

# Magyarországi földrengések évkönyve Hungarian Earthquake Bulletin 2003

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

GeoRisk   
Földrengéskutató Intézet ♦ Earthquake Research Institute

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

2003

TÓTH LÁSZLÓ, MÓNUS PÉTER, ZSÍROS TIBOR,  
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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 – az ÉK-i területet kivéve – 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 kiválasztott célterület a 45.5-49.0N szélesség és 16.0-23.0E 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 not including the NE territory.

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 2003. év szeizmikus szempontból az átlagosnál valamivel aktívabb időszak volt. Az év folyamán 131 szeizmikus eseményről szereztünk tudomást a 45.5-49.0N szélességi és 16.0-23.0E hosszúsági koordináták által határolt területen, amelyek közül 103 volt természetes eredetű földrengés, a többi nagyrészt kőbányarobbantás. Az események mérete a  $0.0 \leq M_L \leq 4.3$  lokális magnitúdó tartományba esett.

Az év folyamán 15 olyan földrengés volt, melyet a lakosság is érzett. Ezek közül négy a Bükk és Bükkalja területen, négy a Nyírségben (Máriapócs), kettő a Jászságban, egy-egy pedig Hegyeshalom, Salgótarján, Körmend, Nagykanizsa és Pécs környékén keletkezett.

A legnagyobb földrengés intenzitás, melyet az év folyamán Magyarország területéről jelentettek 5-6 EMS fokozat volt. Ez kisebb vakolatrepedéseket jelent néhány hagyományos épületben, jelentős épületkár azonban ebben az évben sem keletkezett.

Időrendben az első érezhető szeizmikus esemény a február 3-i, 2.7  $M_L$  magnitúdójú földrengés Hegyeshalom környékén (5 EMS).

Április 3-án hajnalban kisebb földrengést éreztek a Bükk-hegységben. Az esemény nagyon kis területen volt érezhető, a legnagyobb intenzitás 3-4 EMS volt.

Egy viszonylag nagyobb rengés (3.7  $M_L$ ) pattant ki június 21-én, Jászapáti környékén (5-6 EMS). A rengést több utórengés követte, melyek közül a június 27-i (2.4  $M_L$ ) Jászapátiban érezhető volt 3-4 EMS intenzitással.

Július 1-én a Bükkalján mozdult meg a föld, egy 3.4  $M_L$  rengés volt érezhető Igrici, Gelej körzetben (5 EMS). Egy héttel később, július 8-án délután Bükkábrány környékén egy 3.0  $M_L$  magnitúdójú földrengés okozott 5 EMS megrázottságot.

Július 10-én hajnalban kisebb (2.4  $M_L$ ) földrengést éreztek és jelentettek Rimóc, Hollókő, Nógrádsipek környékéről, a legnagyobb intenzitás itt 4 EMS volt.

Július 13-án ismét a Bükk és Bükkalja területen pattant ki 3.1  $M_L$  magnitúdójú földrengés. Az esemény legjobban Vatta, Mezőnyárád, Szakáld, Ónod, Emőd, Bükkábrány településeken volt érezhető, az epicentrális intenzitás 5 EMS-re tehető.

Augusztus 9-én éjjel az év egyik legnagyobb magyarországi rengése (3.8  $M_L$ ) pattant ki Körmend környékén, mely érezhető volt mintegy 1500 km<sup>2</sup> területen. A legnagyobb megrázottságot (5-6 EMS) Magyarszecsőd, Molnászecsőd, Nádasd, Katafa, Kemenestaródfa településekről jelentették.

Szeptember és október hónap folyamán négy kisebb földrengést éreztek a Nyírségben Máriapócs, Pócspetri környékén. Először szeptember 10-én reggel, majd aznap délben jelentettek földmozgást (3-4 EMS). Október 7-én este 2.6  $M_L$  magnitúdójú rengés volt érezhető (3-4 EMS), végül október 11-én hajnalban éreztek 4-5 EMS rengést.

December 16-án, Nagykanizsától délre jeleztek földrengést. A 3.8  $M_L$  magnitúdójú rengés 5-6 EMS megrázottságot okozott.

December 31-én este 2.6  $M_L$  magnitúdójú földrengés keltett riadalmat Pécs város déli részén és Magyarsarlós környékén. A rengés intenzitása 4-5 EMS.



# 1.

## SUMMARY

2003 was a relatively active year for Hungarian seismicity. Out of the 131 seismic events ( $0.0 \leq M_L \leq 4.3$ ) located within the area bounded by latitudes 45.5-49.0N and longitudes 16.0-23.0E 103 were identified as natural earthquakes, the rest were mostly quarry blasts.

Fifteen earthquakes were reported as felt. Four quake burst in the Bükk mountain region, four in the Nyírség region (Máriapócs), two were felt in the Jászság region. The rest was reported from Hegyeshalom, Salgótarján, Körmend, Nagykanizsa and Pécs town.

The highest magnitude assigned to a shock was 4.3  $M_L$  while the highest intensity reported during the year was 5-6 EMS causing fine cracks in the plaster at a few ordinary buildings. No significant earthquake damage was reported.

Reviewing the more notable events of the year in chronological order, a shock of magnitude 2.7  $M_L$  on the 3<sup>rd</sup> of February produced reports of intensity 5 EMS at Hegyeshalom.

On early morning April 3<sup>rd</sup>, a small shock (3-4 EMS) was reported from the Bükk mountain area.

A relatively larger magnitude (3.7  $M_L$ ) event was felt in Jászapáti on 21<sup>st</sup> June and produced reports of 5-6 EMS. Out of the several aftershocks one (2.4  $M_L$ ) was reported on 27<sup>th</sup> June with 3-4 EMS.

On July 1<sup>st</sup>, an earthquake of magnitude 3.4  $M_L$  was felt in the Bükk mountain region and produced reports of 5 EMS from Igrici and Gelej. One week after, a smaller magnitude event (3.0  $M_L$ ) was felt and reported from Bükkábrány (5 EMS).

On July 10<sup>th</sup>, a small magnitude (2.4  $M_L$ ) event was felt and produced reports of intensity 4 EMS from a very small epicentral area at Rimóc, Hollókő, Nógrádsipek.

On July 13<sup>th</sup>, a 3.1  $M_L$  event was felt again in the Bükk mountain region and produced reports of 5 EMS. The earthquake was best felt at Vatta, Mezőnyárád, Szakáld, Ónod, Emőd, Bükkábrány.

One of the largest magnitude (3.8  $M_L$ ) earthquakes of the year was the Magyarszecsőd event on August 9<sup>th</sup>. The earthquake was felt in an area of about 1500 km<sup>2</sup> in W Hungary, near the Austrian border. The highest intensity values (5-6 EMS) were reported from Magyarszecsőd, Molnasszecsőd, Nádasd, Katafa, Kemenestárodfa.

During September and October, four smaller shocks were reported from the Nyírség region from Máriapócs, Pócspetri. First, in the morning September 10<sup>th</sup>, next early afternoon on the same day, earthquakes were felt and reported (3-4 EMS). On 7<sup>th</sup> October, 2.6  $M_L$  earthquake was felt (3-4 EMS). Finally, on 11<sup>th</sup> October, 4-5 EMS was reported again.

On December 16<sup>th</sup>, a 3.8  $M_L$  magnitude event was felt in SW of Hungary. 5-6 EMS was reported from S of Nagykanizsa.

On December 31<sup>st</sup> night, a 2.6  $M_L$  magnitude earthquake alarmed people in the southern part of Pécs city. 4-5 EMS were reported from Magyarsarlós, Kökény, Egerág.

## 2.

### A MAGYARORSZÁGI FÖLDRENGÉS-MEGFIGYELŐ HÁLÓZAT

2003-ban 16 szeizmográf állomás működött Magyarországon. A megfigyelő hálózat az előző évhez viszonyítva jelentősebb mértékben nem változott, két új állomás létesült (RHK5 és RHK6), a GYL állomás pedig megszűnt.

A *Paksi Atomerőmű Rt.* által 1995-ben létesített mikroszeizmikus megfigyelő hálózat az egész év folyamán működött. A Bátaapáti - Üveghuta térségében tervezett kis és közepes aktivitású radioaktív hulladéktároló környezetének monitorozására 1999-ben létrehozott „*üveghutai hálózat*” mérőállomásai közül az RHK1 (Bakonya) és az RHK3 (Tenkes) szintén üzemelt. A *Püspökszilágyi Radioaktív Hulladéktároló és Feldolgozó* monitorozására új állomások (RHK5 – Szentendre és RHK6 – Örbottyán) létesültek.

Az egész hálózat gerincét továbbra is a paksi mikroszeizmikus megfigyelő hálózat egységes adatbázissal működő mérőállomásai jelentették, melyek az események felismerését lehetővé tették. A helymeghatározás során számottevő szerepe volt az *MTA GGKI Szeizmológiai Observatóriuma* által működtetett három állomásnak is. Különösen jelentős a német GEOFON hálózattal együttműködve üzemeltetett piszkéstetői szélessávú mérőállomás, mely a folyamatos regisztrálás miatt referencia szerepet töltött be.

A feldolgozás és kiértékelés során fontos szerepet játszott a szomszédos országok állomásaival, illetve nemzetközi adatközpontokkal történt adatsere is.

Átlagos zaj- (talajnyugtalanág) viszonyokat feltételezve a hálózat észlelési küszöbe  $ML=1.5-2.0$  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.

Öt gyorsulásmérő állomás működött Magyarországon az év folyamán, melyek adatai szintén rendelkezésre álltak. Ezen állomások tulajdonosai, illetve üzemeltetői: a *Paksi Atomerőmű Rt.*, a *GeoRisk Földrengéskutató Intézet*, az *MTA GGKI*, a *Környezetvédelmi Minisztérium* és a *MOL Rt.*

## 2.

### SEISMOGRAPH STATIONS IN HUNGARY

In 2003, there were 16 seismograph stations running in Hungary. Only some minor modifications have been done with the monitoring network compared to the previous year, two new stations have been installed (RHK5 and RHK6) and the station GYL has been closed.

The microseismic monitoring network established by the *Paks Nuclear Power Plant Ltd.* in 1995, has been operational throughout the year. Two stations (RHK1-Bakonya and RHK3-Tenkes) of the “*Üveghuta Network*” set up in 1999 to monitor microseismic activity at a potential low and medium activity nuclear waste disposal site vicinity was running throughout the year. Two additional stations (RHK5-Szentendre and RHK6-Örbottyán) were installed to monitor The Püspökszilág Nuclear Waste Disposal.

