendova. Felt (VI) at Gizo. The tsunami was recorded at the following tide stations with these wave heights (peak-to-trough): 2 cm at Cape Ferguson and 15 cm at Rosslyn Bay, Australia; 13 cm at Honiara, Solomon Islands; 1 cm at Luganville, Vanuatu.
JAN 05	04 55 38.9	58.173 S 14.696 W	10 G 6.8	1.2 198	EAST OF THE SOUTH SANDWICH ISLANDS. MW 6.8 (UCMT), 6.8 (GCMT), 6.7 (GS), 6.8 (WCMT). mb 6.2 (GS). MS 6.5 (GS). Mo $1.8 \cdot 10^{19}$ Nm (GCMT), $1.7 \cdot 10^{19}$ Nm (UCMT), $1.5 \cdot 10^{19}$ Nm (GS), $2.2 \cdot 10^{19}$ Nm (WCMT), $2.7 \cdot 10^{19}$ Nm (PPT).
JAN 05	12 15 32.2	9.019 S 157.551 E	15 6.8	1.2 338	SOLOMON ISLANDS. MW 6.8 (UCMT), 6.8 (GCMT), 6.8 (WCMT). mb 6.2 (GS). MS 6.7 (GS). Mo $2.0 \cdot 10^{19}$ Nm (GCMT), $2.3 \cdot 10^{19}$ Nm (WCMT), $1.9 \cdot 10^{19}$ Nm (UCMT), $1.6 \cdot 10^{19}$ Nm (PPT). Felt (II) at Honiara. A 3 cm tsunami was recorded at Honiara.
JAN 10	00 25 04.2	7.907 S 107.879 E	65 5.1	1.2 155	JAVA, INDONESIA. mb 5.1 (GS). One person died from a heart attack in Garut and two people injured at Kampungbaru. Felt (V) at Garut; (IV) at Bandung, Ciamis and Pangandaran; (III) at Cianjur. Also felt at Bogor and Ciampea.
JAN 10	00 27 39.3&	40.652 N 124.692 W	29 6.5	330	OFFSHORE NORTHERN CALIFORNIA. <NC>. MW 6.5 (UCMT), 6.5 (GCMT), 6.4 (GS), 6.5 (WCMT), 6.5 (BRK). mb 6.5 (GS). MS 6.3 (GS). ME 7.0 (GS). Mo $7.3 \cdot 10^{18}$ Nm (GCMT), $4.8 \cdot 10^{18}$ Nm (GS), $7.6 \cdot 10^{18}$ Nm (WCMT), $6.9 \cdot 10^{18}$ Nm (UCMT), $8.4 \cdot 10^{18}$ Nm (PPT), $7.1 \cdot 10^{18}$ Nm (BRK). Es $6.8 \cdot 10^{14}$ Nm (GS). About 30 people injured and moderate damage to hundreds of homes and buildings in the Eureka-Ferndale area. Felt (VII) at Eureka, Ferndale and Samoa; (VI) at Bayside, Fortuna, Loleta and Rio Dell; (V) at Arcata, Blue Lake, Carlotta, Hydesville, Kneeland, Korbel, McKinleyville, Petrolia, Scotia, Somes Bar and Whitethorn. Felt widely in northern California and southwestern Oregon and as far as Hollister, California; Reno, Nevada; Portland, Oregon.
JAN 12	21 53 10.0	18.443 N 72.571 W	13 G 7.0	1.0 500	HAITI REGION. MW 7.0 (GS), 7.0 (UCMT), 7.0 (GCMT), 7.0 (WCMT). mb 6.8 (GS). MS 7.3 (GS). ME 7.6 (GS). Mo $4.7 \cdot 10^{19}$ Nm (GCMT), $4.5 \cdot 10^{19}$ Nm (UCMT), $4.4 \cdot 10^{19}$ Nm (GS), $4.4 \cdot 10^{19}$ Nm (WCMT), $5.0 \cdot 10^{19}$ Nm (PPT). Es $5.4 \cdot 10^{15}$ Nm (GS). According to official estimates, 222,570 people killed, 300,000 injured, 1.3 million displaced, 97,294 houses destroyed and 188,383 damaged in the Port-au-Prince area and in much of southern Haiti. This includes at least 4 people killed by a local tsunami in the Petit Paradis area near Leogane. Tsunami waves were also



reported at Jacmel, Les Cayes, Petit Goave, Leogane, Luly and Anse a Galets. The tsunami had recorded wave heights (peak-to-trough) of 12 cm at Santo Domingo, Dominican Republic and 2 cm at Christiansted, US Virgin Islands. Uplift was observed along the coast from Leogane to L'Acul and subsidence was observed along the coast from Grand Trou to Port Royal. Felt (VII) at Port-au-Prince and Petionville and (V) at Vieux Bourg d'Aquin and Port-de-Paix. Felt (V) at La Vega, Moca and San Cristobal; (IV) at Puerto Plata, Santiago, Santo Domingo and Sosua, Dominican Republic. Felt throughout Haiti and the Dominican Republic. Felt (III) at Oranjestad, Aruba; (IV) at Santiago de Cuba and (III) at Guantanamo, Cuba; (II) in the Kingston-Mona area, Jamaica; (III) at Cockburn Harbour and (II) at Cockburn Town, Turks and Caicos Islands; (II) at Caracas, Venezuela. Felt in parts of The Bahamas, Puerto Rico and the US Virgin Islands and as far as southern Florida, northern Colombia and northwestern Venezuela.

- JAN 15 18 00 46.7 10.454 N 63.475 W 8 5.5 1.1 325 SUCRE, VENEZUELA. MW 5.5 (UCMT), 5.5 (GCMT), 5.4 (CAR). mb 5.4 (GS). MS 5.2 (GS). Mo  $2.6 \cdot 10^{17}$  Nm (UCMT),  $2.6 \cdot 10^{17}$  Nm (GCMT). Eleven people injured and three houses damaged at Cariaco. Felt (IV) at Barcelona and Cumana; (III) at Ciudad Guayana, Porlamar and Puerto La Cruz; (II) at Caracas. Also felt at Acarigua, Carupano, La Asuncion, Maturin and Patate. Felt at Port-of-Spain, Trinidad.
- JAN 17 09 37 26.1 25.558 N 105.804 E 27 4.4 0.7 27 GUIZHOU, CHINA. mb 4.4 (GS). At least 7 people killed, 9 injured and 1 missing after 2 landslides occurred in Guizhou.
- JAN 30 21 36 58.0 30.268 N 105.668 E 10 G 5.1 1.0 137 EASTERN SICHUAN, CHINA. mb 5.1 (GS). MS 4.7 (GS). One person killed, 15 injured, more than 100 homes destroyed and thousands damaged in Moxi.
- FEB 18 01 13 19.5 42.587 N 130.703 E 578 6.9 1.4 524 CHINA-RUSSIA-NORTH KOREA BORDER REGION. MW 6.9 (GS), 6.9 (GCMT), 6.8 (UCMT), 6.8 (WCMT). mb 6.3 (GS). Mo  $2.7 \cdot 10^{19}$  Nm (GS),  $2.6 \cdot 10^{19}$  Nm (GCMT),  $2.3 \cdot 10^{19}$  Nm (UCMT),  $2.3 \cdot 10^{19}$  Nm (WCMT). Recorded (2 JMA) in southeastern Hokkaido and (1 JMA) in northern and southern Hokkaido, Japan. Also recorded (2 JMA) in Aomori, Ishikawa, Iwate, Miyagi and Saitama; (1 JMA) in Akita, Chiba, Fukui, Fukushima, Gumma, Ibaraki, Kanagawa and Tokyo, Honshu.
- FEB 25 04 56 51.9 25.523 N 101.903 E 10 G 5.2 0.9 176 YUNNAN, CHINA. mb 5.2 (GS). Eleven people injured and houses damaged in Yunnan. Felt (II) at Kunming.
- FEB 26 20 31 26.9 25.930 N 128.425 E 25 G 7.0 1.0 487 RYUKYU ISLANDS, JAPAN. MW 7.0 (UCMT), 7.0 (GCMT), 6.9 (GS), 7.0 (WCMT). mb 6.7 (GS). MS 7.0 (GS). Mo  $3.6 \cdot 10^{19}$  Nm (GCMT),  $3.4 \cdot 10^{19}$  Nm (UCMT),  $3.2 \cdot 10^{19}$  Nm (GS),  $3.4 \cdot 10^{19}$  Nm (WCMT),  $3.4 \cdot 10^{19}$  Nm (PPT). Felt (V) on Okinawa. Also felt at Taipei and T'ao-yuan, Taiwan. Recorded (5L JMA) on Okinawa; (4 JMA) in the Kerama-retto and on Kitadaito and Yoron-jima; (3 JMA) on Aguni-jima, Amami-oshima, Ie-jima, Iheya-shima, Izena-shima, Kikaiga-shima, Kume-jima, Minamidaito-jima, Okino-erabu-shima, Tokuno-shima, Tonaki-jima, Uke-jima and Yoro-jima; (2 JMA) on Akuseki-jima, Kareroma-jima, Miyako-jima and Suwanose-jima; (1 JMA) on Iriomote-jima, Ishigaki-jima, Tanega-shima, Tarama-shima and Yaku-shima. Also recorded (1 JMA) in Kagoshima, Kumamoto and Miyazaki, Kyushu.
- FEB 27 06 34 11.5 36.122 S 72.898 W 23 8.8 1.1 454 OFFSHORE BIO-BIO, CHILE. MW 8.8 (UCMT), 8.8 (GCMT), 8.8 (WCMT). mb 7.2 (GS). MS 8.5 (GS). ME 8.2 (GS). Mo  $1.8 \cdot 10^{22}$  Nm (GCMT),  $2.0 \cdot 10^{22}$  Nm (WCMT),  $1.8 \cdot 10^{22}$  Nm (UCMT),  $8.4 \cdot 10^{21}$  Nm (PPT). Es  $4.7 \cdot 10^{16}$  Nm (GS). At least 521 people killed, 56 missing, about 12,000 injured, 800,000 displaced and at least 370,000 houses, 4,013 schools, 79 hospitals and 4,200 boats damaged or destroyed by the earthquake and tsunami in the Valparaiso-Concepcion-Temuco area. At least 1.8 million people affected in Araucania, Bio-Bio, Maule, O'Higgins, Region Metropolitana and

