



Magyarországi földrengések évkönyve
Hungarian Earthquake Bulletin
2007

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

2007

TÓTH LÁSZLÓ, MÓNUS PÉTER, ZSÍROS TIBOR,
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Back cover page:

Map of Seismic Zones
for EUROCODE 8 (MSZ EN 1998-1) Hungarian National Annex

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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 2007. év szeizmikus szempontból csendes időszaknak tekinthető. Az év folyamán 91 szeizmikus eseményről szereztünk tudomást a 45.5-49.0N szélességi és 16.0-23.0E hosszúsági koordináták által határolt területen, amelyek közül 58 volt természetes eredetű földrengés, 33 robbantás. Az események mérete a $0.9 \leq M_L \leq 3.5$ lokális magnitúdó tartományba esett.

Az év folyamán 3 olyan földrengés volt, melyet a lakosság is érzett. A nyugat-, dél- és észak-Magyarországon keletkezett három rengés mindegyike ismert forrászónához köthető.

A legnagyobb földrengés intenzitás, melyet az év folyamán Magyarország területéről jelentettek 5 EMS fokozat volt. Ez jelentéktelen épületkárokat (hajszálrepedések a falakban) okozott néhány hagyományos, gyengébb minőségű épületben.

Időrendben az első érezhető, és egyben az év legnagyobb szeizmikus eseménye március 3-án pattant ki a Vas – Veszprém – Győr-Moson-Sopron megyék hármass határa közelében. A 3.0 M_L magnitúdójú rengés kb. 1000 km² területen volt érezhető, legnagyobb intenzitása 5 EMS volt.

Szeptember 15-én 2.7 M_L magnitúdójú földrengés keltett riadalmat Somogy-megyében, a Dráva közelében. A viszonylag kis területen érezhető rengés legnagyobb intenzitása 4-5 EMS volt.

Szintén kis területen volt érezhető november 18-án Nógrád megyében Hollókő környékén egy 3.0 M_L magnitúdójú földrengés, melynek legnagyobb becsült intenzitása 4 EMS volt.

1.

SUMMARY

2007 was a quiet year for Hungarian seismicity. Out of the 91 seismic events ($0.9 \leq M_L \leq 3.5$) located within the area bounded by latitudes 45.5-49.0N and longitudes 16.0-23.0E 58 were identified as natural earthquakes, 33 were known quarry blasts.

Three earthquakes were reported as felt. One of those burst in W of Hungary, one in S of Hungary and one in northern part of the country; all of them can be connected to known source zones.

The highest magnitude assigned to a shock was 3.5 M_L while the highest intensity reported during the year was 5 EMS causing minor damage (small cracks in walls) in some old poorer of quality buildings.

Reviewing the more notable events of the year in chronological order, the first felt earthquake was reported from the border region of Vas – Veszprém – Győr-Moson-Sopron counties on March 3rd. The 3.0 M_L earthquake was felt in an area of about 1000 km² in W of Hungary. The highest reported intensity were about 5 EMS.

On September 15th, a 2.7 M_L magnitude earthquake alarmed people in Somogy County near the Drava River and produced reports of 4-5 EMS.

A 3.0 M_L magnitude event was felt in a relatively small area and reported 4 EMS from Nógrád county (Hollókő).

2.

A MAGYARORSZÁGI FÖLDRENGÉS-MEGFIGYELŐ HÁLÓZAT

2007-ben 15 szeizmográf állomást működtetett Magyarországon az MTA Geodéziai és Geofizikai Kutatóintézet és a GeoRisk Földrengekutató 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 a PKSM állomáson egy Quanterra Q380 berendezésen keresztül, a többi helyen pedig 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 protokollal (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. A helyszínen tárolt adatok bizonyos idő elteltével törlődnek.

Rövidperiódusú állomások

A 9 rövidperiódusú állomás mindegyikén Lennartz LE-3D 1 s sajátperiódusú 3 komponenses szeizmométer és Lennartz MARS88 digitalizáló és adatgyűjtő működik, 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.

Négy állomás (PENC, PKSG, PKST, RHK3) működése eltér a többi rövidperiódusú állomásától. Az érzékelő és digitalizáló ugyanaz, de az adatok a helyszínen működő SeisComp rendszerű számítógépbe jutnak, ahol annak merevlemezén tárolódnak, és 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. A helyszínen tárolt adatok bizonyos idő elteltével itt is automatikusan törlődnek (2.2. ábra).

Az RHK3 állomásról az adatok telefonos kapcsolat segítségével jutnak el az adatközpontba. A telefonos adatgyűjtés ezen állomásról félóránként történik.

2.

SEISMOGRAPH STATIONS IN HUNGARY

In 2007, there were 15 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 except PKSM where a Quanterra Q380 unit serves as a 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

Each of the nine 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 is recorded at each short period station.

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 four stations (PENC, PKSG, PKST, RHK3) 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 stations have 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.

Station RHK3 is accessible via telephone modem; continuous data is routinely collected on 'half an hour' basis.

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 számára készülnek, 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 készül havonta a fázisadatokat (kimérési adatokat) tartalmazó jelentés. 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 oldalon.

Átlagos zaj- (talajnyugtalanosság) viszonyokat feltételezve a magyarországi szeizmológiai hálózat észlelési képessége $ML=1.5-2.0$ 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 ez az érték. 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 adatahoz 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 (2.4. ábra és 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 neighbor 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 1.5-2.0 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 Fig. 2.4 and Table 2.2.

2.1. Táblázat Szeizmológiai állomások, műszerek és alapkőzet

Table 2.1. Seismic stations, instrumentation and lithology

Jel 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	46,4702	16,7755	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
PENC Penc	47,7905	19,2817	250	üledék alluvium	3C SP	LE-3D	D-C; MARS-88MC + SeisComP PC	GR
PKS2 Kecel	46,4920	19,2131	106	homok sand	3C SP	LE-3D	D-C; MARS-880C	GR
PKS6 Bócsa	46,5998	19,5645	120	homok sand	3C SP	LE-3D	D-C; MARS-880C	GR
PKS7 Kunszentmiklós	47,0473	19,1609	95	agyag mud	3C SP	LE-3D	D-C; MARS-880C	GR
PKS9 Tamási	46,5870	18,2789	240	löss loess	3C SP	LE-3D	D-C; MARS-880C	GR
PKSG Gánt	47,3918	18,3907	200	dolomit dolomite	3C SP	LE-3D	D-C; MARS-88MC + SeisComP PC	GR
PKSM Mórággy	46,2119	18,6413	170	gránit granite	3C BB	STS-2	D-C; Q380 + SeisComP PC	GGKI/ GR
PKSN Nyárlőrinc	46,8972	19,8673	110	homok sand	3C SP	LE-3D	D-C; MARS-880C	GR
PKSO* Öskü	47,1614	18,0711	163	dolomit dolomite	3C SP	LE-3D	D-C; MARS-88MC + SeisComP PC	GR
PKST** Tés	47,2590	18,0711	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
RHK3 Tenkes	45,8885	18,2521	420	mészkeő limestone	3C SP	LE-3D	D-C; MARS-88MC + SeisComP PC	GR
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

(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

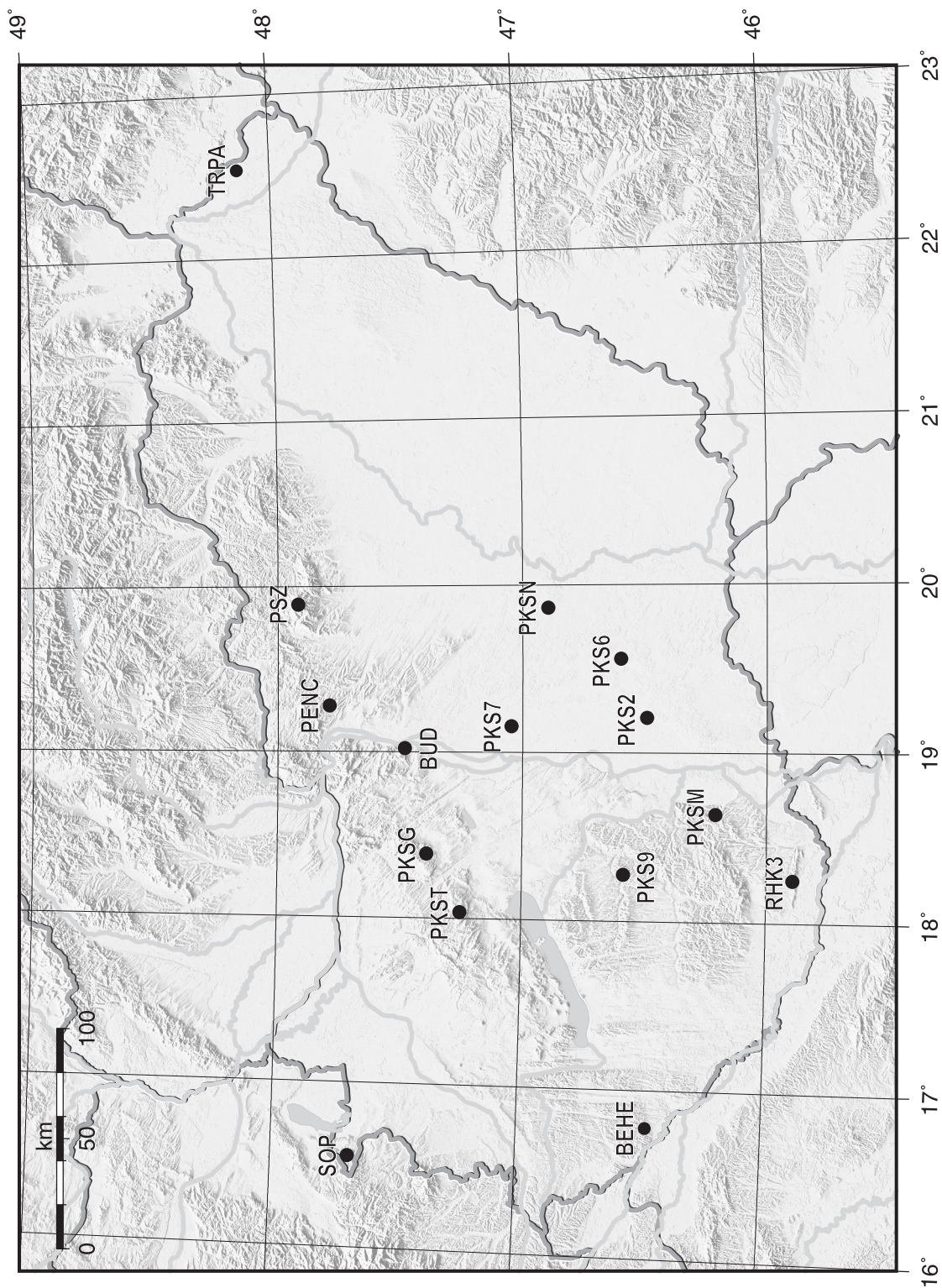
MARS-88 – Lennartz adatgyűjtő / Lennartz data acquisition system

(4) GGKI – MTA Geodéziai és Geofizikai Kutatóintézet / Geodetic and Geophysical Research Institute, HAS

GR – GeoRisk Földrengekutató Intézet Kft. / GeoRisk Earthquake Research Institute Ltd.

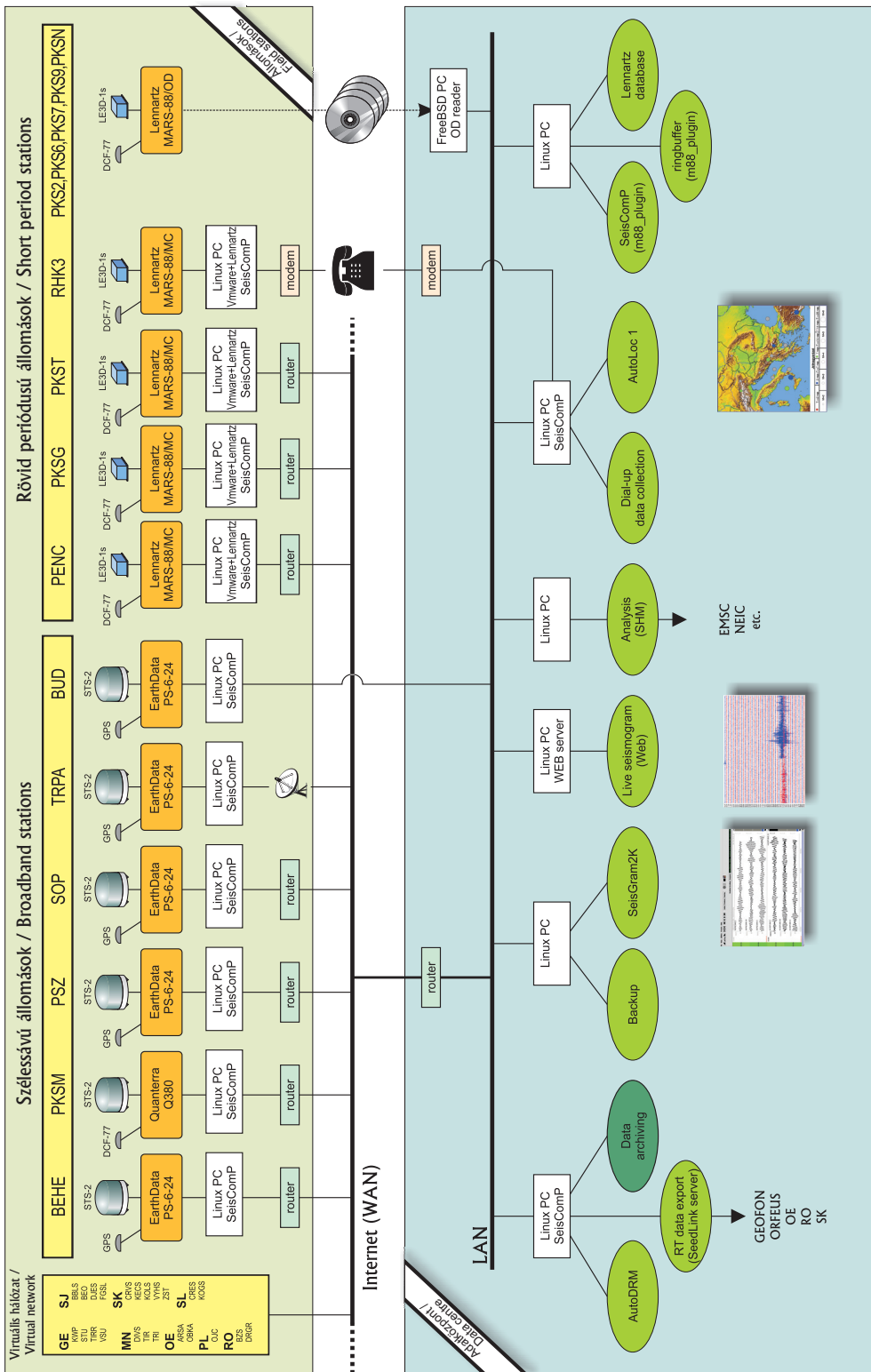
(*) Működés vége / Off date: 2007/05/30;

(**) Működés kezdete / Open date: 2007/05/31



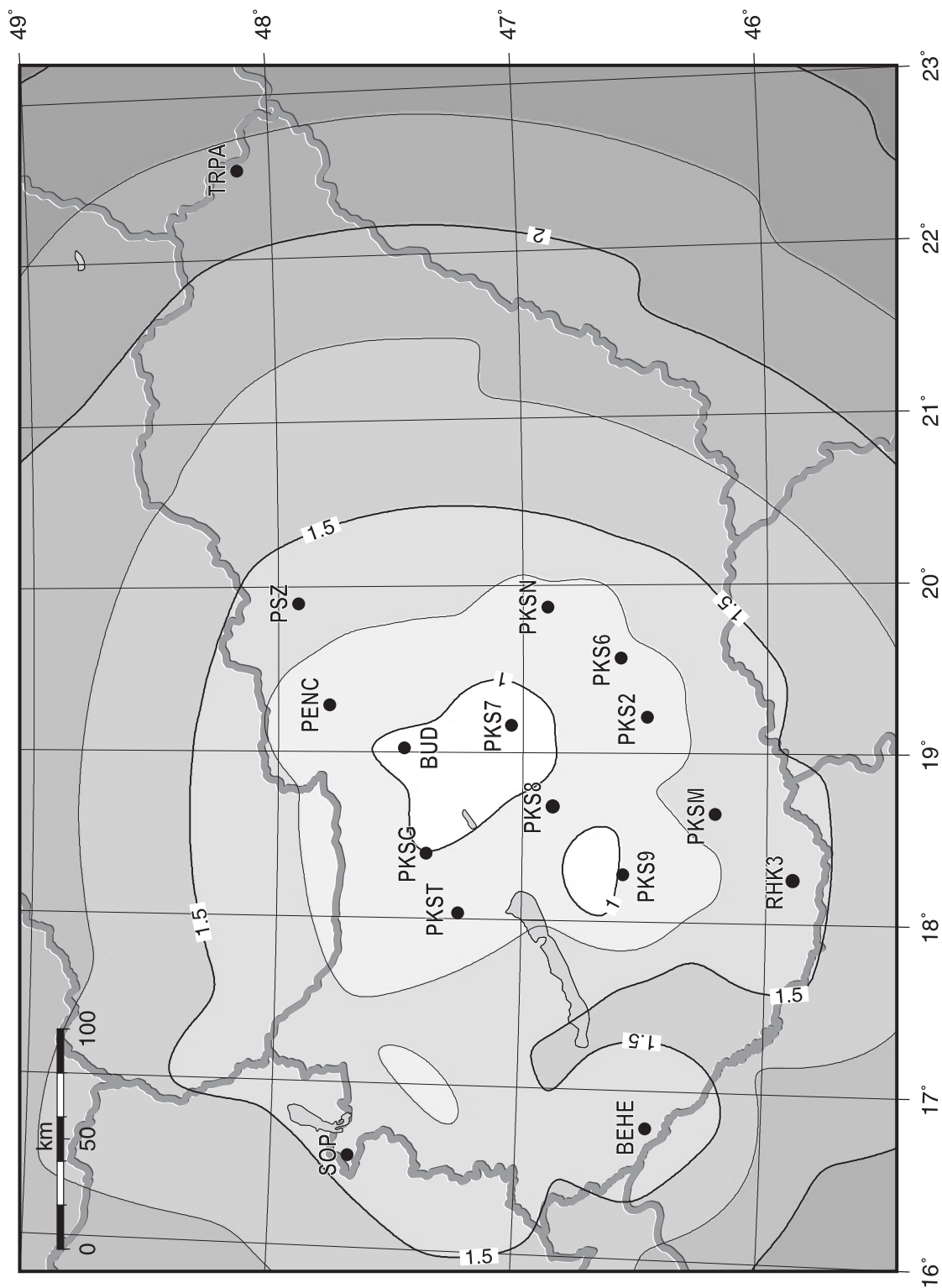
2.1. ábra A magyarországi szeizmológiai állomáshálózat 2007-ben (részletek: 2.1. Táblázat)

Figure 2.1. Seismograph station network in Hungary in 2007 (See Table 2.1. for details)



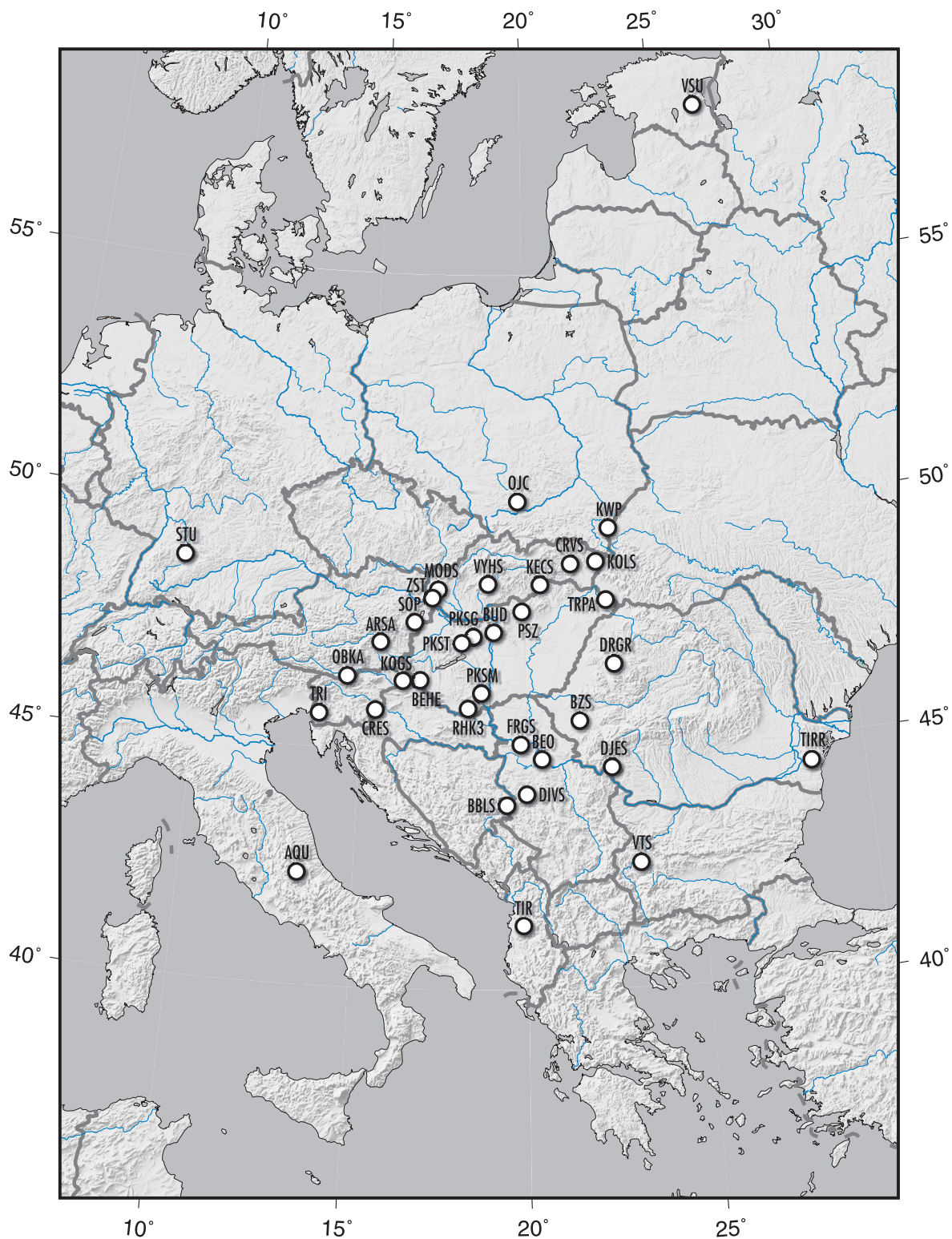
2.2. ábra A magyarországi szeizmológiai hálózat felépítése

Figure 2.2. Structure of the Hungarian seismograph network



2.3. ábra Érzékenységi küszöb átlagos zajviszonyokat feltételezve. Az izovonalak Richter-féle lokális magnitúdót (ML) mutatnak.

Figure 2.3. Detection capability at average noise conditions. Contour values are local Richter magnitudes (ML)



2.4. ábra HUNRENG virtuális szeizmológiai hálózat állomásai

Figure 2.4. Seismic stations used for HUNRENG virtual seismic network

2.2. Táblázat HUNRENG virtuális szeizmológiai hálózat külföldi állomásai
 Table 2.2. Supplementary seismic stations used for HUNRENG virtual seismic network

Állomáskód Station code	Az üzemeltető hálózat / Operating network		Ország / Country
	Kódja / Code *	Neve / Name	
KWP	GE	GEOFON	Lengyelország / Poland
SANT			Görögország / Greece
STU			Németország / Germany
TIRR			Románia / Romania
VSU			Észtország / Estonia
AQU	MN	MEDNET	Olaszország / Italy
DIVS			Szerbia / Serbia
TIR			Albánia / Albania
TRI			Olaszország / Italy
VTS			Bulgária / Bulgaria
ARSA	OE	Osztrák Szeizmológiai Hálózat / Austrian Seismic Network	Ausztria / Austria
OBKA			
OJC	PL	Lengyel Szeizmológiai Hálózat / Polish Seismological Network	Lengyelország / Poland
BZS	RO	Román Szeizmológiai Hálózat / Romanian Seismic Network	Románia / Romania
DRGR			
BBLS	SJ	Szerb Szeizmológiai Hálózat / Serbian Seismological Network	Szerbia / Serbia
BEO			
DJES			
FRGS			
CRVS	SK	Szlovák Nemzeti Szeizmológiai Hálózat / Slovak National Seismic Network	Szlovákia / Slovakia
KECS			
KOLS			
MODS			
VYHS			
ZST			
CRES	SL	Szlovéniai Szeizmológiai Hálózat / Slovenia Seismic Network	Szlovénia / Slovenia
KOGS			

(*) 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). Az eredeti kódot kissé módosítottuk a könnyebb kezelhetőség érdekében, és kiegészítettük egy rutinnal, amely a Richter-féle lokális magnitúdót (M_L) számolja Bakun és Joyner (1984) módszerével.

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 (v_P) [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	∞	

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. The original program has been modified and a routine for Richter local magnitude calculation implemented. For the magnitude calculations, the method published by Bakun and Joyner (1984) has been used.

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 (v_P)</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	∞	

ESEMÉNYLISTA / LIST OF EVENTS

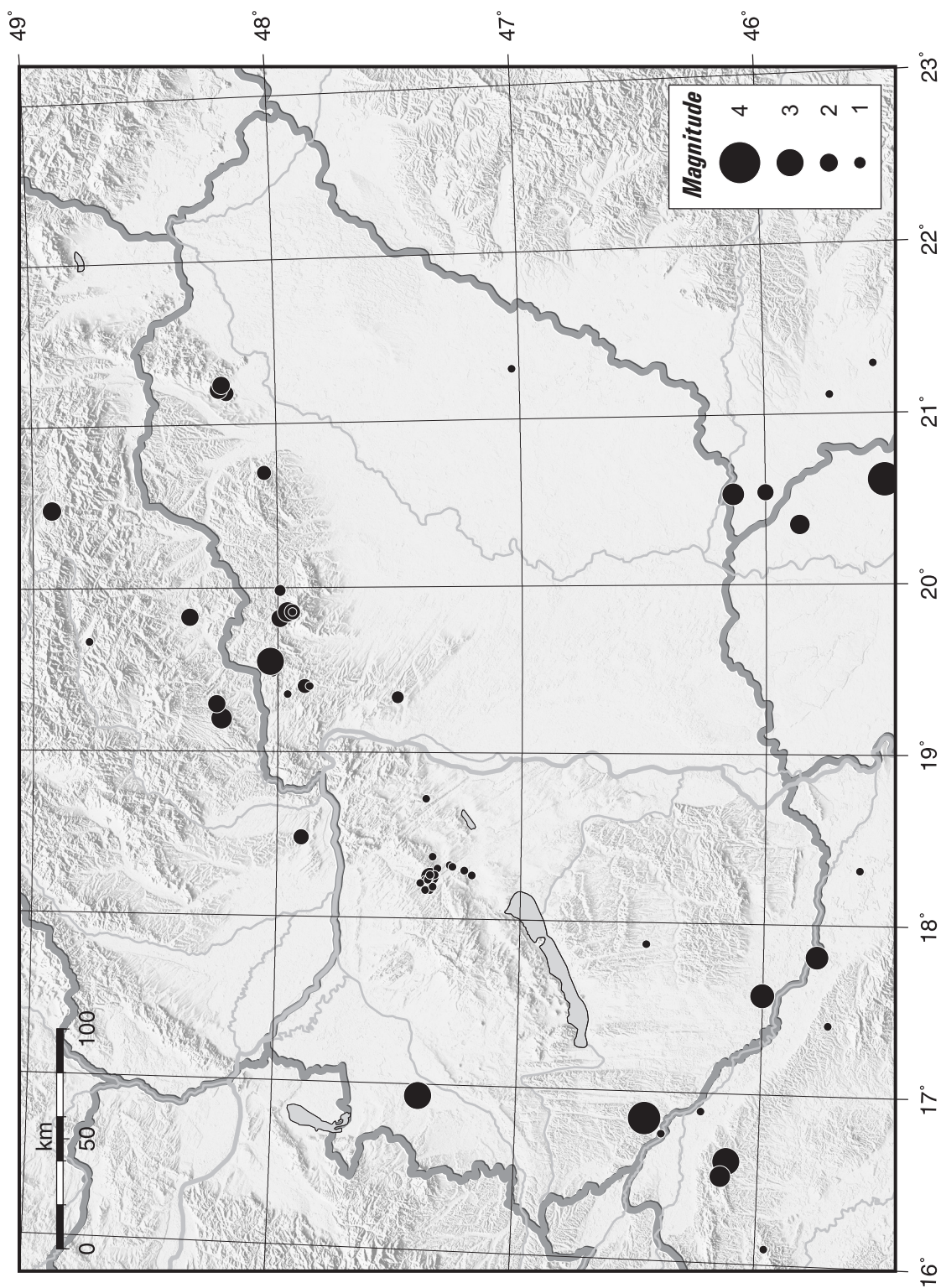
Nap	Kipattanási idő (UTC)	Földrajzi koordináták		Mélység (km)	ML	I _{MAX} (EMS)	Helyszín
	óó pp mp	Lat	Long				
Day	Origin time UTC	Geographic coordinates		Depth (km)	ML	I _{MAX} (EMS)	Locality/Region
	hr mn sec	Lat	Long				
JANUÁR / JANUARY, 2007							
03	4:39:48.3	47.511N	19.334E	27	1.2	-	Nagytarcsa
15	18:17:29.0	48.200N	21.186E	4	1.7	-	Monok
FEBRUÁR / FEBRUARY, 2007							
20	13:37:06.3	45.615N	18.319E	8		-	Croatia
28	11:06:20.3	48.047N	19.640E	0		-	Sóshartyán (expl.)
MÁRCIUS / MARCH, 2007							
02	15:26:56.3	48.458N	18.462E	8	0.9	-	Slovakia (expl.)
03	20:35:33.9	47.402N	16.931E	6	3.0	5	Bő
05	9:14:31.5	48.362N	19.819E	1	1.9	-	Slovakia
07	23:26:33.6	46.396N	16.750E	10		-	Tótszerdahely
14	14:36:25.9	48.230N	21.214E	0	2.0	-	Rátka
22	9:30:55.1	47.994N	19.805E	1	1.9	-	Bátonyterenye
22	11:21:38.4	47.895N	19.403E	10	1.5	-	Bercel
24	4:53:02.1	48.637N	20.179E	0	2.1	-	Slovakia (expl.)
26	14:33:53.5	47.373N	18.255E	5	1.9	-	Mór
28	10:53:23.3	48.892N	20.511E	0	1.7	-	Slovakia (expl.)
29	8:04:08.6	47.964N	19.852E	1	2.2	-	Dorogháza
ÁPRILIS / APRIL, 2007							
04	6:06:45.1	47.361N	18.372E	10		-	Gánt
14	6:19:39.0	45.549N	21.287E	11		-	Romania
18	12:57:58.8	48.641N	20.870E	10	2.0	-	Slovakia (expl.)
19	12:02:37.6	48.005N	21.399E	3		-	Tiszalök (expl.)
21	19:35:43.2	46.133N	20.528E	10	2.5	-	Apátfalva
MÁJUS / MAY, 2007							
05	4:39:25.6	47.372N	18.170E	9		-	Nagyveleg
05	10:17:07.0	47.390N	18.168E	11		-	Nagyveleg
05	16:16:16.1	47.360N	18.191E	8		-	Mór
08	3:59:01.2	47.293N	18.315E	15		-	Magyaralmás
08	9:15:48.2	47.233N	18.289E	5		-	Moha
18	12:13:56.8	47.575N	18.289E	10	1.4	-	Környe (expl.)