The core of the whole network was formed by the Paks microseismic monitoring stations. This network had been operated and data collected in a uniform database what made possible to detect and identify the local seismic events. In addition, data was contributed by three stations operated by the *Seismological Observatory, GGKI*. Of those, especially important was the broadband station PSZ operated in cooperation with the German GEOFON network.

Data exchange with stations from the adjoining countries and international data centers was also utmost important.

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.

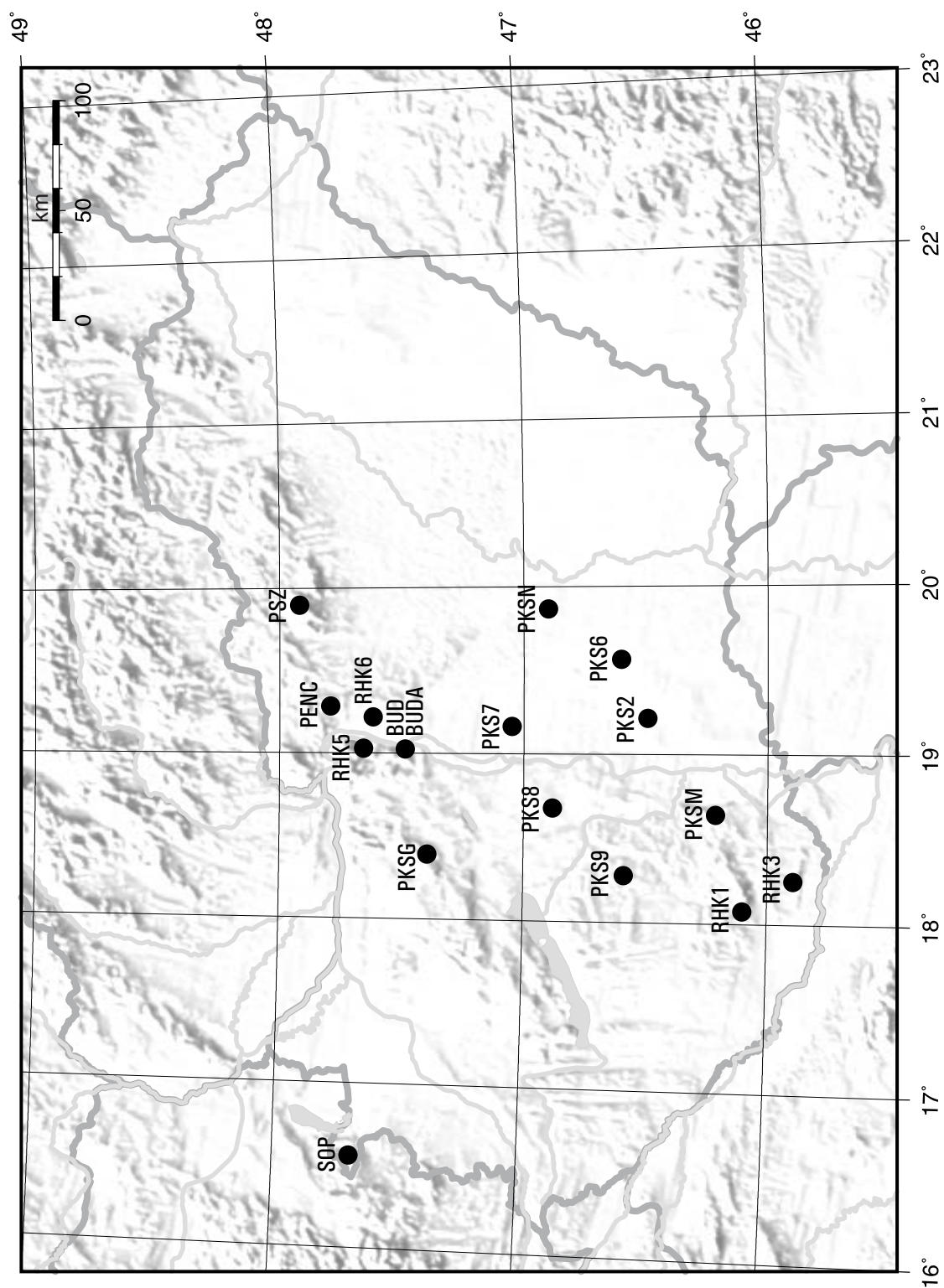
During the reporting period, we also had access to five strong motion accelerograph stations belonging to and operated by different organizations such as *Paks Nuclear Power Plant, GeoRisk, GGKI, Ministry of Environment and MOL RT*.

## 2.1. Táblázat Szeizmológiai állomások, műszerek és alapkőzet

Table 2.1. Seismic stations, instrumentation and lithology

Jel Code	Szélesség Latitude (N)	Hosszúság Longitude (E)	Magasság Elevation (m)	Alapkőzet Foundation	Állomás típusa Station type (1)	Érzékelő típusa Sensor type (2)	Regisztrálás Recording (3)	Szervezet Org. (4)
BUD	47,4836	19,0239	196	dolomit dolomite	3C LP	Kirnos	A - C	GGKI
BUDA	47,4836	19,0239	196	dolomit dolomite	3C SP	LE-3D	D - E	GR
PENC (RHK4)	47,7905	19,2817	250	üledék alluvium	3C SP	LE-3D	D - E	GGKI-GR
PKS2	46,4920	19,2131	106	homok sand	3C SP	LE-3D	D - E	GR
PKS6	46,5998	19,5645	120	homok sand	3C SP	LE-3D	D - E	GR
PKS7	47,0473	19,1609	95	agyag mud	3C SP	LE-3D	D - E	GR
PKS8	46,8787	18,6765	135	riolit tufa rhyolite tuff	3C SP	LE-3D	D - E	GR
PKS9	46,5870	18,2789	240	löss loess	3C SP	LE-3D	D - E	GR
PKSG	47,3918	18,3907	200	dolomit dolomite	3C SP	LE-3D	D - E	GR
PKSM	46,2119	18,6413	170	gránit granite	3C SP	LE-3D	D - E	GR
PKSN	46,8972	19,8673	110	homok sand	3C SP	LE-3D	D - E	GR
PSZ	47,9184	19,8944	940	andezit andesite	3C BB	STS-2	D - C	GGKI
RHK1	46,0948	18,0720	297	mészkeő limestone	3C SP	SS-1	D - E	GGKI
RHK3	45,8885	18,2521	420	mészkeő limestone	3C SP	LE-3D	D - E	GR
RHK5	47,6983	19,0822	213	mészkeő limestone	3C SP	LE-3D	D - E	GR
RHK6	47,6741	19,2488	157	homok sand	3C SP	LE-3D	D - E	GR
SOP	47,6833	16,5583	260	gneisz gneiss	3C SP	SS-1	D - E	GGKI

- (1) 3C – 3 komponenses szeizmométer / three component seismometer  
 SP – rövid periódusú szeizmométer / short period seismometer; BB – széles sávú szeizmométer / broad band seismometer  
 LP – hosszú periódusú szeizmométer / long period seismometer
- (2) STS-2 – Streckeisen széles sávú szeizmométer / Streckeisen broad band seismometer  
 LE-3D – Lennartz 3 komponenses 1Hz-es geofon / Lennartz three directional 1Hz geophone  
 SS-1 – Kinematics 1Hz-es szeizmométer / Kinematics 1Hz seismometer  
 Kirnos – 12 s-os hosszú periódusú szeizmométer / 12 s long period seismometer
- (3) A – analóg / analogue; D – digitális / digital; C – folyamatos felvétel / continuous recording; E – esemény felvétel / event recording
- (4) GGKI – MTA Geodéziai és Geofizikai Kutatóintézet / Geodetic and Geophysical Research Institute, HAS  
 GR – GeoRisk Földrengéskutató Intézet Kft. / GeoRisk Earthquake Research Institute Ltd.