Valparaiso. The total economic loss in Chile was estimated at 30 billion US dollars. Electricity, telecommunications and water supplies were disrupted and the airports at Concepcion and Santiago had minor damage. The tsunami damaged or destroyed many buildings and roads at Concepcion, Constitucion, Dichato and Pichilemu and also damaged boats and a dock in the San Diego area, USA. Maximum acceleration of 0.65g was recorded at Concepcion and more than 2 m of uplift along the coast was observed near Arauco. Felt (IX) at Concepcion; (VIII) at Chiguayante, Coronel, Lebu, Nacimiento, Penco, Rancagua, Santiago, San Vicente, Talca, Temuco and Tome; (VII) from La Ligua to Villarrica; (VI) as far as Ovalle and Valdivia. Felt in Chile as far as Iquique and Punta Arenas. Felt (V) at Cutral-Co and San Juan, (IV) at Cordoba and Mendoza and (III) at Buenos Aires, Argentina and (II) at Sao Paulo, Brazil. Felt in much of Argentina and in parts of Bolivia, southern Brazil, Paraguay, Peru and Uruguay. Seiches were observed on Lake Pontchartrain, Louisiana, USA. A Pacific-wide tsunami was generated. Tsunami wave heights in centimeters (above sea level) were recorded at the following selected tide gauges: 71 at Pago Pago, American Samoa; 22 at Winter Harbour, Canada; 261 at Valparaiso, 181 at Talcahuano, 164 at Coquimbo, 144 at Corral, 118 at Arica, 90 at Caldera, 79 at San Felix, 68 at Iquique, 47 at Antofagasta and 40 at San Pedro, Chile; 33 at Rarotonga, Cook Islands; 105 at Santa Cruz and 41 at Baltra, Ecuador; 32 at Rikitea, French Polynesia; 95 at Hanasaki, 40 at Ofunato and 30 at Naha, Japan; 21 on Johnston Island; 15 on Saipan, Northern Mariana Islands; 32 on Midway Island; 65.5 at Acapulco and 35.9 at Cabo San Lucas, Mexico; 117 at Gisborne, 101 on Chatham Island, 98 at Owenga and 50 on Raoul Island, New Zealand; 37 at Manus, Papua New Guinea; 69 at Callao, Peru; 16 at Currimao, Philippines; 42 at Apia, Samoa; 63 at King Cove, 42 on Atka, 39 at Seward, 39 on Shemya, 36 at Kodiak, 36 at Yakutat and 23 at Craig, Alaska, USA; 91 at Santa Barbara, 64 at Crescent City, 60 at La Jolla and 46 at Point Reyes, California; 86 at Kahului, 51 at Kawaihae, 40 at Nawiliwili and 26 at Honolulu, Hawaii; 32 at Port Orford, Oregon; 23 at Neah Bay, Washington.

FEB 27 08 01 23.0 37.773 S 75.048 W 35 G 6.9 1.1 409 OFF THE COAST OF BIO-BIO, CHILE. mb 6.9 (GS).

FEB 27 15 45 37.0& 24.872 S 65.602 W 10 6.3 376 SALTA, ARGENTINA. <SJA>. mb 6.3 (GS). MD 6.1 (SJA). Two people killed and two injured in the Salta area. Felt (V) at Cordoba and Salta and (IV) at San Miguel de Tucuman and San Salvador de Jujuy. Also felt at Libertador General San Martin, Mendoza, San Pedro and Santa Fe. Felt (II) at Asuncion, Paraguay. Felt at Antofagasta and Calama, Chile and at Tarija, Bolivia.

MAR 04 00 18 51.2 22.918 N 120.795 E 21 G 6.3 0.9 326 TAIWAN. MW 6.3 (GCMT), 6.2 (GS), 6.2 (UCMT), 6.2 (WCMT), 6.1 (RMT). mb 6.2 (GS). MS 6.2 (GS). ME 5.9 (GS). ML 6.4 (TAP). Mo  $3.1 \cdot 10^{18}$  Nm (GCMT),  $2.2 \cdot 10^{18}$  Nm (GS),  $2.6 \cdot 10^{18}$  Nm (WCMT),  $2.3 \cdot 10^{18}$  Nm (UCMT),  $1.9 \cdot 10^{18}$  Nm (RMT). Es  $1.7 \cdot 10^{13}$  Nm (GS). Ninety-six people injured and one bridge damaged in Kao-hsiung. At least 340 buildings, including historical sites, damaged throughout the island. Felt (VI) at Yung-kang; (V) at Chao-chou, Chia-i, Hsin-ying, Kao-hsiung and Tai-nan; (IV) at Chang-hua, Hsin-chu, P'ing-tung and T'ai-chung; (III) at Hsin-tien, Tao-yuan and Taipei; (II) at Chung-liao. Also felt at Chih-shan, Chu-pei, Kang-shan, Kincheng, Ma-kung, Pan-chiao, Pu-li, San-hsia, Shu-lin, Tan-shui, Tou-liu and Yung-ho. Felt (III) at Fuzhou and (II) at Xiamen, Fujian. Also felt at Jiaocheng. Felt in Hong Kong and (II) at Ningbo, Zhejiang. Felt at Basco, Philippines. Recorded (6 TAP) in Chia-i and Tai-nan; (5 TAP) in Kao-hsiung, Ping-tung, Tai-tung and Yun-lin; (4 TAP) in Chang-hua, Nan-tou and Tai-chung; (3 TAP) in Hua-lien, I-lan, Miao-li and P'eng-hu; (2 TAP) in Hsin-chu, Tai-pei and Tao-yuan; (1 TAP) in Chin-men and Lien-chiang, Taiwan.

MAR 04 14 02 27.5 13.571 S 167.227 E 176 G 6.5 1.0 426 VANUATU. MW 6.5 (GS), 6.4 (UCMT), 6.4 (GCMT), 6.4 (WCMT). mb 6.0

(GS). Mo  $6.8 \times 10^{18}$  Nm (GS),  $5.6 \times 10^{18}$  Nm (GCMT),  $5.3 \times 10^{18}$  Nm (UCMT),  $5.2 \times 10^{18}$  Nm (WCMT),  $7.1 \times 10^{18}$  Nm (PPT). Felt at Luganville.