Földrengés paraméterek**Hypocenter Parameters**

31	11:26:41.0	47.907N	19.392E	10	1.5	-	Becske (expl.)
JÚNIUS / JUNE, 2007							
04	9:52:25.5	48.055N	20.704E	1	1.5	-	Miskolctapolca
05	9:08:56.3	47.387N	18.717E	10		-	Gyúró
07	10:46:27.4	48.616N	20.764E	0	1.6	-	Slovakia (expl.)
11	11:45:55.8	48.223N	21.241E	0	1.9	-	Tállya
JÚLIUS / JULY, 2007							
01	15:33:03.9	45.856N	20.353E	10	2.2	-	Serbia
04	11:51:39.4	48.354N	19.853E	0	1.9	-	Slovakia (expl.)
09	22:07:08.8	46.134N	16.605E	5	3.0	-	Croatia
09	22:31:05.0	46.150N	16.510E	6	2.3	-	Croatia
10	10:15:11.3	48.898N	20.510E	0	2.3	-	Slovakia (expl.)
10	13:57:20.3	48.231N	19.198E	2	2.4	-	Slovakia
12	7:06:58.1	48.336N	19.849E	0	2.0	-	Slovakia (expl.)
13	11:17:03.4	48.442N	20.485E	0	1.3	-	Trizs (expl.)
23	8:45:10.4	47.360N	18.508E	0		-	Lovasberény (expl.)
23	16:09:58.6	48.556N	20.306E	0	1.4	-	Slovakia (expl.)
27	6:03:10.9	46.239N	16.891E	6		-	Croatia
27	8:40:56.3	47.199N	18.261E	7		-	Csór
29	0:28:32.1	45.996N	20.537E	6	1.8	-	Romania
31	6:55:44.3	46.481N	17.874E	10		-	Somodor
31	8:41:55.3	47.362N	18.375E	7		-	Gánt (expl.)
31	15:09:47.3	47.337N	18.299E	10		-	Csákberény
AUGUSZTUS / AUGUST, 2007							
09	4:22:23.5	47.898N	18.478E	13	1.7	-	Slovakia
14	5:04:44.6	45.734N	21.111E	6		-	Romania
14	9:06:05.8	48.369N	19.866E	0	1.9	-	Slovakia (expl.)
19	22:57:03.6	46.471N	16.844E	13	3.4	-	Rigyác
23	6:44:56.9	47.934N	19.801E	0	1.9	-	Mátraverebély (expl.)
23	10:09:02.4	48.578N	20.796E	0	1.8	-	Tornanádaska (expl.)
30	8:49:34.9	48.342N	19.837E	0	2.2	-	Slovakia (expl.)
SZEPTEMBER / SEPTEMBER, 2007							
05	12:44:52.4	45.783N	17.810E	6	2.6	-	Croatia/Drávasztára
07	9:30:46.8	47.988N	19.985E	0	0.9	-	Mátramindszent
10	6:10:07.9	47.943N	19.840E	0	1.7	-	Mátraverebély (expl.)
10	12:28:59.9	48.003N	19.503E	0	1.2	-	Nógrádsipek (expl.)
12	8:34:30.6	47.942N	19.851E	6	1.6	-	Mátraszentimre
14	10:40:41.5	48.648N	19.871E	0	1.8	-	Slovakia (expl.)
15	4:39:33.9	46.000N	17.575E	10	2.7	4-5	Homokszentgyörgy
17	12:37:17.5	48.022N	19.375E	0	1.5	-	Nógrádmarcfal (expl.)
20	10:47:48.2	48.923N	20.476E	10	2.1	-	Slovakia
20	22:46:06.3	45.510N	20.611E	10	3.5	-	Serbia

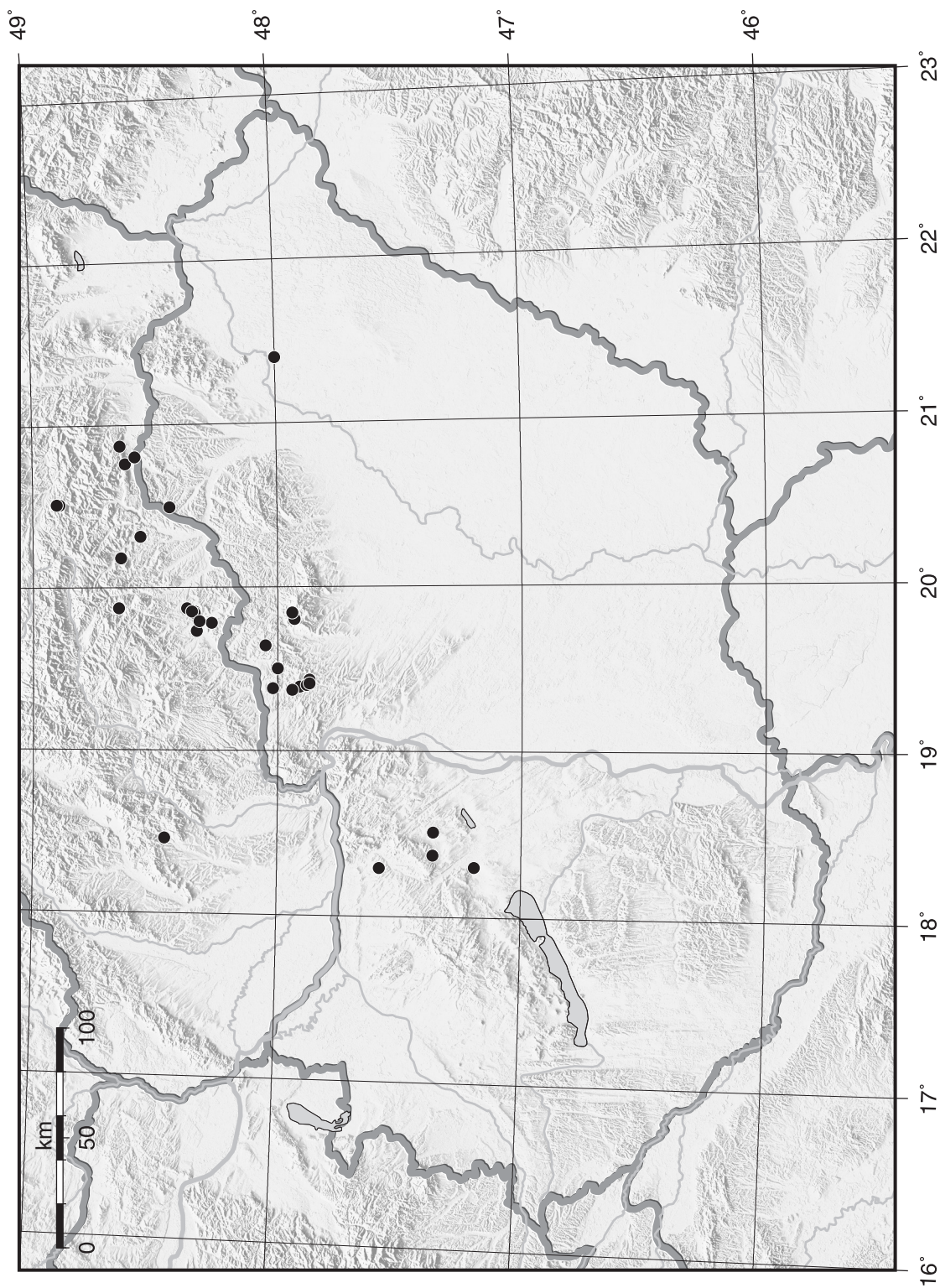
Hypocenter Parameters**Földrengés paraméterek**

24	11:26:45.7	47.867N	19.426E	0	1.5	-	Bercel (expl.)
29	14:04:28.6	45.961N	16.091E	2		-	Croatia
OKTÓBER / OCTOBER, 2007							
01	12:12:22.5	47.875N	19.397E	0		-	Bercel (expl.)
03	10:46:31.7	47.872N	19.410E	0		-	Bercel (expl.)
10	11:28:37.1	47.942N	19.371E	0		-	Magyarnándor (expl.)
11	9:52:58.5	47.193N	18.296E	0		-	Szfehérvár (expl.)
12	8:43:49.5	47.367N	18.243E	8		-	Mór
12	8:54:46.8	47.390N	18.230E	10		-	Mór
12	8:57:16.3	47.383N	18.229E	3		-	Mór
12	13:57:01.8	47.412N	18.207E	1		-	Pusztavám
12	19:19:12.1	47.347N	18.256E	8		-	Csókakő
13	3:42:43.8	47.285N	18.306E	1		-	Magyaralmás
13	13:08:47.5	48.354N	19.846E	1	2.1	-	Slovakia (expl.)
16	10:57:23.0	47.955N	19.348E	1		-	Magyarnándor
27	23:21:31.0	47.380N	18.229E	0		-	Mór
NOVEMBER / NOVEMBER, 2007							
07	11:08:24.1	48.332N	19.725E	0	2.3	-	Slovakia (expl.)
08	11:06:59.1	47.936N	19.851E	8		-	Mátraszentimre
08	15:01:27.4	48.016N	19.483E	8		-	Rimóc
14	13:31:10.0	48.272N	19.784E	10		-	Slovakia (expl.)
18	14:22:38.3	48.033N	19.552E	3	3.0	4	Hollókő
20	9:03:27.7	48.251N	19.292E	0	2.0	-	Slovakia
24	12:09:39.3	48.325N	19.786E	0	1.9	-	Slovakia (expl.)
29	12:15:18.4	47.867N	19.400E	10		-	Bercel
DECEMBER / DECEMBER, 2007							
16	13:00:54.9	47.030N	21.296E	2		-	Csökmő
18	3:27:34.5	48.772N	19.671E	10		-	Slovakia
21	22:46:24.7	47.366N	18.263E	10		-	Csókakő
26	6:10:33.0	45.729N	17.407E	17		-	Croatia



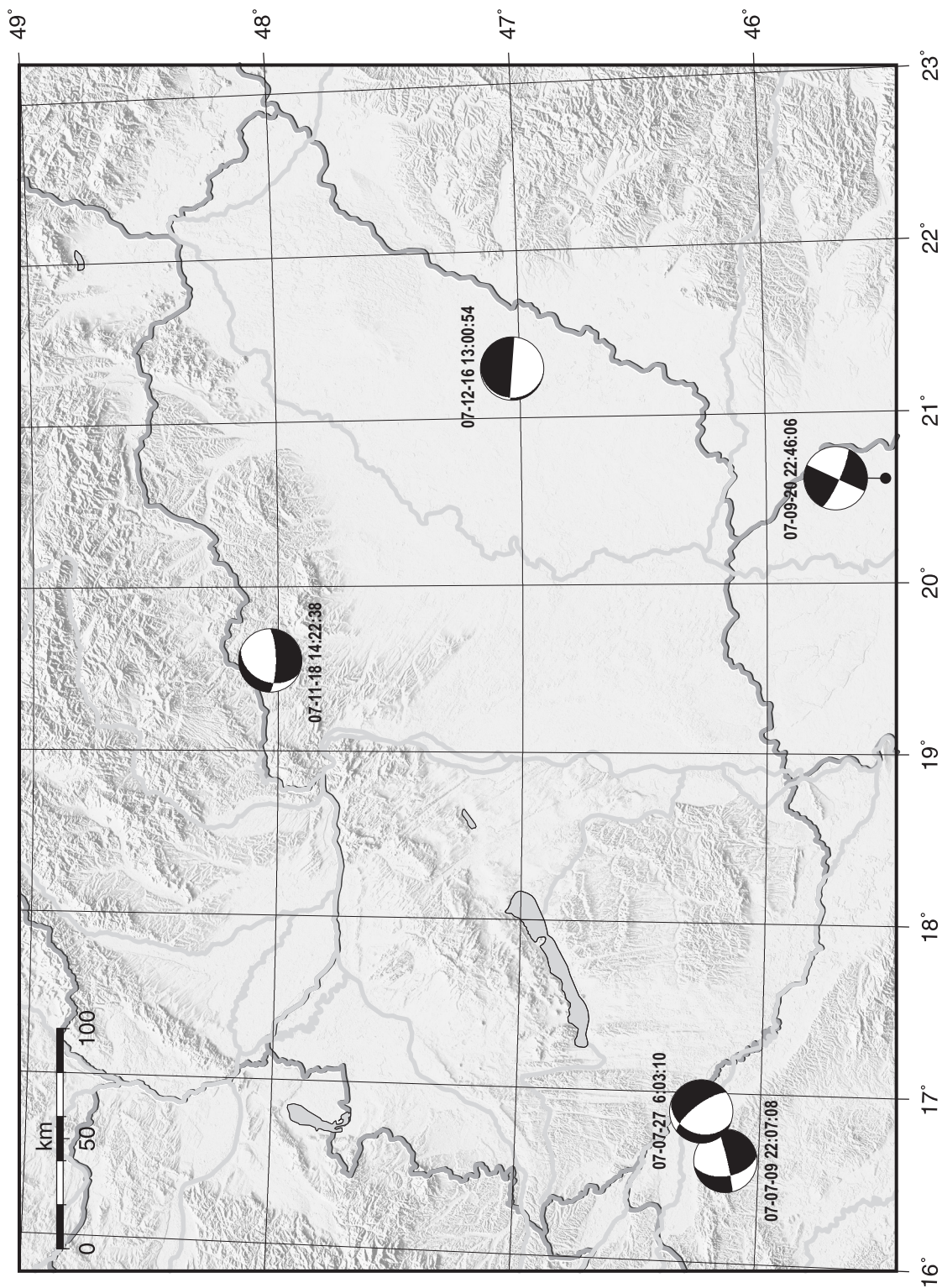
3.1. ábra A 2007-ben regisztrált földrengések epicentrumai

Figure 3.1. Epicenters of 2007 earthquakes



3.2. ábra A 2007-ben regisztrált robbantások epicentrumai

Figure 3.2. Epicenters of 2007 explosions



3.3. ábra A 2007-ben regisztrált földrengések fészekmechanizmusai

Figure 3.3. Fault plane solutions of 2007 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.

Hypocenter Parameters

Földrengés paraméterek

1.

2007-01-03 time: 4:39:48.29 UTC ML= 1.2
 lat: 47.511N lon: 19.334E h= 27.1 km
 erh= 4.8km erz= 2.8km
 nr= 5 gap=157 rms=1.23
 Locality: Nagytarcsa
 Comments:

sta	dist	azm	phase	hr mn sec	res
BUD	23.6	263	iPgD	4:39:56.00	1.56
PSZ	61.8	43	ePgC	4:39:59.10	-0.59
PKSG	72.4	259	ePnC	4:40:00.70	-0.48
			Sn	40:09.10	-2.12
PKSM	153.8	200	Sn	4:40:30.00	0.70

2.

2007-01-15 time: 18:17:28.97 UTC ML= 1.7
 lat: 48.200N lon: 21.186E h= 4.0 km
 erh= 1.8km erz= 1.8km
 nr= 14 gap= 79 rms=0.51
 Locality: Monok
 Comments:

sta	dist	azm	phase	hr mn sec	res
KECS	60.8	301	iPg	18:17:40.30	0.45
			iSg	17:47.70	-0.63
TRPA	100.9	94	iPgD	18:17:47.20	0.18
			eSg	18:00.20	-0.89
PSZ	101.2	252	iPg	18:17:46.90	-0.17
			eSg	18:00.80	-0.38
KOLS	114.4	45	iPg	18:17:50.10	0.68
			eSg	18:04.40	-0.97
STHS	135.4	2	ePn	18:17:53.50	1.12
			iSn	18:10.40	-0.24
VYHS	177.2	281	iPn	18:17:57.90	0.30
			iSn	18:19.80	-0.12
DRGR	194.2	144	iPn	18:17:59.30	-0.41
BZS	289.0	173	iPnD	18:18:12.50	0.97
BURB	308.3	102	iPn	18:18:15.30	1.36
GZR	334.8	159	iPn	18:18:17.50	0.26

3.

2007-02-20 time: 13:37:06.30 UTC ML=
 lat: 45.615N lon: 18.319E h= 8.1 km
 erh= 1.6km erz= 1.1km
 nr= 6 gap=288 rms=0.09
 Locality: Croatia
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	30.9	350	iPgD	13:37:11.90	-0.09
			eSg	37:16.60	0.17
PKSM	70.9	21	ePgD	13:37:19.10	0.06
			eSg	37:28.90	-0.08
BEHE	152.7	309	ePnC	13:37:31.40	0.06
			eSn	37:50.80	-0.07

4.

2007-02-28 time: 11:06:20.27 UTC ML=
 lat: 48.047N lon: 19.640E h= 0.0 km
 erh= 1.5km erz= 365km
 nr= 6 gap=103 rms=0.21
 Locality: Sóshartyán
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	23.8	127	ePgC	11:06:24.60	0.08
			eSg	06:27.90	0.07
PENC	39.2	223	ePgC	11:06:26.90	-0.37
			eSg	06:32.90	0.18
VYHS	77.7	310	ePg	11:06:34.50	0.35
KECS	79.3	52	ePg	11:06:34.40	-0.04

5.

2007-03-02 time: 15:26:56.30 UTC ML= 0.9
 lat: 48.458N lon: 18.462E h= 7.6 km
 erh= 5.4km erz= 5.2km
 nr= 9 gap=165 rms=0.83
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KOLL	14.1	342	ePg	15:26:57.80	-1.36
			eSg	27:02.00	0.60
VYHS	28.0	82	ePg	15:27:00.70	-0.78
			eSg	27:07.60	2.08
SMOL	76.6	275	ePg	15:27:10.30	0.26
			eSg	27:21.40	0.63
ZST	104.9	254	eSg	15:27:29.80	0.07
KECS	149.7	89	ePn	15:27:21.60	0.58
			eSn	27:40.20	-0.10

6.

2007-03-03 time: 20:35:33.90 UTC ML= 3.0
 lat: 47.402N lon: 16.931E h= 6.4 km
 erh= 1.6km erz= 1.8km
 nr= 31 gap= 45 rms=0.58
 Locality: Bó
 Comments: felt 5 EMS

sta	dist	azm	phase	hr mn sec	res
SOP	42.0	318	ePg	20:35:41.80	0.32
			eSg	35:46.40	-1.00
ZST	89.2	8	iPg	20:35:49.40	-0.47
			eSg	35:59.50	-2.82
BEH	104.3	187	ePgD	20:35:53.80	1.25
			eSg	36:07.60	0.49
ARSA	107.8	261	Pg	20:35:52.60	-0.57
			Sg	36:04.90	-3.31
PKSG	110.2	91	iPgD	20:35:53.60	-0.01
			eSg	36:08.40	-0.59
KOGS	118.1	206	iPn	20:35:54.10	-0.73
SMOL	129.1	17	ePn	20:35:56.80	0.60
GROS	151.0	226	iPn	20:35:58.40	-0.53
			iSn	36:18.70	0.24
BUD	158.1	87	eSn	20:36:22.40	2.35
PERS	162.1	238	iPn	20:36:00.10	-0.22
KOLL	170.8	40	eSn	20:36:23.60	0.74
ZAVS	180.8	233	iPn	20:36:02.50	-0.15
PENC	182.0	76	iPnD	20:36:02.90	0.10
			eSn	36:31.90	6.56
PKSM	185.9	135	iPnD	20:36:02.90	-0.39
			eSn	36:29.00	2.79
VYHS	187.1	50	iPn	20:36:02.30	-1.13
			eSn	36:23.00	-3.47
RHK3	196.3	149	iPnD	20:36:04.70	0.11
			eSn	36:31.30	2.77
MOA	206.4	284	Pn	20:36:08.20	2.36
			Sn	36:30.20	-0.56
OBKA	206.7	241	Pn	20:36:06.00	0.12
			Sn	36:29.00	-1.84
VRAC	213.4	353	iPn	20:36:07.40	0.68
PKSN	229.7	104	eSn	20:36:43.80	7.87
PSZ	229.9	76	iPn	20:36:09.10	0.33
			eSn	36:42.20	6.22
MORC	267.9	10	iPnD	20:36:13.40	-0.11
KBA	273.9	262	Pn	20:36:14.80	0.54
			Sn	36:44.40	-1.35
VOY	277.8	237	ePn	20:36:14.70	-0.04
			eSn	36:55.10	8.50
OKC	285.3	18	ePn	20:36:15.50	-0.18
GEC2	289.1	304	ePn	20:36:17.30	1.15
KECS	291.5	66	ePn	20:36:16.10	-0.36
			eSn	36:59.00	9.35
KHC	314.5	308	ePn	20:36:20.50	1.18
			eSn	37:00.70	5.94
DPC	330.9	352	ePn	20:36:22.00	0.64
NIE	336.1	48	ePn	20:36:22.70	0.68

Földrengés paraméterek

Hypocenter Parameters

		eSn	36:57.30	-2.26
PRU	337.1	329	ePn 20:36:23.10	0.96
			eSn 37:08.20	8.43
UPC	351.8	349	ePn 20:36:25.10	1.13
CRVS	376.1	64	ePn 20:36:27.60	0.60
			eSn 37:24.80	16.37
STHS	390.0	55	ePn 20:36:30.40	1.66
			eSn 37:11.70	0.18
BZS	410.8	119	iPn 20:36:31.10	-0.23
SQTA	433.2	267	Pn 20:36:35.50	1.38
			Sn 37:21.90	0.81
MOTA	440.2	269	Pn 20:36:36.30	1.31
			Sn 37:22.70	0.05
BRG	443.3	331	Pn 20:36:37.97	2.58
DRGR	444.1	99	iPnD 20:36:35.20	-0.28
CLL	519.7	327	iPn 20:36:45.70	0.79
DAVA	533.0	269	Pn 20:36:47.30	0.74
BURB	624.7	88	iPn 20:36:52.00	-6.00
CDF	730.5	279	ePn 20:37:09.00	-2.19
			eSn 39:00.30	33.22
HINF	759.2	273	ePn 20:37:12.40	-2.37
			eSn 39:08.60	35.15
HAU	797.1	275	ePn 20:37:16.80	-2.70
			eSn 39:19.30	37.43
LPG	810.3	255	ePn 20:37:22.60	1.46
LPL	811.0	255	ePn 20:37:22.20	0.96
MBDF	840.5	249	ePn 20:37:22.30	-2.61
ORIF	897.1	252	ePn 20:37:29.10	-2.87
FRF	910.4	242	ePn 20:37:30.00	-3.63
SMRF	963.1	247	ePn 20:37:36.30	-3.90
SMF	998.7	265	ePn 20:37:41.30	-3.34
AVF	33.1	266	ePn 20:37:46.40	-2.53
BGF	75.8	265	ePn 20:37:50.90	-3.34

7.

2007-03-05 time: 9:14:31.52 UTC ML= 1.9
 lat: 48.362N lon: 19.819E h= 0.6 km
 erh= 2.2km erz= 2.9km
 nr= 8 gap=119 rms=0.72
 Locality: Slovakia
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	49.6	174	ePg	9:14:40.50	0.13
			eSg	14:47.70	0.41
KECS	51.1	75	ePg	9:14:40.10	-0.55
			eSg	14:46.50	-1.27
VYHS	74.2	281	eSg	9:14:54.50	-0.61
KOLL	107.5	283	eSg	9:15:06.30	0.61
CRVS	135.1	64	eSn	9:15:14.20	0.30
STHS	157.1	42	eSn	9:15:20.30	1.53

8.

2007-03-07 time: 23:26:33.62 UTC ML=
 lat: 46.396N lon: 16.750E h= 10.0 km
 erh= 3.0km erz= 2.5km
 nr= 7 gap=224 rms=0.52
 Locality: Tótszerdahely
 Comments:

sta	dist	azm	phase	hr mn sec	res
BEH	8.5	14	iPgC	23:26:35.80	-0.16
			eSg	26:37.80	0.01
KOGS	38.8	279	iPgD	23:26:41.00	0.22
			iSg	26:46.70	0.33
DOBS	102.4	254	iPg	23:26:52.00	-0.01
			iSg	27:05.50	-0.84
CRES	118.4	238	iSn	23:27:12.30	2.16

9.

2007-03-14 time: 14:36:25.89 UTC ML= 2.0
 lat: 48.230N lon: 21.214E h= 0.1 km
 erh= 4.6km erz= 4.7km
 nr= 10 gap=206 rms=0.80
 Locality: Rátka
 Comments:

sta	dist	azm	phase	hr mn sec	res
KECS	60.9	298	ePg	14:36:36.30	-0.47
			eSg	36:44.80	-0.45
CRVS	76.9	14	ePg	14:36:40.60	0.96
			eSg	36:50.50	0.15
PSZ	104.3	251	ePgC	14:36:44.60	0.09
			eSg	36:58.20	-0.83
KOLS	110.6	45	ePg	14:36:45.10	-0.54
			eSg	36:59.30	-1.74
STHS	132.0	1	ePn	14:36:50.80	1.43
			eSn	37:07.80	0.12

10.

2007-03-22 time: 9:30:55.12 UTC ML= 1.9
 lat: 47.994N lon: 19.805E h= 0.6 km
 erh= 4.5km erz= 5.2km
 nr= 5 gap=166 rms=0.79
 Locality: Bátorlyterenyé
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	10.7	142	eSg	9:30:58.40	-0.13
KECS	74.3	43	eSg	9:31:17.90	-0.82
VYHS	91.0	308	eSg	9:31:24.10	0.07
CRVS	158.8	50	eSn	9:31:42.80	0.06
STHS	190.4	34	eSn	9:31:51.80	2.04

11.

2007-03-22 time: 11:21:38.41 UTC ML= 1.5
 lat: 47.895N lon: 19.403E h= 10.0 km
 erh= 6.2km erz= 8.3km
 nr= 8 gap=132 rms=0.94
 Locality: Bercel
 Comments:

sta	dist	azm	phase	hr mn sec	res
PENC	14.7	218	iPgC	11:21:41.00	-0.59
			eSg	21:44.80	0.74
PSZ	36.9	86	ePgD	11:21:45.20	-0.03
			eSg	21:50.90	0.34
VYHS	78.8	328	ePg	11:21:54.50	1.90
			eSg	22:02.20	-1.47
KECS	103.8	51	eP*	11:21:57.40	0.39
			eS*	22:10.20	-1.31

12.

2007-03-24 time: 4:53:02.07 UTC ML= 2.1
 lat: 48.637N lon: 20.179E h= 0.0 km
 erh= 2.6km erz= 3.9km
 nr= 16 gap=135 rms=0.79
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	28.3	127	iPg	4:53:06.60	-0.53
			eSg	53:10.00	-1.08
PSZ	82.7	195	ePgD	4:53:17.40	0.57
			eSg	53:30.10	1.76
CRVS	98.8	73	iPg	4:53:19.30	-0.40
			eSg	53:30.40	-3.06
VYHS	100.4	261	iPg	4:53:20.40	0.40
			eSg	53:32.70	-1.28
PENC	115.4	215	ePgC	4:53:23.00	0.33
			eSg	53:38.80	0.06
STHS	116.5	42	ePg	4:53:22.70	-0.18
			eSg	53:40.40	1.29
KOLL	131.2	267	ePn	4:53:25.00	-0.46
			eSn	53:42.20	-1.51
KOLS	157.4	78	ePn	4:53:30.70	1.98
			eSn	53:49.30	-0.21

Hypocenter Parameters

Földrengés paraméterek

13.