**2.1. ábra** A magyarországi szeizmológiai állomáshálózat 2003-ban (részletek: 2.1. táblázat)

**Figure 2.1.** Seismograph station network in Hungary in 2003 (See Table 2.1. for details)

## 2.2. Táblázat Gyorsulásmérő állomások, műszerek és alapkőzet

Table 2.2. Strong motion accelerograph stations

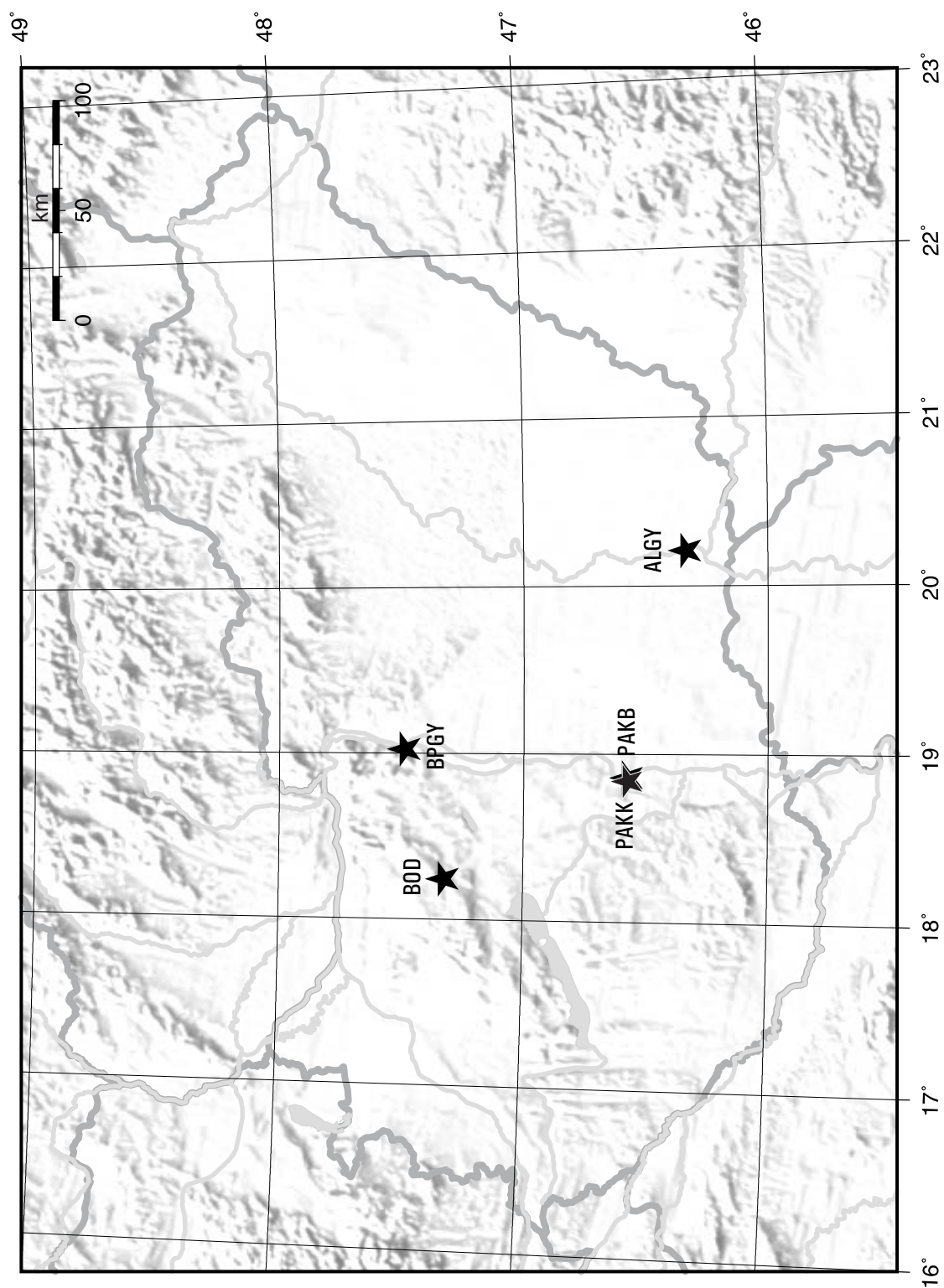
Jel Code	Szélesség Latitude (N)	Hosszúság Longitude (E)	Magasság Elevation (m)	Alapkőzet Foundation	Állomás típusa Station type (1)	Érzékelő típusa Sensor type (2)	Regisztrálás Recording (3)	Szervezet Org. (4)
ALGY	46.3332	20.2092	90	laza homok loose sand	3C SM	AC-23	D – E	MO-GR
BOD	47.322	18.241	250	mészkiő limestone	3C SM	AC-23	D – E	GR
BPGY	47.4836	19.0239	196	dolomit dolomite	3C SM	AC-23	D – E	GGKI
PAKB	46.5743	18.8587	100	homok sand	3C SM	AC-23	D – E	PART
PAKK	46.5743	18.8449	100	laza homok loose sand	3C SM	AC-23	D – E	GGKI

(1) 3C – 3 komponenses szeizmométer / three component seismometer  
SM – gyorsulásmérő / strong motion accelerograph

(2) AC-23 – triaxiális gyorsulásmérő egység / triaxial accelerometer package (full scale 0.5g)

(3) D – digitális / digital  
E – eseményfelvétel / event recording

(4) GGKI – MTA Geodéziai és Geofizikai Kutatóintézet / Geodetic and Geophysical Research Institute, HAS  
GR – GeoRisk Földrengéskutató Intézet Kft. / GeoRisk Earthquake Research Institute Ltd.  
MO – MOL Rt.  
PART – Paksi Atomerőmű Rt. / Paks Nuclear Power Plant Ltd.



2.2. ábra A magyarországi gyorsulásmérő állomások 2003-ban (részletek: 2.2. táblázat)

Figure 2.2. Strong motion accelerograph stations in Hungary in 2003 (See Table 2.2. for details)

## A PAKSI MIKROSZEIZMIKUS MEGFIGYELŐ HÁLÓZAT

A hálózat keretében - beleértve a radioaktív hulladéktárolók megfigyelésére létesített állomásokat is - 2003-ban 13 mérőállomás működött. Az adatok összegyűjtése és feldolgozása a budapesti adatközpontban történik (Tóth és Mónus, 1997). A terepi állomások műszerezettsége egyforma: érzékelő, digitális adatrögzítő és időjel-vevő. Az érzékelő Lennartz gyártmányú, LE-3D típusú 3 komponenses rövid periódusú szeizmométer. Az adatrögzítő egység szintén Lennartz gyártmányú MARS-88 digitális regisztráló, 20 bites A/D konverzióval, 62,5 Hz-es mintavételi frekvenciával. Az adatrögzítő eseményregisztrálást végez, s emellett egy ritkábban mintavételezett folyamatos adatsort, az ún. „monitor csatornát” is rögzíti. 8 állomás helyszínen regisztrál, az adatok 5¼"-es újraírható magneto-optikai lemezre kerülnek, amelyeket kéthetente cserélünk és juttatunk az adatközpontba. További 5 állomás modem telefon kapcsolattal érhető el, ezekről az adatgyűjtés naponta történik. Az állomások többségén a tápfeszültséget napelemek biztosítják, a pontos időt pedig mindenütt DCF-77 vevő szolgáltatja.

Az adatközpontban az adatok gyűjtése, rendezése, nyilvántartása Lennartz adatbázis szoftverrel, míg a szeizmológiai igényű feldolgozás a PITSA nevű program felhasználásával történik. A teljes adatmennyiséget archiváljuk.

*A paksi mikroszeizmikus megfigyelő hálózat, az üveghutai megfigyelő hálózat és a püspökszilágyi mikroszeizmikus hálózat üzemeltetését és az adatok feldolgozását a GeoRisk Földrengéskutató Intézet végzi.*

## AZ MTA GGKI ÁLLOMÁSAI

Az év folyamán az MTA GGKI három digitális és egy analóg szeizmológiai állomást üzemeltetett. Piszkésető állomás (PSZ) mint „nyílt állomás” (*open station*) létesült, melynek fő célja az atomcsend egyezmény ellenőrzésében való részvétel volt (Tóth, 1992). Az állomáson a három komponenses STS-2 széles sávú szeizmométer jelét 24 bites A/D konverterrel ellátott 80 Hz-es mintavételezésű, nagyfelbontású adatgyűjtő regisztrálja. Folyamatos adatgyűjtés történik mágneslemezen, az adatok azonnali (on-line) hozzáférhetősége több mint 1 hónap. Az állomás jelenleg a német GEOFON hálózat társult állomásaként működik.

A Bakonya (RHKI) és Sopron (SOP) állomásokon 3 komponenses rövid periódusú adatok gyűjtése folyik KINEMATRICS gyártmányú K2 és SSR-1 típusú digitális eseményregisztrálókon. A mintavételi frekvencia 20 Hz, az A/D konverter felbontása 16 bit. Az érzékelők szintén KINEMATRICS gyártmányú SS-1 rövidperiódusú szeizmométerek.

## GYORSULÁSMÉRŐ ÁLLOMÁSOK

Az öt gyorsulásmérő állomás műszerezettsége azonos, annak ellenére, hogy ezen állomások három különböző intézményhez tartoznak. Érzékelő: AC-23 három tengelyű gyorsulásmérő egység (0,5 g legnagyobb gyorsulás); adatgyűjtő: SM-2 digitális eseményregisztráló (a svájci SIG<sup>SA</sup> termékei).

2003. folyamán mindegyik állomás mérési adata rendelkezésünkre állt.



## PAKS MICROSEISMIC MONITORING NETWORK

The system (including the *Paks Microseismic Monitoring Network*, the *Üveghuta Network* and the *Püspökszilágyi Monitoring Network*) comprises of a network of 13 seismometer stations and a data centre in Budapest where the data is collected and analyzed (Tóth and Mónus, 1997). The field stations each 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 MARS-88 recorder that uses 20 bit AD converters sampling the data 62.5 times per second. The recorder also performs signal detection by its internal STA/LTA algorithm. Eight of the stations store event and continuous monitor channel data on rewritable magneto-optical disks, which are collected and transferred to the data center on two-week basis. Five additional stations are accessible via telephone modems. Most of the stations are powered by solar panels, and absolute time is provided by DCF-77 time code receivers.

At the data center Lennartz M88 database software is used for the data management and PITSA for advanced seismogram analysis. All recorded data are archived.

The *Paks Microseismic Monitoring Network*, the *Üveghuta Network* and the *Püspökszilágyi Monitoring Network* are currently operated and their data processed and analyzed by *GeoRisk Earthquake Research Institute Ltd.*

## STATIONS OPERATED BY GGKI

During 2003 GGKI operated three digital and one analogue seismic stations. Piskés (*PSZ*) has been installed as an 'Open Station' with the primary goal of nuclear test ban monitoring (Tóth, 1992). The station is equipped with a triaxial STS-2 broad-band seismometer and data acquisition system with a 24 bit high resolution digitizer. Three component continuous data streams are transmitted near real time to the Data Centre via internet and recorded in circular buffers on magnetic disks and archived on CDs. The station serves as an associated station to the German GEOFON Network.