- MAR 05 11 47 06.8 36.665 S 73.374 W 18 G 6.6 0.9 255 OFFSHORE BIO-BIO, CHILE. MW 6.6 (GS), 6.6 (GCMT), 6.6 (WCMT), 6.5 (UCMT). mb 6.1 (GS). MS 6.7 (GS). ME 6.1 (GS). ML 6.5 (GUC). Mo  $8.7 \times 10^{18}$  Nm (GS),  $1.1 \times 10^{19}$  Nm (GCMT),  $8.6 \times 10^{18}$  Nm (WCMT),  $7.3 \times 10^{18}$  Nm (UCMT),  $1.3 \times 10^{19}$  Nm (PPT). Es  $2.8 \times 10^{13}$  Nm (GS). Felt (VII) at Concepcion; (VI) at Chiguayante and Chillan; (V) at Angol and Los Angeles; (IV) at Constitucion; (III) at Santiago, Temuco and Valdivia. Also felt at Bulnes, Coihaique, Coronel, La Laja, Linares, Penafior, Puerto Varas, San Carlos, Talca, Talcahuano, Vilcun and Villarrica. Felt (II) at Buenos Aires, Argentina. Also felt at Comodoro Rivadavia, Cutral-Co, Mendoza, Neuquen, San Carlos de Bariloche and Santa Rosa.
- MAR 05 16 07 00.6 3.762 S 100.991 E 26 G 6.8 1.1 401 KEPULAUAN MENTAWAI REGION, INDONESIA. MW 6.8 (UCMT), 6.7 (GCMT), 6.5 (GS), 6.7 (WCMT). mb 6.0 (GS). MS 6.6 (GS). ME 6.1 (GS). Mo  $7.3 \times 10^{18}$  Nm (GS),  $2.3 \times 10^{19}$  Nm (UCMT),  $1.6 \times 10^{19}$  Nm (GCMT),  $1.2 \times 10^{19}$  Nm (WCMT). Es  $2.7 \times 10^{13}$  Nm (GS). Felt (II) at Bengkulu and Padang, Sumatra. Also felt at Jambi and at Jakarta, Java. Felt at Petaling Jaya, Malaysia and (II) in Singapore.
- MAR 08 02 32 34.7 38.864 N 39.986 E 12 G 6.1 0.8 379 EASTERN TURKEY. MW 6.1 (UCMT), 6.1 (GCMT), 5.9 (GS), 6.0 (WCMT). mb 5.9 (GS). MS 6.0 (GS). ME 6.3 (GS). ML 6.0 (ISK). Mo  $9.4 \times 10^{17}$  Nm (GS),  $1.8 \times 10^{18}$  Nm (UCMT),  $1.6 \times 10^{18}$  Nm (GCMT),  $1.3 \times 10^{18}$  Nm (WCMT). Es  $5.6 \times 10^{13}$  Nm (GS). At least 51 people killed, 100 injured and 3,500 displaced, 287 buildings destroyed and 700 heavily damaged in the Basyurt-Demirci-Kovancilar-Okular area. Felt (VI) at Elazig, (V) at Diyarbakir, (IV) at Gaziantep and Siirt, (III) at Erzurum and (II) at Ankara and Trabzon. Felt widely in eastern Turkey. Felt (III) at Mosul, Iraq. Also felt at Arbil and Sinjar. Felt (II) at Aleppo, Syria. Also felt at Al Qamishli, Manbij, Nubl and Ra's al `Ayn.
- MAR 11 14 39 43.9 34.290 S 71.891 W 11 G 6.9 0.9 415 LIBERTADOR O'HIGGINS, CHILE. MW 6.9 (UCMT), 6.9 (GCMT), 6.8 (GS), 6.8 (WCMT). mb 6.7 (GS). MS 7.0 (GS). ME 7.1 (GS). Mo  $2.5 \times 10^{19}$  Nm (GCMT),  $2.4 \times 10^{19}$  Nm (UCMT),  $1.7 \times 10^{19}$  Nm (GS),  $2.1 \times 10^{19}$  Nm (WCMT),  $4.3 \times 10^{19}$  Nm (PPT). Es  $9.5 \times 10^{14}$  Nm (GS). Some damage (VII) at Rancagua. Felt (VI) at Curico, Santiago, San Vicente and Talca; (V) at Buin, Calera, Chillan, Colina, Concepcion, Melipilla, San Antonio, San Fernando and Valparaiso; (IV) at Angol, Limache, Los Andes, Penafior, Petorca, Puente Alto, Quillota, Quilpue, San Bernardo, Temuco, Villa Alemana and Vina del Mar. Felt in much of central and southern Chile as far as La Serena and Coihaique. Felt (V) at San Rafael, (IV) at Cordoba, (III) at Mendoza and (II) at Buenos Aires, Argentina. Felt at Montevideo, Uruguay and (II) at Asuncion, Paraguay. A small tsunami was recorded with wave heights (peak-to-trough) of 29 cm at San Antonio and 16 cm at Valparaiso.
- MAR 11 14 55 27.5 34.326 S 71.799 W 18 G 6.7 1.0 403 LIBERTADOR O'HIGGINS, CHILE. MW 6.7 (WCMT). mb 6.5 (GS). ML 6.4 (GUC). Mo  $1.2 \times 10^{19}$  Nm (WCMT). Felt (V) at Talca; (IV) at San Fernando, Santiago and Vina del Mar; (III) at Rancagua; (II) at Quillota, San Antonio and Valparaiso. Also felt at Buin, Chillan, Concepcion, Constitution, Curico, Machali, Puente Alto, Quilpue, San Bernardo, San Felipe, San Fernando and Talagante. Felt (III) at Mendoza, Argentina. Also felt at Bariloche, Cordoba, San Juan and San Rafael. Felt at Asuncion, Paraguay.
- MAR 14 08 08 03.9 37.745 N 141.590 E 32 G 6.5 0.8 491 NEAR THE EAST COAST OF HONSHU, JAPAN. MW 6.5 (UCMT), 6.5 (GCMT), 6.4 (GS), 6.5 (WCMT). mb 6.3 (GS). MS 6.4 (GS). ME 6.6 (GS). Mo  $8.1 \times 10^{18}$  Nm (GCMT),  $7.9 \times 10^{18}$  Nm (UCMT),  $5.3 \times 10^{18}$  Nm (GS),  $6.5 \times 10^{18}$  Nm (WCMT),  $8.7 \times 10^{18}$  Nm (PPT). Es  $1.7 \times 10^{14}$  Nm (GS). Felt (IV) at Kitakami and Sendai; (III) at Ayase, Misawa, Tokyo, Yokohama and Yokosuka; (II) at Hamura. Widely felt on Honshu. Recorded (5L JMA) in Fukushima; (4 JMA) in Iwate, Miyagi and Tochigi; (3 JMA) in Akita, Aomori, Chiba, Gumma, Ibaraki,

- Kanagawa, Niigata, Saitama, Tokyo, Yamagata and Yamanashi; (2 JMA) in Nagano and Shizuoka; (1 JMA) in Aichi, Gifu, Ishikawa and Shiga. Also recorded (2 JMA) in southern and southwestern Hokkaido and (1 JMA) in central and eastern Hokkaido. Recorded (1 JMA) on Hachijo-jima, Miyake-jima, Oshima and Sadoga-shima.
- MAR 16 02 21 57.9 36.217 S 73.257 W 18 G 6.7 0.9 312 OFFSHORE BIO-BIO, CHILE. MW 6.7 (UCMT), 6.6 (GCMT), 6.5 (GS), 6.7 (WCMT). mb 6.0 (GS). MS 6.7 (GS). ME 6.3 (GS). ML 6.7 (GUC). Mo  $8.3 \times 10^{18}$  Nm (GS),  $1.1 \times 10^{19}$  Nm (GCMT),  $1.5 \times 10^{19}$  Nm (WCMT),  $1.2 \times 10^{19}$  Nm (UCMT),  $1.2 \times 10^{19}$  Nm (PPT). Es  $6.1 \times 10^{13}$  Nm (GS). Felt (VI) at Concepcion; (V) at Chiguayante, Curico, Parral, San Clemente, San Javier, Talca, Talcahuano and Temuco; (IV) at Angol, Chillan, Coronel, Linares, Los Angeles, Pichilemu, Rancagua and Tome; (II) at Corral, Lanco, Puente Alto, San Fernando, Santiago, Valdivia, Villarrica and Vina del Mar. Felt as far as La Serena and Osorno. Felt (III) at Neuquen and (II) at Mendoza, Argentina. Also felt at San Rafael.
- MAR 20 14 00 49.9 3.361 S 152.245 E 415 D 6.6 0.9 519 NEW IRELAND REGION, PAPUA NEW GUINEA. MW 6.6 (GCMT), 6.5 (GS), 6.5 (UCMT), 6.5 (WCMT). mb 6.0 (GS). Mo  $8.9 \times 10^{18}$  Nm (GCMT),  $8.4 \times 10^{18}$  Nm (UCMT),  $8.3 \times 10^{18}$  Nm (GS),  $7.6 \times 10^{18}$  Nm (WCMT),  $6.7 \times 10^{18}$  Nm (PPT).
- MAR 30 16 54 46.7 13.667 N 92.831 E 34 6.7 0.9 413 ANDAMAN ISLANDS, INDIA REGION. MW 6.7 (GCMT), 6.6 (UCMT), 6.4 (GS), 6.6 (WCMT). mb 6.5 (GS). MS 6.3 (GS). Mo  $5.6 \times 10^{18}$  Nm (GS),  $1.2 \times 10^{19}$  Nm (GCMT),  $9.6 \times 10^{18}$  Nm (WCMT),  $1.1 \times 10^{19}$  Nm (UCMT). At least 10 people injured by jumping from buildings and many buildings damaged slightly at Diglipur. Landslides occurred in the Diglipur area. Felt (V) at Bombufat; (IV) at Port Blair and Vishakhapatnam; (III) at Bhubaneswar; (II) at Calcutta and Dhaka. Also felt at Bangalore, Chetput, Choudwar, Haldia and Jajpur. Felt at Barguna, Chattagam and Dhaka, Bangladesh and at Rangoon, Myanmar.
- APR 04 22 40 43.1& 32.297 N 115.278 W 4 G 7.2 406 BAJA CALIFORNIA, MEXICO. <ECX>. MW 7.2 (UCMT), 7.2 (GCMT), 7.2 (WCMT), 6.9 (PAS). mb 6.4 (GS). MS 7.3 (GS). ME 6.8 (GS). Mo  $8.5 \times 10^{19}$  Nm (UCMT),  $7.3 \times 10^{19}$  Nm (GCMT),  $6.8 \times 10^{19}$  Nm (WCMT),  $5.6 \times 10^{19}$  Nm (PPT),  $2.8 \times 10^{19}$  Nm (PAS). Es  $3.7 \times 10^{14}$  Nm (GS). Two people killed, at least 233 injured and many buildings damaged (VII) in the Mexicali area. Felt (VII) at Guadalupe Victoria and (V) at El Sauzal, Ensenada, Maneadero, Primo Tapia, San Felipe, Tecate and Tijuana. Felt (VI) at San Luis Rio Colorado, Sonora. Felt in much of Baja California and northwestern Sonora and as far as Aguascalientes, Ciudad Juarez and La Paz. About 28 km of surface faulting observed on the Borrego Fault southwest of Mexicali. Many buildings damaged (VII) at Calexico and Imperial, California. Felt (VII) at El Centro and Heber; (VI) at Brawley, Calipatria, Holtville and Ocotillo; (V) at Borrego Springs, Boulevard, Campo, Chula Vista, Coachella, Coronado, Jacumba, Lemon Grove, Los Angeles, Niland, Pine Valley, San Diego, San Ysidro, Tecate, Thermal, Westmorland and Winterhaven. Felt (V) at Somerton, Wellton and Yuma, Arizona. Felt throughout southern California, in much of Arizona, in the Henderson-Las Vegas area, Nevada and in parts of New Mexico and Utah.
- APR 06 22 15 01.5 2.383 N 97.048 E 31 G 7.8 1.2 352 NORTHERN SUMATRA, INDONESIA. MW 7.8 (GCMT), 7.7 (WCMT). mb 7.0 (GS). MS 7.9 (GS). ME 7.5 (GS). Mo  $5.6 \times 10^{20}$  Nm (GCMT),  $3.9 \times 10^{20}$  Nm (WCMT),  $2.2 \times 10^{20}$  Nm (PPT). Es  $3.4 \times 10^{15}$  Nm (GS). Felt (V) at Meulaboh and Sibolga; (IV) at Banda Aceh and Medan; (III) at Padangsidempuan, Samosir and Tarutung. Also felt at Belawan, Duri, Lhokseumawe and Padang. Felt at Bandung and Jakarta, Java and at Kuta, Bali. Felt (IV) at Butterworth and Perai; (III) at Ayer Itam, Gelugor Estate, George Town, Sungai Ara and Tanjong Bunga Estate; (II) at Banting, Kuala Lumpur, Petaling Jaya and Tanjong Malim, Malaysia. Felt along the west coast of Peninsular Malaysia and (II) in Singapore. Also felt at Male, Maldives. A tsunami was recorded along the coast of

Sumatra with heights (center-to-peak) at the following tide stations: 44 cm at Meulaboh, 19 cm at Sibolga, 17 cm at Telukdalam, 7 cm at Padang and 7 cm on Pulau Tanahbalah.