2007-03-26 time: 14:33:53.53 UTC ML= 1.9
 lat: 47.373N lon: 18.255E h= 5.1 km
 erh= 2.7km erz= 2.0km
 nr= 11 gap=118 rms=0.45
 Locality: Mór
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	10.5	79	iPgC	14:33:55.40	-0.21
			eSg	33:57.10	-0.13
BUD	59.3	78	eSg	14:34:12.30	-0.15
VYHS	132.0	19	ePn	14:34:17.00	0.64
			eSn	34:33.40	-0.77
SOP	132.3	285	eSn	14:34:34.00	-0.25
PKSM	132.4	167	ePnC	14:34:16.50	0.08
			eSn	34:30.70	-3.57
MODS	133.1	327	eSn	14:34:34.00	-0.43
KOLL	134.5	5	eSn	14:34:35.00	0.27
PSZ	137.3	64	ePnC	14:34:18.10	1.07
			eSn	34:35.10	-0.25

14.

2007-03-28 time: 10:53:23.29 UTC ML= 1.7
 lat: 48.892N lon: 20.511E h= 0.0 km
 erh= 2.9km erz= 4.0km
 nr= 11 gap=145 rms=0.98
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	45.5	182	ePg	10:53:31.50	0.09
			eSg	53:37.00	-0.74
CRVS	69.7	89	ePg	10:53:36.60	0.87
			eSg	53:45.20	-0.25
STHS	79.2	42	ePg	10:53:38.60	1.18
PSZ	117.5	203	ePgC	10:53:45.10	0.84
			eSg	54:01.50	0.88
KOLS	129.3	88	eSg	10:54:02.90	-1.48
VYHS	131.0	250	ePn	10:53:46.10	-0.55
			eSn	54:01.20	-3.68
KOLL	159.0	257	eSn	10:54:10.10	-0.98

15.

2007-03-29 time: 8:04:08.65 UTC ML= 2.2
 lat: 47.964N lon: 19.852E h= 0.6 km
 erh= 3.2km erz= 6.2km
 nr= 8 gap=160 rms=1.09
 Locality: Dorogháza
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	6.0	148	ePgC	8:04:08.90	-0.83
			eSg	04:11.60	1.04
KECS	74.5	39	ePg	8:04:21.80	-0.15
			eSg	04:31.10	-1.23
VYHS	95.8	308	ePg	8:04:25.90	0.14
			eSg	04:38.70	-0.40
STHS	191.3	32	ePn	8:04:42.20	2.74
			eSn	05:06.30	2.81

16.

2007-04-04 time: 6:06:45.06 UTC ML=
 lat: 47.361N lon: 18.372E h= 10.0 km
 erh= 8.2km erz= 4.3km
 nr= 5 gap=156 rms=0.20
 Locality: Gánt
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	3.7	22	ePgD	6:06:47.00	0.03
			eSg	06:48.50	0.05
PKSO	31.8	226	ePg	6:06:50.70	-0.31
			eSg	06:56.00	0.35

PKSM 129.3 171 eSn 6:07:24.10 0.09

17.

2007-04-14 time: 6:19:39.02 UTC ML=
 lat: 45.549N lon: 21.287E h= 11.2 km
 erh= 0.9km erz= 0.5km
 nr= 5 gap=191 rms=0.03
 Locality: Romania
 Comments:

sta	dist	azm	phase	hr mn sec	res
BZS	26.8	74	iPgD	6:19:44.20	0.00
GZR	117.8	98	iPn	6:19:59.30	0.00
DRGR	176.5	39	iPn	6:20:06.60	-0.02
PKSM	218.2	290	iPnD	6:20:11.80	-0.02
VYHS	376.7	330	ePn	6:20:31.70	0.12

18.

2007-04-18 time: 12:57:58.75 UTC ML= 2.0
 lat: 48.641N lon: 20.870E h= 10.0 km
 erh= 1.6km erz= 1.0km
 nr= 12 gap=149 rms=0.29
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	33.4	238	iPg	12:58:04.80	-0.17
			eSg	58:10.20	0.38
CRVS	52.3	56	iPg	12:58:08.20	-0.05
			eSg	58:15.10	-0.56
STHS	90.4	18	ePg	12:58:15.50	0.50
			eSg	58:27.80	0.13
KOLS	108.1	73	ePn	12:58:18.40	0.42
			eSn	58:32.60	-0.39
PSZ	108.2	222	ePnC	12:58:18.00	0.01
			eSn	58:33.20	0.20
LIKS	137.2	289	ePn	12:58:21.40	-0.21
			eSn	58:38.90	-0.54
VYHS	151.0	264	ePn	12:58:24.90	1.57

19.

2007-04-19 time: 12:02:37.58 UTC ML=
 lat: 48.005N lon: 21.399E h= 2.6 km
 erh=19.6km erz=11.9km
 nr= 6 gap=262 rms=1.31
 Locality: Tiszalök
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	86.2	308	ePg	12:02:53.50	0.52
			eSg	03:01.40	-3.60
CRVS	99.9	3	eSg	12:03:09.60	0.25
PSZ	112.8	265	ePgC	12:02:56.80	-0.92
			eSg	03:15.50	2.07
VYHS	198.0	286	eSn	12:03:34.10	0.65

20.

2007-04-21 time: 19:35:43.17 UTC ML= 2.5
 lat: 46.133N lon: 20.528E h= 10.0 km
 erh= 2.6km erz= 2.0km
 nr= 11 gap=149 rms=0.39
 Locality: Apátfalva
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS6	90.5	305	Pg	19:35:59.80	0.38
			eSg	36:11.40	-0.70
PKSN	98.9	329	ePgC	19:36:01.50	0.58
			eSg	36:14.60	-0.16
BZS	102.2	124	iPg	19:36:01.40	-0.10
PKSM	146.0	273	ePnC	19:36:06.70	-0.42
			eSn	36:26.20	0.39
DRGR	183.0	66	iPn	19:36:11.60	-0.14
GZR	193.3	115	iPn	19:36:14.50	1.47

Földrengés paraméterek

Hypocenter Parameters

PKSG 215.0 311 ePn 19:36:15.80 0.07
 BEH 291.5 277 ePn 19:36:25.60 0.33
 21.

2007-05-05 time: 4:39:25.60 UTC ML=
 lat: 47.372N lon: 18.170E h= 8.9 km
 erh= 4.7km erz= 1.7km
 nr= 5 gap=245 rms=0.26
 Locality: Nagyveleg
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	16.8	83	ePgC	4:39:29.00	0.00
			eSg	39:31.80	0.14
PKSO	24.6	198	ePg	4:39:29.90	-0.37
			eSg	39:34.40	0.48
PKSM	133.9	164	eSn	4:40:05.90	0.09

22.

2007-05-05 time: 10:17:07.00 UTC ML=
 lat: 47.390N lon: 18.168E h= 10.8 km
 erh= 1.9km erz= 0.6km
 nr= 5 gap=253 rms=0.07
 Locality: Nagyveleg
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	16.8	89	ePgC	10:17:10.50	-0.07
			eSg	17:13.40	0.04
PKSO	26.5	196	ePg	10:17:12.20	0.10
			eSg	17:16.00	-0.08
PKSM	135.9	165	eSn	10:17:47.20	-0.01

23.

2007-05-05 time: 16:16:16.07 UTC ML=
 lat: 47.360N lon: 18.191E h= 8.4 km
 erh= ---km erz= ---km
 nr= 4 gap=234 rms=0.01
 Locality: Mór
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	15.5	77	ePgC	16:16:19.20	-0.01
			eSg	16:21.70	0.03
PKSO	23.8	202	eSg	16:16:24.10	-0.01
PKSM	132.1	165	eSn	16:16:56.00	0.00

24.

2007-05-08 time: 3:59:01.20 UTC ML=
 lat: 47.293N lon: 18.315E h= 15.2 km
 erh=15.5km erz= 2.4km
 nr= 5 gap=204 rms=0.22
 Locality: Magyaralmás
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	12.3	28	ePgC	3:59:04.50	-0.20
			eSg	59:07.60	0.17
PKSO	23.6	232	ePg	3:59:06.50	0.29
			eSg	59:09.80	-0.32
VYHS	139.1	16	eSn	3:59:41.10	-0.02

25.

2007-05-08 time: 9:15:48.24 UTC ML=
 lat: 47.233N lon: 18.289E h= 5.0 km
 erh=16.0km erz= 3.7km
 nr= 6 gap=221 rms=0.51
 Locality: Moha
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSO	18.3	244	ePgC	9:15:51.30	-0.33
			eSg	15:54.70	0.42
PKSG	19.3	23	ePgC	9:15:51.50	-0.29

VYHS 146.1 16 eSg 15:54.60 0.04
 ePn 9:16:13.80 0.96
 eSn 16:31.40 -0.63

26.

2007-05-18 time: 12:13:56.75 UTC ML= 1.4
 lat: 47.575N lon: 18.289E h= 10.0 km
 erh=27.9km erz=33.8km
 nr= 5 gap=160 rms=0.74
 Locality: Környe
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	21.8	159	ePgC	12:14:00.90	-0.13
			eSg	14:03.70	-0.67
VYHS	110.0	22	ePn	12:14:17.30	1.08
			eSn	14:29.30	-2.11
MODS	116.6	320	eSn	12:14:33.10	0.23

27.

2007-05-31 time: 11:26:41.03 UTC ML= 1.5
 lat: 47.907N lon: 19.392E h= 10.0 km
 erh= 5.5km erz= 8.0km
 nr= 8 gap=124 rms=0.83
 Locality: Becske
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	15.4	212	ePgC	11:26:43.80	-0.51
			eSg	26:46.90	0.04
PSZ	37.6	88	ePgD	11:26:48.10	0.12
			eSg	26:53.50	0.10
VYHS	77.2	328	ePg	11:26:56.60	1.67
			eSg	27:04.50	-1.28
KECS	103.5	52	eP*	11:27:00.20	0.61
			eS*	27:12.10	-1.96

28.

2007-06-04 time: 9:52:25.46 UTC ML= 1.5
 lat: 48.055N lon: 20.704E h= 1.2 km
 erh= 5.8km erz= 4.3km
 nr= 10 gap=225 rms=0.88
 Locality: Miskolctapolca
 Comments:

sta	dist	azm	phase	hr mn sec	res
KECS	50.3	341	ePg	9:52:34.70	0.25
			eSg	52:41.10	-0.37
PSZ	62.3	256	ePgC	9:52:36.30	-0.29
			eSg	52:45.50	0.23
CRVS	109.6	31	ePg	9:52:44.90	-0.14
			eSg	52:58.50	-1.81
VYHS	147.0	289	ePn	9:52:50.90	0.23
			eSn	53:08.60	-1.74
STHS	156.6	15	ePn	9:52:53.90	2.03
			eSn	53:13.70	1.23

29.

2007-06-05 time: 9:08:56.26 UTC ML=
 lat: 47.387N lon: 18.717E h= 10.0 km
 erh=38.1km erz=35.3km
 nr= 6 gap=271 rms=0.44
 Locality: Gyúró
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	24.6	271	ePgD	9:09:00.50	-0.51
			eSg	09:05.10	0.39
PKST	53.5	255	ePg	9:09:05.70	-0.29
			eSg	09:14.20	0.63
PKSM	130.8	183	ePnD	9:09:18.80	0.47
			eSn	09:35.30	-0.24

Hypocenter Parameters

Földrengés paraméterek

30.

2007-06-07 time: 10:46:27.40 UTC ML= 1.6
 lat: 48.616N lon: 20.764E h= 0.0 km
 erh= 3.2km erz= 3.4km
 nr= 9 gap=162 rms=0.46
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	25.3	234	ePg	10:46:31.70	-0.22
			eSg	46:36.00	0.56
CRVS	60.3	58	ePg	10:46:38.50	0.32
			eSg	46:46.50	-0.08
STHS	95.7	22	eSg	10:46:57.70	-0.11
PSZ	100.9	220	ePgD	10:46:46.10	0.68
			eSg	46:58.50	-0.98
VYHS	142.9	265	ePn	10:46:52.00	-0.26
			eSn	47:10.90	-0.74

31.

2007-06-11 time: 11:45:55.81 UTC ML= 1.9
 lat: 48.223N lon: 21.241E h= 0.2 km
 erh= 5.2km erz= 3.6km
 nr= 9 gap=207 rms=0.76
 Locality: Tállya
 Comments:

sta	dist	azm	phase	hr mn sec	res
KECS	63.0	297	ePg	11:46:07.10	0.03
			eSg	46:14.90	-0.94
PSZ	105.9	251	ePgD	11:46:15.60	0.88
			eSg	46:28.60	-0.87
KOLS	109.8	44	ePg	11:46:15.50	0.09
			eSg	46:29.60	-1.10
STHS	132.8	0	ePn	11:46:20.60	1.22
			eSn	46:37.50	-0.26
VYHS	180.7	280	eSn	11:46:47.70	-0.70

32.

2007-07-01 time: 15:33:03.88 UTC ML= 2.2
 lat: 45.856N lon: 20.353E h= 10.0 km
 erh= 8.2km erz= 7.3km
 nr= 9 gap=273 rms=0.29
 Locality: Serbia
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSM	138.3	287	ePnC	15:33:26.90	0.02
			eSn	33:44.60	-0.22
PSZ	231.9	351	ePnC	15:33:38.30	-0.25
			eSn	34:05.50	-0.09
KECS	292.2	2	ePn	15:33:46.40	0.33
			eSn	34:18.70	-0.28
VYHS	315.0	339	ePn	15:33:49.40	0.49
			eSn	34:24.60	0.56
CRVS	348.8	14	ePn	15:33:52.80	-0.33

33.

2007-07-04 time: 11:51:39.42 UTC ML= 1.9
 lat: 48.354N lon: 19.853E h= 0.0 km
 erh= 3.2km erz= 4.3km
 nr= 10 gap=118 rms=0.73
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	48.5	176	ePgC	11:51:48.30	0.21
			eSg	51:55.00	0.16
KECS	49.0	73	iPg	11:51:48.20	0.03
			eSg	51:54.70	-0.30
VYHS	76.9	282	ePg	11:51:53.10	-0.05
			eSg	52:02.50	-1.35
KOLL	110.2	283	ePg	11:51:59.40	0.31
			eSg	52:15.10	0.66

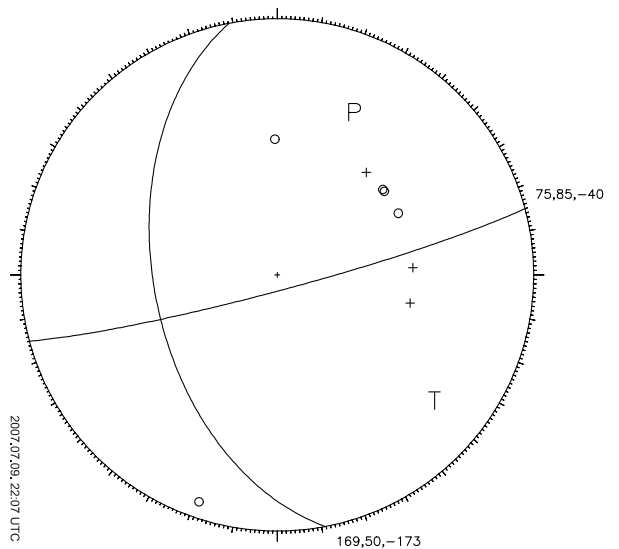
CRVS 133.3 63 eSn 11:52:19.90 -1.64
 STHS 156.1 41 eSn 11:52:28.20 1.60

34.

2007-07-09 time: 22:07:08.76 UTC ML= 3.0
 lat: 46.134N lon: 16.605E h= 5.0 km
 erh= 5.7km erz= 5.8km
 nr= 15 gap=134 rms=0.96

Locality: Croatia
 Comments:

sta	dist	azm	phase	hr mn sec	res
BEHE	39.6	19	ePgD	22:07:16.40	0.51
			eSg	07:22.10	0.65
KOGS	44.3	322	iPg	22:07:16.40	-0.32
BOJS	126.3	236	iPn	22:07:31.40	0.50
RHK3	130.5	102	ePnC	22:07:30.90	-0.52
			eSn	07:49.00	-0.09
ARSA	149.2	326	Pn	22:07:33.00	-0.75
			Sn	07:49.80	-3.44
PKSM	157.5	87	ePnC	22:07:33.90	-0.89
			eSn	07:57.00	1.91
OBKA	163.7	285	Pn	22:07:34.70	-0.86
			Sn	07:54.80	-1.68
PKST	166.1	41	ePnC	22:07:35.00	-0.86
			eSn	07:57.90	0.90
SOP	172.3	359	ePnD	22:07:37.90	1.27
			eSn	07:58.40	0.03
PKSG	195.4	44	ePn	22:07:38.80	-0.71
			eSn	08:06.40	2.91
CONA	207.4	344	Pn	22:07:42.40	1.40
			Sn	08:08.00	1.85
VOY	210.0	267	ePn	22:07:43.70	2.36
			eSn	08:11.90	5.15
PKS7	220.6	63	ePnD	22:07:48.30	5.64
			eSn	08:15.60	6.50
ZST	232.3	9	eSn	22:08:07.30	-4.40
BUD	237.9	51	ePnD	22:07:49.40	4.59
			eSn	08:19.70	6.76
MODS	254.1	12	ePn	22:07:46.00	-0.84
			eSn	08:12.30	-4.24
PKSN	264.4	71	eSn	22:08:31.10	12.29
KOLL	303.8	27	ePn	22:07:52.30	-0.73
			eSn	08:22.90	-4.67
VYHS	311.9	33	ePn	22:07:53.10	-0.94
			eSn	08:24.90	-4.47
PSZ	319.2	52	ePnD	22:07:55.00	0.05
			eSn	08:28.70	-2.28
KHC	403.5	326	ePn	22:08:06.00	0.55
			eSn	08:46.10	-3.58
STHS	504.1	44	ePn	22:08:18.30	0.30
NKC	550.7	326	ePn	22:08:23.10	-0.72
			eSn	09:43.20	20.83



Földrengés paraméterek

Hypocenter Parameters

35.

2007-07-09 time: 22:31:05.03 UTC ML= 2.3
 lat: 46.150N lon: 16.510E h= 6.1 km
 erh= 3.6km erz= 3.5km
 nr= 11 gap=132 rms=0.49
 Locality: Croatia
 Comments:

sta	dist	azm	phase	hr mn sec	res
KOGS	38.7	329	iPg	22:31:12.10	0.07
BEHE	41.0	30	ePgD	22:31:12.00	-0.43
			eSg	31:18.10	-0.11
PERS	120.0	297	iPn	22:31:25.90	-0.35
BOJS	121.3	234	iPn	22:31:26.90	0.49
RHK3	138.0	102	ePnC	22:31:28.30	-0.19
			eSn	31:45.00	-1.78
ARSA	143.7	328	Pn	22:31:28.90	-0.31
			Sn	31:45.40	-2.67
OBKA	156.2	285	Pn	22:31:30.10	-0.67
			Sn	31:50.40	-0.44
PKSM	164.7	88	ePn	22:31:31.30	-0.52
			eSn	31:52.70	-0.01
PKST	169.6	43	ePnD	22:31:33.20	0.77
			eSn	31:56.90	3.09
SOP	170.5	1	ePnD	22:31:33.50	0.96
			eSn	31:53.70	-0.30
PKSG	199.2	46	eSn	22:32:05.90	5.53
CONA	203.8	346	Pn	22:31:37.30	0.61
KOLL	305.5	28	ePn	22:31:47.40	-1.97
			eSn	32:18.60	-5.36
VYHS	314.3	34	ePn	22:31:49.00	-1.48
			eSn	32:20.30	-5.63
KHC	398.0	326	ePn	22:32:01.60	0.69
			eSn	32:42.20	-2.29

36.

2007-07-10 time: 10:15:11.32 UTC ML= 2.3
 lat: 48.898N lon: 20.510E h= 0.0 km
 erh= 4.3km erz= 6.0km
 nr= 10 gap=146 rms=0.97
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	46.2	182	ePg	10:15:19.40	-0.17
			eSg	15:24.90	-1.11
CRVS	69.8	90	ePg	10:15:24.10	0.32
			eSg	15:32.80	-0.70
STHS	78.7	43	ePg	10:15:25.80	0.43
PSZ	118.1	203	ePgC	10:15:33.50	1.09
			eSg	15:48.00	-0.86
KOLS	129.3	88	ePg	10:15:35.50	1.09
			eSg	15:50.10	-2.32
KOLL	159.0	257	eSn	10:15:57.60	-1.54

37.

2007-07-10 time: 13:57:20.29 UTC ML= 2.4
 lat: 48.231N lon: 19.198E h= 1.6 km
 erh= 3.3km erz= 3.7km
 nr= 10 gap=105 rms=0.57
 Locality: Slovakia
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	62.5	124	ePgC	13:57:31.60	0.16
			eSg	57:39.60	-0.54
KOLL	70.5	303	iPg	13:57:32.80	-0.08
			eSg	57:40.60	-2.09
BUD	84.1	189	eSg	13:57:46.70	-0.32
LIKS	91.3	356	eSg	13:57:47.60	-1.73
KECS	99.5	74	e g	13:57:37.00	-1.05
			eSg	57:49.60	-2.31
PKSG	111.2	213	ePg	13:57:40.20	0.06
			eSg	57:54.40	-1.23
PKST	138.9	219	ePnC	13:57:43.80	-0.64

			eSn	58:02.80	-0.48
MODS	143.4	276	ePn	13:57:45.00	0.00
			eSn	58:02.80	-1.47
ZST	155.8	269	ePn	13:57:47.10	0.56
			eSn	58:05.80	-1.23
CRVS	183.0	66	ePn	13:57:51.00	1.07
			eSn	58:13.70	0.64
STHS	199.9	49	ePn	13:57:54.40	2.36
			eSn	58:19.70	2.89
CONA	250.8	262	Pn	13:57:59.30	0.91

38.

2007-07-12 time: 7:06:58.14 UTC ML= 2.0
 lat: 48.336N lon: 19.849E h= 0.0 km
 erh= 4.3km erz= 5.7km
 nr= 9 gap=116 rms=1.17
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	46.6	176	ePgC	7:07:06.30	-0.15
			eSg	07:13.30	0.37
KECS	49.9	71	ePg	7:07:06.20	-0.85
			eSg	07:12.70	-1.31
KOLL	110.3	284	eSg	7:07:32.30	-0.91
CRVS	134.5	62	ePn	7:07:23.80	1.85
			eSn	07:37.80	-2.72
STHS	157.9	40	eSn	7:07:47.10	1.41
KOLS	190.7	70	eSn	7:07:54.60	1.63

39.

2007-07-13 time: 11:17:03.37 UTC ML= 1.3
 lat: 48.442N lon: 20.485E h= 0.0 km
 erh= ***km erz= ***km
 nr= 8 gap=162 rms=0.87
 Locality: Trizs
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	4.6	1	iPg	11:17:04.30	0.11
			eSg	17:05.70	0.87
PSZ	72.9	217	ePgC	11:17:15.90	-0.49
			eSg	17:25.80	-0.75
CRVS	88.3	55	ePg	11:17:20.80	1.67
			eSg	17:30.50	-0.92
STHS	121.8	27	ePg	11:17:25.00	-0.12
			eSg	17:40.10	-1.99

40.

2007-07-23 time: 8:45:10.40 UTC ML=
 lat: 47.360N lon: 18.508E h= 0.0 km
 erh= 2.6km erz= 333km
 nr= 5 gap=244 rms=0.16
 Locality: Lovasberény
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	9.6	292	ePgC	8:45:12.20	0.10
			eSg	45:13.30	-0.13
PKST	37.5	253	ePg	8:45:16.80	-0.30
			eSg	45:22.40	0.07
PKSM	128.0	175	eSg	8:45:51.20	0.11

41.

2007-07-23 time: 16:09:58.58 UTC ML= 1.4
 lat: 48.556N lon: 20.306E h= 0.0 km
 erh= 2.2km erz= 3.3km
 nr= 9 gap=159 rms=0.54
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	15.6	121	iPg	16:10:01.40	0.04
			eSg	10:02.90	-0.62

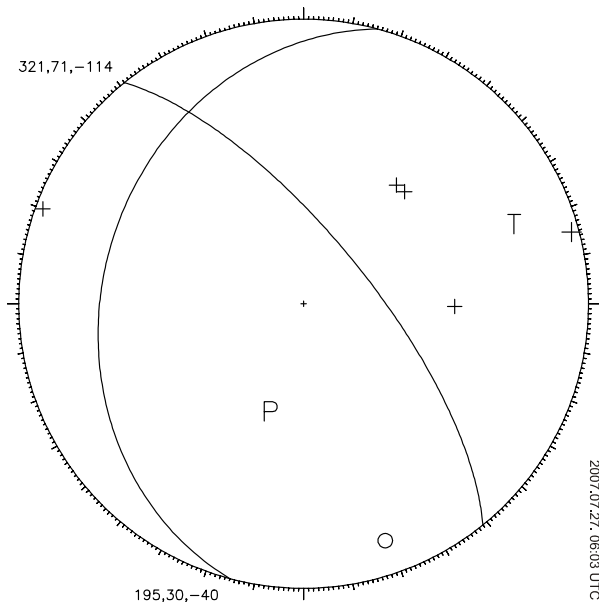
Hypocenter Parameters

PSZ	77.2	203	ePgD	16:10:12.70	0.34
			eSg	10:22.70	-0.40
CRVS	93.4	66	ePg	16:10:15.00	-0.25
			eSg	10:27.10	-1.16
VYHS	108.7	266	ePg	16:10:18.40	0.40
			eSg	10:32.10	-1.04
KOLS	150.7	74	eSn	16:10:45.60	1.06

42.

2007-07-27 time: 6:03:10.91 UTC ML=
 lat: 46.239N lon: 16.891E h= 6.1 km
 erh= 2.8km erz= 2.6km
 nr= 21 gap=137 rms=0.88
 Locality: Croatia
 Comments:

sta	dist	azm	phase	hr mn sec	res
BEHE	27.2	341	ePgD	6:03:16.40	0.52
			eSg	03:19.50	-0.26
KOGS	54.5	295	iPg	6:03:20.60	-0.10
			eSg	03:27.10	-1.24
GOLS	101.1	255	iPgC	6:03:28.60	-0.39
GCIS	106.1	247	ePg	6:03:29.70	-0.19
			eSg	03:44.20	-0.50
RHK3	112.3	110	ePgC	6:03:31.20	0.20
			eSg	03:47.70	1.04
LEGS	125.9	255	iPn	6:03:32.70	-0.15
PKSM	135.1	91	ePnC	6:03:33.60	-0.40
			eSn	03:52.80	0.79
PKST	143.1	38	ePnC	6:03:34.50	-0.50
			eSn	03:51.30	-2.50
PKSM	143.1	91	ePnC	6:03:33.60	-0.40
			eSn	04:06.10	5.93
OBKA	182.7	279	Pn	6:03:40.50	0.57
			Sn	04:03.60	1.03
CONA	203.4	337	Pn	6:03:44.60	2.08
PENC	250.6	47	eSn	6:04:30.00	12.35
PSZ	294.8	51	ePn	6:04:02.20	8.29
			eSn	04:39.60	12.15



43.

2007-07-27 time: 8:40:56.29 UTC ML=
 lat: 47.199N lon: 18.261E h= 7.0 km
 erh= 8.3km erz=10.7km
 nr= 5 gap=141 rms=0.12
 Locality: Csór
 Comments:

Földrengés paraméterek

sta	dist	azm	phase	hr mn sec	res
PKST	18.4	291	ePgD	8:40:59.70	-0.11
			eSg	41:02.80	0.24
PKSG	23.6	25	eSg	8:41:04.10	0.00
PKSM	113.5	165	ePn	8:41:16.70	0.13
			eSn	41:32.30	-0.10

44.

2007-07-29 time: 0:28:32.07 UTC ML= 1.8
 lat: 45.996N lon: 20.537E h= 6.0 km
 erh= 3.3km erz= 1.7km
 nr= 12 gap=163 rms=0.40
 Locality: Romania
 Comments:

sta	dist	azm	phase	hr mn sec	res
BZS	94.0	117	iPg	0:28:48.80	-0.08
PKS6	100.5	312	iPgD	0:28:50.60	0.55
			Sg	29:03.50	-0.58
PKSM	148.5	279	ePn	0:28:56.70	-0.15
			eSn	29:16.40	0.21
PKS7	157.5	318	PnD	0:28:57.20	-0.77
			Sn	29:18.70	0.53
GZR	186.9	111	iPn	0:29:01.60	-0.04
DRGR	189.2	62	iPn	0:29:02.20	0.28
PENC	221.2	334	ePnC	0:29:05.80	-0.12
PKSG	225.8	313	ePn	0:29:05.90	-0.60
PKST	237.5	306	ePnD	0:29:07.90	-0.06

45.