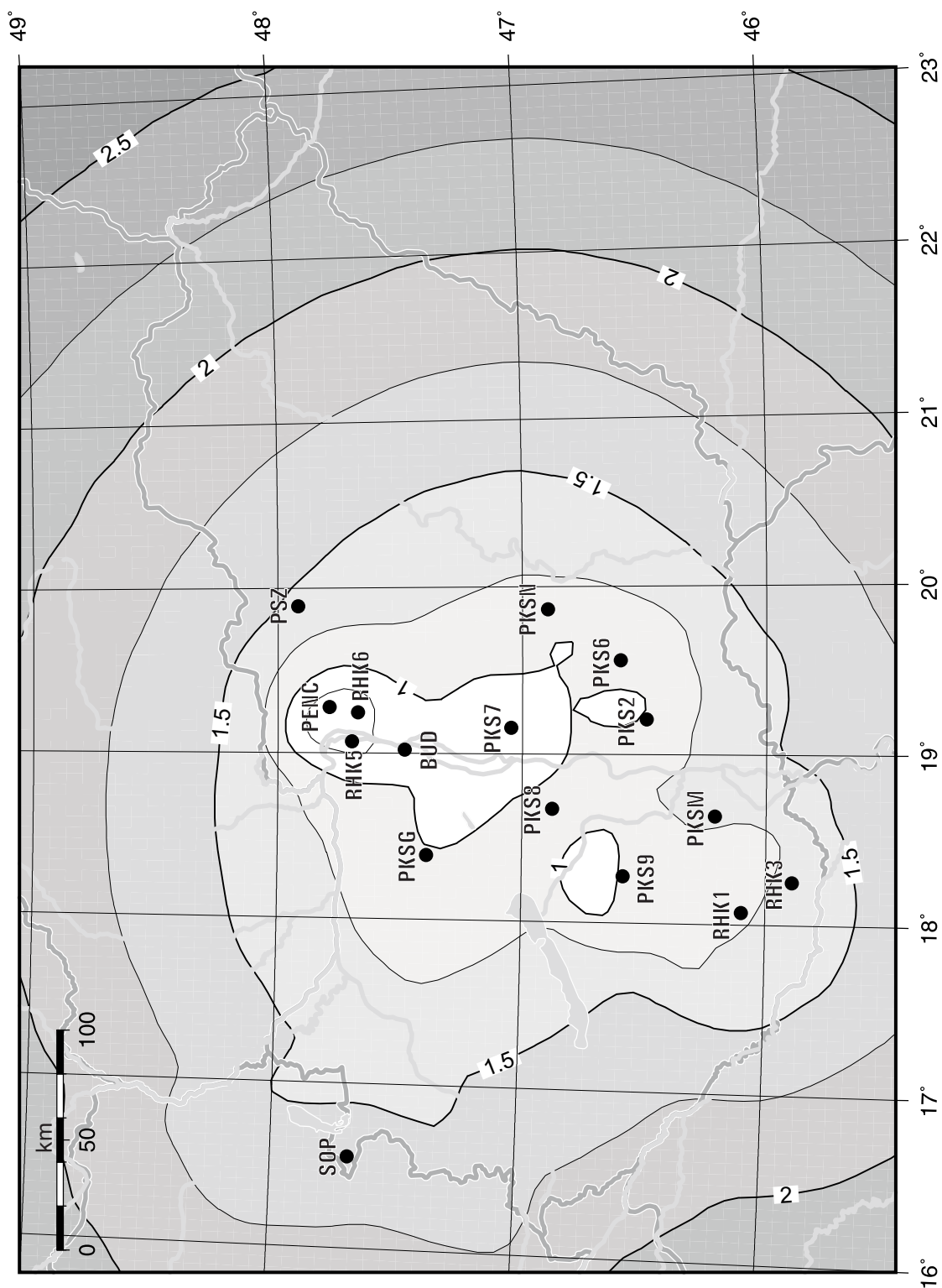
RHK1 (Bakonya) and SOP (Sopron) are three component short period stations where Kinometrics K2 and SSR-1 16bit digitizers and event recorders sample and record the output of three component SS-1 Ranger seismometers. Data of recorded events are collected via commercial telephone links.

A long period analogue recording seismograph has been operated at the *Seismological Observatory* in Budapest mostly for demonstration purposes.

## STRONG MOTION STATIONS

Although the five strong motion accelerograph stations belong to three different organizations, they are all equipped with the same instrumentation: AC-23 triaxial accelerometer package (full scale 0.5g) and an SM-2 digital event recorder (manufactured by SIG<sup>SA</sup>, Switzerland).

During 2003, we had access to all of these stations.



**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)

**Szeizmológiai állomások**

**Seismograph Stations**

### 3.

## ESEMÉNYLISTA ÉS FÖLDRENGÉS FÉSZKEPARAMÉTEREK

### A FÖLDRENGÉS FÉSZKEPARAMÉTEREK MEGHATÁROZÁSA

A fészkeparaméterek 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 fészkeparaméterek 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.

Az amerikai NEIC (National Earthquake Information Center) 2003-ra vonatkozóan közölt 11 olyan kisebb magnitúdójú eseményt, melynek a megadott epicentruma a vizsgált tartományba esett, de hálózatunk eseményként nem azonosított. A teljesség kedvéért az események listáján „*Reported by NEIC*” megjelöléssel ezeket is szerepeltetjük.

### SEBESSÉGMODELL

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

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

### 3.

## LIST OF ORIGINS AND HYPOCENTER PARAMETERS

### METHOD FOR HYPOCENTER PARAMETER DETERMINATION

HYPO71PC (Lee and Lahr, 1975) was used for the routine calculation of hypocenter parameters. 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.

During 2003, *USGS National Earthquake Information Center* reported 11 low magnitude events on the monitored area what were not identified by our network. For the sake of completeness, these events are also listed with an indication of “*Reported by NEIC*”.

### CRUSTAL VELOCITY MODEL

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

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

## ESEMÉNYLISTA / LIST OF EVENTS

Nap	Kipattanási idő (UTC) óó pp mp	Földrajzi koordináták Lat Long	Mélység (km)	ML	I <sub>MAX</sub> (EMS)	Helyszín
Day	Origin time UTC hr mn sec	Geographic coordinates Lat Long	Depth (km)	ML	I <sub>MAX</sub> (EMS)	Locality/Region
JANUÁR / JANUARY, 2003						
01	19:09:48.3	46.161N 16.541E	10	1.9	-	Croatia
14	1:06:46.0	46.16N 16.24E	10	1.5	-	Croatia
19	23:32:26.8	45.946N 18.425E	0	0.3	-	Kiskassa
29	20:04:53.7	46.352N 17.193E	7	1.5	-	Inke
FEBRUÁR / FEBRUARY, 2003						
03	19:32:46.3	47.896N 17.094E	10	2.7	5.0	Hegyeshalom
07	10:43:55.3	47.667N 18.567E	15	1.1	-	Nagysáp
11	10:14:59.5	46.082N 18.354E	10	0.0	-	Romonya (expl.)
12	10:38:46.7	46.069N 18.346E	9	0.4	-	Bogád (expl.)
12	14:25:27.3	45.518N 17.720E	13	1.5	-	Croatia
14	11:01:28.4	46.140N 16.013E	10		-	Croatia
17	12:27:45.9	46.179N 18.291E	8	1.0	-	Zobákpuszta (expl.)
19	17:56:05.3	46.168N 16.628E	10	2.0	-	Croatia
21	10:03:22.5	47.407N 18.348E	9	1.0	-	Gánt (expl.)
MÁRCIUS / MARCH, 2003						
01	20:09:46.6	45.517N 19.927E	10	2.0	-	Serbia
03	11:19:28.3	46.157N 18.324E	7	0.0	-	Zobákpuszta (expl.)
04	19:05:38.6	45.770N 17.445E	19	1.1	-	Croatia
10	15:11:46.8	45.502N 17.884E	0	2.0	-	Croatia
23	9:05:46.0	47.554N 19.929E	10	1.7	-	Jászdózsa
25	9:39:55.8	47.436N 18.379E	6	1.1	-	Várgesztes (expl.)
ÁPRILIS / APRIL, 2003						
06	21:59:08.3	45.907N 18.703E	10	1.2	-	Udvar
10	22:09:36.9	46.455N 18.931E	15	1.2	-	Fajsz
11	13:03:34.9	45.553N 17.715E	15	1.5	-	Croatia
16	3:05:59.6	45.884N 16.149E	10	2.2	-	Croatia
16	5:35:02.3	46.110N 17.173E	13	1.9	-	Bélavár
16	19:24:20.8	46.396N 17.257E	25	1.5	-	Vése
20	18:43:15.5	46.082N 17.177E	22	1.6	-	Croatia
24	11:38:03.0	47.840N 19.016E	0	1.0	-	Kismaros

**Földrengés paraméterek****Hypocenter Parameters**

28	9:25:47.3	45.559N	18.058E	10	1.3	-	Croatia
MÁJUS / MAY, 2003							
02	21:31:20.0	47.774N	18.492E	7	1.0	-	Lábatlan
04	1:24:18.4	47.618N	18.051E	14	0.4	-	Nagyigmánd
06	16:55:56.7	45.610N	18.022E	10	2.0	-	Croatia
08	11:41:43.4	46.203N	18.262E	10	1.1	-	Komló
08	15:04:52.3	45.588N	17.358E	10	1.8	-	Croatia
20	20:13:41.5	48.764N	22.089E	2	4.3	-	Slovakia
22	0:25:12.4	45.658N	18.791E	6	1.8	-	Croatia
JÚNIUS / JUNE, 2003							
04	23:39:59.5	47.341N	20.946E	10	2.3	-	Karcag (expl.)
05	8:27:05.7	46.038N	18.377E	0	0.2	-	Hásságy (expl.)
05	23:19:59.3	48.025N	19.424E	0	1.7	-	Iliny (expl.)
11	12:05:24.2	45.571N	16.675E	13	1.8	-	Croatia
17	8:58:16.5	48.56N	17.66E	10	2.5	-	Slovakia
21	8:03:01.6	47.548N	19.936E	10	2.0	-	Jászdózsza
21	20:05:58.1	47.531N	20.032E	13	3.7	5.5	Jászapáti
22	1:46:26.8	47.542N	19.945E	10	1.4	-	Jászdózsza
22	6:43:53.2	47.544N	19.966E	10	1.6	-	Jászdózsza
22	22:14:00.4	46.861N	19.485E	10	1.4	-	Ágasegyháza
26	4:45:47.4	47.517N	19.913E	10	1.6	-	Jászberény
27	1:19:19.3	47.536N	20.001E	16	2.4	3.5	Jászapáti
JÚLIUS / JULY, 2003							
01	11:26:14.5	47.871N	20.620E	8	3.4	5.0	Igrici
01	11:46:01.2	47.755N	20.554E	10	3.3	-	Mezőszemere
01	22:41:17.2	47.894N	20.386E	10	2.0	-	Eger
03	1:58:15.0	46.897N	19.159E	1	0.9	-	Újsolt
08	17:04:19.1	48.152N	20.743E	10	3.0	5.0	Bükkábrány
10	2:40:18.2	48.151N	19.457E	6	2.4	4.0	Rimóc
11	10:52:59.4	45.549N	17.789E	14	1.7	-	Croatia
11	12:20:35.2	47.421N	18.485E	10	1.0	-	Csákvár (expl.)
13	2:29:09.8	48.078N	20.643E	13	3.1	5.0	Vatta
13	2:39:55.1	47.879N	20.695E	10	1.5	-	Bükkábrány
16	0:23:01.2	47.816N	20.550E	6	2.0	-	Mezőkövesd
17	20:52:55.7	47.94N	16.38E	5	2.6	-	Austria
18	9:46:34.9	47.370N	18.390E	6	1.1	-	Gánt (expl.)
19	9:12:13.6	47.783N	20.538E	3	2.8	-	Mezőkövesd
23	8:11:34.9	47.843N	20.559E	10	2.6	-	Mezőkövesd
AUGUSZTUS / AUGUST, 2003							
02	20:31:47.9	45.840N	17.245E	10	3.1	-	Croatia
05	13:52:11.9	47.108N	19.097E	10	0.8	-	Apaj