- APR 11 09 40 25.6 10.878 S 161.116 E 21 G 6.8 1.0 399 SOLOMON ISLANDS. MW 6.8 (UCMT), 6.8 (GCMT), 6.8 (WCMT). mb 6.6 (GS). MS 7.0 (GS). ME 6.7 (GS). Mo  $2.2 \cdot 10^{19}$  Nm (UCMT),  $2.2 \cdot 10^{19}$  Nm (GCMT),  $2.0 \cdot 10^{19}$  Nm (WCMT),  $9.6 \cdot 10^{18}$  Nm (PPT). Es  $2.5 \cdot 10^{14}$  Nm (GS). Felt (III) at Honiara. Also felt at Auki.
- APR 13 23 49 38.3 33.165 N 96.548 E 17 G 6.9 1.3 410 SOUTHERN QINGHAI, CHINA. MW 6.9 (UCMT), 6.9 (GCMT), 6.7 (GS), 6.8 (WCMT). mb 6.5 (GS). MS 7.0 (GS). ME 7.5 (GS). Mo  $2.5 \cdot 10^{19}$  Nm (UCMT),  $2.5 \cdot 10^{19}$  Nm (GCMT),  $1.3 \cdot 10^{19}$  Nm (GS),  $2.0 \cdot 10^{19}$  Nm (WCMT),  $3.2 \cdot 10^{19}$  Nm (PPT). Es  $3.7 \cdot 10^{15}$  Nm (GS). At least 2,220 people killed, 70 missing, 12,135 injured and 15,000 buildings damaged in the Yushu area. Felt (IV) at Lhasa, Qiaotou and Xining; (II) at Baojishan, Lanzhou and Urumqi. Felt at Aksu, Dazhou, Jinchang, Ya'an, Yumen Dong Zhan and Zhangye. Felt (II) at Thimphu, Bhutan. Also felt at Punakha. Felt at Dibrugarh and Gezing, India. Also felt at Kathmandu, Nepal and at Chiang Mai, Thailand.
- APR 18 20 28 50.2 35.633 N 67.658 E 13 G 5.6 0.8 262 CENTRAL AFGHANISTAN. MW 5.6 (GCMT), 5.4 (GS). mb 5.7 (GS). MS 5.4 (GS). Mo  $2.9 \cdot 10^{17}$  Nm (GCMT),  $1.7 \cdot 10^{17}$  Nm (GS). Eleven people killed, more than 70 injured, 2,000 houses destroyed and dozens of livestock killed in Samangan. Landslides blocked roads in the area. Felt (IV) at Mazar-e Sharif and (II) at Kabul. Also felt at Baghlan, Bagrami, Bamyan, Baraki Barak, Gazab, Panjab, Shibirghan and Shahrak. Felt at Samarqand, Uzbekistan and (II) at Dushanbe, Tajikistan.
- APR 20 00 17 08.0& 30.794 S 121.406 E 0 5.2 77 WESTERN AUSTRALIA. <AUST>. mb 5.2 (GS). ML 5.0 (AUST). Three people injured and buildings and roads damaged at Kalgoorlie-Boulder. Felt (II) at Perth. Also felt at Carnarvon.
- APR 26 02 59 51.0 22.180 N 123.630 E 15 6.5 1.1 351 SOUTHEAST OF TAIWAN. MW 6.5 (UCMT), 6.5 (GCMT), 6.4 (GS), 6.5 (WCMT). mb 6.2 (GS). MS 6.3 (GS). ML 6.8 (TAP). Mo  $6.9 \cdot 10^{18}$  Nm (UCMT),  $6.9 \cdot 10^{18}$  Nm (GCMT),  $4.4 \cdot 10^{18}$  Nm (GS),  $6.9 \cdot 10^{18}$  Nm (WCMT). Felt (III) at Taipei and (II) at T'ai-chung. Felt in much of Taiwan. Recorded (3 TAP) in Hua-lien, I-lan and T'ai-tung; (2 TAP) in Miao-li, Nan-t'ou, P'ing-tung, T'ai-nan and Yun-lin; (1 TAP) in P'eng-hu. Felt (II) at Quanzhou, Fujian. Felt on Ishigaki-jima, Ryukyu Islands. Recorded (2 JMA) on Hateruma-jima, Iriomote-jima and Yonaguni-jima; (1 JMA) on Ikema-jima, Ishigaki-jima, Miyako-jima and Tarama-shima.
- APR 30 23 11 43.3 60.473 N 177.875 W 14 6.5 1.1 430 BERING SEA. MW 6.5 (GCMT), 6.4 (UCMT), 6.3 (GS), 6.4 (WCMT). mb 6.0 (GS). MS 6.7 (GS). ML 6.2 (AEIC). Mo  $6.7 \cdot 10^{18}$  Nm (GCMT),  $5.8 \cdot 10^{18}$  Nm (UCMT),  $3.7 \cdot 10^{18}$  Nm (GS),  $5.6 \cdot 10^{18}$  Nm (WCMT).
- MAY 05 16 29 03.2 4.054 S 101.096 E 27 G 6.6 1.0 347 SOUTHERN SUMATRA, INDONESIA. MW 6.6 (GCMT), 6.4 (GS), 6.5 (WCMT). mb 5.9 (GS). MS 6.6 (GS). ME 6.3 (GS). Mo  $9.1 \cdot 10^{18}$  Nm (GCMT),  $4.8 \cdot 10^{18}$  Nm (GS),  $6.9 \cdot 10^{18}$  Nm (WCMT). Es  $7.4 \cdot 10^{13}$  Nm (GS). Felt (IV) at Ipuh, Ketaun and Mukomuko; (III) at Bengkulu, Lebong and Muaraaman. Also felt in Singapore.
- MAY 06 02 42 47.9 18.058 S 70.547 W 37 G 6.2 0.7 455 OFFSHORE TARAPACA, CHILE. MW 6.2 (UCMT), 6.2 (GCMT), 6.1 (GS), 6.2 (WCMT). mb 6.7 (GS). MS 5.9 (GS). ME 6.6 (GS). ML 6.5 (GUC), 6.5 (LIM). Mo  $2.8 \cdot 10^{18}$  Nm (UCMT),  $2.8 \cdot 10^{18}$  Nm (GCMT),  $1.6 \cdot 10^{18}$  Nm (GS),  $2.8 \cdot 10^{18}$  Nm (WCMT),  $2.9 \cdot 10^{18}$  Nm (PPT). Es  $1.8 \cdot 10^{14}$  Nm (GS). Eleven people injured, some buildings slightly damaged (V), utilities disrupted and landslides in the Tacna area, Peru. Felt (IV) at Moquegua and Ilo; (III) at Arequipa, Juliaca and Puno; (II) at Puerto Maldonado. Also felt at Acari, Ayaviri, Camana, Chivay and Tarata. Felt (V) at Arica; (IV) Alto Hospicio, Camina, Iquique and Pozo Almonte; (III) at Huara; (II) at Pica and Quillagua, Chile. Also felt at Antofagasta and Tocopilla. Felt (III) at La Paz and Oruro, Bolivia. Also felt at Cochabamba and El Alto.