2007-07-31 time: 6:55:44.25 UTC ML=
 lat: 46.481N lon: 17.874E h= 10.0 km
 erh= 3.3km erz= 3.5km
 nr= 26 gap=113 rms=1.23
 Locality: Somodor
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSM	66.3	117	ePgC	6:55:55.10	-1.11
			eSg	56:05.90	0.35
RHK3	72.1	156	iPgD	6:55:57.80	0.56
			eSg	56:07.60	0.22
BEHE	84.4	269	ePgD	6:55:58.90	-0.52
			eSg	56:11.20	-0.05
PKST	87.3	8	ePg	6:55:59.60	-0.34
			eSg	56:13.20	1.02
PKSG	108.6	21	ePnC	6:56:02.80	-0.74
			eSn	56:17.40	-1.19
BUD	141.7	38	ePnD	6:56:08.30	0.63
			eSn	56:26.40	0.46
SOP	166.8	323	eSn	6:56:35.00	3.48
PENC	180.5	36	ePnC	6:56:12.00	-0.51
			eSn	56:37.80	3.24
ARSA	198.6	296	Pn	6:56:11.70	-3.06
			Sn	56:33.90	-4.66
ZST	199.4	343	iPn	6:56:14.80	-0.06
MODS	215.1	348	iPn	6:56:16.60	-0.23
PSZ	221.3	44	ePnD	6:56:17.80	0.21
			eSn	56:50.30	6.69
CONA	221.6	317	Pn	6:56:18.10	0.47
			Sn	56:41.00	-2.68
VYHS	235.2	18	ePn	6:56:19.90	0.57
KOLL	236.5	10	ePn	6:56:19.30	-0.20
OBKA	255.3	271	Pn	6:56:24.50	2.67
			Sn	56:56.50	5.35
KECS	297.1	41	ePn	6:56:24.70	-2.35
DIVS	312.7	148	Pn	6:56:28.37	-0.62

46.

2007-07-31 time: 8:41:55.25 UTC ML=
 lat: 47.362N lon: 18.375E h= 6.9 km
 erh=21.4km erz=14.5km
 nr= 5 gap=151 rms=0.36
 Locality: Gánt
 Comments: probably explosion

Földrengés paraméterek

Hypocenter Parameters

sta	dist	azm	phase	hr mn sec	res
PKSG	3.5	20	ePgC	8:41:56.30	-0.33
			eSg	41:57.70	-0.01
PKST	28.2	246	ePg	8:42:00.90	0.47
			eSg	42:03.90	-0.57
PKSM	129.5	171	eSn	8:42:35.10	0.16

47.

2007-07-31 time: 15:09:47.33 UTC ML=
 lat: 47.337N lon: 18.299E h= 10.0 km
 erh=12.1km erz= 7.5km
 nr= 6 gap=162 rms=0.25
 Locality: Csákberény
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	9.3	49	ePgC	15:09:49.60	-0.17
			eSg	09:51.90	0.23
PKST	21.8	247	ePgD	15:09:51.60	-0.01
			eSg	09:55.00	0.05
PKSM	127.8	168	ePn	15:10:09.60	0.58
			eSn	10:25.50	-0.43

48.

2007-08-09 time: 4:22:23.46 UTC ML= 1.7
 lat: 47.898N lon: 18.478E h= 12.7 km
 erh= 4.6km erz= 3.3km
 nr= 12 gap=187 rms=0.79
 Locality: Slovakia
 Comments:

sta	dist	azm	phase	hr mn sec	res
PENC	61.4	101	ePgD	4:22:34.70	0.05
			eSg	22:42.60	-0.78
KOLL	75.9	356	ePg	4:22:38.20	1.00
			eSg	22:46.80	-1.12
MODS	103.8	301	eP*	4:22:42.40	0.59
			eS*	22:55.30	-0.82
PSZ	106.0	89	ePn	4:22:41.80	-0.28
			eSn	22:55.60	-1.01
ZST	107.7	288	ePn	4:22:42.50	0.20
			eSn	22:55.10	-1.90
KECS	162.9	66	ePn	4:22:50.10	0.92
			eSn	23:11.80	2.56

49.

2007-08-14 time: 5:04:44.58 UTC ML=
 lat: 45.734N lon: 21.111E h= 6.0 km
 erh= 9.5km erz= 6.8km
 nr= 6 gap=177 rms=0.57
 Locality: Romania
 Comments:

sta	dist	azm	phase	hr mn sec	res
BZS	41.5	108	iPg	5:04:52.10	0.03
GZR	135.5	106	iPnD	5:05:07.40	-0.33
DRGR	170.5	46	iPnD	5:05:12.80	0.70
PKSM	198.6	286	ePnC	5:05:15.20	-0.41
			eSn	05:40.10	0.29
PSZ	260.0	339	ePnD	5:05:19.90	-3.36
			eSn	05:45.70	-7.73

50.

2007-08-14 time: 9:06:05.83 UTC ML= 1.9
 lat: 48.369N lon: 19.866E h= 0.0 km
 erh= 1.9km erz= 2.9km
 nr= 6 gap=141 rms=0.62
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	47.6	75	ePg	9:06:14.80	0.47
			eSg	06:21.80	0.85

PSZ	50.2	178	ePg	9:06:14.30	-0.49
			eSg	06:22.10	0.32
KOLL	110.7	282	eSg	9:06:41.30	0.27
CRVS	131.7	63	eSn	9:06:46.50	-1.08

51.

2007-08-19 time: 22:57:03.62 UTC ML= 3.4
 lat: 46.471N lon: 16.844E h= 12.7 km
 erh= 1.0km erz= 0.6km
 nr= 28 gap=108 rms=0.23
 Locality: Rigyác
 Comments:

sta	dist	azm	phase	hr mn sec	res
BEHE	5.3	269	ePgD	22:57:06.10	0.04
			eSg	57:08.00	0.03
KOGS	45.7	267	iPgD	22:57:12.00	-0.08
			iSg	57:18.80	0.12
GOLS	107.1	241	iPnD	22:57:22.30	-0.08
			iSn	57:36.80	-0.22
DOBS	111.8	251	iPnD	22:57:22.60	-0.37
			iSn	57:37.30	-0.76
PKST	126.2	46	ePnC	22:57:24.60	-0.16
			eSn	57:40.60	-0.66
RHK3	126.5	121	ePnD	22:57:25.20	0.39
			eSn	57:27.10	-14.24
CRES	128.9	236	iPnD	22:57:25.11	0.00
			Sn	57:41.00	-0.87
ARSA	132.9	311	Pn	22:57:25.60	0.00
			Sn	57:41.50	-1.25
SOP	136.5	351	eSn	22:57:33.60	-9.96
ZAVS	139.9	268	iPnC	22:57:26.40	-0.07
			iSn	57:43.70	-0.60
SOKA	140.8	279	Pn	22:57:26.50	-0.08
			Sn	57:43.40	-1.10
PKSM	141.3	102	ePnD	22:57:26.30	-0.35
			eSn	57:46.10	1.48
PDKS	148.8	253	iPnD	22:57:27.60	0.01
			iSn	57:47.50	1.21
BOJS	163.6	229	iPnD	22:57:29.50	0.07
OBKA	176.3	271	Pn	22:57:31.10	0.09
			Sn	57:55.60	3.22
CONA	178.3	335	Pn	22:57:31.30	0.03
			Sn	57:53.30	0.46
CSNA	178.4	335	Pn	22:57:31.30	0.02
			Sn	57:53.40	0.55
LJU	184.8	255	iPn	22:57:32.10	0.02
PKS7	188.2	70	ePn	22:57:35.50	3.00
			eSn	58:00.90	5.86
ZST	192.8	6	iPn	22:57:33.10	0.03
			eSn	57:53.40	-2.65
MODS	214.1	9	ePn	22:57:35.50	-0.22
			eSn	57:57.80	-2.97
VOY	232.7	258	ePn	22:57:38.20	0.15
			eSn	58:12.50	7.59
PKSN	236.1	78	eSn	22:58:19.60	13.94
MYKA	246.2	274	Pn	22:57:39.80	0.06
			Sn	58:08.30	0.39
MOA	248.4	308	Pn	22:57:40.60	0.59
			Sn	58:09.10	0.71
KOLL	262.1	27	iPn	22:57:41.70	-0.01
			eSn	58:09.10	-2.33
PTCC	268.4	268	Pn	22:57:43.30	0.81
KBA	275.7	284	Pn	22:57:44.30	0.89
			Sn	58:15.90	1.46
GMNA	278.4	266	Pn	22:57:46.10	2.36
PSZ	281.7	55	ePnC	22:57:43.90	-0.25
FVI	312.1	273	Pn	22:57:48.90	0.96
VRAC	316.1	357	iPn	22:57:48.30	-0.14
TIM	348.1	104	iPn	22:57:56.30	3.86
KECS	354.1	51	ePn	22:57:53.60	0.41
			eSn	58:30.20	-1.65
GEC2	354.2	318	ePn	22:57:55.10	1.91
			eSn	58:45.30	13.44
MORC	371.3	8	iPn	22:57:55.70	0.37
KHC	383.9	320	ePn	22:57:58.20	1.30
			eSn	58:37.40	-1.05
OKC	386.7	15	ePn	22:57:57.90	0.65

Hypocenter Parameters

Földrengés paraméterek

	eSn	58:37.50	-1.59
CTI 403.2 263	Pn	22:57:59.60	0.29
WTTA 406.8 283	Pn	22:58:01.50	1.75
	Sn	58:45.60	2.07
WATA 412.7 283	Pn	22:58:01.70	1.20
	Sn	58:46.10	1.24
WET 420.2 315	ePn	22:58:02.60	1.17
PRU 426.9 336	ePn	22:58:02.60	0.34
	eSn	59:04.60	16.59
APPI 431.3 270	Pn	22:58:04.20	1.39
DPC 433.1 355	ePn	22:58:02.50	-0.54
	eSn	58:45.90	-3.48
CRVS 439.6 52	ePn	22:58:04.70	0.85
MOTA 448.0 283	Pn	22:58:05.90	1.00
	Sn	58:53.80	1.11
STHS 464.0 45	ePn	22:58:08.90	2.01
	eSn	58:56.40	0.15
NKC 530.3 322	ePn	22:58:15.10	-0.05
	eSn	59:08.50	-2.45
DAVA 538.6 280	Pn	22:58:16.90	0.72
	Sn	59:12.70	-0.08
KWP 560.9 51	iPnD	22:58:23.00	4.03
MOX 603.8 320	Pn	22:58:25.50	1.19
	Sn	59:55.90	28.64
CLL 607.2 332	iPn	22:58:25.40	0.66
	eSn	59:58.00	29.98
BFO 675.2 288	ePn	22:58:33.10	-0.12
CDF 753.3 287	ePn	22:58:42.00	-0.96
	eSn	59:52.90	-7.55
BUC1 756.7 108	Pn	22:58:44.45	1.06
PGF 761.0 235	ePn	22:58:42.50	-1.42
HINF 772.5 281	ePn	22:58:43.80	-1.55
	eSn	59:57.30	-7.41
LPL 790.6 262	ePn	22:58:46.70	-0.91

52.

2007-08-23 time: 6:44:56.92 UTC ML= 1.9
 lat: 47.934N lon: 19.801E h= 0.0 km
 erh= 2.5km erz= 3.7km
 nr= 11 gap=136 rms=0.75
 Locality: Mátraverebély
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	7.2	104	ePgC	6:44:57.40	-0.81
			eSg	45:00.40	1.19
PENC	42.0	248	ePgD	6:45:04.70	0.28
			eSg	45:15.70	5.42
KECS	79.5	40	eSg	6:45:21.20	-0.97
VYHS	94.9	311	ePg	6:45:14.70	0.83
			eSg	45:27.40	0.30
PKSG	121.9	240	eSg	6:45:34.90	-0.77
KOLL	126.2	305	eSg	6:45:37.00	-0.02
CRVS	163.4	49	eSn	6:45:46.00	0.31
STHS	196.1	33	eSn	6:45:53.50	0.54

53.

2007-08-23 time: 10:09:02.41 UTC ML= 1.8
 lat: 48.578N lon: 20.796E h= 0.0 km
 erh= 2.7km erz= 4.8km
 nr= 11 gap=152 rms=0.54
 Locality: Tornanádaska
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	25.2	245	ePg	10:09:06.60	-0.31
			eSg	09:10.80	0.38
CRVS	60.8	54	ePg	10:09:13.40	0.13
			eSg	09:20.20	-1.53
STHS	98.9	19	ePg	10:09:20.40	0.34
			eSg	09:34.00	0.17
PSZ	99.3	222	ePgC	10:09:20.60	0.46
			eSg	09:33.50	-0.47
KOLS	115.6	70	eSg	10:09:39.50	0.35
VYHS	145.0	266	ePn	10:09:26.90	-0.62
			eSn	09:44.40	-2.71

54.

2007-08-30 time: 8:49:34.89 UTC ML= 2.2
 lat: 48.342N lon: 19.837E h= 0.0 km
 erh= 4.2km erz= 6.1km
 nr= 12 gap=117 rms=1.14
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	47.4	175	ePgC	8:49:43.50	0.16
			eSg	49:50.40	0.46
KECS	50.5	72	ePg	8:49:43.20	-0.71
			eSg	49:49.40	-1.55
VYHS	76.0	283	ePg	8:49:48.70	0.25
			eSg	49:57.40	-1.63
KOLL	109.3	284	ePg	8:49:56.00	1.59
			eSg	50:07.90	-1.73
CRVS	135.0	63	ePn	8:49:58.10	-0.65
			eSn	50:17.00	-0.36
STHS	157.9	41	ePn	8:50:03.90	2.30
			eSn	50:23.10	0.66

55.

2007-09-05 time: 12:44:52.37 UTC ML= 2.6
 lat: 45.783N lon: 17.810E h= 5.6 km
 erh= 6.1km erz= 4.3km
 nr= 23 gap=190 rms=1.57
 Locality: Croatia/Drávasztára
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	36.3	71	ePgD	12:44:58.70	-0.22
			eSg	45:03.40	-0.64
PKSM	80.1	54	ePg	12:45:06.00	-0.71
			eSg	45:17.20	-0.69
BEHE	110.6	314	ePg	12:45:12.40	0.26
			eSg	45:27.40	-0.15
KOGS	141.4	302	iPn	12:45:18.90	2.58
			iSn	45:32.90	-2.11
PKS6	163.0	56	Sn	12:45:41.60	1.79
GOLS	171.5	278	iPn	12:45:20.00	-0.07
			iSn	45:39.90	-1.78
PKS7	174.7	36	eSn	12:45:45.50	3.10
DOBS	186.0	283	iPn	12:45:21.60	-0.28
			iSn	45:43.10	-1.79
PKSN	201.0	52	eSn	12:45:54.70	6.46
BOJS	201.8	261	iPn	12:45:26.80	2.94
			iSn	45:45.60	-2.82
VISS	231.0	271	iPn	12:45:27.20	-0.29
			iSn	45:52.30	-2.59
CONA	281.0	328	Pn	12:45:34.80	1.08
PSZ	285.7	34	ePn	12:45:41.10	6.79
			eSn	46:03.90	-3.12
MODS	290.8	352	ePn	12:45:34.80	-0.15
			eSn	46:02.60	-5.56
VYHS	311.2	14	ePn	12:45:38.00	0.50
			eSn	46:09.00	-3.70
KOLL	314.0	8	ePn	12:45:38.50	0.66
			eSn	46:09.70	-3.61
MOA	354.8	310	Pn	12:45:39.20	-3.74
			Sn	46:16.40	-5.98

56.

2007-09-07 time: 9:30:46.78 UTC ML= 0.9
 lat: 47.988N lon: 19.985E h= 0.0 km
 erh= 3.9km erz= 967km
 nr= 5 gap=187 rms=0.43
 Locality: Mátramindszent
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	10.3	221	ePgC	9:30:48.10	-0.52
			eSg	30:50.90	0.85
KECS	66.4	34	ePg	9:30:59.00	0.36
			eSg	31:07.60	-0.29
VYHS	102.2	303	eSg	9:31:19.20	-0.06

Földrengés paraméterek

Hypocenter Parameters

57.

2007-09-10 time: 6:10:07.88 UTC ML= 1.7
 lat: 47.943N lon: 19.840E h= 0.0 km
 erh= 4.1km erz= 6.0km
 nr= 7 gap=180 rms=0.82
 Locality: Mátraverebély
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	4.9	124	ePgD	6:10:08.30	-0.46
			eSg	10:10.00	0.56
KECS	76.9	39	eSg	6:10:31.70	-0.62
VYHS	96.5	309	ePg	6:10:26.10	0.98
			eSg	10:39.10	0.54
KOLL	128.0	304	eSg	6:10:47.30	-1.27
CRVS	160.6	48	eSn	6:10:56.90	0.86

58.

2007-09-10 time: 12:28:59.88 UTC ML= 1.2
 lat: 48.003N lon: 19.503E h= 0.0 km
 erh= ---km erz= ---km
 nr= 4 gap=210 rms=0.36
 Locality: Nógrádsipek
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	30.7	108	ePg	12:29:05.00	-0.36
			eSg	29:10.30	0.66
VYHS	73.7	318	eSg	12:29:23.60	0.29
KECS	90.4	54	eSg	12:29:28.40	-0.22

59.

2007-09-12 time: 8:34:30.61 UTC ML= 1.6
 lat: 47.942N lon: 19.851E h= 6.4 km
 erh= 3.7km erz= 3.5km
 nr= 8 gap=120 rms=0.57
 Locality: Mátraszentimre
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	4.2	129	ePgc	8:34:31.40	-0.57
			eSg	34:34.20	1.17
PENC	45.8	248	eSg	8:34:45.30	-0.01
KECS	76.5	38	ePg	8:34:45.70	1.38
			eSg	34:54.80	-0.21
VYHS	97.2	309	ePg	8:34:47.90	-0.11
			eSg	35:02.30	0.71
KOLL	128.8	303	eSn	8:35:10.30	0.03

60.

2007-09-14 time: 10:40:41.52 UTC ML= 1.8
 lat: 48.648N lon: 19.871E h= 0.0 km
 erh= ***km erz= ***km
 nr= 8 gap=206 rms=1.22
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
KECS	48.9	112	ePg	10:40:49.80	-0.46
			eSg	40:56.40	-0.68
VYHS	78.2	257	ePg	10:40:55.00	-0.49
			eSg	41:04.10	-2.29
PSZ	81.1	179	ePgc	10:40:57.30	1.29
			eSg	41:04.80	-2.51
KOLL	108.5	266	ePg	10:41:01.90	0.99
			eSg	41:17.00	0.97

61.

2007-09-15 time: 4:39:33.93 UTC ML= 2.7
 lat: 46.000N lon: 17.575E h= 10.0 km
 erh= 5.4km erz= 4.4km
 nr= 18 gap=161 rms=0.93
 Locality: Homokszentgyörgy
 Comments: felt 4-5 EMS

sta	dist	azm	phase	hr mn sec	res
RHK3	54.0	103	ePgD	4:39:43.50	-0.23
			eSg	39:49.50	-1.87
BEHE	80.8	310	ePg	4:39:49.20	0.73
			eSg	39:59.70	-0.12
PKSM	85.7	74	ePg	4:39:48.30	-1.04
			eSg	40:00.90	-0.47
KOGS	113.7	296	iPn	4:39:53.40	-0.46
			eSn	40:08.80	-0.61
PKST	144.3	14	ePnC	4:39:57.00	-0.68
			eSn	40:13.80	-2.40
GOLS	151.1	270	iPn	4:39:58.60	0.08
GCIS	151.8	264	ePn	4:39:58.90	0.29
DOBS	163.8	276	iPn	4:39:59.90	-0.20
PKS6	167.2	66	ePn	4:40:00.40	-0.13
			eSn	40:19.00	-2.27
GROS	167.9	288	iPnC	4:40:00.30	-0.32
			eSn	40:22.70	1.25
PKS7	168.4	46	ePn	4:40:03.50	2.82
			Sn	40:22.10	0.55
BUD	198.7	34	ePn	4:40:07.80	3.35
			eSn	40:29.10	0.84
PKSN	202.4	60	ePnD	4:40:07.00	2.08
			eSn	40:32.90	3.80
SOP	202.6	337	ePn	4:40:07.50	2.56
			eSn	40:35.90	6.77
PENC	237.8	33	ePnD	4:40:08.40	-0.93
			eSn	40:40.80	3.85
MODS	264.9	355	ePn	4:40:11.80	-0.91
			eSn	40:39.30	-3.66
PSZ	276.9	40	ePn	4:40:20.30	6.10
			eSn	40:52.20	6.58
VYHS	293.3	19	ePn	4:40:15.50	-0.75
			eSn	40:44.50	-4.76
KOLL	293.4	12	ePn	4:40:15.90	-0.37
			eSn	40:44.90	-4.40
KHC	460.1	319	ePn	4:40:38.10	1.05
			eSn	41:23.50	-2.78
STHS	469.2	36	ePn	4:40:37.90	-0.28

62.

2007-09-17 time: 12:37:17.54 UTC ML= 1.5
 lat: 48.022N lon: 19.375E h= 0.0 km
 erh= ***km erz= ***km
 nr= 7 gap=137 rms=0.91
 Locality: Nógrádmárcal
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PENC	26.6	195	eSg	12:37:26.10	0.09
VYHS	66.0	323	ePg	12:37:31.20	1.87
			eSg	37:38.60	0.07
KOLL	95.1	311	ePg	12:37:33.80	-0.72
			eSg	37:46.50	-1.27
KECS	97.1	58	ePg	12:37:34.40	-0.48
			eSg	37:48.70	0.29

63.

2007-09-20 time: 10:47:48.20 UTC ML= 2.1
 lat: 48.923N lon: 20.476E h= 10.0 km
 erh= 6.6km erz= 6.0km
 nr= 10 gap=157 rms=1.01
 Locality: Slovakia
 Comments:

sta	dist	azm	phase	hr mn sec	res
CRVS	72.2	92	ePg	10:48:00.30	-0.92
			eSg	48:09.40	-1.98

Hypocenter Parameters

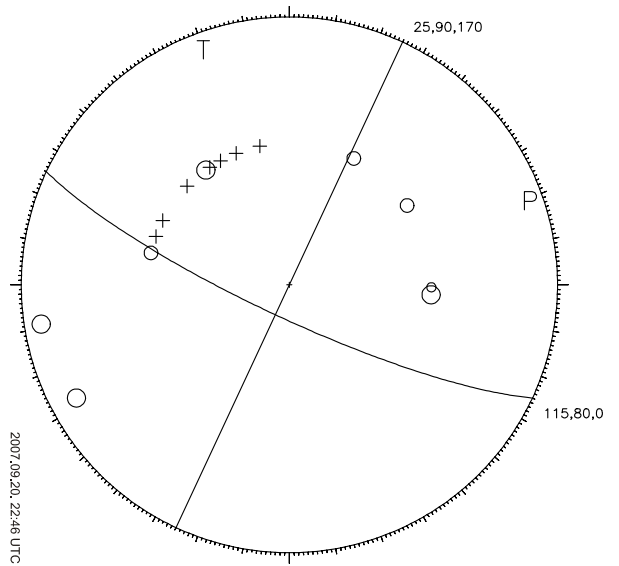
STHS	78.4	46	ePg	10:48:02.80	0.48
			eSg	48:13.60	0.27
PSZ	119.7	201	ePnC	10:48:10.10	1.22
			eSn	48:23.70	-1.31
VYHS	129.8	248	ePn	10:48:10.40	0.26
			eSn	48:25.10	-2.15
KOLS	131.7	89	ePn	10:48:10.80	0.43
			eSn	48:28.20	0.53

64.

2007-09-20 time: 22:46:06.35 UTC ML= 3.5
 lat: 45.510N lon: 20.611E h= 10.0 km
 erh= 2.5km erz= 1.8km
 nr= 12 gap=189 rms=0.22
 Locality: Serbia
 Comments:

sta	dist	azm	phase	hr mn sec	res
TIM	53.8	62	iPgD	22:46:16.30	0.18
BZS	79.4	81	iPgD	22:46:20.50	-0.14
PKS6	145.7	326	ePnC	22:46:30.30	0.03
			eSn	46:50.40	1.47
PKSN	164.5	340	ePn	22:46:33.40	0.78
			eSn	46:51.40	-1.71
GZR	169.9	94	iPnD	22:46:33.30	0.01
PKSM	171.7	297	ePnC	22:46:33.40	-0.11
			eSn	46:49.50	-5.20
RHK3	188.5	283	ePnD	22:46:35.70	0.10
			eSn	47:01.80	3.38
DRGR	215.9	49	ePn	22:46:38.40	-0.62
BUD	251.0	331	ePnC	22:46:43.20	-0.19
			eSn	47:08.30	-3.99
PENC	273.2	338	ePnC	22:46:46.00	-0.16
			eSn	47:14.00	-3.22
PSZ	273.3	348	ePnC	22:46:45.50	-0.67
			eSn	47:12.90	-4.34
PKST	277.6	314	ePnC	22:46:46.90	0.18
			eSn	47:15.20	-3.01
BEHE	315.8	290	ePnC	22:46:51.90	0.43
			eSn	47:25.10	-1.57
TRPA	326.3	27	ePnD	22:46:51.80	-0.99
			eSn	47:21.10	-7.92
VOIR	347.2	91	ePnD	22:46:57.30	1.91
VYHS	358.1	338	ePn	22:46:56.80	0.04
			eSn	47:32.20	-3.88
KOLL	380.2	334	ePn	22:46:59.40	-0.11
			eSn	47:36.50	-4.47
SOP	393.5	308	ePn	22:46:55.30	-5.86
			eSn	47:41.70	-2.22
KOLS	400.8	18	ePn	22:47:02.80	0.72
ZST	401.0	318	ePn	22:47:02.10	0.00
			eSn	47:42.00	-3.58
DOBS	405.8	280	ePn	22:47:02.10	-0.60
MODS	407.2	321	ePn	22:47:03.40	0.53
			eSn	47:42.70	-4.26
MLR	416.9	90	ePn	22:47:04.70	0.61
BURB	423.6	56	ePn	22:47:04.70	-0.22
BURA	423.6	56	PnD	22:47:04.67	-0.25
NIE	435.2	357	ePn	22:47:07.90	1.54
			eSn	47:51.10	-2.07
STHS	436.9	6	ePn	22:47:07.00	0.42
VISS	451.1	274	iPn	22:47:08.60	0.26
OKC	515.5	339	ePn	22:47:11.00	-5.38
			eSn	48:07.00	-4.00
VRAC	519.9	324	iPnD	22:47:16.40	-0.52
MORC	527.5	334	ePn	22:47:17.60	-0.27
GEC2	641.7	305	ePn	22:47:32.70	0.58
			eSn	48:37.00	-2.02
KHC	666.9	307	ePn	22:47:36.50	1.24
			eSn	48:52.60	7.99
PRU	674.6	318	ePn	22:47:37.90	1.68
			eSn	48:52.60	6.29

Földrengés paraméterek



65.

2007-09-24 time: 11:26:45.66 UTC ML= 1.5
 lat: 47.867N lon: 19.426E h= 0.0 km
 erh= ***km erz= ***km
 nr= 6 gap=151 rms=0.60
 Locality: Bercel
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PENC	13.8	232	ePgC	11:26:47.70	-0.42
			eSg	26:51.70	1.65
PSZ	35.5	81	ePgC	11:26:51.80	-0.19
			eSg	26:57.50	0.57
VYHS	82.4	328	ePg	11:27:01.20	0.83
			eSg	27:11.20	-0.64

66.

2007-09-29 time: 14:04:28.59 UTC ML=
 lat: 45.961N lon: 16.091E h= 1.6 km
 erh= 7.3km erz= 6.6km
 nr= 15 gap=160 rms=1.40
 Locality: Croatia
 Comments:

sta	dist	azm	phase	hr mn sec	res
CRES	51.5	253	iPg	14:04:37.60	-0.18
KOGS	55.6	13	iPg	14:04:38.40	-0.11
BEHE	77.4	43	ePg	14:04:42.00	-0.42
			eSg	04:52.10	-1.10
PDKS	85.7	279	iPg	14:04:43.40	-0.49
PERS	106.2	315	iPg	14:04:47.20	-0.34
RHK3	167.8	93	ePnD	14:04:53.40	-2.94
			eSn	05:11.60	-6.39
VOY	170.4	273	ePn	14:04:58.70	2.03
			eSn	05:20.00	1.43
PKS9	182.4	68	ePnD	14:05:01.60	3.44
			eSn	05:22.50	1.27
PKSM	199.2	82	ePn	14:05:01.50	1.25
			eSn	05:25.00	0.04
PKS2	248.0	76	eSn	14:05:39.70	3.92
PKS6	277.0	75	eSn	14:05:49.40	7.19
VYHS	350.1	36	ePn	14:05:16.90	-2.16
			eSn	05:53.20	-5.24
KHC	400.0	332	ePn	14:05:25.90	0.61
			eSn	06:07.80	-1.73
PRU	462.5	346	ePn	14:05:31.40	-1.69

Földrengés paraméterek

Hypocenter Parameters

67.

2007-10-01 time: 12:12:22.50 UTC ML=
 lat: 47.875N lon: 19.397E h= 0.0 km
 erh= ***km erz= ***km
 nr= 6 gap=140 rms=0.88
 Locality: Bercel
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PENC	12.8	223	ePgC	12:12:24.70	-0.08
			eSg	12:26.70	0.14
PSZ	37.5	83	ePgC	12:12:28.80	-0.40
			eSg	12:34.50	0.08
VYHS	80.5	329	ePg	12:12:38.00	1.13
			eSg	12:45.50	-2.58

68.