**Hypocenter Parameters****Földrengés paraméterek**

09	22:01:17.5	46.996N	16.597E	8	3.8	5.5	Magyarszecsőd
10	0:17:24.5	47.011N	16.625E	1	1.9	-	Körmend
16	13:45:04.8	45.516N	17.860E	5	1.6	-	Croatia
17	8:27:54.8	46.292N	19.784E	6	1.8	-	Ruzsa
21	8:09:08.0	45.524N	17.838E	13	1.7	-	Croatia
21	9:35:32.0	47.468N	18.465E	10	1.5	-	Bodmér (expl.)
23	17:31:12.5	47.542N	19.951E	10	1.6	-	Jászdózsa
23	20:13:28.5	47.56N	16.02E	10	2.5	-	Austria
26	8:24:48.6	46.170N	16.357E	10	1.9	-	Croatia
28	14:59:32.7	47.054N	19.408E	9	1.5	-	Tatárszentgyörgy
31	22:57:21.3	46.088N	18.106E	8	1.9	-	Kővágótóttós

## SZEPTEMBER / SEPTEMBER, 2003

01	9:51:29.8	47.366N	18.340E	10	1.5	-	Csákberény (expl.)
02	10:55:32.7	45.536N	17.209E	7	1.2	-	Croatia
02	10:56:11.4	45.500N	17.254E	8	1.3	-	Croatia
03	9:55:36.7	47.77N	16.62E	10	2.4	-	Austria
11	10:45:26.2	45.564N	17.956E	10	1.7	-	Croatia
15	11:46:09.7	45.954N	18.376E	1	1.4	-	Pécsdevecser (expl.)
16	9:28:51.6	47.406N	18.380E	10	1.4	-	Gánt (expl.)
16	9:29:20.7	47.430N	18.422E	10	1.5	-	Gánt (expl.)
18	11:07:06.9	46.129N	18.222E	10	0.3	-	Mánfa
19	7:49:17.6	46.13N	16.26E	10	2.0	-	Croatia
19	8:44:02.5	48.507N	17.598E	5	2.0	-	Slovakia
19	17:30:12.0	45.953N	17.667E	14	1.4	-	Zádor
21	18:26:25.7	45.875N	17.534E	18	2.4	-	Croatia
22	8:45:48.0	47.399N	18.385E	10	0.8	-	Gánt (expl.)
26	12:21:29.8	46.536N	18.213E	7	1.0	-	Kocsola
27	0:24:53.4	46.02N	16.94E	10	1.4	-	Croatia
30	19:43:02.9	46.086N	16.947E	10	1.8	-	Croatia

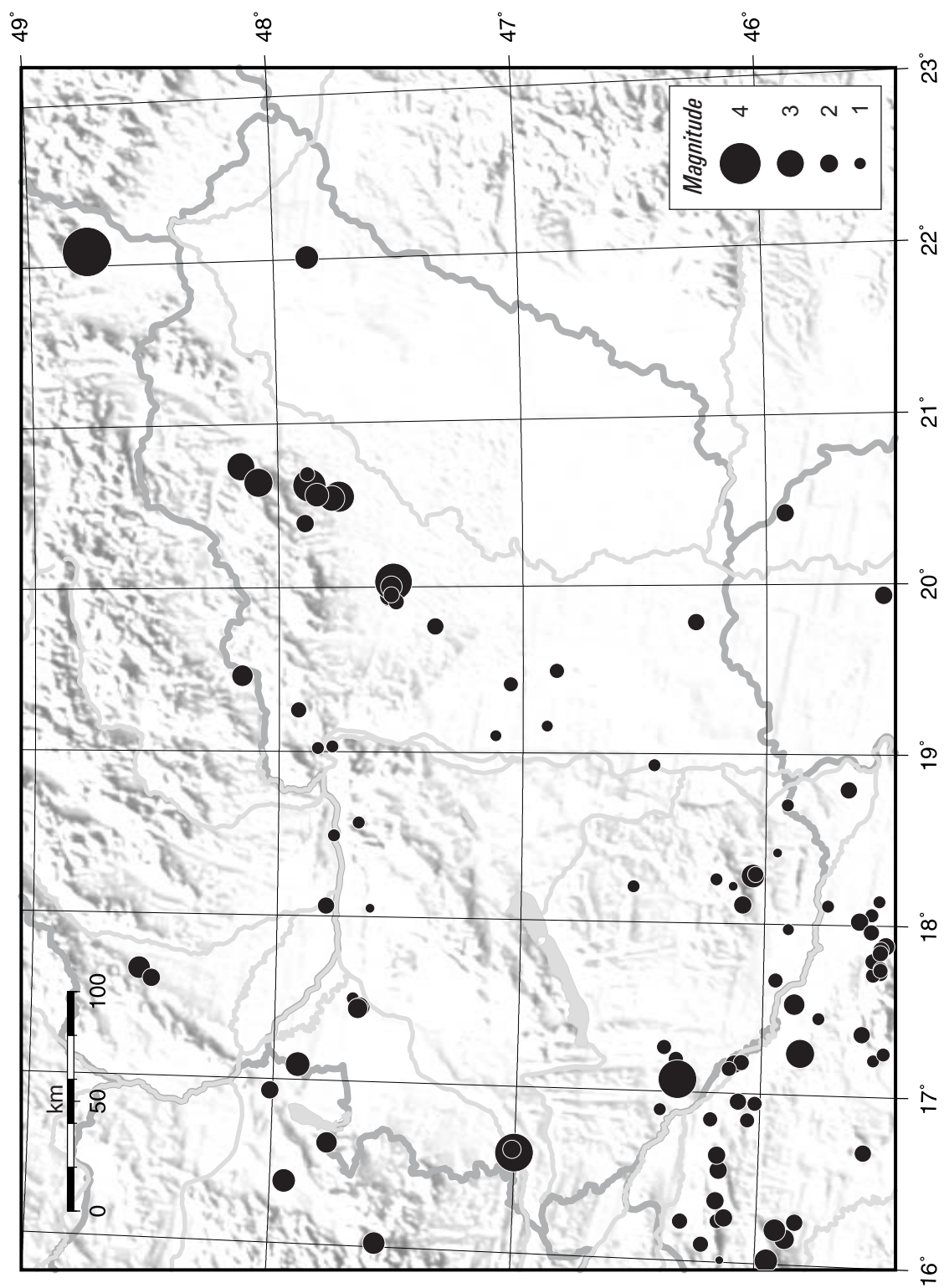
## OKTÓBER / OCTOBER, 2003

01	11:08:56.8	46.084N	18.262E	3	0.8	-	Pécs (expl.)
03	15:10:04.7	45.900N	17.969E	10	0.8	-	Besence
07	22:08:25.1	47.856N	22.012E	10	2.6	3.5	Máriapócs
08	12:04:27.4	47.412N	18.454E	10	0.9	-	Csákvár (expl.)
09	8:15:51.8	45.523N	17.752E	16	1.4	-	Croatia
09	10:08:23.5	47.480N	18.673E	12	0.8	-	Bicske (expl.)
10	5:56:44.1	45.527N	18.136E	8	1.1	-	Croatia
11	3:51:20.7	45.835N	16.249E	5	1.8	-	Croatia
12	0:49:30.8	45.925N	20.416E	10	2.0	-	Serbia
15	11:32:26.1	46.144N	18.300E	10	1.1	-	Vasas (expl.)
16	3:39:16.2	46.31N	16.23E	10	1.6	-	Croatia
16	8:04:40.1	46.410N	16.893E	24	1.1	-	Szepetnek
19	10:05:57.3	46.197N	16.839E	10	1.5	-	Croatia



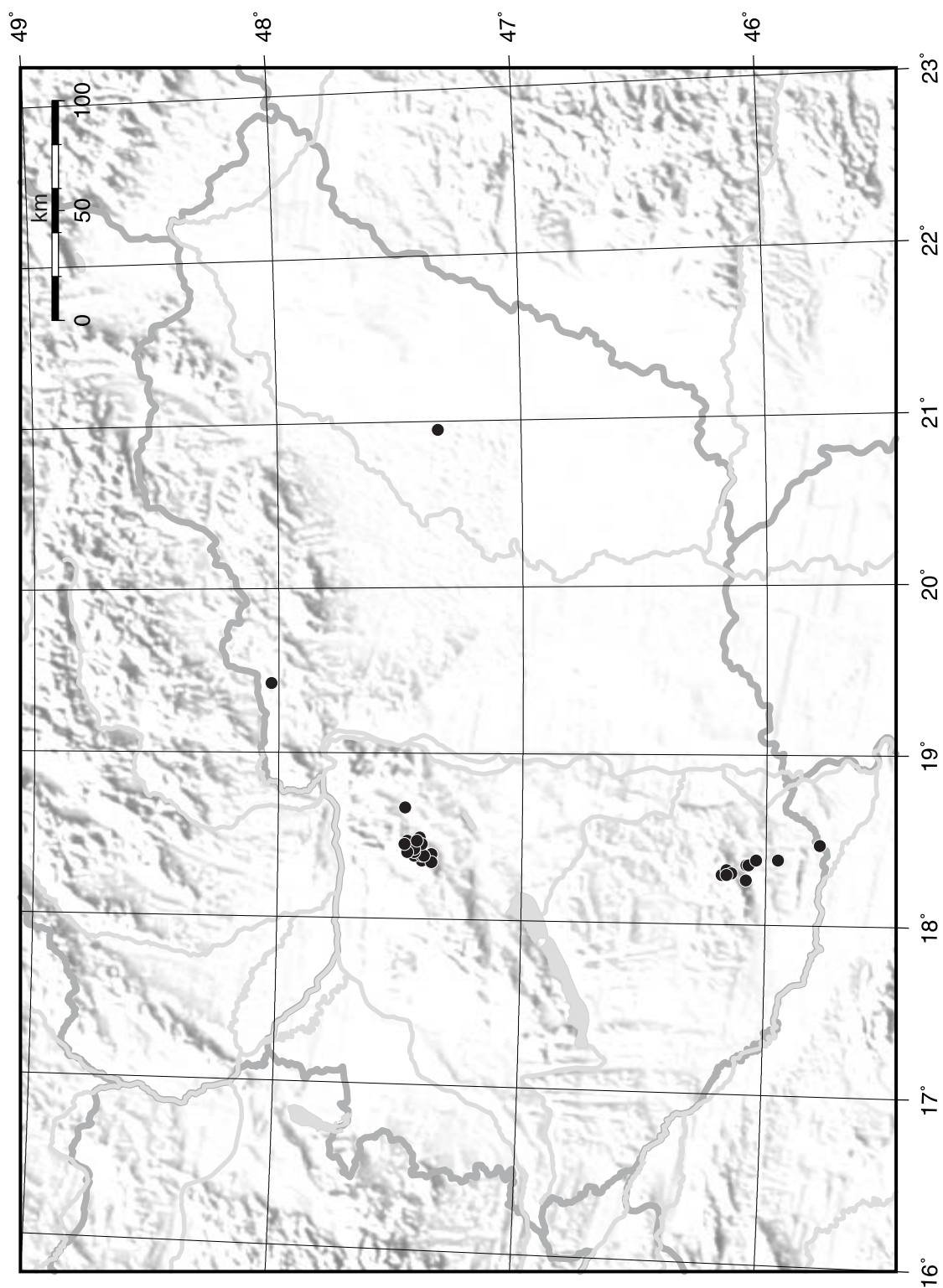
**Földrengés paraméterek****Hypocenter Parameters**