- MAY 09 05 59 41.6 3.748 N 96.018 E 38 G 7.2 0.9 611 NORTHERN SUMATRA, INDONESIA. MW 7.2 (GS), 7.2 (UCMT), 7.2 (GCMT), 7.2 (WCMT). mb 6.6 (GS). MS 7.3 (GS). ME 7.3 (GS). Mo  $9.0 \cdot 10^{19}$  Nm (GCMT),  $8.3 \cdot 10^{19}$  Nm (GS),  $9.1 \cdot 10^{19}$  Nm (WCMT),  $8.5 \cdot 10^{19}$  Nm (UCMT),  $2.5 \cdot 10^{19}$  Nm (PPT). Es  $1.7 \cdot 10^{15}$  Nm (GS). Slight damage and a power outage reported on Simeulue. Felt (V) at Banda Aceh and Meulaboh; (IV) at Medan, Nias and Padang; (III) at Riau and Sibolga; (II) at Jakarta. Felt (III) at Alor Setar, Ayer Itam and Tanjong Bunga; (II) at Bukit Mertajam, Butterworth, Gelugor, Georgetown, Kuala Lumpur, Nibong Tebal and Tanjong Tokong, Malaysia. Felt in much of Peninsular Malaysia. Felt (III) at Phuket, Thailand. Also felt at Bangkok, Hat Yai and Yala. Felt (II) at Rangoon, Burma and at Vientiane, Laos. Also felt (II) in Singapore.
- MAY 14 12 29 22.3& 35.900 N 4.120 E 2 G 5.2 312 NORTHERN ALGERIA. <CSEM>. mb 5.2 (GS). ML 5.2 (ALG). Two people killed and 43 injured near Beni Yellman. Felt (II) at Algiers. Also felt at Birkhadem, Bouira, Bordj Bou Arreridj, Boumerdas, Bou Saada, Constantine, Mansourah and Tizi Ouzou.
- MAY 24 16 18 29.0 8.087 S 71.558 W 581 D 6.5 0.8 460 ACRE, BRAZIL. MW 6.5 (GS), 6.5 (UCMT), 6.4 (GCMT), 6.5 (WCMT). mb 6.0 (GS). Mo  $6.8 \cdot 10^{18}$  Nm (GS),  $6.1 \cdot 10^{18}$  Nm (UCMT),  $5.9 \cdot 10^{18}$  Nm (GCMT),  $6.0 \cdot 10^{18}$  Nm (WCMT). Felt (V) at Cruzeiro do Sul, (III) at Rio Branco and (II) at Manaus. Also felt at Feijo, Tabatinga and Tarauaca. Felt (III) at Pucallpa, Peru. Also felt at Barranca, Campoverde, Chosica, Iquitos and San Luis.
- MAY 26 08 53 08.0 25.773 N 129.944 E 10 G 6.5 0.9 548 SOUTHEAST OF THE RYUKYU ISLANDS. MW 6.5 (GS), 6.5 (UCMT), 6.4 (GCMT), 6.4 (WCMT). mb 6.2 (GS). MS 6.2 (GS). ME 6.2 (GS). Mo  $7.4 \cdot 10^{18}$  Nm (UCMT),  $6.7 \cdot 10^{18}$  Nm (GS),  $5.8 \cdot 10^{18}$  Nm (GCMT),  $5.3 \cdot 10^{18}$  Nm (WCMT). Es  $3.8 \cdot 10^{13}$  Nm (GS). Felt (IV) at Urasoe and (III) at Chatan, Ginowan, Ishikawa, Okinawa and Yomitan. Also felt at Gushikawa, Itoman, Naha and Nishihara. Recorded (3 JMA) in the Kerama-retto and on Okinawa and (2 JMA) from Ukejima to Kume-jima and as far as Akuseki-jima.
- MAY 27 17 14 46.5 13.698 S 166.643 E 31 G 7.1 1.1 327 VANUATU. MW 7.1 (GCMT), 7.0 (GS), 7.2 (WCMT), 7.0 (UCMT). mb 6.2 (GS). MS 7.1 (GS). ME 7.4 (GS). Mo  $6.6 \cdot 10^{19}$  Nm (GCMT),  $3.4 \cdot 10^{19}$  Nm (GS),  $6.9 \cdot 10^{19}$  Nm (WCMT),  $4.4 \cdot 10^{19}$  Nm (UCMT),  $1.0 \cdot 10^{20}$  Nm (PPT). Es  $2.9 \cdot 10^{15}$  Nm (GS). Felt (V) at Luganville and (III) at Port-Vila. Felt at Honiara and Lata, Solomon Islands.
- MAY 31 19 51 45.8 11.132 N 93.471 E 112 G 6.5 1.1 422 ANDAMAN ISLANDS, INDIA REGION. MW 6.5 (GCMT), 6.4 (GS), 6.4 (UCMT), 6.4 (WCMT). mb 6.1 (GS). ME 6.0 (GS). Mo  $6.4 \cdot 10^{18}$  Nm (GCMT),  $5.5 \cdot 10^{18}$  Nm (UCMT),  $5.2 \cdot 10^{18}$  Nm (GS),  $5.1 \cdot 10^{18}$  Nm (WCMT),  $5.5 \cdot 10^{18}$  Nm (PPT). Es  $2.6 \cdot 10^{13}$  Nm (GS). Felt (IV) at Port Blair and (II) at Calcutta and Visakhapatnam. Also felt at Bhubaneswar, Haora, Kataka and Madras. Felt at Chittagong and Dhaka, Bangladesh.
- JUN 12 19 26 50.4 7.881 N 91.936 E 35 G 7.5 1.1 514 NICOBAR ISLANDS, INDIA REGION. MW 7.5 (GCMT), 7.4 (GS), 7.5 (WCMT), 7.4 (UCMT). mb 7.0 (GS). MS 7.5 (GS). ME 7.3 (GS). Mo  $1.9 \cdot 10^{20}$  Nm (GCMT),  $1.7 \cdot 10^{20}$  Nm (GS),  $2.1 \cdot 10^{20}$  Nm (WCMT),  $1.8 \cdot 10^{20}$  Nm (UCMT),  $2.4 \cdot 10^{20}$  Nm (PPT). Es  $2.2 \cdot 10^{15}$  Nm (GS). Felt (VI) at Port Blair; (III) at Abiramam, Ambattur, Chennamalai, Chepet, Madippakkam, Madras, Saint Thomas Mount and Visakhapatnam; (II) at Bangalore, Calcutta, Kolathur, Porur and Valasaravakkam. Felt (IV) at Banda Aceh, Indonesia. Felt (III) at Colombo, Dehiwala-Mount Lavinia, Galle and Kandy; (II) at Battaramulla, Matara and Moratuwa, Sri Lanka. Felt (III) at Dacca, Bangladesh. Also felt at Dhamrai. Felt (II) at Male, Maldives. Felt at Perai, Malaysia and in Singapore. A 6-cm tsunami (peak-to-trough) was recorded at Trincomalee, Sri Lanka.
- JUN 16 03 16 27.5 2.174 S 136.543 E 18 G 7.0 1.3 307 NEAR THE NORTH COAST OF PAPUA, INDONESIA. MW 7.0 (GS), 7.0 (UCMT), 7.0 (GCMT), 7.0 (WCMT). mb 6.7 (GS). MS 7.1 (GS). ME 7.3 (GS). Mo  $4.5 \cdot 10^{19}$  Nm (GS),  $3.9 \cdot 10^{19}$  Nm (UCMT),  $3.9 \cdot 10^{19}$  Nm

(GCMT),  $3.9 \times 10^{19}$  Nm (WCMT),  $9.1 \times 10^{19}$  Nm (PPT). Es  $2.1 \times 10^{15}$  Nm (GS). At least seventeen people killed, 10,000 displaced, 2,556 buildings destroyed or damaged (VI), landslides occurred and utilities disrupted on Yapen. Several buildings destroyed or damaged (VI) on Biak. Felt (V) at Nabire and (IV) at Manokwari. Also felt at Aberpura.

- JUN 16 03 58 08.4 2.329 S 136.484 E 11 6.6 1.4 309 NEAR THE NORTH COAST OF PAPUA, INDONESIA. MW 6.6 (GCMT), 6.6 (WCMT). mb 6.2 (GS). Mo  $8.8 \times 10^{18}$  Nm (GCMT),  $8.9 \times 10^{18}$  Nm (WCMT).
- JUN 26 05 30 19.4 10.627 S 161.447 E 35 G 6.7 1.2 392 SOLOMON ISLANDS. MW 6.7 (GCMT), 6.6 (GS), 6.8 (WCMT), 6.7 (UCMT). mb 6.4 (GS). MS 6.8 (GS). ME 6.6 (GS). Mo  $9.4 \times 10^{18}$  Nm (GS),  $1.4 \times 10^{19}$  Nm (GCMT),  $1.7 \times 10^{19}$  Nm (WCMT),  $1.5 \times 10^{19}$  Nm (UCMT),  $1.5 \times 10^{19}$  Nm (PPT). Es  $1.6 \times 10^{14}$  Nm (GS). Felt (IV) at Honiara.
- JUN 30 07 22 27.6 16.396 N 97.782 W 20 G 6.3 0.9 344 OAXACA, MEXICO. MW 6.2 (GCMT), 6.3 (WCMT). mb 5.9 (GS). MS 6.0 (GS). MD 6.0 (UNM). Mo  $2.6 \times 10^{18}$  Nm (GCMT),  $3.0 \times 10^{18}$  Nm (WCMT). One person killed at San Andres Huaxpaltepec. Felt (VII) at Pinotepa Nacional; (IV) at Ecatepec, Nezahualcoyotl, Tlalnepantla and Veracruz; (III) at Cholula, Cuernavaca, Huixquilucan, Jiquilpan, Mexico, Naucalpan, Oaxaca and Puebla. Felt in much of central and southern Mexico as far as Guadalajara and San Cristobal de las Casas.
- JUL 14 08 32 21.4 38.067 S 73.310 W 22 G 6.6 0.9 295 BIO-BIO, CHILE. MW 6.6 (GCMT), 6.5 (GS), 6.5 (UCMT), 6.5 (WCMT). mb 5.9 (GS). MS 6.5 (GS). ME 5.9 (GS). ML 6.6 (GUC). Mo  $9.0 \times 10^{18}$  Nm (GCMT),  $6.8 \times 10^{18}$  Nm (GS),  $7.4 \times 10^{18}$  Nm (WCMT),  $7.1 \times 10^{18}$  Nm (UCMT),  $7.3 \times 10^{18}$  Nm (PPT). Es  $1.8 \times 10^{13}$  Nm (GS). Felt (VI) at Angol, Canete, Curarrehue, Queule, Renaico, Temuco, Tolten and Traiguén; (V) at Collipulli; (IV) at Chillan, Concepcion, Curacautin, Linares, Los Angeles, Parral, Penco, Talcahuano, and Villarrica; (III) at Cobquecura, Corral, Curanilahue, Mafil, Panguipulli, Ranco, San Jose and Valdivia. Felt in much of central Chile from Santiago to Osorno. Also felt at Bariloche and Cutral-Co, Argentina.
- JUL 18 05 56 44.9 52.876 N 169.848 W 14 G 6.6 0.9 702 FOX ISLANDS, ALEUTIAN ISLANDS, ALASKA. MW 6.6 (GS), 6.6 (UCMT), 6.6 (GCMT), 6.6 (WCMT). mb 6.3 (GS). MS 6.7 (GS). ME 6.7 (GS). ML 6.3 (AEIC). Mo  $8.7 \times 10^{18}$  Nm (GS),  $1.1 \times 10^{19}$  Nm (GCMT),  $9.7 \times 10^{18}$  Nm (WCMT),  $1.1 \times 10^{19}$  Nm (UCMT),  $6.8 \times 10^{18}$  Nm (PPT). Es  $2.6 \times 10^{14}$  Nm (GS). Felt (IV) at Unalaska and (II) at Dutch Harbor. Also felt at Nikolski and on Unimak Island.
- JUL 18 13 04 09.4 5.966 S 150.428 E 28 G 6.9 1.0 456 NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.9 (GCMT), 6.8 (GS), 6.9 (WCMT), 6.8 (UCMT). mb 6.3 (GS). MS 7.1 (GS). ME 6.7 (GS). Mo  $3.0 \times 10^{19}$  Nm (GCMT),  $2.3 \times 10^{19}$  Nm (GS),  $2.5 \times 10^{19}$  Nm (WCMT),  $2.3 \times 10^{19}$  Nm (UCMT),  $6.0 \times 10^{19}$  Nm (PPT). Es  $2.5 \times 10^{14}$  Nm (GS). Felt at Kimbe and Kokopo. Felt (III) at Port Moresby, New Guinea. Also felt at Goroka and Wau. Felt at Gizo, Solomon Islands.
- JUL 18 13 34 59.3 5.931 S 150.590 E 35 G 7.3 1.2 397 NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 7.3 (UCMT), 7.3 (GCMT), 7.3 (WCMT). mb 6.1 (GS). MS 7.3 (GS). Mo  $1.2 \times 10^{20}$  Nm (GCMT),  $1.3 \times 10^{20}$  Nm (WCMT),  $1.1 \times 10^{20}$  Nm (UCMT),  $8.6 \times 10^{19}$  Nm (PPT). Felt (VII) at Kimbe. Also felt strongly at Kandrian and Rabaul. Felt (III) at Goroka, New Britain. Also felt at Kainantu, Port Moresby and Wau.
- JUL 20 19 38 09.5 27.022 N 53.861 E 10 G 5.8 1.0 233 SOUTHERN IRAN. MW 5.8 (GCMT). mb 5.6 (GS). mbLg 5.8 (TEH). ML 5.7 (THR). Mo  $6.3 \times 10^{17}$  Nm (GCMT). At least one person killed and 32 injured in Fars. At least 50 percent of the buildings damaged at Lamerd. Felt at Qeshm. Felt (II) at Manama, Bahrain. Also felt at Al Muharraq. Felt (II) at Dubai, United Arab Emirates. Also felt at Abu Dhabi and Ash Shariqah. Felt (II) at Doha, Qatar.