2007-10-03 time: 10:46:31.67 UTC ML=
 lat: 47.872N lon: 19.410E h= 0.0 km
 erh= ***km erz= ***km
 nr= 6 gap=145 rms=0.71
 Locality: Bercel
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PENC	13.2	227	ePgC	10:46:33.80	-0.24
			eSg	46:36.40	0.52
PSZ	36.6	82	ePgC	10:46:37.90	-0.30
			eSg	46:43.50	0.21
VYHS	81.3	328	ePg	10:46:47.20	1.01
			eSg	46:55.10	-2.41

69.

2007-10-10 time: 11:28:37.09 UTC ML=
 lat: 47.942N lon: 19.371E h= 0.0 km
 erh= ***km erz= ***km
 nr= 7 gap=127 rms=0.83
 Locality: Magyaránador
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PENC	18.1	202	ePgD	11:28:40.00	-0.32
			eSg	28:44.60	1.77
PSZ	39.2	94	ePgC	11:28:43.90	-0.20
			eSg	28:49.60	0.04
VYHS	73.2	327	ePg	11:28:52.90	2.74
			eSg	29:00.60	0.25
KOLL	100.9	315	eSg	11:29:08.40	-0.78

70.

2007-10-11 time: 9:52:58.51 UTC ML=
 lat: 47.193N lon: 18.296E h= 0.0 km
 erh= 1.2km erz= 300km
 nr= 6 gap=149 rms=0.18
 Locality: Székesfehérvár
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PKST	21.2	290	ePgD	9:53:02.20	-0.10
			eSg	53:05.30	0.05
PKSG	23.3	18	ePgC	9:53:02.60	-0.07
			eSg	53:05.90	-0.01
PKSM	112.2	166	ePgC	9:53:18.80	0.26
			eSg	53:33.50	-0.67

71.

2007-10-12 time: 8:43:49.51 UTC ML=
 lat: 47.367N lon: 18.243E h= 8.0 km
 erh= 1.3km erz= 0.7km
 nr= 5 gap=203 rms=0.05
 Locality: Mór
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	11.5	76	ePgD	8:43:52.00	-0.01
			eSg	43:53.90	-0.05
PKST	19.8	233	ePgD	8:43:53.40	0.06
			eSg	43:56.20	-0.11
PKSM	131.9	167	eSn	8:44:29.50	0.00

72.

2007-10-12 time: 8:54:46.82 UTC ML=
 lat: 47.390N lon: 18.230E h= 9.5 km
 erh= 1.1km erz= 0.5km
 nr= 5 gap=224 rms=0.10
 Locality: Mór
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	12.1	89	ePgD	8:54:49.60	0.03
			eSg	54:51.60	-0.12
PKST	20.8	225	ePgD	8:54:51.00	0.10
			eSg	54:53.90	-0.19
PKSM	134.7	167	eSn	8:55:27.00	-0.08

73.

2007-10-12 time: 8:57:16.34 UTC ML=
 lat: 47.383N lon: 18.229E h= 3.4 km
 erh= ---km erz= ---km
 nr= 4 gap=218 rms=0.02
 Locality: Mór
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	12.3	85	ePgD	8:57:18.60	-0.01
			eSg	57:20.40	0.02
PKST	20.1	227	ePgD	8:57:20.00	0.01
			eSg	57:22.80	-0.03

74.

2007-10-12 time: 13:57:01.77 UTC ML=
 lat: 47.412N lon: 18.207E h= 1.2 km
 erh= ---km erz= ---km
 nr= 4 gap=242 rms=0.10
 Locality: Pusztavám
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	14.1	99	ePgC	13:57:04.30	0.01
			eSg	57:06.10	-0.16
PKST	21.4	217	ePgD	13:57:05.70	0.10
			eSg	57:08.40	-0.19

75.

2007-10-12 time: 19:19:12.07 UTC ML=
 lat: 47.347N lon: 18.256E h= 7.6 km
 erh= ---km erz= ---km
 nr= 4 gap=184 rms=0.00
 Locality: Csókakő
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	11.3	64	ePgD	19:19:14.50	0.00
			eSg	19:16.40	0.00
PKST	19.4	240	ePgD	19:19:15.80	0.00
			eSg	19:18.70	0.00

76.

2007-10-13 time: 3:42:43.82 UTC ML=
 lat: 47.285N lon: 18.306E h= 1.0 km
 erh= ---km erz= ---km
 nr= 4 gap=234 rms=0.07
 Locality: Magyaralmás
 Comments:

sta	dist	azm	phase	hr mn sec	res
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Hypocenter Parameters

Földrengés paraméterek

PKSG 13.5 28 ePgD 3:42:46.20 -0.04
 eSg 42:48.20 0.07
 PKST 20.8 262 ePgD 3:42:47.60 0.07
 eSg 42:50.30 -0.13

77.

2007-10-13 time: 13:08:47.55 UTC ML= 2.1
 lat: 48.354N lon: 19.846E h= 0.6 km
 erh= 3.8km erz= 5.0km
 nr= 11 gap=118 rms=0.93
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	48.5	176	ePgC	13:08:56.00	-0.22
			eSg	09:02.80	-0.18
VYHS	76.4	282	ePg	13:09:01.00	-0.19
			eSg	09:10.30	-1.52
KOLL	109.7	283	eSg	13:09:22.20	-0.21
CRVS	133.8	63	ePn	13:09:10.20	-1.00
			eSn	09:27.70	-1.94
STHS	156.5	41	ePn	13:09:15.00	0.98
			eSn	09:35.90	1.23
KOLS	190.1	70	eSn	13:09:43.40	1.26
MODS	190.4	271	eSn	13:09:44.20	2.01

78.

2007-10-16 time: 10:57:23.00 UTC ML=
 lat: 47.955N lon: 19.348E h= 0.5 km
 erh= 2.1km erz= 1.5km
 nr= 6 gap=251 rms=0.19
 Locality: Magyarnándor
 Comments:

sta	dist	azm	phase	hr mn sec	res
PENC	19.0	195	ePgD	10:57:26.30	-0.09
			eSg	57:29.20	0.16
PSZ	41.1	96	ePgD	10:57:30.40	0.06
			eSg	57:36.00	-0.05
BUD	57.8	205	eSg	10:57:41.20	-0.17
PKSM	201.1	195	eSn	10:58:20.70	0.67

79.

2007-10-27 time: 23:21:31.01 UTC ML=
 lat: 47.380N lon: 18.229E h= 0.3 km
 erh= ---km erz= ---km
 nr= 4 gap=216 rms=0.03
 Locality: Mór
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	12.3	84	ePgD	23:21:33.20	-0.01
			eSg	21:34.90	-0.02
PKST	19.9	228	ePgD	23:21:34.60	0.04
			eSg	21:37.30	-0.04

80.

2007-11-07 time: 11:08:24.12 UTC ML= 2.3
 lat: 48.332N lon: 19.725E h= 0.0 km
 erh=24.9km erz=36.0km
 nr= 6 gap=121 rms=1.02
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	47.7	165	ePgD	11:08:32.40	-0.24
			eSg	08:39.20	-0.08
VYHS	68.2	285	ePg	11:08:36.70	0.40
			eSg	08:45.90	0.10
STHS	164.2	43	eSn	11:09:11.40	-1.68
KOLS	199.4	70	eSn	11:09:23.40	2.51

81.

2007-11-08 time: 11:06:59.14 UTC ML=
 lat: 47.936N lon: 19.851E h= 7.7 km
 erh= 5.2km erz= 4.3km
 nr= 9 gap=128 rms=0.80
 Locality: Mátraszentimre
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	3.8	121	ePgC	11:06:59.90	-0.77
			eSg	07:01.90	0.03
PENC	45.6	249	ePg	11:07:06.80	-0.59
			eSg	07:15.60	1.77
KECS	77.0	38	ePg	11:07:14.40	1.44
			eSg	07:23.20	-0.54
VYHS	97.7	309	ePg	11:07:16.60	-0.04
			eSg	07:30.30	0.01
KOLL	129.2	304	eSn	11:07:38.20	-0.38

82.

2007-11-08 time: 15:01:27.43 UTC ML=
 lat: 48.016N lon: 19.483E h= 8.1 km
 erh= 8.2km erz=38.1km
 nr= 6 gap=208 rms=0.90
 Locality: Rimóc
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	32.6	109	ePgC	15:01:32.60	-0.83
			eSg	01:38.00	-0.11
VYHS	71.6	318	ePg	15:01:41.60	1.30
			eSg	01:49.30	-1.03
KECS	90.8	55	ePg	15:01:44.30	0.59
			eSg	01:55.50	-0.91

83.

2007-11-14 time: 13:31:09.98 UTC ML=
 lat: 48.272N lon: 19.784E h= 10.0 km
 erh=20.9km erz= 7.7km
 nr= 6 gap=239 rms=1.42
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr mn sec	res
PSZ	40.2	168	ePgC	13:31:17.10	-0.29
			eSg	31:23.20	0.03
VYHS	74.4	289	ePg	13:31:25.90	2.52
			eSg	31:33.10	-0.74
KOLL	107.7	288	ePn	13:31:28.60	-0.57
			eSn	31:41.80	-2.34

84.

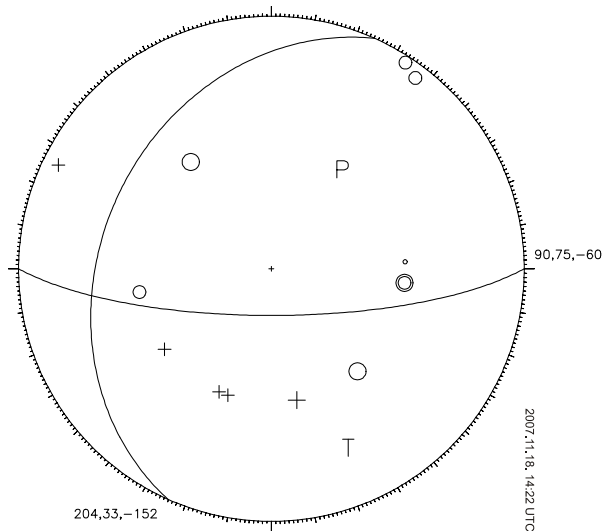
2007-11-18 time: 14:22:38.30 UTC ML= 3.0
 lat: 48.033N lon: 19.552E h= 3.4 km
 erh= 1.7km erz= 1.7km
 nr= 39 gap= 49 rms=0.86
 Locality: Hollókő
 Comments: felt 4 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	28.6	116	ePgC	14:22:43.00	-0.45
			eSg	22:46.70	-0.75
PENC	33.6	217	ePgD	14:22:44.40	0.06
			eSg	22:50.60	1.55
BUD	72.7	213	ePgD	14:22:51.60	0.29
VYHS	73.9	314	iPg	14:22:51.80	0.29
			eSg	23:00.50	-1.30
KOLL	104.7	305	iPg	14:22:56.90	-0.11
			eSg	23:09.70	-1.89
PKSN	128.5	169	iPnC	14:23:01.70	0.78
			Sn	23:17.40	-1.16
PKST	142.8	233	ePnC	14:23:02.30	-0.41
			eSn	23:24.10	2.36
NIE	164.0	20	ePn	14:23:06.20	0.84

Földrengés paraméterek

Hypocenter Parameters

		eSn	23:25.20	-1.26
CRVS	171.2	56	ePn 14:23:05.90	-0.35
			eSn 23:28.90	0.86
MODS	173.3	283	ePn 14:23:06.20	-0.31
			eSn 23:28.90	0.40
ZST	183.3	276	ePn 14:23:07.60	-0.15
			eSn 23:31.90	1.17
STHS	198.0	39	ePn 14:23:10.50	0.91
			eSn 23:35.20	1.21
PKSM	213.9	199	ePnC 14:23:10.50	-1.07
TRPA	222.9	87	ePnD 14:23:16.10	3.41
KOLS	224.8	64	ePn 14:23:13.20	0.27
OKC	225.6	333	eSn 14:23:42.90	2.79
SOP	227.3	260	ePnD 14:23:12.70	-0.55
			eSn 23:37.50	-3.00
MORC	243.6	323	iPnD 14:23:15.70	0.43
OJC	243.9	4	ePn 14:23:20.90	5.59
			eSn 23:49.00	4.82
RHK3	258.1	203	ePnC 14:23:16.40	-0.68
			eSn 23:44.40	-2.92
VRAC	260.0	303	iPn 14:23:17.30	-0.02
BEHE	272.6	230	ePn 14:23:19.30	0.40
DRGR	275.5	120	iPn 14:23:17.80	-1.45
CONA	275.6	268	Pn 14:23:19.20	-0.07
CSNA	275.9	268	Pn 14:23:19.20	-0.11
KWP	292.1	53	iPn 14:23:22.10	0.78
BMR	298.0	98	iPn 14:23:19.60	-2.46
BZS	311.4	150	iPn 14:23:22.50	-1.23
TREC	330.7	295	ePn 14:23:26.30	0.17
DPC	349.1	318	ePn 14:23:29.00	0.57
			eSn 24:17.20	9.67
SOKA	373.2	246	Pn 14:23:30.10	-1.33
			Sn 24:11.40	-1.47
GZR	383.3	140	iPnD 14:23:32.10	-0.59
MOA	395.4	267	Pn 14:23:34.40	0.19
BURB	426.8	96	iPnD 14:23:38.20	0.08
BURA	426.8	96	PnD 14:23:38.20	0.08
			Sn 24:22.88	-1.89
GEC2	442.2	282	ePn 14:23:39.77	-0.27
KHC	457.4	285	ePn 14:23:42.30	0.37
			eSn 24:48.70	17.14
CLL	596.8	308	iPn 14:23:59.00	-0.32



85.

2007-11-20 time: 9:03:27.73 UTC ML= 2.0
 lat: 48.251N lon: 19.292E h= 0.0 km
 erh= 1.4km erz= 1.5km
 nr= 12 gap= 99 rms=0.38
 Locality: Slovakia
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
VYHS	43.3	309	ePg	9:03:35.70			0.25
			eSg	03:41.50			0.02

PENC	51.2	181	ePg	9:03:37.00			0.13
			eSg	03:44.50			0.51
PSZ	58.2	129	ePg	9:03:37.90			-0.21
			eSg	03:45.50			-0.71
KOLL	75.3	299	ePg	9:03:41.10			-0.07
			eSg	03:50.90			-0.75
MODS	150.1	275	eSn	9:04:13.60			0.05
CRVS	175.7	66	eSn	9:04:19.60			0.35
STHS	193.3	48	ePn	9:04:02.80			3.94
			eSn	04:23.20			0.06

86.

2007-11-24 time: 12:09:39.28 UTC ML= 1.9
 lat: 48.325N lon: 19.786E h= 0.0 km
 erh= 7.5km erz=12.9km
 nr= 10 gap=116 rms=0.59
 Locality: Slovakia
 Comments: probably explosion

sta	dist	azm	phase	hr	mn	sec	res
PSZ	45.9	170	ePgC	12:09:47.30			-0.18
			eSg	09:54.00			0.12
VYHS	72.8	285	ePg	12:09:52.20			-0.08
			eSg	10:01.70			-0.72
KOLL	106.2	285	ePg	12:09:59.00			0.76
			eSg	10:13.20			0.17
CRVS	139.2	63	ePn	12:10:02.80			-0.88
			eSn	10:19.60			-3.11
STHS	161.8	41	ePn	12:10:06.90			0.41
			eSn	10:28.90			1.18

87.

2007-11-29 time: 12:15:18.42 UTC ML=
 lat: 47.867N lon: 19.400E h= 10.0 km
 erh=10.1km erz=22.1km
 nr= 6 gap=145 rms=0.74
 Locality: Bercei
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PENC	12.3	226	ePgD	12:15:21.00			-0.25
			eSg	15:23.90			0.44
PSZ	37.4	81	ePgD	12:15:25.10			-0.23
			eSg	15:30.70			-0.02
VYHS	81.4	329	ePg	12:15:34.20			1.14
			eSg	15:42.00			-2.48

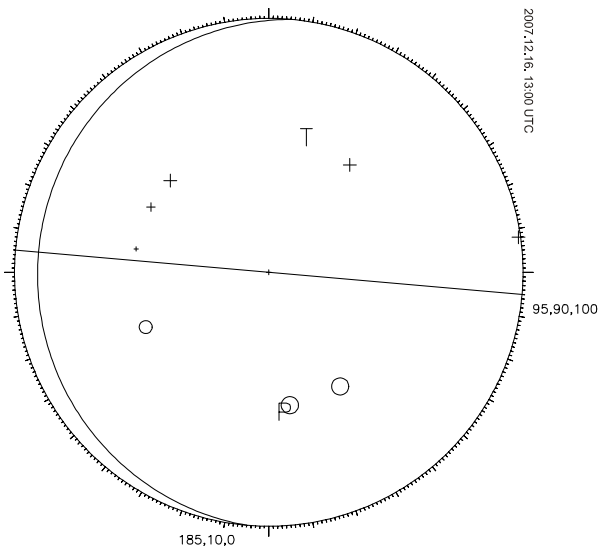
88.

2007-12-16 time: 13:00:54.86 UTC ML=
 lat: 47.030N lon: 21.296E h= 1.5 km
 erh= 5.7km erz= 5.5km
 nr= 16 gap= 84 rms=1.38
 Locality: Csökmő
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PKSN	109.7	262	ePgC	13:01:14.40			-0.06
			eSg	01:23.90			-5.85
DRGR	111.0	104	iPg	13:01:14.40			-0.29
PSZ	144.6	313	ePnC	13:01:19.80			0.07
			eSn	01:34.40			-4.73
TRPA	154.0	37	ePnC	13:01:21.80			0.90
			eSn	01:41.30			0.09
BZS	159.1	171	iPnD	13:01:20.90			-0.64
PENC	173.9	299	ePnC	13:01:21.70			-1.69
			eSn	01:45.50			-0.14
BUD	179.2	286	eSn	13:01:50.10			3.28
GZR	214.9	148	iPnD	13:01:28.60			0.10
PKSM	222.8	246	iPnD	13:01:29.70			0.22
			eSn	01:59.60			3.12
PKSG	223.7	280	ePnC	13:01:34.70			5.10
			eSn	01:59.00			2.30

Hypocenter Parameters

Földrengés paraméterek



PKSM 131.6 167 eSn 22:47:04.20 -0.02

91.

2007-12-26 time: 6:10:33.03 UTC ML=
 lat: 45.729N lon: 17.407E h= 16.6 km
 erh= 4.4km erz= 5.0km
 nr= 19 gap=187 rms=0.50
 Locality: Croatia
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
RHK3	68.0	75	ePg	6:10:45.80			0.27
			eSg		10:56.10		0.82
BEHE	95.8	329	eP*	6:10:50.10			0.31
			eS*		11:02.60		-0.27
PKSM	109.7	61	ePn	6:10:51.70			0.08
			eSn		11:05.90		-0.22
KOGS	120.0	312	iPn	6:10:52.70			-0.20
			iSn		11:06.90		-1.51
GCIS	139.2	276	iPn	6:10:55.10			-0.20
			iSn		11:12.30		-0.38
GOLS	141.9	283	iPn	6:10:55.60			-0.04
			iSn		11:14.90		1.62
CRES	152.1	274	iPn	6:10:56.80			-0.10
			eSn		11:16.30		0.77
CESS	153.4	280	iPn	6:10:57.10			0.03
			eSn		11:17.30		1.47
DOBS	157.4	287	ePn	6:10:57.10			-0.47
LEGS	164.2	279	ePn	6:10:58.20			-0.21
			eSn		11:20.20		1.99
GROS	168.3	299	iPn	6:10:58.50			-0.43
BOJS	170.0	262	iPn	6:10:59.40			0.27
			iSn		11:21.20		1.70
PDKS	191.0	282	iPn	6:11:05.70			3.94
VISS	199.9	272	iPn	6:11:03.00			0.13
PERS	203.6	300	iPn	6:11:03.00			-0.32
ARSA	222.6	319	Pn	6:11:06.20			0.51
			Sn		11:36.10		4.93
SOP	226.8	343	ePn	6:11:09.40			3.18
			eSn		11:35.80		3.70
BUD	231.1	32	ePn	6:11:03.50			-3.25
			eSn		11:41.50		8.44
OBKA	237.4	291	Pn	6:11:07.90			0.36
			Sn		11:40.40		5.94
MOA	336.3	315	Pn	6:11:19.90			0.02
			Sn		11:55.30		-1.12
KHC	476.0	323	ePn	6:11:38.80			1.51
			eSn		12:25.20		-2.21

89.

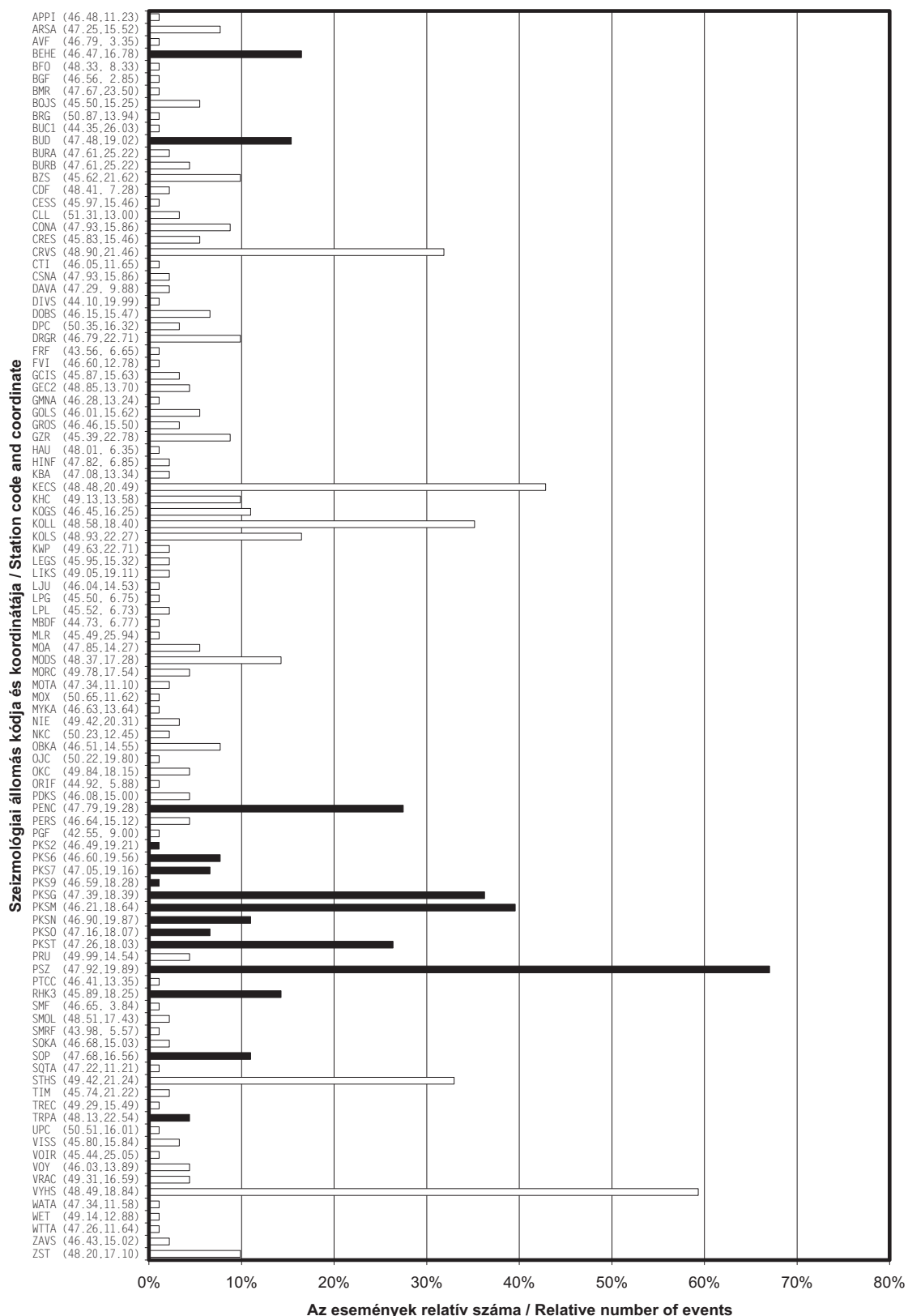
2007-12-18 time: 3:27:34.50 UTC ML=
 lat: 48.772N lon: 19.671E h= 10.0 km
 erh= ---km erz= ---km
 nr= 3 gap=332 rms=0.00
 Locality: Slovakia
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PSZ	96.4	170	ePgD	3:27:51.80			0.00
PENC	112.9	195	eSn	3:28:09.80			0.00
BUD	151.1	199	ePnC	3:27:59.10			0.00

90.

2007-12-21 time: 22:46:24.70 UTC ML=
 lat: 47.366N lon: 18.263E h= 9.7 km
 erh= 0.8km erz= 0.4km
 nr= 5 gap=198 rms=0.04
 Locality: Csókakő
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
PKSG	10.1	74	ePgD	22:46:27.20			0.00
			eSg		46:29.10		-0.05
PKST	21.0	235	ePgD	22:46:28.90			0.07
			eSg		46:32.00		-0.05



3.4. ábra Az egyes állomások részvétele a hipocentrum meghatározásban
 Figure 3.4. Contribution of individual stations to the hypocenter determination

4.

JELENTŐS FÖLDRENGÉSEK 2007-BEN (Magyarországon érezhető földrengések)

- 2007. március 3. - Bő
- 2007. szeptember 15. - Homokszentgyörgy
- 2007. november 18. - Hollókő

A MAKROSZEIZMIKUS INTENZITÁS MEGHATÁROZÁSA

A földrengés érezhető és épített környezetben okozott hatásainak összegyűjtése 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 2007 (Earthquakes that were felt in Hungary)

3 March 2007	-	Bő
15 September 2007	-	Homokszentgyörgy
18 November 2007	-	Hollókő

METHOD USED FOR ESTIMATION OF INTENSITY

The earthquake effects (macroseismic observations) were gathered 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)

2007. március 3. - Bő / 3 March 2007 - Bő**FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2007/03/03
Kipattanási idő / Origin Time:	20:35:33.9 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.402 N 16.931 E (S.D. 1.6 km)
Mélység / Depth:	6.4 km (S.D. 1.8 km)
Magnitúdó / Magnitude:	3.0 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

LEÍRÁS

Az év legerősebb magyarországi rengése március 3-án pattant ki a Vas – Veszprém – Győr-Moson-Sopron megyék hármass határa közelében. A 3.0 M_L magnitúdójú rengés érezhető volt mintegy 1000 km² területen. A legnagyobb megrázottságot (5 EMS) Bő és Chernelházadamonya településekről jelentették, ahol a rengés jelentéktelen épület károkat (hajszálrepedések a falakban) is okozott.

Az esemény szeizmogramja a 4.1. ábrán látható.

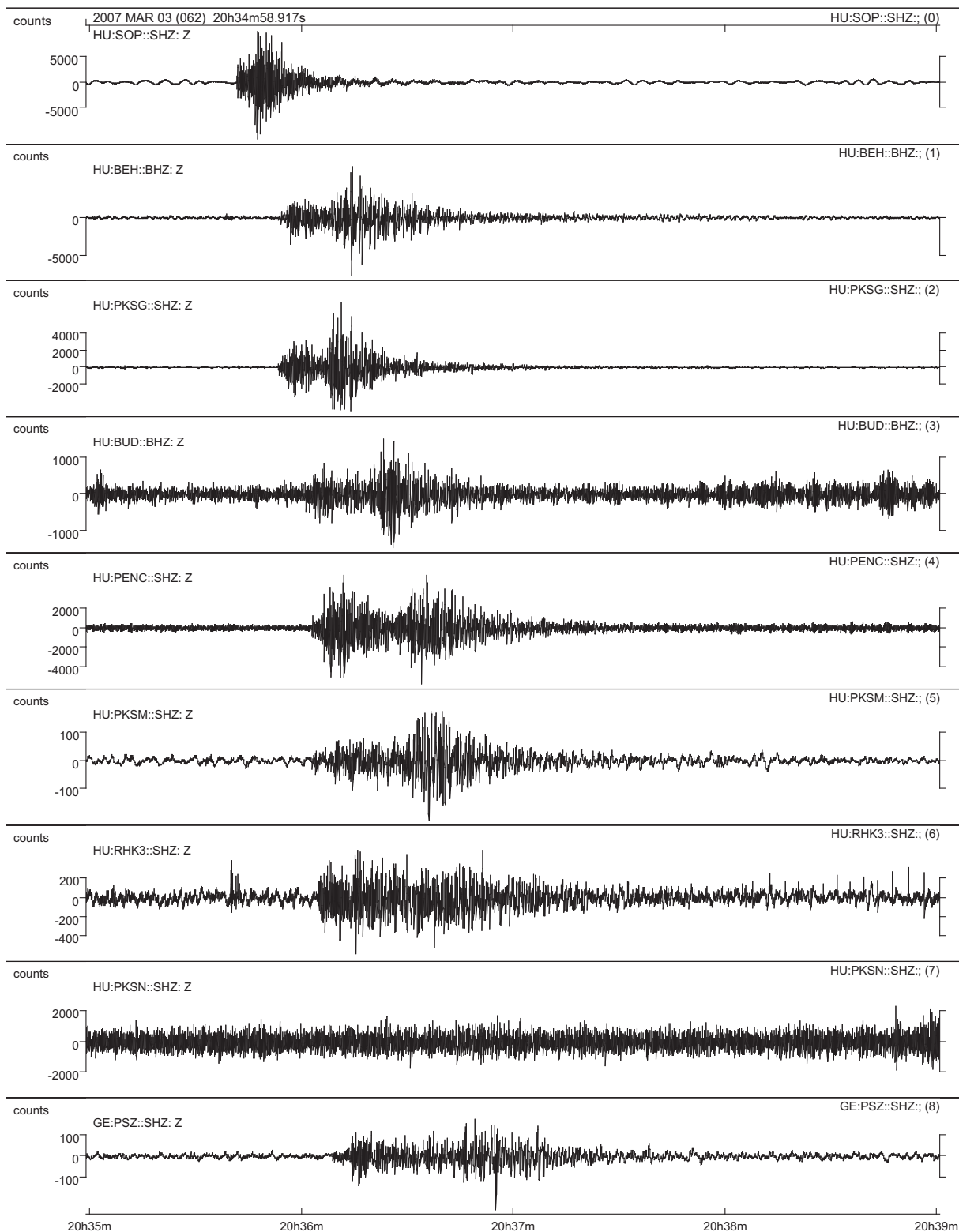
A rengés intenzitás eloszlását a 4.1. táblázat tartalmazza és a 4.2. ábra mutatja.