25	6:44:58.4	47.655N	17.454E	10	2.1	-	Enese
25	6:45:58.2	47.682N	17.502E	10	1.2	-	Börcs
25	6:53:20.9	47.651N	17.457E	10	1.6	-	Enese
25	7:04:31.7	47.656N	17.444E	10	2.2	-	Enese
NOVEMBER / NOVEMBER, 2003							
20	11:15:44.1	47.444N	18.400E	7	1.5	-	Várgesztes (expl.)
20	11:17:16.4	47.441N	18.425E	2	1.4	-	Várgesztes (expl.)
21	10:55:37.6	45.775N	18.468E	0	1.2	-	Beremend (expl.)
24	7:33:53.3	47.362N	19.759E	13	1.8	-	Tápióbicske
29	9:59:36.1	45.923N	16.200E	1	2.5	-	Croatia
29	11:05:07.7	45.95N	16.02E	10	2.6	-	Croatia
29	23:05:50.8	46.052N	16.845E	34	1.4	-	Croatia
DECEMBER / DECEMBER, 2003							
02	10:09:17.6	47.469N	18.404E	10	1.5	-	Várgesztes (expl.)
02	10:09:44.6	47.476N	18.455E	10	1.6	-	Várgesztes (expl.)
02	12:02:03.3	47.779N	19.028E	9	1.0	-	Dunabogdány
08	12:25:33.0	46.164N	18.289E	13	1.1	-	Zobákpuszta (expl.)
09	9:48:31.0	47.434N	18.466E	1	1.4	-	Csákvár (expl.)
11	5:16:15.2	45.744N	18.105E	12	1.1	-	Croatia
13	18:51:28.2	46.128N	17.145E	12	1.5	-	Croatia
14	17:31:39.3	47.922N	19.253E	1	1.7	-	Romhány
16	7:06:20.8	46.341N	17.075E	21	3.8	5.5	Pogányszentpéter
16	12:24:30.4	45.521N	17.744E	14	1.5	-	Croatia
17	7:39:14.4	47.803N	18.063E	14	1.8	-	Komárom
17	10:33:58.0	46.22N	16.10E	10	1.7	-	Croatia
21	17:46:15.3	48.01N	16.93E	5	2.0	-	Austria
31	20:43:49.1	46.046N	18.275E	10	2.6	4.5	Magyarsarlós
31	21:36:01.7	46.038N	18.287E	9	1.6	-	Kozármisleny



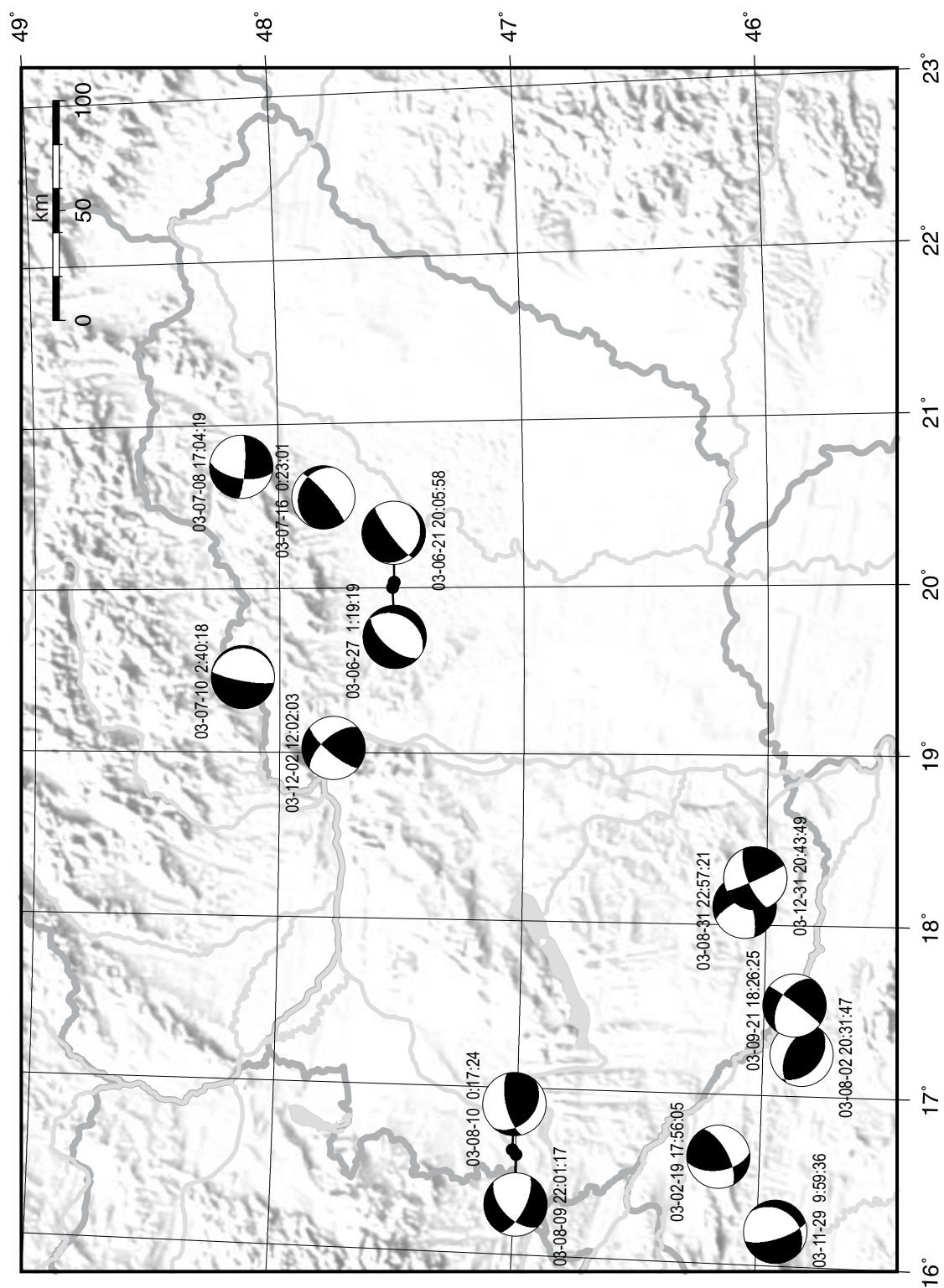
3.1. ábra A 2003-ban regisztrált földrengések epicentrumai

Figure 3.1. Epicenters of 2003 earthquakes



**3.2. ábra** A 2003-ban regisztrált robbantások epicentrumai

**Figure 3.2.** Epicenters of 2003 explosions



3.3. ábra A 2003-ban regisztrált földrengések fészekmechanizmusai

Figure 3.3. Fault plane solutions of 2003 earthquakes

**Földrengés paraméterek**

**Hypocenter Parameters**

## FÉSZKEPARAMÉTEREK 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 fészkek 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 epicentrumból 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 by Fig. 3.3.

## Hypocenter Parameters

## Földrögés paraméterek

1.

2003-01-01 time: 19:09:48.33 UTC ML= 1.9  
 lat: 46.161N lon: 16.541E h= 10.0 km  
 erh= 2.5km erz= 1.6km  
 nr= 19 gap=140 rms=0.49  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PTJ	53.7	237	iPgC	19:09:58.10	0.01
			eSg	10:02.60	-3.10
GOLS	72.9	257	iPg	19:10:01.82	0.35
			eSg	10:11.60	-0.11
DOBS	82.8	269	iPg	19:10:03.00	-0.23
CESS	86.0	256	ePg	19:10:03.25	-0.54
			eSg	10:15.76	-0.09
CRES	91.9	246	iPg	19:10:04.76	-0.08
			eSg	10:17.72	0.00
LEGS	97.6	256	iPg	19:10:05.56	-0.29
RHK1	118.5	94	ePnC	19:10:07.90	-0.97
			eSn	10:22.30	-2.58
BISS	121.5	296	ePn	19:10:09.29	0.06
VBY	123.7	234	ePn	19:10:10.16	0.65
			eSn	10:26.02	0.00
ARSA	144.0	327	iPnD	19:10:12.80	0.76
			iSn	10:29.80	-0.73
OBKA	158.2	284	iPnC	19:10:14.50	0.69
			iSn	10:33.90	0.21

2.

2003-01-14 time: 1:06:46.01 UTC ML=1.5  
 lat: 46.163N lon: 16.240E h= 10.0 km  
 erh=16.7km  
 Locality: Croatia  
 Comments:  
 Reported by NEIC

3.