- JUL 23 22 08 11.2 6.718 N 123.409 E 607 D 7.3 0.9 491 MORO GULF, MINDANAO, PHILIPPINES. MW 7.3 (GS), 7.3 (UCMT), 7.3 (GCMT), 7.3 (WCMT). mb 6.3 (GS). Mo  $1.1 \times 10^{20}$  Nm (GS),  $1.1 \times 10^{20}$  Nm (UCMT),  $1.1 \times 10^{20}$  Nm (GCMT),  $1.0 \times 10^{20}$  Nm (WCMT),  $1.3 \times 10^{20}$  Nm (PPT). Felt (II PIVS) at Butuan, Cagayan de Oro, Cotabato, General Santos, Lingig, Socorro and Surigao; (I PIVS) at Lanuza. Also felt at Alabel, Davao, Kadingilan, Panabo and Puricay. Felt on Bohol and Leyte and at Manila, Luzon. Also felt on Pulau Ternate, Indonesia.
- JUL 23 22 51 12.4 6.486 N 123.467 E 586 7.6 0.9 340 MORO GULF, MINDANAO, PHILIPPINES. MW 7.6 (GS), 7.6 (UCMT), 7.6 (GCMT), 7.6 (WCMT). mb 6.9 (GS). Mo  $3.6 \times 10^{20}$  Nm (UCMT),  $3.5 \times 10^{20}$  Nm (GCMT),  $3.0 \times 10^{20}$  Nm (GS),  $3.2 \times 10^{20}$  Nm (WCMT). Felt (IV PIVS) at General Santos; (III PIVS) at Davao, Malita, Padada, and Santa Maria; (II PIVS) at Ayala, Butuan, Cagayan de Oro, Dipolog, Matanao, Socorro and Surigao; (I PIVS) at Calinan and Midsayap. Felt in much of Mindanao. Felt (II PIVS) at Cebu City, Cebu and at Palo and Tacloban, Leyte. Felt (II PIVS) at Makati and Palanan, Luzon. Also felt at Manila. Felt (II PIVS) at Bayawan, Negros. Also felt at Bacolod. Felt (I PIVS) at Makato, Panay. Also felt at Iloilo. Felt on Pulau Ternate, Indonesia and in tall buildings at T'ai-nan, Taiwan.
- JUL 23 23 15 10.1 6.776 N 123.259 E 641 D 7.4 0.8 441 MORO GULF, MINDANAO, PHILIPPINES. MW 7.4 (GS), 7.4 (GCMT), 7.4 (WCMT). mb 6.8 (GS). Mo  $1.8 \times 10^{20}$  Nm (GCMT),  $1.7 \times 10^{20}$  Nm (GS),  $1.6 \times 10^{20}$  Nm (WCMT). Felt (III PIVS) at General Santos and Lingig; (II PIVS) at Cagayan de Oro, Cotabato, Davao, Dipolog and Kidapawan. Felt (IV PIVS) at San Jose and Tanjay; (II PIVS) at Dumaguete, Negros. Felt (III PIVS) at Hamtic and San Jose, Panay. Felt (III PIVS) at Irosin and Sorsogon; (II PIVS) at Antipolo, Legaspi and Manila, Luzon. Felt (II PIVS) at Cebu City, Cebu and at Tacloban, Leyte. Felt in much of Cebu, Leyte, Luzon, Mindanao, Mindoro, Negros, Panay and Samar. Felt on Pulau Ternate, Indonesia and at Bandar Seri Begawan, Brunei.
- JUL 24 05 35 01.0 6.218 N 123.519 E 553 G 6.6 1.1 380 MORO GULF, MINDANAO, PHILIPPINES. MW 6.6 (GCMT), 6.5 (GS), 6.5 (UCMT), 6.5 (WCMT). mb 5.9 (GS). Mo  $9.1 \times 10^{18}$  Nm (GCMT),  $8.1 \times 10^{18}$  Nm (GS),  $7.3 \times 10^{18}$  Nm (UCMT),  $6.8 \times 10^{18}$  Nm (WCMT). Felt (II PIVS) at General Santos, Malita and San Marcelino. Also felt at Cogon. Felt at Manado, Sulawesi, Indonesia.
- JUL 29 07 31 56.8 6.528 N 123.247 E 627 6.6 1.4 180 MORO GULF, MINDANAO, PHILIPPINES. MW 6.6 (GS), 6.6 (UCMT), 6.6 (GCMT), 6.6 (WCMT). mb 6.1 (GS). Mo  $9.6 \times 10^{18}$  Nm (GCMT),  $9.3 \times 10^{18}$  Nm (UCMT),  $1.1 \times 10^{19}$  Nm (GS),  $8.6 \times 10^{18}$  Nm (WCMT).
- JUL 30 13 50 13.2 35.217 N 59.308 E 24 D 5.4 1.1 197 NORTHEASTERN IRAN. MW 5.4 (GS). mb 5.5 (GS). ML 5.8 (THR). Mo  $1.8 \times 10^{17}$  Nm (GS). At least 274 people injured and severe damage in the Torbat-e Heydariyeh area. Felt (II) at Ashgabat, Turkmenistan.
- AUG 04 07 15 34.0 5.496 S 146.811 E 226 6.5 1.0 402 EASTERN NEW GUINEA REG, PAPUA NEW GUINEA. MW 6.5 (GCMT), 6.4 (GS), 6.4 (UCMT), 6.4 (WCMT). mb 6.1 (GS). Mo  $6.0 \times 10^{18}$  Nm (GCMT),  $5.6 \times 10^{18}$  Nm (UCMT),  $4.7 \times 10^{18}$  Nm (GS),  $5.1 \times 10^{18}$  Nm (WCMT),  $3.6 \times 10^{18}$  Nm (PPT). Felt (IV) at Port Moresby and Lae. Also felt at Goroka, Kainantu, Kerema, Madang, Mount Hagen and Wau.
- AUG 04 22 01 43.6 5.746 S 150.765 E 44 G 7.0 1.2 396 NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.9 (GCMT), 7.0 (WCMT), 6.9 (UCMT). mb 6.1 (GS). MS 6.6 (GS). Mo  $2.6 \times 10^{19}$  Nm (GCMT),  $3.7 \times 10^{19}$  Nm (WCMT),  $2.7 \times 10^{19}$  Nm (UCMT),  $2.4 \times 10^{19}$  Nm (PPT). Felt (IV) at Kimbe.
- AUG 10 05 23 44.9 17.541 S 168.069 E 25 G 7.3 1.3 405 VANUATU. MW 7.3 (UCMT), 7.2 (GCMT), 7.3 (WCMT). mb 6.4 (GS). MS 7.3 (GS). ME 6.9 (GS). Mo  $9.2 \times 10^{19}$  Nm (GCMT),  $1.0 \times 10^{20}$  Nm (UCMT),  $1.0 \times 10^{20}$  Nm (WCMT),  $1.4 \times 10^{20}$  Nm (PPT). Es  $5.9 \times 10^{14}$  Nm (GS). Felt (VII) at Port-Vila. Also felt at Longana and Luganville. Felt at Noumea, New Caledonia. A 23-cm tsunami (center-to-peak) was recorded at Port-Vila.