DISCUSSION

The highest magnitude (3.0 M_L) earthquake of the year was reported from the border region of Vas – Veszprém – Győr-Moson-Sopron counties on March 3rd. The earthquake was felt in an area of about 1000 km² in W Hungary. The highest intensity values (5 EMS) were reported from Bő and Chernelházadamonya. Minor damage (small cracks in walls) was reported from the epicenter area.

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 2007. március 3-i, bő-i földrengés (20:35 UTC) szeizmogramjai

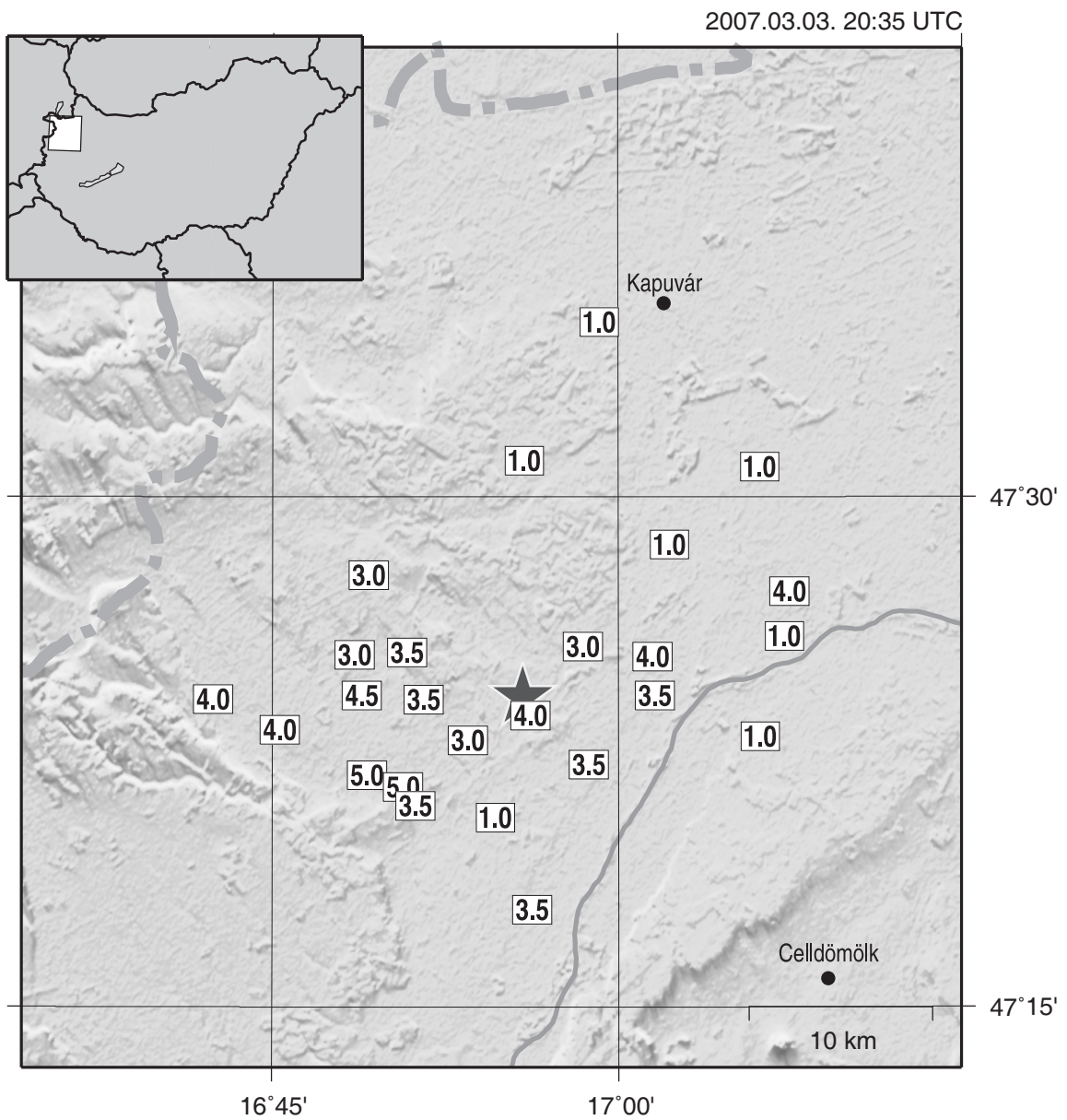
Figure 4.1. Seismograms of the Bő earthquake 3rd March 2007 (20:35 UTC)

4.1. Táblázat

A 2007. március 3-i, bői földrengés (20:35 UTC) intenzitás eloszlása

Table 4.1.Intensity distribution of the Bő earthquake 3rd March 2007 (20:35 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	Bő	47.364	16.818	5.0	50%	1
2	Bük	47.386	16.755	4.0	48%	1
3	Chernelházadamonya	47.358	16.844	5.0	50%	1
4	Cirák	47.477	17.036	1.0	0%	2
5	Csapod	47.518	16.931	1.0	0%	1
6	Csepreg	47.401	16.707	4.0	29%	1
7	Iklandberény	47.423	16.809	3.0	26%	1
8	Kenyeri	47.383	17.101	1.0	0%	1
9	Lócs	47.403	16.814	4.5	33%	1
10	Mihályi	47.515	17.101	1.0	0%	1
11	Nagygeresd	47.393	16.936	4.0	49%	1
12	Nick	47.403	17.026	3.5	35%	1
13	Rábakecöl	47.432	17.119	1.0	0%	1
14	Rábapaty	47.298	16.937	3.5	41%	1
15	Répcelak	47.422	17.024	4.0	38%	4
16	Répceszemere	47.427	16.974	3.0	39%	1
17	Répceszentgyörgy	47.349	16.853	3.5	38%	1
18	Sajtoskál	47.401	16.859	3.5	34%	2
19	Simaság	47.424	16.847	3.5	35%	1
20	Tompaládony	47.381	16.891	3.0	39%	1
21	Uraiújfalu	47.369	16.978	3.5	34%	1
22	Újkér	47.462	16.819	3.0	38%	1
23	Vásárosfalu	47.454	17.123	4.0	34%	1
24	Vitnyéd	47.586	16.985	1.0	0%	1
25	Zsédény	47.343	16.910	1.0	0%	1



4.2. ábra A 2007. március 3-i, bő-i földrengés (20:35 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.2. Intensity distribution of the Bő earthquake 3rd March 2007 (20:35 UTC) (star - instrumental epicentre)

**2007. szeptember 15. - Homokszentgyörgy /
15 September 2007 - Homokszentgyörgy****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2007/09/15
Kipattanási idő / Origin Time:	04:39:33.9 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.000 N 17.575 E (S.D. 5.4 km)
Mélység / Depth:	10 km (S.D. 4.4 km)
Magnitúdó / Magnitude:	2.7 ML
Maximális intenzitás / Maximum Intensity:	4-5 EMS

LEÍRÁS

Szeptember 15-én hajnalban 2.7 M_L magnitúdójú földrengés keltett riadalmat Somogy-megyében, a Dráva közelében. A rengés intenzitása 4-5 EMS fokra becsülhető (Homokszentgyörgy). A rengés csak viszonylag kis területen (100-200 km²) volt érezhető.

Az esemény szeizmogramja a 4.3. ábrán látható.

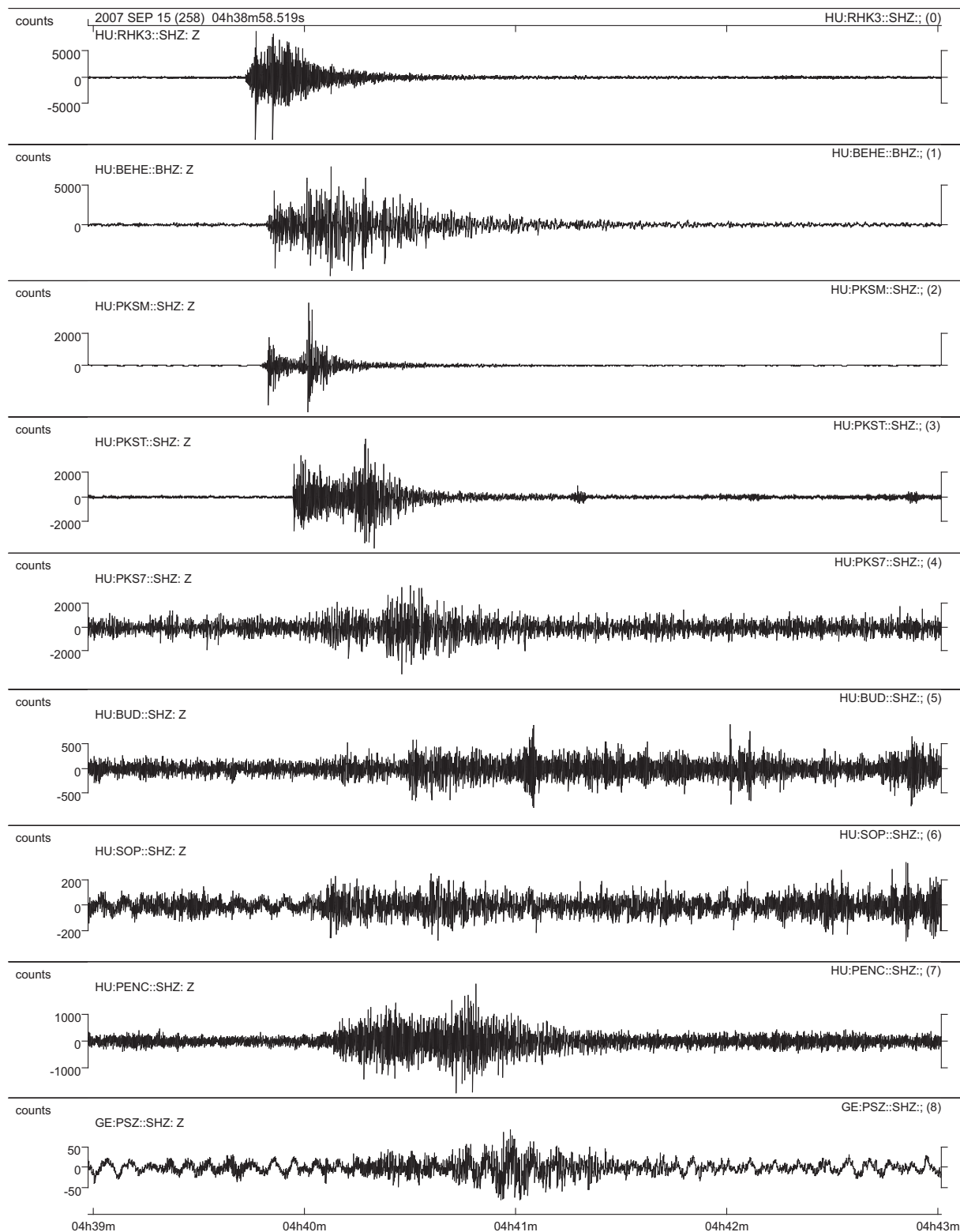
A rengés intenzitás eloszlását a 4.2. táblázat tartalmazza és a 4.4. ábra mutatja.

DISCUSSION

On September 15th early morning, a 2.7 M_L magnitude earthquake alarmed people in Somogy County near the Drava River. The shock was felt in a relatively small area of 100-200 km² and produced reports of 4-5 EMS from Homokszentgyörgy.

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 2007. szeptember 15-i, homokszentgyörgyi földrengés (04:39 UTC) szeizmogramjai

Figure 4.3. Seismograms of the Homokszentgyörgy earthquake 15th September 2007 (04:39 UTC)

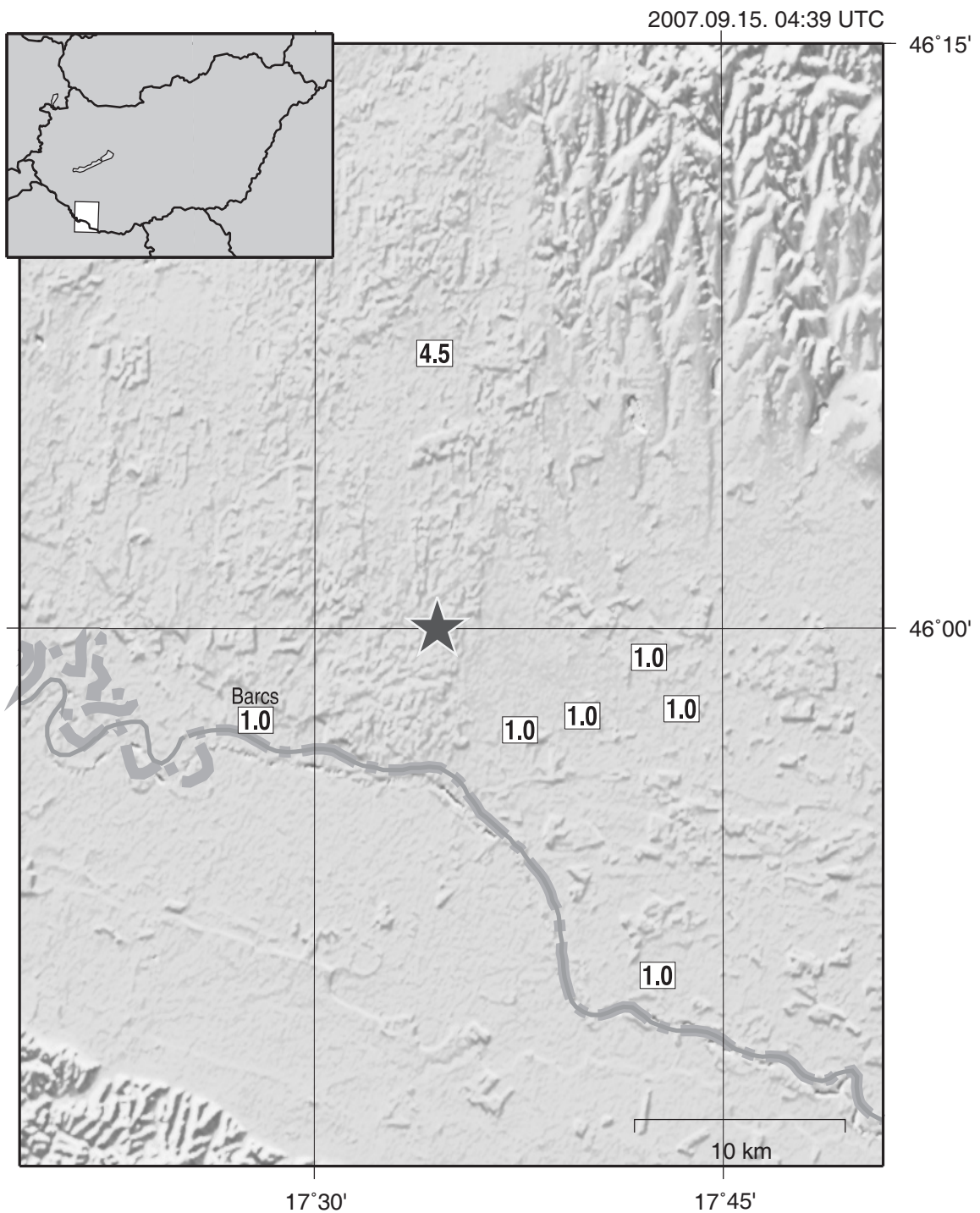
4.2. Táblázat

A 2007. szeptember 15-i, homokszentgyörgyi földrengés (04:39 UTC) intenzitás eloszlása

Table 4.2.

Intensity distribution of the Homokszentgyörgy earthquake 15th September 2007 (04:39 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	Barcs	45.961	17.463	1.0	0%	2
2	Felsőszentmárton	45.852	17.709	1.0	0%	1
3	Gyöngyösmellék	45.988	17.704	1.0	0%	1
4	Homokszentgyörgy	46.118	17.573	4.5	37%	1
5	Kastélyosdombó	45.957	17.625	1.0	0%	1
6	Kétújfalu	45.966	17.724	1.0	0%	1
7	Zádor	45.963	17.663	1.0	0%	1



4.4. ábra A 2007. szeptember 15-i, homokszentgyörgyi földrengés (04:39 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.4. Intensity distribution of the Homokszentgyörgy earthquake 15th September 2007 (04:39 UTC) (star - instrumental epicentre)

2007. november 18. - Hollókő / 18 November 2007 - Hollókő**FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2007/11/18
Kipattanási idő / Origin Time:	14:22:38.3 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.033 N 19.552 E (S.D. 1.7 km)
Mélység / Depth:	3.4 km (S.D. 1.7 km)
Magnitúdó / Magnitude:	3.0 M _L
Maximális intenzitás / Maximum Intensity:	4 EMS

LEÍRÁS

Viszonylag kis területen (200-250 km²) volt érezhető november 18-án Nógrád megyében Hollókő környékén egy 3.0 M_L magnitúdójú földrengés, melynek legnagyobb becsült intenzitása 4 EMS volt.

Az esemény szeizmogramja a 4.5. ábrán látható.

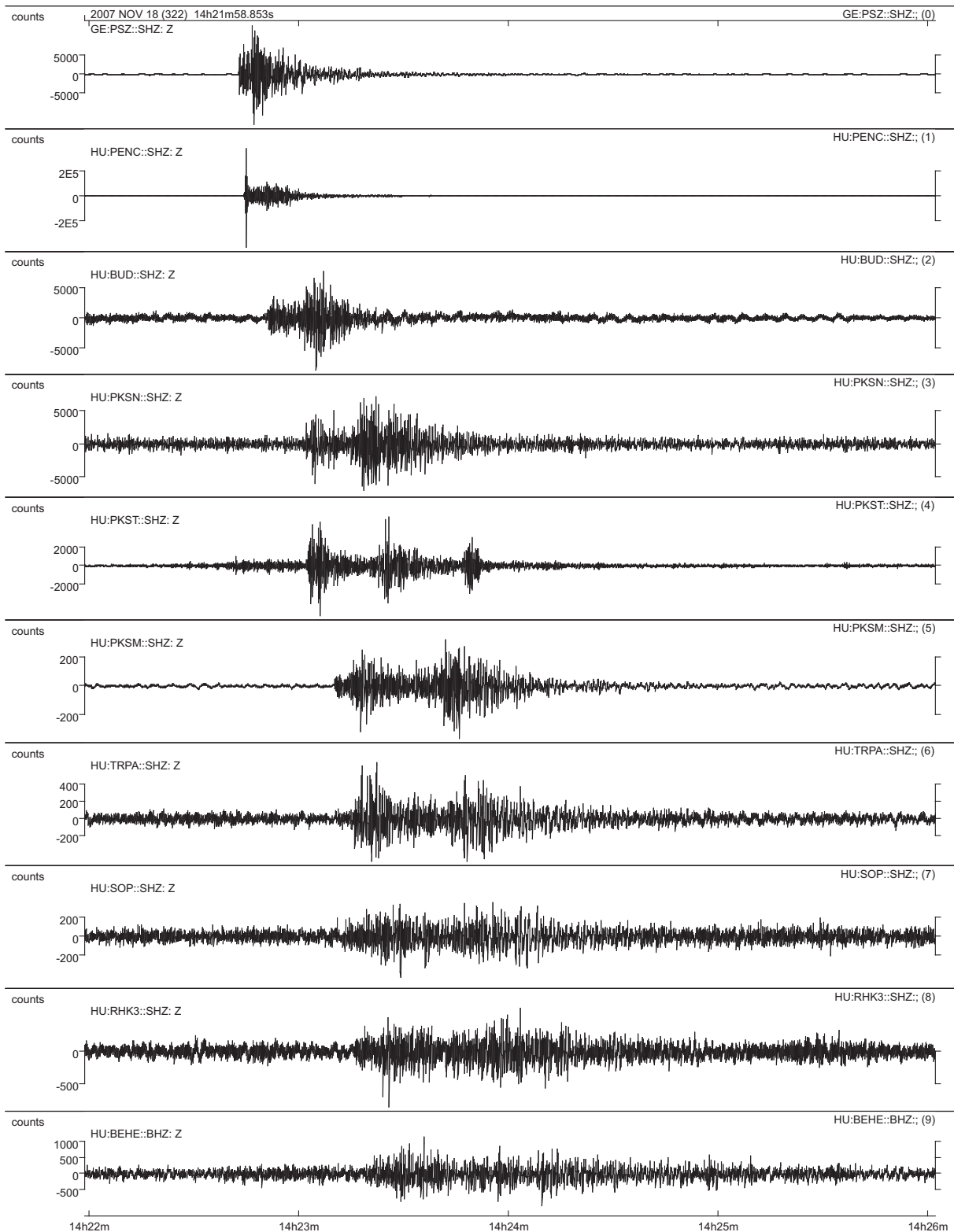
A rengés intenzitás eloszlását a 4.3. táblázat tartalmazza és a 4.6. ábra mutatja.

DISCUSSION

A 3.0 M_L magnitude event was felt and reported from Nógrád county (Hollókő, 4 EMS). The earthquake was felt in a relatively small area of 200-250 km².

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 2007. november 18-i, hollókői földrengés (14:22 UTC) szeizmogramjai

Figure 4.5. Seismograms of the Hollókő earthquake 18th November 2007 (14:22 UTC)

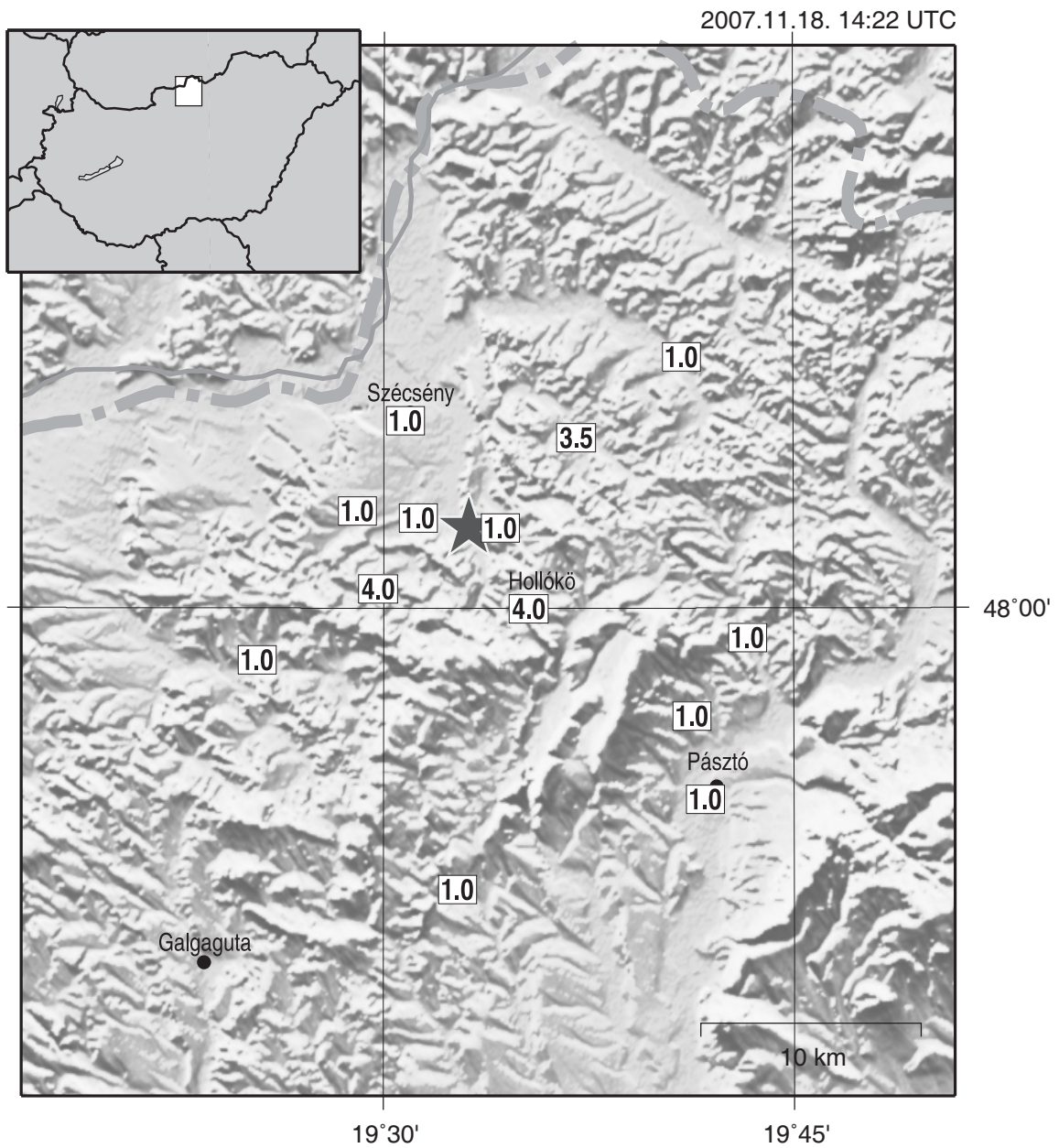
4.3. Táblázat

A 2007. november 18-i, hollókői földrengés (14:22 UTC) intenzitás eloszlása

Table 4.3.