2003-01-19 time: 23:32:26.82 UTC ML= 0.3  
 lat: 45.946N lon: 18.425E h= 0.1 km  
 erh= 0.5km erz=97.9km  
 nr= 6 gap=215 rms=0.07  
 Locality: Kiskassa  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	14.9	244	ePg	23:32:29.40	-0.07
			eSg	32:31.50	-0.04
RHK1	31.9	301	iPgC	23:32:32.60	0.08
			eSg	32:36.90	-0.07
PKSM	33.9	30	iPgC	23:32:32.90	0.02
			eSg	32:37.50	-0.11

4.

2003-01-29 time: 20:04:53.67 UTC ML= 1.5  
 lat: 46.352N lon: 17.193E h= 6.9 km  
 erh= 7.1km erz=12.8km  
 nr= 8 gap=151 rms=0.55  
 Locality: Inke  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS9	87.4	73	ePg	20:05:09.50	0.18
			eSg	05:21.70	0.16
RHK3	96.7	122	ePgC	20:05:10.80	-0.18
			eSg	05:24.40	-0.08
GOLS	126.9	253	ePn	20:05:15.30	-0.34
LEGS	151.6	253	ePn	20:05:19.70	0.98
			eSn	05:39.20	0.93
BISS	162.0	282	ePn	20:05:18.80	-1.21

5.

2003-02-03 time: 19:32:46.30 UTC ML= 2.7  
 lat: 47.896N lon: 17.094E h= 10.0 km  
 erh= 4.1km erz= 5.2km  
 nr= 22 gap= 70 rms=0.78  
 Locality: Hegyeshalom  
 Comments: felt 5 EMS

sta	dist	azm	phase	hr mn sec	res
ZST	33.3	1	iPg	19:32:52.60	0.09
			iSg	32:56.80	-0.56
MODS	54.8	14	iPg	19:32:55.90	-0.34
			iSg	33:02.00	-2.00
VKA	70.9	305	iPgC	19:32:59.10	0.02
			iSg	33:07.10	-1.94
PKSG	112.4	120	ePnC	19:33:05.10	-0.97
			iSn	33:19.50	-1.99
ARSA	138.3	239	iPnD	19:33:08.80	-0.50
			iSn	33:24.80	-2.44
BUD	152.0	108	eSn	19:33:30.30	0.03
PKS8	164.6	133	iPnD	19:33:12.40	-0.17
			eSn	33:30.90	-2.16
PKS9	171.0	148	iPnC	19:33:13.50	0.13
			eSn	33:31.60	-2.89
PKS7	182.2	121	iPnD	19:33:18.40	3.63
			eSn	33:39.30	2.33
PSZ	209.4	89	ePn	19:33:19.60	1.44
			eSn	33:33.80	-9.21
MOA	211.6	269	iPnC	19:33:21.10	2.66
			iSn	33:45.60	2.09
RHK1	213.6	160	ePn	19:33:17.90	-0.79
PKSM	221.1	148	ePn	19:33:18.70	-0.92
			eSn	33:42.30	-3.32
OKC	229.3	20	ePn	19:33:21.20	0.56
PKS6	236.1	128	iPnC	19:33:21.60	0.11
GOLS	237.6	208	iPn	19:33:21.10	-0.58
RHK3	240.0	158	ePnC	19:33:21.60	-0.38
			eSn	33:46.00	-3.81
OBKA	246.9	231	iPnC	19:33:23.30	0.46
			iSn	33:50.90	-0.45
GEC2	272.6	293	ePn	19:33:26.90	0.86
			eSn	34:01.50	4.45
DPC	278.7	348	ePn	19:33:27.20	0.40
			eSn	34:05.70	7.31
KHC	293.8	298	ePn	19:33:29.60	0.91
			eSn	34:08.00	6.25
KBA	296.9	252	iPnC	19:33:28.70	-0.37
			iSn	34:12.20	9.77
PRU	298.5	321	Pn	19:33:29.20	-0.07
			eSn	34:02.30	-0.49
OJC	325.3	37	ePn	19:33:32.30	-0.31
			eSn	34:06.50	-2.24
PTCC	328.6	240	ePn	19:33:33.37	0.35
			eSn	33:41.83	-27.64
KSP	332.8	350	ePn	19:33:33.80	0.25
WET	341.0	294	iPnC	19:33:43.20	8.63
FVI	357.3	246	ePn	19:33:37.14	0.54
			eSn	33:45.76	-30.07
BRG	402.4	325	ePn	19:33:48.60	6.37
WTTA	416.6	260	iPnC	19:33:43.60	-0.40
			iSn	34:27.60	-1.40
SCE	417.0	257	iPnD	19:33:45.00	0.96
NKC	427.6	307	ePn	19:33:45.70	0.33
NKC	427.6	307	ePn	19:33:45.70	0.33
			eSn	34:46.80	15.36
SQTA	449.3	260	iPnD	19:33:47.70	-0.37
			iSn	34:55.50	19.24
MOTA	454.5	262	iPnD	19:33:49.40	0.68
			iSn	34:36.20	-1.21
MOX	502.5	307	ePn	19:33:55.30	0.60
DAVA	546.8	263	iPnD	19:34:00.40	0.17
			iSn	35:23.50	25.60



## Földrengés paraméterek

## Hypocenter Parameters

6.

2003-02-07 time: 10:43:55.26 UTC ML= 1.1  
 lat: 47.667N lon: 18.567E h= 15.0 km  
 erh= 5.3km erz= 2.6km  
 nr= 5 gap=241 rms=0.30  
 Locality: Nagysáp  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	33.3	203	ePgC	10:44:02.20	0.41
			eSg	44:06.40	-0.49
RHK5	38.1	85	eSg	10:44:08.00	-0.28
BUD	40.0	121	eSg	10:44:09.00	0.17
PKSM	161.9	178	eSn	10:44:40.20	-0.08

7.

2003-02-11 time: 10:14:59.47 UTC ML= 0.0  
 lat: 46.082N lon: 18.354E h= 10.0 km  
 erh= 3.9km erz=13.7km  
 nr= 6 gap=143 rms=0.50  
 Locality: Romonya  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	21.8	274	ePgC	10:15:03.90	0.14
			eSg	15:06.80	-0.30
RHK3	22.9	200	ePg	10:15:03.40	-0.54
			eSg	15:09.20	1.78
PKSM	26.5	57	ePgC	10:15:04.60	0.08
			eSg	15:08.60	0.13

8.

2003-02-12 time: 10:38:46.65 UTC ML= 0.4  
 lat: 46.069N lon: 18.346E h= 8.6 km  
 erh= ---km erz= ---km  
 nr= 4 gap=223 rms=0.05  
 Locality: Bogád  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	21.4	278	iPgC	10:38:50.80	0.03
			eSg	38:53.90	-0.08
PKSM	27.9	55	ePgC	10:38:51.80	-0.06
			eSg	38:56.00	0.07

9.

2003-02-12 time: 14:25:27.25 UTC ML= 1.5  
 lat: 45.518N lon: 17.720E h= 13.3 km  
 erh= 3.9km erz= 1.3km  
 nr= 6 gap=338 rms=0.14  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	58.5	45	ePgD	14:25:38.00	0.04
			eSg	25:46.30	-0.01
RHK1	69.8	23	iPgC	14:25:40.00	0.07
			eSg	25:49.30	-0.52
PKSM	105.2	43	iPnC	14:25:45.60	-0.11
			eSn	26:00.40	0.30

10.

2003-02-14 time: 11:01:28.44 UTC ML=  
 lat: 46.140N lon: 16.013E h= 10.0 km  
 erh= 2.8km erz= 1.9km  
 nr= 12 gap=248 rms=0.32  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
GOLS	33.3	244	ePg	11:01:34.80	0.15
			iSg	01:40.10	0.61
DOBS	42.0	271	iPg	11:01:35.40	-0.75
			eSg	01:41.80	-0.36
CESS	46.4	246	iPg	11:01:37.00	0.08
CRES	55.5	231	iPg	11:01:38.50	-0.01
			eSg	01:46.30	-0.06
LEGS	57.8	248	ePg	11:01:38.60	-0.33
OBKA	119.9	290	iPnC	11:01:49.40	0.25
			iSn	02:05.20	-0.11
ARSA	128.9	343	iPnC	11:01:50.40	0.12
			iSn	02:07.30	-0.01

11.

2003-02-17 time: 12:27:45.91 UTC ML= 1.0  
 lat: 46.179N lon: 18.291E h= 7.8 km  
 erh= 0.4km erz= 1.5km  
 nr= 6 gap=201 rms=0.04  
 Locality: Zobákpuszta  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	19.3	241	iPgC	12:27:49.60	-0.03
			eSg	27:52.60	0.07
PKSM	27.3	82	iPgC	12:27:51.00	0.02
			eSg	27:54.90	-0.03
RHK3	32.4	185	ePgC	12:27:51.90	0.04
			eSg	27:56.40	-0.11

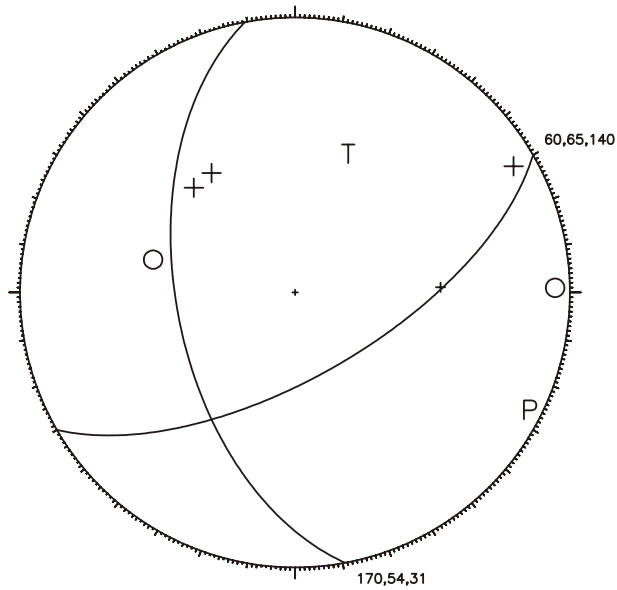
12.