- AUG 12 11 54 15.5 1.266 S 77.306 W 207 D 7.1 0.9 672 ECUADOR. MW 7.1 (GS), 7.1 (UCMT), 7.1 (GCMT), 7.1 (WCMT). mb 6.4 (GS). MD 7.2 (QUI). Mo  $5.9 \times 10^{19}$  Nm (GS),  $4.9 \times 10^{19}$  Nm (GCMT),  $5.3 \times 10^{19}$  Nm (WCMT),  $4.8 \times 10^{19}$  Nm (UCMT),  $4.7 \times 10^{19}$  Nm (PPT). Slight damage at Manta, Guayaquil and Loja. Felt (V) at Guayaquil and Santo Domingo; (IV) at Cuenca, Loja, Machala, Manta and Samborondon; (III) at Ibarra and Quito; (II) at Ambato. Felt (III) at Iquitos, Peru. Felt throughout Ecuador and in much of northern Peru as far south as Imperial. Felt at Bogota and Cali, Colombia and at Maracaibo, Venezuela.
- AUG 13 21 19 33.0 12.484 N 141.476 E 10 G 6.9 1.3 391 MARIANA ISLANDS REGION. MW 6.9 (UCMT), 6.9 (GCMT), 6.9 (WCMT). mb 6.5 (GS). MS 6.9 (GS). Mo  $2.7 \times 10^{19}$  Nm (GCMT),  $2.7 \times 10^{19}$  Nm (WCMT),  $2.5 \times 10^{19}$  Nm (UCMT),  $3.1 \times 10^{19}$  Nm (PPT).
- AUG 14 23 01 04.0 12.273 N 141.429 E 13 G 6.6 1.3 374 MARIANA ISLANDS REGION. MW 6.6 (UCMT), 6.3 (GS), 6.3 (GCMT), 6.4 (WCMT). mb 6.1 (GS). MS 6.3 (GS). ME 6.4 (GS). Mo  $8.8 \times 10^{18}$  Nm (UCMT),  $4.0 \times 10^{18}$  Nm (GS),  $4.0 \times 10^{18}$  Nm (GCMT),  $5.9 \times 10^{18}$  Nm (WCMT). Es  $1.0 \times 10^{14}$  Nm (GS).
- AUG 27 19 23 49.5& 35.490 N 54.470 E 7 5.7 301 NORTHERN IRAN. <TEH>. MW 5.7 (GCMT), 5.6 (GS), 5.8 (WCMT). mb 5.6 (GS). MS 5.5 (GS). mbLg 5.9 (TEH). Mo  $5.1 \times 10^{17}$  Nm (GCMT),  $2.8 \times 10^{17}$  Nm (GS),  $7.2 \times 10^{17}$  Nm (WCMT). At least three people killed, several hundred injured and 700 homes destroyed in the Damghan-Torud area. Felt (IV) at Shahrud and (II) at Europus. Also felt at Ardabil, Ashrafabad, Damghan, Eslamshahr, Meydan-e Qods, Qarchak, Sarivdeh, Shahrak-e Qods and Shahrjar.
- AUG 29 00 53 31.4 27.197 N 103.005 E 35 G 4.9 1.1 167 SICHUAN-YUNNAN-GUIZHOU REGION, CHINA. mb 4.9 (GS). Fourteen people injured and more than 1,000 homes damaged in Ningnan and Ziaojia. Felt at Xichang.
- SEP 03 11 16 06.6& 51.451 N 175.870 W 24 6.5 583 ANDREANOF ISLANDS, ALEUTIAN IS., ALASKA. <AEIC>. MW 6.5 (GCMT), 6.3 (GS), 6.5 (WCMT), 6.4 (UCMT). mb 6.1 (GS). MS 6.2 (GS). ML 6.0 (AEIC). Mo  $6.0 \times 10^{18}$  Nm (GCMT),  $3.7 \times 10^{18}$  Nm (GS),  $6.8 \times 10^{18}$  Nm (WCMT),  $5.6 \times 10^{18}$  Nm (UCMT). Felt on Adak.
- SEP 03 16 35 47.7 43.522 S 171.830 E 12 G 7.0 1.3 365 SOUTH ISLAND OF NEW ZEALAND. MW 7.0 (UCMT), 7.0 (GCMT), 6.9 (GS), 7.0 (WCMT). mb 6.4 (GS). MS 7.3 (GS). ME 7.4 (GS). ML 7.1 (WEL). Mo  $3.5 \times 10^{19}$  Nm (UCMT),  $3.5 \times 10^{19}$  Nm (GCMT),  $2.8 \times 10^{19}$  Nm (GS),  $4.1 \times 10^{19}$  Nm (WCMT),  $6.7 \times 10^{19}$  Nm (PPT). Es  $3.1 \times 10^{15}$  Nm (GS). Two people seriously injured, six bridges and many buildings damaged in the Christchurch area. About 30 km of right-lateral surface faulting with a maximum offset of more than 5 m was observed southeast of Darfield. Liquefaction caused damage at Bexley, Kaiapoi and in parts of Christchurch. Landslides were observed along the Rakaia River and the Port Hills area. Maximum intensity IX in the Christchurch-Greendale area and felt (VI) in much of Canterbury. Felt throughout New Zealand. Detailed information about this earthquake is available on the New Zealand GeoNet website at <http://www.geonet.org.nz>.
- SEP 27 17 22 46.0 29.647 N 51.665 E 27 5.8 1.0 341 SOUTHERN IRAN. MW 5.8 (GCMT), 5.5 (GS). mb 5.9 (GS). MS 5.6 (GS). mbLg 6.1 (TEH). ML 6.0 (THR). Mo  $6.7 \times 10^{17}$  Nm (GCMT),  $2.6 \times 10^{17}$  Nm (GS). One person killed and three injured at Konar Takhteh. Felt (IV) at Shiraz. Also felt at Bandar Bushehr. Felt (II) at As Salimiyah, Kuwait. Also felt at Ad Dasmah, Al Manqaf, Hawalli and Mishrif.
- SEP 29 17 11 25.9 4.963 S 133.760 E 26 G 7.0 1.3 271 NEAR THE SOUTH COAST OF PAPUA, INDONESIA. MW 7.0 (UCMT), 6.9 (GCMT), 6.8 (GS), 7.0 (WCMT). mb 6.7 (GS). MS 6.8 (GS). ME 7.6 (GS). Mo  $4.2 \times 10^{19}$  Nm (UCMT),  $3.2 \times 10^{19}$  Nm (GCMT),  $2.2 \times 10^{19}$  Nm (GS),  $3.6 \times 10^{19}$  Nm (WCMT),  $7.9 \times 10^{19}$  Nm (PPT). Es  $5.9 \times 10^{15}$  Nm (GS). Felt (VIII) at Tual, (VII) at Nabire and (III) at Fakfak and Kaimana. Also felt at Aberpura, Ambon, Merauke and Sorong. Felt (II) at Darwin, Australia. Also felt at Galiwinku, Howard Springs, Katherine and Palmerston.

- OCT 10 21 44 25.9 33.869 N 72.887 E 33 5.2 1.0 168 PAKISTAN. mb 5.2 (GS). One person killed, 15 injured and at least 100 buildings damaged in the Khanpur-Haripur area. Felt (V) at Topi. Also felt at Islamabad, Lahore, Peshawar, Rawalpindi and Taxila. Felt at Srinagar, India.
- OCT 21 17 53 12.8 24.664 N 109.154 W 10 G 6.7 1.2 333 GULF OF CALIFORNIA. MW 6.7 (UCMT), 6.7 (GCMT), 6.6 (GS), 6.7 (WCMT). mb 6.2 (GS). MS 6.8 (GS). Mo  $9.7 \cdot 10^{18}$  Nm (GS),  $1.2 \cdot 10^{19}$  Nm (UCMT),  $1.2 \cdot 10^{19}$  Nm (GCMT),  $1.3 \cdot 10^{19}$  Nm (WCMT),  $1.4 \cdot 10^{19}$  Nm (PPT). Felt (IV) at Guasave and Los Mochis, (III) at Culiacan and La Paz and (II) at Cabo San Lucas and Hermosillo. Also felt at Ahome, Angostura, Chihuahua, Constitucion, Durango, Obregon, San Quintin and Topolobampo. Felt (II) at Los Angeles and San Diego, California. Also felt at Bakersfield, Carson, Chatsworth, Chula, Coachella, Coronado, Dana Point, Fresno, Gridley, Irvine, La Jolla, Montclair, San Francisco, San Jose, Santa Clara, Thousand Oaks, Valencia and Vista. Felt at Glendale, Goodyear, Marana, Phoenix, Prescott and Yuma, Arizona. Felt at Truth or Consequences, New Mexico. Felt at Norman, Oklahoma. Felt at Bastrop and Plano, Texas. Also felt at Draper, Utah.
- OCT 25 14 42 22.5 3.486 S 100.088 E 20 7.8 1.2 355 KEPULAUAN MENTAWAI REGION, INDONESIA. MW 7.8 (GCMT), 7.7 (WCMT). mb 6.5 (GS). MS 7.3 (GS). ME 7.2 (GS). Mo  $6.7 \cdot 10^{20}$  Nm (GCMT),  $4.0 \cdot 10^{20}$  Nm (WCMT). Es  $1.4 \cdot 10^{15}$  Nm (GS). At least 340 people killed and 330 missing from the earthquake and tsunami with maximum height of 7 meters. Felt (III) at Bukittinggi and Padang, Sumatra. Also felt at Bengkulu. Felt (II) in Singapore. Felt at Bangkok, Thailand.
- NOV 06 03 52 20.0& 33.370 N 48.940 E 5 G 4.9 130 WESTERN IRAN. <TEH>. mb 4.9 (GS). mbLg 4.9 (TEH). ML 4.7 (THR). At least 104 people injured, some houses damaged and power outages in the Dorud-Razan area.
- NOV 10 04 05 24.4 45.464 S 96.394 E 10 G 6.5 1.1 267 SOUTHEAST INDIAN RIDGE. MW 6.5 (UCMT), 6.4 (GCMT), 6.3 (GS), 6.4 (WCMT). mb 6.0 (GS). MS 6.5 (GS). Mo  $6.6 \cdot 10^{18}$  Nm (UCMT),  $5.7 \cdot 10^{18}$  Nm (GCMT),  $4.2 \cdot 10^{18}$  Nm (GS),  $5.6 \cdot 10^{18}$  Nm (WCMT).
- NOV 30 03 24 41.6 28.360 N 139.154 E 487 6.8 0.9 479 BONIN ISLANDS, JAPAN REGION. MW 6.8 (UCMT), 6.8 (GCMT), 6.7 (GS), 6.8 (WCMT). mb 5.9 (GS). Mo  $1.9 \cdot 10^{19}$  Nm (UCMT),  $1.8 \cdot 10^{19}$  Nm (GCMT),  $1.3 \cdot 10^{19}$  Nm (GS),  $1.8 \cdot 10^{19}$  Nm (WCMT),  $8.9 \cdot 10^{18}$  Nm (PPT). Felt (IV) at Ayase, Yokohama and Zushi; (III) at and Yokosuka; (II) at Narita, Honshu. Also felt at Ageo, Akishima, Atsugi, Fujisawa, Fukushima, Fussa, Hamura, Hanamaki, Hitachi, Ichikawa, Kawasaki, Machida, Mitaka, Mizuho, Narashino, Ryugasaki, Sano, Takanezawa, Tateyama, Tokyo, Tsukuba, Urayasu, Yaita and Zama. Recorded (3 JMA) in Chiba, Ibaraki, Kanagawa, Miyagi, Saitama, Tochigi and Yamanashi; (2 JMA) in Aomori, Gumma, Iwate, Nagano, Niigata, Shizuoka and Yamagata; (1 JMA) in Aichi and Akita. Also recorded (1 JMA) in southeastern Hokkaido. Recorded (2 JMA) on Aogo-shima, Hachijo-jima, Kozu-shima, Mikura-jima, Miyake-jima, Nii-jima, O-shima and To-shima. Also recorded (1 JMA) in the Chichijima-retto and Hahajima-retto.
- DEC 02 03 12 09.8 6.002 S 149.976 E 33 G 6.6 1.1 306 NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.6 (GS), 6.6 (GCMT), 6.7 (WCMT), 6.6 (UCMT). mb 5.9 (GS). MS 6.7 (GS). ME 6.1 (GS). Mo  $9.7 \cdot 10^{18}$  Nm (GCMT),  $1.1 \cdot 10^{19}$  Nm (GS),  $1.2 \cdot 10^{19}$  Nm (WCMT),  $1.1 \cdot 10^{19}$  Nm (UCMT),  $7.4 \cdot 10^{18}$  Nm (PPT). Es  $2.9 \cdot 10^{13}$  Nm (GS). Felt (VI) at Kimbe. Also felt at Rabaul. Felt at Goroka, Kerema, Mount Hagen and Port Moresby, Papua New Guinea.
- DEC 19 12 14 24.5 7.521 N 37.839 E 10 G 5.1 0.9 115 ETHIOPIA. mb 5.1 (GS). Dozens of people injured in the Jima area and buildings damaged in the Hosa'ina-Shenk'ola-Wenjela area. Felt at Asendabo.
- DEC 20 18 41 59.6 28.440 N 59.168 E 12 G 6.7 1.4 218 SOUTHEASTERN IRAN. MW 6.7 (UCMT), 6.5 (GCMT), 6.5 (WCMT), 6.5 (GS). ME 7.0 (GS). mbLg 5.5 (GS). Mo  $8.4 \cdot 10^{18}$  Nm (GCMT),  $1.2 \cdot 10^{19}$  Nm (UCMT),  $8.2 \cdot 10^{18}$  Nm (WCMT). Es  $7.0 \cdot 10^{14}$  Nm