Intensity distribution of the Hollókő earthquake 18th November 2007 (14:22 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	Buják	47.885	19.544	1.0	0%	1
2	Cserhátsurány	47.979	19.422	1.0	0%	2
3	Hollókő	48.000	19.588	4.0	42%	1
4	Mátraszőlős	47.956	19.687	1.0	0%	1
5	Nagylóc	48.033	19.570	1.0	0%	1
6	Nógrádmegyer	48.070	19.617	3.5	41%	1
7	Nógrádsípek	48.008	19.496	4.0	49%	1
8	Pásztó	47.922	19.695	1.0	0%	1
9	Rimóc	48.037	19.520	1.0	0%	1
10	Ságújfalu	48.103	19.681	1.0	0%	1
11	Sámsonháza	47.988	19.721	1.0	0%	1
12	Szécsény	48.077	19.512	1.0	0%	1
13	Varsány	48.040	19.483	1.0	0%	1



4.6. ábra A 2007. november 18-i, hollókői földrengés (14:22 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.6. Intensity distribution of the Hollókő earthquake 18th November 2007 (14:22 UTC) (star - instrumental epicentre)

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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 károk 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

2007

Forrás:

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

APPENDIX B

SIGNIFICANT EARTHQUAKES OF THE WORLD

2007

Source:

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

Halálos áldozatot követelő földrengések a világon 2007-ben

Deaths from Earthquakes in 2007

Dátum Date	Ország, terület Region	Magnitúdó Magnitude	Áldozatok száma Number killed
2007 01 21	Molucca Sea	7.5	4
2007 03 06	Southern Sumatra, Indonesia	6.4	67
2007 03 25	Honshu, Japan	6.7	1
2007 04 01	Solomon Islands	8.1	54
2007 04 21	Aisen, Chile	6.2	10
2007 06 02	Yunnan, China	6.1	3
2007 07 16	Honshu, Japan	6.6	9
2007 07 21	Tajikistan	5.2	12
2007 08 02	Tatar Strait, Russia	6.2	2
2007 08 15	Central Peru	8.0	514
2007 09 12	Southern Sumatra, Indonesia	8.4	25
2007 10 26	Northwestern Kashmir	5.3	1
2007 11 06	Gujarat, India	5.0	1
2007 11 07	Bohol, Philippines	5.1	1
2007 11 14	Antofagasta, Chile	7.7	2
2007 11 25	Sumbawa region, Indonesia	6.5	3
2007 11 29	Windward Islands	7.4	1
2007 12 09	Minas Gerais, Brazil	4.9	1
2007 12 20	North Island, New Zealand	6.6	1
	Összesen / Total		712

A 7.0 vagy annál nagyobb magnitúdójú földrengések a világon 2007-ben

Earthquakes of magnitude 7.0 and greater in 2007

	Év Year	Hónap Month	Nap Day	Idő Time (UTC)	Szélesség Latitude	Hosszúság Longitude	Mélység Depth (km)	Magnitúdó Magnitude	Ország, terület Region
1.	2007	01	13	04:23:21.1	46.243	154.524	10	8.1	East of the Kuril Islands
2.	2007	01	21	11:27:45.0	1.065	126.282	22	7.5	Molucca Sea
3.	2007	03	25	00:40:01.6	-20.617	169.357	34	7.1	Vanuatu
4.	2007	04	01	20:39:58.7	-8.466	157.043	24	8.1	Solomon Islands
5.	2007	08	01	17:08:51.4	-15.595	167.680	120	7.2	Vanuatu
6.	2007	08	08	17:05:04.9	-5.859	107.419	280	7.5	Java, Indonesia
7.	2007	08	15	23:40:57.8	-13.386	-76.603	39	8.0	Near the Coast of Central Peru
8.	2007	09	02	01:05:18.1	-11.610	165.762	35	7.2	Santa Cruz Islands
9.	2007	09	12	11:10:26.8	-4.438	101.367	34	8.4	Southern Sumatra, Indonesia
10.	2007	09	12	23:49:03.7	-2.625	100.841	35	7.9	Indonesia
11.	2007	09	13	03:35:28.7	-2.130	99.627	22	7.0	Indonesia
12.	2007	09	28	13:38:59.5	22.004	142.651	276	7.4	Volcano Islands, Japan Region
13.	2007	09	30	05:23:34.0	-49.271	164.115	10	7.4	Auckland Islands
14.	2007	10	31	03:30:17.6	18.896	145.363	223	7.2	Northern Mariana Islands
15.	2007	11	14	15:40:50.5	-22.247	-69.890	40	7.7	Antofagasta, Chile
16.	2007	11	29	19:00:19.6	14.973	-61.263	148	7.4	Windward Islands
17.	2007	12	09	07:28:20.8	-25.996	-177.514	153	7.8	South of the Fiji Islands
18.	2007	12	19	09:30:27.2	51.363	-179.522	29	7.1	Aleutian Islands, Alaska

**A 6.5 vagy annál nagyobb magnitúdójú,
és a jelentősebb károkat okozó földrengések a világon 2007-ben**

**Earthquakes of magnitude 6.5 or greater
or ones that caused fatalities, injuries or substantial damage in 2007**

DÁTUM	IDŐ Ó M S	KOORDINÁTA SZÉL HOSSZ	MÉLYSÉG MAG KM	ÁLLOMÁS 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 13	04 23 21.1	46.243 N 154.524 E	10 G 8.1	1.1 606	EAST OF THE KURIL ISLANDS. MW 8.1 (GCMT), 7.9 (GS), 8.0 (OBN). mb 7.3 (GS). MS 8.2 (GS). ME 8.2 (GS). Mo 7.8*10**20 Nm (GS), 1.8*10**21 Nm (GCMT), 2.8*10**21 Nm (PPT), 1.2*10**21 Nm (OBN). Es 4.2*10**16 Nm (GS). Felt (VI) on Paramushir; (V) on Iturup and Kunashir; (III) on Shikotan. Felt (IV) at Petropavlovsk-Kamchatskiy. Felt (IV) at Misawa and (II) at Tokyo, Japan. Also felt in parts of Hokkaido and northern Honshu. Recorded (3 JMA) in eastern Hokkaido and in the Shizunai area; (2 JMA) throughout southern Hokkaido and in the Sarufutsu area, Hokkaido. Also recorded (3 JMA) in Aomori, Iwate and Miyagi; (2 JMA) in Akita, Fukushima and Yamagata; (1 JMA) in Hyogo, Ibaraki, Kanagawa, Nagano, Saitama, Tochigi and Tokyo Prefectures, Honshu. Tsunami wave heights in centimeters (peak-to-trough) were recorded at the following tide stations: 10 at Hana-saki, Japan; 4 at Adak and 32 on Shemya Island, Alaska; 33 at Arena Cove, 37 at Crescent City and 20 at Port San Luis, California; 12 at Hilo, 14 at Kahului and 9 at Nawiliwili, Hawaii; 27 at Port Orford, Oregon; 18 on Midway Island; 9 on Wake Island.
JAN 21	07 38 57.0&	39.592 N 42.863 E	3 5.2	262	EASTERN TURKEY. <ISK>. MW 5.2 (GCMT). mb 5.1 (GS). ML 5.0 (ISK). Mo 6.7*10**16 Nm (GCMT). Two people slightly injured. Some old houses slightly damaged in at least seven villages in Agri. Felt in the Agri area.
JAN 21	11 27 45.0	1.065 N 126.282 E	22 G 7.5	1.2 570	MOLUCCA SEA. MW 7.5 (GCMT), 7.3 (GS), 7.4 (OBN). mb 6.7 (GS). MS 7.3 (GS). ME 7.5 (GS). Mo 2.0*10**20 Nm (GCMT), 1.1*10**20 Nm (GS), 3.7*10**20 Nm (PPT), 1.5*10**20 Nm (OBN). Es 4.1*10**15 Nm (GS). One person died of a heart attack, 3 others killed, 4 others injured and minor damage to some buildings at Manado, Sulawesi, Indonesia. Felt (VI) on Ternate and (IV) in southern Halmahera. Also felt (VI) at Bitung and Tondano, (V) at Kotamobagu and (IV) at Gorontalo, Sulawesi.
JAN 30	04 54 50.5	54.740 S 146.298 E	11 G 6.9	1.4 388	WEST OF MACQUARIE ISLAND. MW 6.9 (GCMT), 6.8 (GS). mb 6.2 (GS). MS 6.9 (GS). ME 7.5 (GS). Mo 2.4*10**19 Nm (GCMT), 2.0*10**19 Nm (GS), 2.5*10**19 Nm (PPT). Es 4.4*10**15 Nm (GS).
JAN 30	21 37 44.3	20.980 N 144.705 E	20 G 6.6	0.9 418	MAUG ISLANDS REG., NORTHERN MARIANA ISL. MW 6.6 (GCMT), 6.5 (GS). mb 6.3 (GS). MS 6.5 (GS). ME 6.9 (GS). Mo 9.2*10**18 Nm (GCMT), 7.6*10**18 Nm (GS), 1.3*10**19 Nm (PPT). Es 4.3*10**14 Nm (GS).
JAN 31	03 15 52.2	29.776 S 178.002 W	34 G 6.5	0.9 493	KERMADEC ISLANDS, NEW ZEALAND. MW 6.5 (GCMT), 6.4 (GS). mb 6.1 (GS). MS 6.3 (GS). ME 6.2 (GS). Mo 7.1*10**18 Nm (GCMT), 4.4*10**18 Nm (GS), 9.2*10**18 Nm (PPT). Es 4.0*10**13 Nm (GS).
FEB 20	08 04 25.2	1.034 S 126.976 E	12 G 6.7	1.1 253	KEPULAUAN SULA, INDONESIA. MW 6.7 (GCMT), 6.5 (GS). mb 6.2 (GS). MS 6.6 (GS). ME 6.6 (GS). Mo 7.9*10**18 Nm (GS), 1.5*10**19 Nm (GCMT), 1.6*10**19 Nm (PPT). Es 1.8*10**14 Nm (GS). Felt (IV) at Labuha and Sanana; (III) on Ternate; (II) on Ambon and at Bitung.
MAR 06	03 49 38.9	0.493 S 100.498 E	19 G 6.4	1.2 306	SOUTHERN SUMATRA, INDONESIA. MW 6.4 (GCMT), 6.3 (GS). mb 5.9 (GS). MS 6.4 (GS). ME 7.0 (GS). Mo 5.4*10**18 Nm (GCMT), 3.7*10**18 Nm (GS). Es 7.5*10**14 Nm (GS). At least 67 people killed, 826 injured and 43,719 houses damaged or destroyed (VIII) in the Bukittinggi-Payakumbuh-Solok area. Felt (V) at Padang, (IV) at Pekanbaru and (III) at Duri, Jambi and in Kepulauan Riau. Felt at Dumai and Padangsidempuan. Also felt (IV) at Johor Bahru; (III) at Kuala Lumpur, Petaling Jaya, Sekudai, Shah Alam and Subang Jaya; (II) at Klang, Malaysia. Felt at Bandar, Baru, Batu Pahat, Bukit Baru, Jenjarum, Kajang, Kampung Sungai Tinggi, Melaka, Parit Raja, Pasir Gudang, Pontian Keci1, Salak and Seremban, Malaysia. Felt (III) in Singapore.
MAR 06	05 49 25.4	0.488 S 100.530 E	11 G 6.3	1.0 392	SOUTHERN SUMATRA, INDONESIA. MW 6.3 (GCMT), 6.1 (GS). mb 5.9

A világ jelentős földrengései

Significant Earthquakes of the World

											(GS). MS 6.3 (GS). ME 6.6 (GS). Mo 3.4×10^{18} Nm (GCMT). 1.8×10^{18} Nm (GS). Es 2.0×10^{14} Nm (GS). Casualties and damage are included with the event at 03:49 UTC. Felt (VI) at Padang, (IV) at Duri, (III) at Pekanbaru and (II) at Medan. Felt at Padangpanjang and Selatpanjang. Also felt (III) at Kuala Lumpur, Petaling Jaya, Shah Alam and Subang Jaya, Malaysia. Felt at Air Keruh, Banting, Batu Pahat, Johor Bahru, Klang, Muar, Port Dickson, Sekudai and Sungai Besar, Malaysia. Felt (III) in Singapore.
MAR 06	13 05 12.1	2.082 N	76.495 W	43	5.2	1.0	132	COLOMBIA.	MW 5.2 (GCMT). mb 5.0 (GS). MS 5.0 (GS). Mo 7.5×10^{16} Nm (GCMT). At least 7 people injured in Cauca and 2 in Sotara. One building destroyed and 7 damaged in Purace; one building destroyed and 17 damaged in Sierra Cauca; six buildings destroyed and 38 damaged in Sotara; one building damaged in Timbio. Felt at Cali and Popayan.		
MAR 06	22 32 06.8&	33.490 N	48.930 E	16	4.7		158	WESTERN IRAN.	<TEH>. mb 4.7 (GS). mbLg 4.8 (TEH). Thirty-five people injured and buildings damaged at Dorud.		
MAR 25	00 40 01.6	20.617 S	169.357 E	34 G	7.1	1.0	426	VANUATU.	MW 7.1 (GS), 7.1 (GCMT). mb 6.5 (GS). MS 7.0 (GS). ME 6.8 (GS). Mo 6.2×10^{19} Nm (GCMT), 5.5×10^{19} Nm (GS), 8.1×10^{19} Nm (PPT). Es 3.4×10^{14} Nm (GS). A tsunami was generated with maximum recorded wave heights (peak-to-trough) of 16 cm at Port-Vila, Vanuatu and 4 cm at Honiara, Solomon Islands. Felt (III) at Port-Vila. Felt (III) at Mont-Dore, New Caledonia. Also felt at Noumea and Yate, New Caledonia.		
MAR 25	00 41 57.8	37.336 N	136.588 E	8 G	6.7	0.8	493	NEAR THE WEST COAST OF HONSHU, JAPAN.	MW 6.7 (GCMT), 6.6 (GS), 6.7 (NIED), 6.7 (OBN). mb 6.1 (GS). MS 6.8 (GS). ME 6.5 (GS). Mo 9.1×10^{18} Nm (GS), 1.3×10^{19} Nm (GCMT), 6.8×10^{19} Nm (PPT), 1.4×10^{19} Nm (NIED), 1.2×10^{19} Nm (OBN). Es 1.1×10^{14} Nm (GS). At least one person killed and 359 injured and more than 13,556 houses destroyed. More than 60 landslides occurred on and near the Noto-hanto. Roads damaged and cracks occurred in the landing field of Noto airport. Train service and water supply were interrupted. A tsunami was generated with maximum observed wave heights (peak-to-trough) of 22 cm at Suzushi Nagahashi, 18 cm at Kanazawa and 6 cm Toyama. Felt (V) at Kanazawa; (III) at Nagoya and Osaka; (II) at Kobe, Kyoto, Tokyo and Yokohama. Recorded (6U JMA) in Ishikawa Prefecture, (3 JMA) in much of central Honshu and (2 JMA) throughout Honshu. Also recorded (1 JMA) in southwestern Hokkaido.		
MAR 25	01 08 19.0	20.754 S	169.354 E	35 G	6.9	1.0	281	VANUATU.	MW 6.9 (GCMT). mb 5.9 (GS). MS 7.1 (GS). Mo 2.7×10^{19} Nm (GCMT).		
APR 01	20 39 58.7	8.466 S	157.043 E	24 G	8.1	1.3	439	SOLOMON ISLANDS.	MW 8.1 (GCMT), 7.7 (OBN). mb 6.8 (GS). MS 7.9 (GS). ME 7.6 (GS). Mo 1.6×10^{21} Nm (GCMT), 9.1×10^{20} Nm (PPT), 4.5×10^{20} Nm (OBN). Es 5.1×10^{15} Nm (GS). Fifty-two people killed and several villages destroyed by the earthquake and tsunami. About 300 homes, schools and a hospital were destroyed at Sasamunga and about 500 houses were damaged at Gizo. Tsunami damage also occurred on Lefung and Taro. Two people were killed by landslides on Ranongga, where uplift was also observed. Felt (IV) at Honiara. A 3.5-meter tsunami was measured at Unumatana and a 2 meter tsunami was observed at Kelau, Woodlark Island, Papua New Guinea, where 17 houses were destroyed, a church was damaged and the tsunami ran inland up to 1 km. The tsunami also caused damage on Rossel Island and Bougainville. Tsunami wave heights in centimeters (peak-to-trough) were recorded at the following tide stations: 16 at Pago Pago, American Samoa; 22 at Cape Ferguson, Australia; 8 at Suva, Fiji; 16 at Kwajalein, Marshall Islands; 14 in Midway Islands; 102 at Charleston, 76 at Jackson Bay and 66 at New Plymouth, New Zealand; 18 at Manus Island, Papua New Guinea; 14 at Nuku'alofa, Tonga; 14 at Adak, Alaska, USA; 20 at San Diego and 22 at Santa Monica, California, USA; 20 at Kahului, Hawaii, USA; and 24 at Port-Vila, Vanuatu.		
APR 01	20 47 31.3	7.169 S	155.777 E	10 G	6.6	1.2	251	SOLOMON ISLANDS.	mb 6.6 (GS).		
APR 01	21 11 33.1	7.306 S	155.741 E	10 G	6.9	1.1	305	SOLOMON ISLANDS.	MW 6.9 (GCMT). mb 6.3 (GS). Mo 2.6×10^{19} Nm (GCMT).		
APR 04	11 02 29.6	20.688 S	169.056 E	10 G	6.5	1.5	170	VANUATU.	MW 6.5 (GCMT), 6.2 (GS). mb 5.8 (GS). MS 6.2 (GS). Mo 6.2×10^{18} Nm (GCMT), 2.9×10^{18} Nm (GS).		

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APR 15	03 19 30.3	34.807 N	136.239 E	16 D	5.1	0.7	351	WESTERN HONSHU, JAPAN. MW 5.1 (GCMT). 5.0 (NIED). mb 5.4 (GS). MS 4.6 (GS). Mo 6.6×10^{16} Nm (GCMT), 3.9×10^{16} Nm (NIED). At least 12 people injured and 63 buildings damaged in the Mie-Nara-Shiga area. Felt (IV) at Kyoto and (III) at Kobe, Nagoya and Osaka. Felt in much of west-central Honshu and in eastern Shikoku. Recorded (5U JMA) in Mie; (4 JMA) in Nara and Shiga; (3 JMA) in Aichi, Fukui, Gifu, Ishikawa, Kyoto, Nagano, Osaka and Wakayama; (2 JMA) in Hyogo, Shizuoka, Tottori, Toyama and Yamanashi; (1 JMA) in Kanagawa and Okayama Prefectures. Also recorded (1 JMA) in Kagawa, Kochi and Tokushima Prefectures, Shikoku.
APR 21	17 53 46.3	45.243 S	72.648 W	37	6.2	1.0	316	AISEN, CHILE. MW 6.2 (GS), 6.2 (GCMT). mb 6.1 (GS). MS 6.3 (GS). Mo 2.8×10^{18} Nm (GCMT), 2.5×10^{18} Nm (GS), 1.5×10^{18} Nm (PPT). At least 3 people killed and 7 missing due to a 7.6 meter tsunami caused by rockslides falling into a narrow fjord near Puerto Aisen. Felt (VII) at Puerto Aisen and Puerto Chacabuco, (VI) at Coihaique, (V) at Balmaceda and (IV) at Cochrane.
APR 28	07 18 11.3	51.085 N	1.009 E	10 G	4.6	1.1	295	ENGLAND, UNITED KINGDOM. mb 4.6 (GS). ML 5.0 (GRF), 4.9 (CSEM), 4.9 (LDG), 4.7 (STR), 4.3 (BGS). One person injured and some buildings damaged slightly in the Folkestone area. Felt (VI) at Folkestone; (V) at Dover; (IV) at Ashford, Canterbury and Hastings; (III) at Deal; (II) at London and Maidstone. Also felt at Boston, Broadstairs, Lincoln, Milton Keynes, Norwich, Ramsgate, Swindon, Tonbridge and Walsall. Felt at Outreau and Roubaix, France and at Wetteren, Belgium.
MAY 06	21 11 52.5	19.401 S	179.354 W	676 D	6.5	0.9	617	FIJI REGION. MW 6.5 (GCMT), 6.4 (GS). mb 6.0 (GS). Mo 6.1×10^{18} Nm (GCMT), 5.6×10^{18} Nm (GS). Felt at Neiafu, Tonga.
JUN 02	21 34 57.7	23.028 N	101.052 E	5 G	6.1	1.0	400	YUNNAN, CHINA. MW 6.1 (GS), 6.1 (GCMT). mb 5.7 (GS). MS 6.3 (GS). ME 5.8 (GS). Mo 1.6×10^{18} Nm (GCMT), 1.5×10^{18} Nm (GS). Es 1.2×10^{13} Nm (GS). Three people killed, at least 329 injured, rockslides blocked roads and an estimated 310 million U.S. dollars damage was caused in the Ning'er area. Felt (VII) at Simao. Also felt at Yunjinghong.
JUN 13	19 29 40.1	13.554 N	90.618 W	23 G	6.7	1.1	468	OFFSHORE GUATEMALA. MW 6.7 (GCMT), 6.5 (GS). mb 5.9 (GS). MS 6.5 (GS). ME 5.9 (GS). MD 6.5 (SNET). Mo 8.0×10^{18} Nm (GS), 1.2×10^{19} Nm (GCMT), 1.5×10^{19} Nm (PPT). Es 1.5×10^{13} Nm (GS). Some houses damaged in the Guatemala City area. Felt (VI) at Escuintla and San Jose; (V) at Mixco; (IV) at Antigua Guatemala, Palencia, Panajachel, Petapa, Quetzaltenango and Santa Catarina Pinula. Felt at Amatitlan, Chimaltenango, Chiquimulilla, Coban, El Palmar, Fraijanes, Iztapa, Jalapa, Jocotenango, La Esperanza, Mazatenango, Patzun, Retalhuleu, Salcaba, San Antonio Palopo, San Lucas Sacatepequez, Sanarate, Santiago Atitlan, Santiago Sacatepequez, Totonicapan, Villa Canales and Villa Nueva. Landslides occurred at Escuintla. Felt (V) at Antiguo Cuscatlan and Nueva San Salvador; (IV) at San Salvador, Soyapango and Zaragoza, El Salvador. Felt at Acajutla, Ahuachapan, Apopa, Ilopango, La Libertad, Mejicanos, Nuevo Cuscatlan, Olocuilta, Opico, Santa Rosa de Lima, Santo Tomas and Tonacatepeque, El Salvador. Also felt at Arriaga and Tapachula, Mexico; Managua and Masaya, Nicaragua; Tegucigalpa, Honduras.
JUN 24	00 25 18.4*	55.645 S	2.626 W	10 G	6.5	1.5	65	SOUTHERN MID-ATLANTIC RIDGE. MW 6.5 (GCMT), 6.3 (GS). mb 5.7 (GS). MS 6.1 (GS). Mo 6.3×10^{18} Nm (GCMT), 4.0×10^{18} Nm (GS).
JUN 28	02 52 09.6	7.969 S	154.630 E	10 G	6.7	1.1	420	BOUGAINVILLE REGION, PAPUA NEW GUINEA. MW 6.7 (GS), 6.7 (GCMT). mb 6.3 (GS). MS 6.7 (GS). ME 7.0 (GS). Mo 1.6×10^{19} Nm (GS), 1.2×10^{19} Nm (GCMT), 2.3×10^{19} Nm (PPT). Es 6.6×10^{14} Nm (GS).
JUL 16	01 13 22.3	37.535 N	138.446 E	12 G	6.6	1.0	782	NEAR THE WEST COAST OF HONSHU, JAPAN. MW 6.6 (GCMT), 6.5 (GS). mb 6.5 (GS). MS 6.4 (GS). ME 6.4 (GS). Mo 6.3×10^{18} Nm (GS), 1.0×10^{19} Nm (GCMT), 2.3×10^{19} Nm (PPT). Es 9.3×10^{13} Nm (GS). Nine people killed, at least 1,088 injured, 875 houses damaged, roads and bridges damaged and landslides occurred in Nagano, Niigata and Toyama Prefectures. A two-car train derailed on the JR Echigo Line at Kashiwazaki. A minor tsunami was observed on Sadoga-shima. Felt (VI) at Niigata; (IV) at Higashimatsuyama and Ueda; (III) at Daigo, Ichikawa, Tokyo, Yokohama and Yokosuka; (II) at Misawa, Nagoya and Tsukuba. Also felt at Atzuwakamatsu, Akita, Asaka, Atsugi, Chiba, Chino, Fukui, Funabashi, Furukawa, Fussa, Gifu, Hachioji, Hamamatsu, Hamura, Hitachinaka, Inagi, Iwaki, Iwatsuki, Joetsu, Kanazawa, Kariya, Kashiwa, Kawasaki, Kobe, Kodaira, Koriyama, Kyoto, Maebashi, Matsumoto, Muika, Murayama, Nagareyama, Narashino,

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Narita, Niitsu, Noshiro, Nyuzen, Osaka, Ryotsu, Ryugasaki, Sagami-hara, Sakura, Sendai, Shichigahama, Shimizu, Shimosuwa, Shizuoka, Tachikawa, Takayama, Tatebayashi, Toda, Tomisato, Tsurugi, Tsuruoka, Uji, Urawa, Urayasu, Zushi. Recorded (6U JMA) in Nagano and Niigata; (5L JMA) in Ishikawa; (4 JMA) in Fukushima, Gumma, Ibaraki, Saitama, Tochigi and Yamagata; (3 JMA) in Aichi, Chiba, Gifu, Kanagawa, Miyagi, Shizuoka, Tokyo, Toyama and Yamanashi; (2 JMA) in Akita, Fukui, Hyogo, Iwate, Kyoto, Mie, Nara, Osaka and Shiga; (1 JMA) in Aomori, Tottori and Wakayama Prefectures.

JUL 16	14 17 37.3	36.808 N	134.850 E	350 D	6.8	0.7	664	SEA OF JAPAN. MW 6.8 (GS), 6.8 (GCMT). mb 6.2 (GS). Mo 2.0×10^{19} Nm (GCMT), 1.8×10^{19} Nm (GS), 2.4×10^{19} Nm (PPT). Felt (III) at Misawa, Narita, Tokyo, Yokohama and Yokosuka. Felt at Ayase, Daigo, Hamura, Hanamaki, Haramachi, Hitachinaka, Iwaki, Kamagaya, Kashiwa, Kawaguchi, Kikugawa, Kodaira, Konosu, Makubetsu, Mitaka, Muroran, Nara, Niiza, Obihiro, Ofunato, Osaka, Ryugasaki, Sagami-hara, Sayama, Sendai, Tachikawa, Tanashi, Tono, Utsunomiya, Yono, Zama and Zushi. Recorded (4 JMA) in the Obihiro area, (3 JMA) in south-central and eastern Hokkaido, (2 JMA) in much of southern Hokkaido and (1 JMA) in northern Hokkaido. Also recorded (3 JMA) in eastern Honshu, (2 JMA) in much of central and northern Honshu and (1 JMA) in parts of southern Honshu. Also recorded (1 JMA) on Hachijo-jima.
JUL 21	22 44 13.5	38.936 N	70.485 E	10 G	5.2	1.0	364	TAJIKISTAN. MW 5.2 (GCMT). mb 5.6 (GS). MS 5.0 (GS). Mo 7.8×10^{16} Nm (GCMT). Three people killed in the Rasht region and nine killed in a related landslide in the Asht region. Felt at Dushanbe.
JUL 22	23 02 14.7	30.881 N	78.239 E	19	5.1	0.7	179	UTTARANCHAL, INDIA. mb 5.1 (GS). MS 4.3 (GS). Three people injured and buildings damaged at Uttarkashi. Buildings also damaged at Chamoli and Muzaffarnagar; in parts of the Dehra Dun District and in the Yamnatri Valley area. Rockfalls blocked National Highway 94 in the Dharasu-Phulchatti-Yamnatri area. Felt at Almora, Badaun, Bharmaur, Chakrata, Chamba, Chandigarh, Dehra Dun, Didihat, Gopeshwar, Gurgaon, Haridwar, Haryana, Karnaprayag, Kinnaur, Manali, Meerut, Mussoorie, Muzaffarnagar, New Tehri, Pauri, Roorkee, Shimla, Srinagar and in the Lahaul and Spiti District.
JUL 26	05 40 16.1	2.872 N	127.464 E	25 G	6.9	1.3	374	MOLUCCA SEA. MW 6.9 (GS), 6.9 (GCMT). mb 6.4 (GS). MS 6.8 (GS). ME 6.7 (GS). Mo 3.1×10^{19} Nm (GCMT), 2.7×10^{19} Nm (GS), 4.8×10^{19} Nm (PPT). Es 2.2×10^{14} Nm (GS). Several people injured and many houses damaged in North Maluku Province, Indonesia. Felt (V) on Ternate; (IV) at Manado and Tobelo; (III) at Labuha, Indonesia. Also felt at Davao, Philippines.
AUG 01	17 08 51.4	15.595 S	167.680 E	120 G	7.2	1.1	494	VANUATU. MW 7.2 (GS), 7.2 (GCMT). mb 6.2 (GS). ME 6.5 (GS). Mo 7.2×10^{19} Nm (GCMT), 7.0×10^{19} Nm (GS), 9.1×10^{19} Nm (PPT). Es 1.2×10^{14} Nm (GS). Some buildings, roads and a bridge damaged (VII) at Luganville. Power outages also occurred at Luganville. Felt at Port-Olry.
AUG 02	02 37 42.3	47.116 N	141.798 E	5 G	6.2	1.1	429	TATAR STRAIT, RUSSIA. MW 6.2 (GS), 6.2 (GCMT). mb 5.3 (GS). MS 6.2 (GS). Mo 2.2×10^{18} Nm (GS), 2.2×10^{18} Nm (GCMT), 6.1×10^{18} Nm (PPT). At least 2 people killed, 12 injured, 11 buildings destroyed and 20 buildings damaged at Nevel'sk. Felt (III) at Yuzhno-Sakhalinsk. Felt at Dolinsk. Tsunami with recorded wave heights (peak-to-trough) of 30 cm at Wakkanai and 20 cm at Rumoi, Hokkaido. Recorded (2 JMA) in northern Hokkaido.
AUG 02	03 21 42.8	51.307 N	179.971 W	21 G	6.7	1.0	725	ANDREANOF ISLANDS, ALEUTIAN IS., ALASKA. MW 6.7 (GCMT). 6.6 (GS). mb 6.3 (GS). MS 6.6 (GS). ME 6.5 (GS). Mo 8.9×10^{18} Nm (GS), 1.5×10^{19} Nm (GCMT). Es 1.4×10^{14} Nm (GS).
AUG 04	22 21 53.9	46.663 N	141.772 E	9 D	4.9	0.6	203	SAKHALIN, RUSSIA. mb 4.9 (GS). Two people injured at Nevel'sk. Felt at Yuzhno-Sakhalinsk.
AUG 08	17 05 04.9	5.859 S	107.419 E	280 G	7.5	1.1	228	JAVA, INDONESIA. MW 7.5 (GCMT). 7.4 (GS). mb 6.5 (GS). ME 7.3 (GS). Mo 2.5×10^{20} Nm (GCMT), 1.8×10^{20} Nm (GS), 1.7×10^{20} Nm (PPT). Es 1.8×10^{15} Nm (GS). Felt (V) at Serpong; (IV) at Bandung, Bekasi, Bogor, Cicurug, Depok, Jakarta and Sleman; (III) at Citeko, Kebuman, Malang, Pacitan and Tangerang; (II) at Tretes and Blitar. Felt at Baki, Banjar, Banjaran, Bantul, Ciawi, Cibadak, Cilacap, Cilegon, Cimanggis, Ciputat, Cirebon, Dayeuhkolot, Garut, Karangasem, Karawang, Kebumen, Kediri, Kuningan, Lembang, Madiun, Pelabuhanratu, Pondok Aren, Pondokgede, Purwokerto, Salatiga, Semarang, Sewon and Sukabumi.