(GS). At least 7 people killed, 25 injured and 3 villages destroyed in eastern Kerman. Felt at Bam, Iranshahr, Khash and Zahedan.

DEC 21 17 19 41.1 26.901 N 143.701 E 17 7.4 1.0 605 BONIN ISLANDS, JAPAN REGION. MW 7.4 (UCMT), 7.4 (GCMT), 7.4 (WCMT). mb 7.0 (GS). MS 7.5 (GS). ME 7.9 (GS). Mo  $1.4 \times 10^{20}$  Nm (UCMT),  $1.4 \times 10^{20}$  Nm (GCMT),  $1.4 \times 10^{20}$  Nm (WCMT),  $9.1 \times 10^{19}$  Nm (PPT). Es  $1.6 \times 10^{16}$  Nm (GS). Felt at Agui, Chiba, Kawasaki, mitaka, Yokohama and Yokosuka. Recorded (4 JMA) in the Chichijima-retto and Hahajima-retto. Also recorded (2 JMA) in Chiba, Fukushima, Ibaraki, Iwate, Kanagawa, Miyagi, Niigata, Saitama, Tochigi, Yamagata and Yamanashi; (1 JMA) in Akita, Aomori, Gumma, Nagano and Shizuoka, Honshu. Recorded (1 JMA) in eastern and southeastern Hokkaido. Also recorded (1 JMA) on Aogoshima, Hachijo-jima, Kozu-shima, Mikura-jima, Miyake-jima, Nii-jima and O-shima.

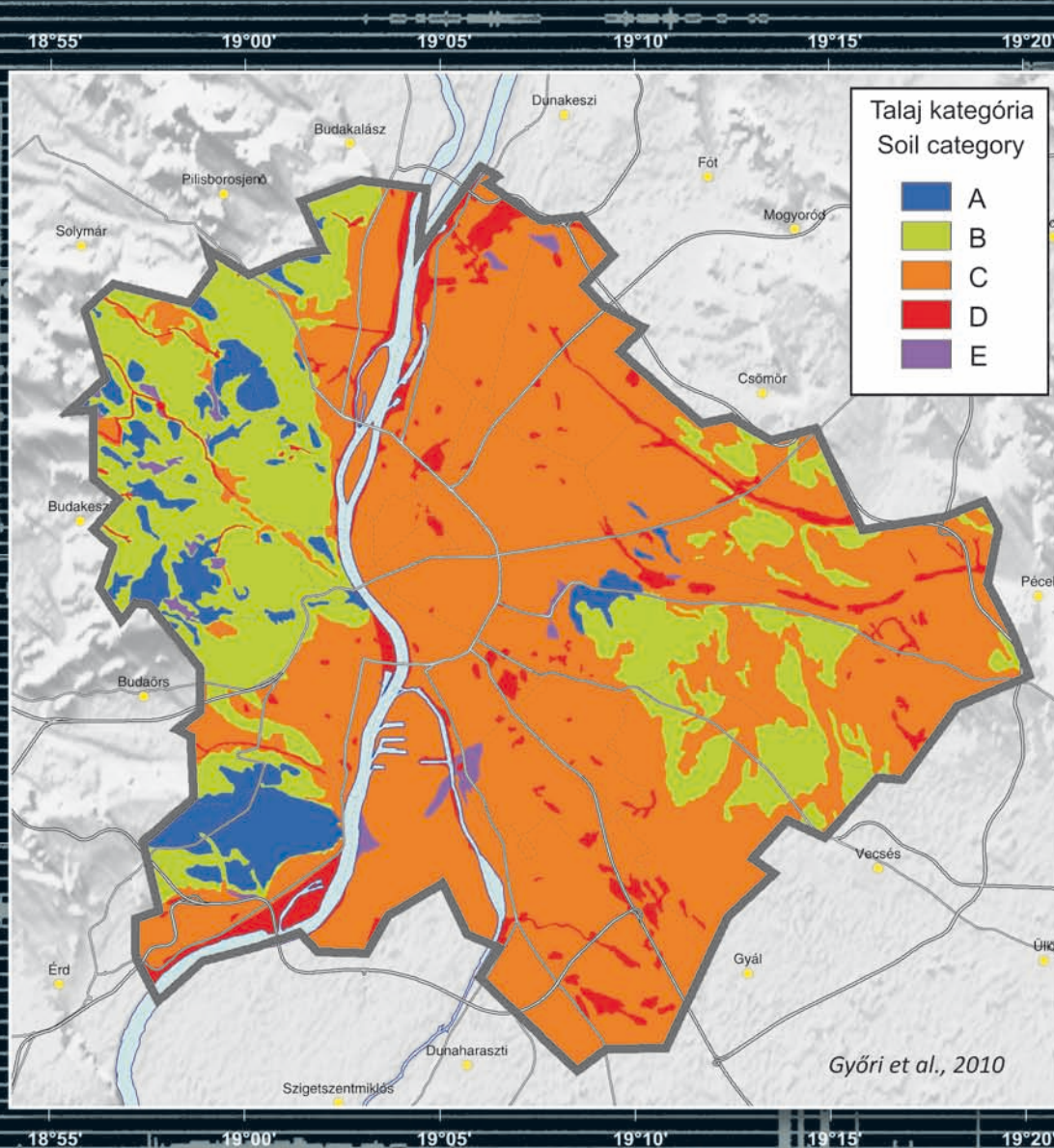
DEC 25 13 16 36.9 19.733 S 167.896 E 12 G 7.3 1.1 171 VANUATU REGION. MW 7.3 (UCMT), 7.3 (GCMT), 7.3 (WCMT), 7.3 (GS). ME 7.3 (GS). Mo  $9.7 \times 10^{19}$  Nm (GCMT),  $1.3 \times 10^{20}$  Nm (UCMT),  $1.1 \times 10^{20}$  Nm (WCMT),  $2.0 \times 10^{20}$  Nm (PPT). Es  $1.9 \times 10^{15}$  Nm (GS).

Compiled by Pamela J. Benfield and NEIC Operations Staff.





# BUDAPEST ÁTTEKINTŐ MÉRNOKSZEIZMOLÓGIAI TÉRKÉPE ENGINEERING SEISMOLOGICAL SUMMARY MAP OF BUDAPEST



Talaj kategória térkép  
az MSZ EN 1998-1 (Eurocode 8) szerint, az S1 és S2 talajok nélkül

Soil category map  
based on MSZ EN 1998-1 (Eurocode 8), without S1 and S2 soils