												Felt (IV) at Kuta, (III) at Denpasar and (II) at Bali; felt at Klungkung, Bali. Felt (III) at Liwa and Padang; felt at Banda Aceh and Bandar Lampung, Sumatra. Also felt (III) at Kuala Lumpur; felt at Petaling Jaya and Sungai Ara, Malaysia.
AUG 15	23 40 57.8	13.386 S	76.603 W	39 G	8.0	0.9	625	NEAR THE COAST OF CENTRAL PERU. MW 8.0 (GCMT). mb 6.7 (GS). MS 7.9 (GS). ME 7.5 (GS). Mo 1.1×10^{21} Nm (GCMT), 1.4×10^{21} Nm (PPT). Es 4.2×10^{15} Nm (GS). At least 514 people killed, 1,090 injured and more than 39,700 buildings damaged or destroyed. The majority of the casualties and damage occurred in Chincha Alta, Ica and Pisco. Widespread communication and power outages occurred in the area. The Panamerican Highway, the Carretera Central and other main transport routes were heavily damaged due to landslides and cracks. Felt (VIII) at Chincha Alta; (VII) at Ica, Pisco and San Vicente de Canete; (VI) at Lima; (V) at Cusco; (IV) at Arequipa; (III) at Trujillo. Felt at Abancay, Ayacucho, Cajamarca, Chacabuco, Chillca, Chimbote, Chosica, Cocachacra, Huacho, Huanuco, Huaraz, Huarney, Imperial, La Oroya, Lambayeque, Mala, Nazca, Nuevo Imperial, Pachacamac, Quillabamba, Urubamba and Viru. Felt (III) at Bogota, Colombia and (II) at La Serena, Chile. Also felt at Coquimbo and Iquique, Chile; at Guayaquil and Quito, Ecuador; at La Paz, Bolivia and at Manaus, Brazil. Possible earthquake lights observed at Lima. A tsunami with wave heights, peak-to-trough in centimeters, was recorded at the following selected tide stations: 16 at Antofagasta, 36 at Arica, 23 at Caldera, 28 at Coquimbo, 16 at Iquique, 21 in Archipelago Juan Fernandez, 18 at San Antonio, 28 at San Felix, 35 at Talcahuano and 17 at Valparaiso, Chile; 27 at Galapagos Islands, Ecuador; 30 at Nuku Hiva Island, French Polynesia; 12 at Hanasaki and 13 at Tosa-Shimizu, Japan; 20 at Acapulco, Mexico; 30 at Chatham Island, 13 at Green Island, 25 at Kaikoura, 17 at Lyttelton, 22 at Sumner Head and 26 at Tinaru, New Zealand; 100 at Callao and La Punta, Peru; 13 at Apia, Samoa; 14 at Port-Vila, Vanuatu; 10 at Dutch Harbor, Alaska; 12 at Crescent City, California; 33 at Hilo, 28 at Kahului and 12 at Kawaihae, Hawaii, USA.				
AUG 20	22 42 29.1	8.038 N	39.248 W	10 G	6.5	0.9	651	CENTRAL MID-ATLANTIC RIDGE. MW 6.5 (GCMT). mb 6.3 (GS). MS 6.4 (GS). Mo 7.7×10^{18} Nm (GCMT), 6.3×10^{18} Nm (PPT).				
AUG 25	04 24 21.9	28.154 N	56.652 E	10 G	5.0	1.2	234	SOUTHERN IRAN. mb 5.0 (GS). mbLg 4.7 (TEH). ML 4.5 (THR). At least 4 people injured in the Haji Abad-Orzuyeh area. Felt at Tehran.				
SEP 02	01 05 18.1	11.610 S	165.762 E	35 G	7.2	1.3	312	SANTA CRUZ ISLANDS. MW 7.2 (GCMT). mb 5.9 (GS). MS 7.3 (GS). ME 6.9 (GS). Mo 8.1×10^{19} Nm (GCMT), 1.1×10^{20} Nm (PPT). Es 4.4×10^{14} Nm (GS).				
SEP 09	18 36 37.6	7.783 S	114.338 E	35 G	4.8	1.3	47	BALI SEA. mb 4.8 (GS). At least 13 people injured and buildings damaged (VI) at Situbondo.				
SEP 10	01 49 14.2	2.982 N	77.967 W	31 D	6.8	0.9	654	NEAR THE WEST COAST OF COLOMBIA. MW 6.8 (GCMT). mb 6.1 (GS). MS 6.7 (GS). Mo 1.7×10^{19} Nm (GCMT), 5.2×10^{18} Nm (PPT). Five people injured in Narino. Thirty-four houses damaged at El Charco, Iscuande, La Tola and Mosquera. Power outages occurred at Iscuande. Liquefaction observed at El Charco. Felt (IV) at Bogota and Cali; (III) at Quito. Also felt at Buenaventura, Dos Quebradas, Ibarra, Ipiales, Jamundi, Mulatos, Olaya Herrera, Pasto, Popayan and Tumaco.				
SEP 12	11 10 26.8	4.438 S	101.367 E	34 G	8.4	1.0	411	SOUTHERN SUMATRA, INDONESIA. MW 8.4 (GCMT). mb 6.9 (GS). MS 8.5 (GS). ME 8.0 (GS). Mo 5.1×10^{21} Nm (GCMT), 7.8×10^{20} Nm (PPT). Es 2.6×10^{16} Nm (GS). Twenty-five people killed and at least 161 injured, 56,425 buildings damaged or destroyed and roads damaged in Bengkulu and Sumatera Barat. Power and telephone outages occurred. Felt (VI) at Bengkulu; (V) at Padang; (IV) at Lampung, Palembang, Pekanbaru and Sibolga; (III) at Jambi; (II) at Banten and Serang. Also felt at Medan. Felt (IV) at Duri and (III) at Jakarta, Java. Also felt at Bekasi and Kuningan. Felt (III) at Kuala Lumpur and Petaling Jaya, Malaysia and in Singapore. Also felt at Batang Berjuntai, Batu Pahat, Gelugor, Johor Bahru, Kertih, Kuala Selangor, Muar, Penang, Pontian Kecil, Putrajaya, Sekudai and Subang Jaya, Malaysia and by people in high-rise buildings at Bangkok, Thailand and Male, Maldives. A seiche was observed in Khlong Saensaep in Bangkok, Thailand and sink holes which may have been caused by the earthquake appeared at 3 locations in Ipoh, Malaysia. A tsunami was generated which caused some building damage (included above) in the Serangai area, north of Bengkulu. Tsunami wave heights				

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(in cm, peak-to-trough) were recorded at the following tide stations in the Indian Ocean: 24 at Cocos Island, Australia; 9 on Diego Garcia; 227 at Padang, 52 at Cilacap, 42 at Prigi, 30 at Sibolga, 16 at Sabang and 4.5 at Benoa, Indonesia; 8 at Lamu, Kenya; 23 at Hanimadu, 21 at Male and 13 at Gan, Maldives; 114 at Rodrigues, Mauritius; 131 at Salalah and Sur Masirah, Oman; 40 at Point La Rue, Seychelles; 60 at Colombo and at Trincomalee, Sri Lanka; 8 on Phuket, Thailand.

SEP 12	23 49 03.7	2.625 S	100.841 E	35 G	7.9	1.0	446	KEPULAUAN MENTAWAI REGION, INDONESIA. MW 7.9 (GCMT). mb 6.6 (GS). MS 8.1 (GS). ME 7.6 (GS). Mo 7.8×10^{20} Nm (GCMT). 2.0×10^{20} Nm (PPT). Es 6.5×10^{15} Nm (GS). Casualties and damage are included with the event at 11:10 UTC. Felt (VI) at Padang and Painan; (IV) at Pekanbaru, Sibolga and Singkil; (III) at Duri. Felt at Curup, Jakarta and Pondok Aren. Felt (III) at Kuala Lumpur, Malaysia and in Singapore. Also felt at Georgetown, Johor Bahru, Kampong Salak Tinggi, Kuala Selangor, Melaka, Petaling Jaya, Subang Jaya and Sungai Ara, Malaysia.
SEP 13	03 35 28.7	2.130 S	99.627 E	22 G	7.0	1.0	537	KEPULAUAN MENTAWAI REGION, INDONESIA. MW 7.0 (GCMT). mb 6.3 (GS). MS 7.2 (GS). ME 7.1 (GS). Mo 4.4×10^{19} Nm (GCMT). Es 8.9×10^{14} Nm (GS). Casualties and damage are included with the event of September 12 at 11:10 UTC. Felt (III) at Bengkulu and Padang; (II) at Kapahiang and Padangpanjang.
SEP 20	08 31 14.4	1.999 S	100.141 E	30 G	6.7	0.9	503	SOUTHERN SUMATRA, INDONESIA. MW 6.7 (GCMT). mb 6.3 (GS). MS 6.8 (GS). ME 6.3 (GS). Mo 1.3×10^{19} Nm (GCMT). Es 6.6×10^{13} Nm (GS). Felt (V) at Painan; (IV) at Kerinci, Merangin and Padangpanjang; (III) at Kapahiang, Muaro Jambi and Padang; (II) at Bukittinggi. Also felt (III) in Singapore.
SEP 26	12 36 26.8	4.990 S	153.500 E	40 G	6.7	1.1	348	NEW IRELAND REGION, PAPUA NEW GUINEA. MW 6.7 (GS). 6.7 (GCMT). mb 6.2 (GS). MS 6.6 (GS). ME 6.3 (GS). Mo 1.5×10^{19} Nm (GS). 1.5×10^{19} Nm (GCMT). 1.7×10^{19} Nm (PPT). Es 6.9×10^{13} Nm (GS). Felt at Kokopo. Also felt at Gizo, Solomon Islands.
SEP 28	01 35 51.9	21.133 S	169.373 E	10 G	6.5	1.3	503	SOUTHEAST OF THE LOYALTY ISLANDS. MW 6.5 (GS). 6.3 (GCMT). mb 6.1 (GS). MS 6.6 (GS). Mo 6.7×10^{18} Nm (GS). 3.5×10^{18} Nm (GCMT).
SEP 28	13 38 59.5	22.004 N	142.651 E	276	7.4	0.9	556	VOLCANO ISLANDS, JAPAN REGION. MW 7.4 (GS). 7.4 (GCMT). mb 6.7 (GS). Mo 1.8×10^{20} Nm (GCMT). 1.4×10^{20} Nm (GS). 2.0×10^{20} Nm (PPT). Felt (IV) at Chatan and Naha, Okinawa. Felt (III) at Yokosuka; (II) at Tokyo and Yokohama, Honshu.
SEP 30	02 08 30.1	10.454 N	145.718 E	14 G	6.9	1.1	535	SOUTH OF THE MARIANA ISLANDS. MW 6.9 (GS). 6.9 (GCMT). mb 6.4 (GS). MS 7.1 (GS). ME 7.2 (GS). Mo 3.2×10^{19} Nm (GCMT). 2.5×10^{19} Nm (GS). 2.7×10^{19} Nm (PPT). Es 1.3×10^{15} Nm (GS). Felt (IV) at Agana and Barrigada and (III) at Yigo, Guam. Felt at Santa Rita.
SEP 30	05 23 34.0	49.271 S	164.115 E	10 G	7.4	1.2	499	AUCKLAND ISLANDS, NEW ZEALAND REGION. MW 7.4 (GCMT). 6.9 (GS). mb 6.4 (GS). MS 7.4 (GS). ME 7.2 (GS). Mo 3.1×10^{19} Nm (GS). 1.5×10^{20} Nm (GCMT). 2.6×10^{20} Nm (PPT). Es 1.4×10^{15} Nm (GS). Felt (III) at Dunedin and Invercargill on the South Island. Also felt at Christchurch. Felt at Rotorua and Te Puke on the North Island.
SEP 30	09 47 51.9	49.138 S	164.110 E	18 G	6.6	1.3	572	AUCKLAND ISLANDS, NEW ZEALAND REGION. MW 6.6 (GCMT). 6.5 (GS). mb 6.6 (GS). MS 6.7 (GS). ME 6.9 (GS). Mo 9.7×10^{18} Nm (GCMT). 7.6×10^{18} Nm (GS). 2.6×10^{19} Nm (PPT). Es 5.6×10^{14} Nm (GS). Felt (III) at Dunedin, Invercargill and Queenstown on the South Island. Also felt at Alexandra, Balclutha and Gore.
OCT 05	07 17 52.8	25.189 S	179.459 E	509	6.5	1.0	573	SOUTH OF THE FIJI ISLANDS. MW 6.5 (GCMT). 6.4 (GS). mb 6.0 (GS). Mo 6.8×10^{18} Nm (GCMT). 5.2×10^{18} Nm (GS). 3.9×10^{18} Nm (PPT).
OCT 15	12 29 36.0	44.785 S	167.583 E	26 D	6.8	1.2	337	SOUTH ISLAND OF NEW ZEALAND. MW 6.8 (GCMT). 6.7 (GS). mb 6.0 (GS). MS 6.8 (GS). ML 6.7 (WEL). Mo 2.1×10^{19} Nm (GCMT). 1.4×10^{19} Nm (GS). 2.6×10^{19} Nm (PPT). Slight damage in Fiordland. Felt (V) at Invercargill; (IV) at Dunedin, Queenstown and Wanaka; (III) at Christchurch. Felt in much of the South Island and southern part of the North Island.
OCT 16	21 05 43.2	25.775 S	179.530 E	509 D	6.6	0.9	538	SOUTH OF THE FIJI ISLANDS. MW 6.6 (GCMT). 6.5 (GS). mb 6.2 (GS). Mo 9.4×10^{18} Nm (GCMT). 6.7×10^{18} Nm (GS). 6.8×10^{18} Nm (PPT). Felt in the southern part of the North Island, New Zealand.

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OCT 24	21 02 50.4	3.896 S	101.017 E	20 G	6.8	1.2	491	SOUTHERN SUMATRA, INDONESIA. MW 6.8 (GCMT). mb 6.1 (GS). MS 6.9 (GS). ME 6.3 (GS). Mo 2.1*10**19 Nm (GCMT), 1.5*10**19 Nm (PPT). Es 6.2*10**13 Nm (GS). Felt (IV) at Argamakmur, Lais, Muaraaman and Mukomuko; (III) at Kapahiang. Also felt at Bengkulu, Jakarta and in Singapore.
OCT 26	06 50 06.6	35.304 N	76.753 E	10 G	5.3	1.2	228	NORTHWESTERN KASHMIR. mb 5.3 (GS). MS 4.8 (GS). One person killed and landslides injured at least 12 people in Ghanche. Felt in Ladakh.
OCT 31	03 30 17.6	18.896 N	145.363 E	223 D	7.2	1.0	460	PAGAN REGION, NORTHERN MARIANA ISLANDS. MW 7.2 (GS). 7.2 (GCMT). mb 6.2 (GS). Mo 8.4*10**19 Nm (GCMT), 7.2*10**19 Nm (GS), 8.1*10**19 Nm (PPT). Felt (IV) on Tinian and (III) on Saipan. Felt (II) at Yigo. Also felt at Hagatna Heights, Santa Rita and Tamuning, Guam. Recorded (1 JMA) in the Chichijima-retto and in Nagano, Niigata and Shizuoka Prefectures, Honshu.
NOV 06	09 38 05.7	21.181 N	70.724 E	10 A	5.0	1.4	90	GUJARAT, INDIA. mb 5.0 (GS). One person killed, 5 people injured and several buildings collapsed or damaged in the Talala area. Felt throughout the Bhavnagar-Jamnagar-Porbandar-Surendranagar area. Felt as far as Ahmadabad (II) and Navsari.
NOV 07	04 12 38.6	9.721 N	124.647 E	72	5.1	0.8	96	BOHOL, PHILIPPINES. mb 5.1 (GS). One person died at Mabini. Felt (V PIVS) at Jagna and (IV PIVS) at at Tagbilaran. Felt (V PIVS) at Hibok-Hibok, Camiguin. Felt (IV PIVS) at Mandaue City and (III PIVS) at Lapu-Lapu City, Cebu. Felt (III PIVS) at Cagayan de Oro and (II PIVS) at Butuan, Dipolog, Manucan and Surigao, Mindanao. Felt (III PIVS) at Maasin, Leyte and at Dumaguete, Negros. Also felt at Sagay and Talisay, Luzon.
NOV 07	07 10 21.9	22.150 N	92.388 E	29 D	5.1	0.8	172	INDIA-BANGLADESH BORDER REGION. mb 5.1 (GS). MS 5.1 (GS). Ten people injured in Chittagong Hill Tracts and minor damage occurred at Bandarban, Chittagong and Rangamati, Bangladesh. Felt at Chattagam, Comilla, Cox's Bazar, Feni, Khagrachari and Teknaf. Also felt at Agartala, Aizawl and Guwahati, India.
NOV 10	01 13 29.3	51.777 S	161.318 E	10 G	6.5	1.3	73	NORTH OF MACQUARIE ISLAND. MW 6.5 (GCMT). mb 5.4 (GS). MS 6.4 (GS). Mo 8.1*10**18 Nm (GCMT), 1.8*10**19 Nm (PPT).
NOV 14	15 40 50.5	22.247 S	69.890 W	40 G	7.7	1.1	610	ANTOFAGASTA, CHILE. MW 7.7 (GCMT). mb 6.7 (GS). MS 7.4 (GS). ME 7.4 (GS). Mo 4.7*10**20 Nm (GCMT), 3.9*10**20 Nm (PPT). Es 3.0*10**15 Nm (GS). Two people killed, at least 45 injured and buildings damaged (VIII) at Tocopilla. Twenty people injured and buildings damaged (VII) at Maria Elena. Several thousand homes destroyed or damaged, displacing about 15,000 people in the Maria Elena-Tocopilla area. Buildings damaged (VII) at Antofagasta and Calama. Power and telephone outages occurred at Antofagasta and Iquique. Felt (VIII) at Quillagua: (VII) at Baquedano and Mejillones; (VI) at Alto Hospicio, Arica, Huara, Iquique and Taltal; (V) at Caldera, Chanaral, Copiapo and Tierra Amarilla; (III) at Alto del Carmen, Coquimbo, Freirina, Huasco, La Higuera, La Serena and Vallenar; (II) at Santiago, Valparaiso and Vina del Mar. Felt from Arica to Santiago. Felt (IV) at Arequipa; felt at Lima and in Moquegua and Tacna, Peru. Felt (III) at La Paz; felt at Cochabamba and in other parts of Bolivia. Felt at San Juan, Argentina. Also felt at Sao Paulo, Brazil. Tsunami wave heights in centimeters (peak-to-trough) were recorded at the following tide stations: 25.5 at Antofagasta, 19.5 at Arica, 9.5 at Caldera and 19.3 at Iquique.
NOV 15	15 05 58.3	22.925 S	70.237 W	26 G	6.8	1.1	285	ANTOFAGASTA, CHILE. MW 6.8 (GCMT). 6.6 (GS). mb 6.1 (GS). MS 6.6 (GS). ME 6.3 (GS). Mo 2.1*10**19 Nm (GCMT), 1.1*10**19 Nm (GS), 2.3*10**19 Nm (PPT). Es 5.5*10**13 Nm (GS). Felt (V) at Antofagasta; (IV) at Pozo Almonte; (III) at Alto Hospicio, Huara, Iquique, Maria Elena, Mejillones, Quillagua, Pica, Sierra Gorda and Tocopilla; (II) at Caldera, Copiapo, San Pedro de Atacama and Tierra Amarilla.
NOV 16	03 13 00.1	2.312 S	77.838 W	123 D	6.8	0.9	649	PERU-ECUADOR BORDER REGION. MW 6.8 (GCMT), 6.7 (GS). mb 6.3 (GS). MD 6.7 (QUI). Mo 1.7*10**19 Nm (GCMT), 1.6*10**19 Nm (GS), 1.1*10**19 Nm (PPT). Minor damage at Guayaquil, Ecuador. Felt (IV) at Cuenca, Guayaquil, Loja, Macas, Manta and Puyo; (III) at Quito, Ecuador. Felt (IV) at Santa Maria de Nieva, Peru. Felt at Ambato, Bahia de Caraquez, Gualaceo, Jaramijo, La Libertad, Latacunga, Machala, Milagro, Morona, Portoviejo, Riobamba, Samborondon and Tena, Ecuador. Felt at Iquitos, Jaen, Lima, Moyobamba, Paita, Piura, San Ignacio, Trujillo and Tumbes, Peru. Felt strongly in much of Ecuador and northern Peru.

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NOV 20	05 20 03.48	31.680 N	49.930 E	7	4.8	186	WESTERN IRAN. <TEH>. mb 4.8 (GS). mbLg 5.1 (TEH). ML 4.9 (THR). Thirty people slightly injured at Qal' eh-ye Tol and some houses slightly damaged in Khuzestan. Felt at Ahvaz. Also felt at Ash Shuwaykh, Kuwait.	
NOV 22	08 48 27.5	5.757 S	147.098 E	53 G	6.7	1.2	341	EASTERN NEW GUINEA REG, PAPUA NEW GUINEA. MW 6.7 (GS). 6.7 (GCMT). mb 6.0 (GS). Mo 1.6*10**19 Nm (GCMT). 1.5*10**19 Nm (GS). 8.0*10**18 Nm (PPT). One water tower damaged and power knocked out at Lae. Felt (V) at Lae. Also felt at Bulolo, Goroka, Kainantu, Madang and Port Moresby.
NOV 25	16 02 17.9	8.277 S	118.339 E	35 G	6.5	1.0	345	SUMBAWA REGION, INDONESIA. MW 6.5 (GCMT). 6.4 (GS). mb 6.2 (GS). MS 6.3 (GS). Mo 6.0*10**18 Nm (GCMT). 4.3*10**18 Nm (GS). 4.6*10**18 Nm (PPT). Three people killed, hundreds injured and hundreds of houses destroyed (V) in the Bima-Dompu-Raba area. Felt (IV) at Sumbawabesar and (III) at Taliwang. Also felt (IV) at Mataram, Lombok and (III) at Denpasar, Bali and at Labuhanbajo, Flores. Felt at Kuta and Ubud, Bali.
NOV 25	19 53 07.9	8.225 S	118.453 E	35 G	6.5	1.2	272	SUMBAWA REGION, INDONESIA. MW 6.5 (GCMT). 6.4 (GS). mb 6.2 (GS). MS 6.2 (GS). Mo 6.2*10**18 Nm (GCMT). 4.6*10**18 Nm (GS). 3.7*10**18 Nm (PPT). Felt (V) at Bima and Dompu and (IV) at Sumbawabesar, Sumbawa. Also felt (IV) at Mataram, Lombok, (III) at Denpasar, Kuta and Ubud, Bali, and at Lubuhanbajo, Flores.
NOV 27	11 49 58.0	10.950 S	162.149 E	16 G	6.6	1.1	280	SOLOMON ISLANDS. MW 6.6 (GCMT). 6.4 (GS). mb 5.9 (GS). MS 6.7 (GS). ME 5.8 (GS). Mo 8.8*10**18 Nm (GCMT). 5.3*10**18 Nm (GS). 9.8*10**18 Nm (PPT). Es 1.2*10**13 Nm (GS). Felt at Honiara.
NOV 29	19 00 19.6	14.973 N	61.263 W	148 D	7.4	0.7	662	MARTINIQUE REGION, WINDWARD ISLANDS. MW 7.4 (GS). 7.4 (GCMT). 7.7 (CAR). mb 6.9 (GS). Mo 1.5*10**20 Nm (GS). 1.5*10**20 Nm (GCMT). 2.3*10**20 Nm (PPT). One person killed, at least 100 injured, several buildings damaged or destroyed and power outages occurred on Martinique. Two people injured and several buildings destroyed on Barbados. Minor damage occurred on Saint Lucia and Saint Vincent. Power outages occurred on Guadeloupe. Felt (VII) at Fort-de-France and (VI) at Le Lamentin, Martinique. Felt (VII) at Cap Estate, Castries and Soufriere; (VI) at Choc and Gros Islet, Saint Lucia. Also felt (VI) at Bolans, Antigua. Felt (V) on Barbados, Grenada, Guadeloupe, Saint Kitts, Saint Vincent and Trinidad. Felt (IV) at Guaynabo, Humacao, Mayaguez, Rio Grande, San Juan and Trujillo Alto; (III) at Bayamon, Catano, Cidra and Juncos, Puerto Rico. Also felt (IV) on Anguilla, Bequia, Dominica, Nevis, Saint Martin, Tobago and Tortola; (III) on Saba, Saint Croix, Saint John, Saint Thomas, Sint Eustatius and at Savanna-la-Mar, Jamaica; (II) at Santo Domingo, Dominican Republic. Felt (V) at Georgetown and Linden, Guyana; (IV) at Lelydorp and (III) at Paramaribo, Suriname; (IV) at Kourou, French Guiana. Felt (IV) at Ciudad Bolivar, Ciudad Guayana and Maturin; (II) at Caracas and Puerto La Cruz, Venezuela. Felt at Armenia and Bogota, Colombia; at Macouria, Montjoly and Remire, French Guiana; at Overwacht, Suriname. Also felt throughout northern Guyana and Venezuela and as far south as Boa Vista, Brazil.
DEC 09	02 03 29.5	15.033 S	44.245 W	10 G	4.9	0.9	93	MINAS GERAIS, BRAZIL. mb 4.9 (GS). One person killed, six injured, 76 buildings damaged and 380 people displaced in the Itacarambi-Januarina-Manga area.
DEC 09	07 28 19.6	26.057 S	177.518 W	143	7.8	1.3	350	SOUTH OF THE FIJI ISLANDS. MW 7.8 (GCMT). 7.7 (GS). mb 7.0 (GS). Mo 6.4*10**20 Nm (GCMT). 4.2*10**20 Nm (GS). 1.5*10**20 Nm (PPT). Felt (IV) at Nuku'alofa, and felt at Mu'a, Neiafu, Pangai and Vaini, Tonga. Felt at Alofi, Niue. Also felt throughout the North Island of New Zealand and specifically at Lower Hutt, Napier, Wellington and Whakatane.
DEC 15	18 22 28.8	32.668 S	71.587 W	37	5.9	1.0	213	OFFSHORE VALPARAISO, CHILE. MW 5.9 (GS). 5.9 (GCMT). mb 5.5 (GS). MS 6.0 (GS). ML 6.0 (GUC). Mo 9.2*10**17 Nm (GCMT). 7.6*10**17 Nm (GS). Four people were injured at Vina del Mar and several buildings were damaged at Con Con and Valparaiso. Felt (VI) at Puchuncavi; (V) at San Felipe, Valparaiso and Vina del Mar; (IV) at La Ligua, Los Andes, Papudo, Petorca, San Antonio and Santiago; (III) at Illapel and Rancagua; (II) at San Fernando. Felt at Buin, Colina, Limache, Paine, Penaflo, Puente Alto and Quilpe.
DEC 16	08 09 17.7	22.915 S	70.072 W	45 G	6.7	1.0	273	ANTOFAGASTA, CHILE. MW 6.7 (GS). 6.7 (GCMT). mb 6.1 (GS). MS 6.4 (GS). ME 6.4 (GS). Mo 1.3*10**19 Nm (GCMT). 1.2*10**19 Nm (GS). 1.3*10**19 Nm (PPT). Es 7.7*10**13 Nm (GS). Felt (VI) at

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																					Baquedano, Maria Elena, Mejillones, Sierra Gorda and Tocopilla: (V) at Antofagasta, Calama, Iquique and San Pedro de Atacama: (IV) at Alto Hospicio, Huara, Pica, Pozo Almonte and Taltal. Also felt at Arica. Disrupted power and telecommunications throughout the epicentral area from Antofagasta to Iquique.
DEC 19	09 30	27.1	51.367 N	179.549 W	29 D	7.1	1.0	405													ANDREANOF ISLANDS, ALEUTIAN IS., ALASKA. MW 7.1 (GCMT), 7.0 (GS), mb 6.4 (GS). MS 7.1 (GS). ME 6.6 (GS). Mo 6.3×10^{19} Nm (GCMT), 3.8×10^{19} Nm (GS), 7.7×10^{19} Nm (PPT). Es 1.7×10^{14} Nm (GS).
DEC 20	07 55	16.9&	38.860 S	178.520 E	36	6.6		326													OFF EAST COAST OF THE NORTH ISLAND, N.Z. <WEL>. MW 6.6 (GCMT), 6.5 (GS), 6.6 (GS). ME 6.5 (GS). Mo 9.1×10^{18} Nm (GCMT), 6.0×10^{18} Nm (GS), 8.6×10^{18} Nm (PPT). Es 1.2×10^{14} Nm (GS). One casualty due to heart attack. Three buildings collapsed, and others heavily damaged at Gisborne. Power lines were down in some areas, and damage to one of Gisborne's main roads. Felt (VII) at Gisborne; (IV) at Hastings, Napier, Tauranga and Whakatane; (III) at Kapiti, Lower Hutt, New Plymouth, Palmerston North, Rotorua, Taupo, Te Puke, Upper Hutt and Wellington; (II) at Christchurch, Nelson and North Shore. Also felt at Auckland, Blenheim, Dannevirke, Levin, Marton, Opotiki, Otake, Porirua, Waipukurau and Wanganui.

Compiled by Pamela J. Benfield and NEIC Operations Staff.

SZEIZMIKUS ZÓNATÉRKÉP

az MSZ EN 1998-1 (EUROCODE 8)
Magyar Nemzeti Melléklethez

MAP OF SEISMIC ZONES

for EUROCODE 8 (MSZ EN 1998-1)
Hungarian National Annex

Horizontális gyorsulás értékek 50 évre,
10% meghaladási valószínűség mellett
(1/475 év gyakoriság) az alapkőzeten, g egységben

Peak Ground Acceleration in g
10% probability of exceedance in 50 years
(1/475 year return period) on bedrock

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