2003-02-19 time: 17:56:05.28 UTC ML= 2.0  
 lat: 46.168N lon: 16.628E h= 10.0 km  
 erh= 2.9km erz= 2.3km  
 nr= 32 gap=114 rms=1.09  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PTJ	59.8	240	iPgC	17:56:16.10	0.00
			eSg	56:24.50	-0.04
GOLS	79.5	257	iPg	17:56:19.40	-0.19
			eSg	56:30.40	-0.35
DOBS	89.5	269	iPgD	17:56:20.80	-0.56
CESS	92.6	257	ePg	17:56:22.10	0.18
			iSg	56:33.70	-1.20
CRES	98.3	247	iPg	17:56:22.50	-0.43
			iSg	56:35.30	-1.39
LEGS	104.2	256	iP*	17:56:23.40	-0.55
			iS*	56:37.40	-1.11
RHK1	111.9	94	ePn	17:56:24.90	-0.09
			eSn	56:38.20	-2.16
BISS	127.1	295	iPn	17:56:26.70	-0.18
VBY	129.5	235	ePn	17:56:28.70	1.51
			iSn	56:45.40	1.13
RHK3	129.6	104	ePn	17:56:28.40	1.21
			eSn	56:43.90	-0.38
PKS9	135.3	70	ePn	17:56:26.90	-1.01
			eSn	56:47.10	1.54
ARSA	147.0	325	iPnC	17:56:29.40	0.03
			iSn	56:47.60	-0.56
PKSM	155.5	88	ePnC	17:56:29.50	-0.93
			eSn	56:47.40	-2.65
OBKA	164.5	283	iPnD	17:56:32.60	1.06
			iSn	56:53.50	1.47
PKS8	176.0	63	eSn	17:56:50.90	-3.68
NVLJ	225.2	218	iPn	17:56:41.56	2.44
			iSn	57:06.36	0.85
MOA	259.2	316	iPnC	17:56:44.30	0.94
			iSn	57:12.80	-0.26
KHC	401.3	325	e	17:57:02.00	0.93
			eSn	58:01.50	16.91

## Hypocenter Parameters

## Földrengés paraméterek



13.

2003-02-21 time: 10:03:22.54 UTC ML= 1.0  
 lat: 47.407N lon: 18.348E h= 8.9 km  
 erh=73.0km erz=17.4km  
 nr= 6 gap=307 rms=0.37  
 Locality: Gánt  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	3.7	118	ePgC	10:03:24.20	-0.07
			eSg	03:25.20	-0.41
PKS8	63.8	157	ePgC	10:03:34.10	0.04
			eSg	03:43.20	0.17
PKSM	134.8	170	ePnC	10:03:45.70	0.46
			eSn	04:01.70	-1.24

14.

2003-03-01 time: 20:09:46.64 UTC ML= 2.0  
 lat: 45.517N lon: 19.927E h= 10.0 km  
 erh=45.3km erz=42.0km  
 nr= 16 gap=301 rms=1.31  
 Locality: Serbia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS2	121.7	333	iPnD	20:10:07.50	-0.07
			eSn	10:24.40	0.51
PKS6	123.6	347	iPnC	20:10:07.40	-0.41
			eSn	10:22.00	-2.32
PKSM	126.2	308	ePnC	20:10:08.00	-0.13
			eSn	10:22.80	-2.10
RHK3	136.8	288	ePnD	20:10:09.90	0.45
			eSn	10:25.70	-1.54
RHK1	157.8	294	ePnC	20:10:12.40	0.33
			eSn	10:30.20	-1.72
PKS9	174.4	313	ePn	20:10:18.50	4.36
			eSn	10:38.90	3.31
PKS8	179.5	327	ePnC	20:10:14.50	-0.28
			eSn	10:39.50	2.77
PKS7	180.1	341	ePn	20:10:14.90	0.05
			eSn	10:39.40	2.55

15.

2003-03-03 time: 11:19:28.31 UTC ML= 0.0  
 lat: 46.157N lon: 18.324E h= 7.2 km  
 erh= 1.0km erz= 5.7km  
 nr= 5 gap=186 rms=0.09  
 Locality: Zobákpuzsta  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	20.7	250	iPgC	11:19:32.20	-0.03
			eSg	19:35.40	0.12
PKSM	25.2	76	ePgD	11:19:33.10	0.10
			eSg	19:36.40	-0.26
RHK3	30.4	191	eSg	11:19:38.20	-0.03

16.

2003-03-04 time: 19:05:38.62 UTC ML= 1.1  
 lat: 45.770N lon: 17.445E h= 18.8 km  
 erh= 6.7km erz= 6.7km  
 nr= 6 gap=335 rms=0.25  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	60.5	53	iP*D	19:05:49.60	-0.22
			eS*	05:59.00	0.45
RHK3	64.0	78	iP*C	19:05:50.60	0.25
			eS*	05:59.40	-0.10
PKSM	104.8	62	iPnC	19:05:56.30	-0.03
			eSn	06:09.30	-0.84

17.

2003-03-10 time: 15:11:46.77 UTC ML= 2.0  
 lat: 45.502N lon: 17.884E h= 0.4 km  
 erh= 1.6km erz= 168km  
 nr= 6 gap=336 rms=0.10  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	67.5	13	ePgD	15:11:58.70	-0.12
			eSg	12:08.10	-0.12
PKSM	98.4	37	ePgD	15:12:04.30	-0.04
			eSg	12:18.10	0.05
PKS9	124.4	14	iPgC	15:12:09.10	0.12
			eSg	12:26.30	-0.01

18.

2003-03-23 time: 9:05:46.02 UTC ML= 1.7  
 lat: 47.554N lon: 19.929E h= 10.0 km  
 erh= 3.9km erz= 2.6km  
 nr= 12 gap=187 rms=0.65  
 Locality: Jászdózsza  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	40.6	356	iPgC	9:05:53.50	0.01
			eSg	05:59.40	0.08
PKSN	73.1	184	iPgD	9:05:59.10	-0.10
			eSg	06:08.80	-0.68
PKS7	80.9	226	ePg	9:06:00.90	0.33
			eSg	06:11.80	-0.13
PKSG	117.4	261	eSn	9:06:21.90	-0.41
PKS2	130.0	205	ePn	9:06:08.20	0.22
			eSn	06:25.30	0.19
PKS9	165.1	229	ePnD	9:06:17.10	4.74
			eSn	06:35.00	2.09
PKSM	178.6	213	ePn	9:06:12.80	-1.24
			eSn	06:39.10	3.21

## Földrengés paraméterek

## Hypocenter Parameters

19.

2003-03-25 time: 9:39:55.78 UTC ML= 1.1  
 lat: 47.436N lon: 18.379E h= 5.8 km  
 erh=11.4km erz= 1.4km  
 nr= 6 gap=345 rms=0.60  
 Locality: Várgezsztos  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	4.9	170	iPgC	9:39:56.90	-0.24
			eSg	39:57.50	-0.71
PKS9	94.6	185	ePgC	9:40:13.50	0.79
			eSg	40:26.50	0.58
PKSM	137.5	172	ePnC	9:40:19.40	0.19
			eSn	40:35.70	-1.78

20.

2003-04-06 time: 21:59:08.25 UTC ML= 1.2  
 lat: 45.907N lon: 18.703E h= 10.0 km  
 erh= 5.8km erz= 4.3km  
 nr= 12 gap=252 rms=0.83  
 Locality: Udvar  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSM	34.2	352	iPgC	21:59:13.90	-0.70
			eSg	59:19.30	-0.26
RHK1	53.1	293	ePgC	21:59:17.90	0.00
			eSg	59:24.10	-1.33
PKS2	76.0	31	ePg	21:59:22.40	0.47
			eSg	59:34.10	1.49
PKS9	82.3	337	iPgC	21:59:23.90	0.85
			eSg	59:34.90	0.30
PKS6	101.7	41	ePgC	21:59:25.50	-0.99
			eSg	59:40.00	-0.72
PKS8	108.0	359	ePn	21:59:28.60	1.14
			eSn	59:41.30	-1.16

21.

2003-04-10 time: 22:09:36.86 UTC ML= 1.2  
 lat: 46.455N lon: 18.931E h= 14.9 km  
 erh=14.7km erz= 7.6km  
 nr= 8 gap=241 rms=1.15  
 Locality: Fajsz  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSM	35.0	220	iPgD	22:09:43.50	-0.16
			eSg	09:47.20	-1.77
PKS8	51.0	338	iPgD	22:09:47.00	0.66
			eSg	09:52.50	-1.24
RHK1	77.4	239	iPgC	22:09:52.10	1.17
			eSg	10:01.80	-0.11
PKSG	112.0	338	ePn	22:09:52.90	-3.04
			eSn	10:10.90	0.07

22.

2003-04-11 time: 13:03:34.86 UTC ML= 1.5  
 lat: 45.553N lon: 17.715E h= 15.4 km  
 erh= 1.7km erz= 0.6km  
 nr= 6 gap=336 rms=0.07  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	56.1	48	ePgC	13:03:45.20	-0.05
			eSg	03:53.40	0.05
RHK1	66.4	25	iPgD	13:03:47.00	-0.03
			eSg	03:56.60	0.09
PKSM	102.7	44	iPnD	13:03:52.80	0.06
			eSn	04:06.50	-0.18

23.

2003-04-16 time: 3:05:59.62 UTC ML= 2.2  
 lat: 45.884N lon: 16.149E h= 10.0 km  
 erh= 4.0km erz= 2.8km  
 nr= 20 gap=173 rms=0.69  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
GOLS	43.0	289	iPg	3:06:07.30	-0.21
			iSg	06:13.20	-0.46
CESS	54.1	281	iPgD	3:06:09.79	0.35
			iSg	06:16.30	-0.81
CRES	54.1	263	iPg	3:06:09.10	-0.35
			iSg	06:16.30	-0.82
DOBS	60.3	299	iPg	3:06:10.29	-0.25
LEGS	64.9	276	iPg	3:06:11.00	-0.34
			iSg	06:19.90	-0.59
GROS	81.3	322	iPg	3:06:13.60	-0.64
PKKS	91.8	284	iPgC	3:06:15.40	-0.71
			eSg	06:26.70	-2.27
PERS	115.4	316	iPn	3:06:19.10	-0.66
			iSn	06:32.90	-2.57
BISS	115.8	317	iPn	3:06:19.30	-0.51
			eSn	06:32.50	-3.06
CEY	134.8	263	ePnD	3:06:23.20	1.01
			eSn	06:40.40	0.61
OBKA	141.7	299	iPnC	3:06:23.50	0.46
			iSn	06:39.30	-2.01
RHK1	150.8	81	iPnC	3:06:24.00	-0.18
			eSn	06:43.80	0.46
ARSA	159.3	342	iPnC	3:06:25.50	0.27
			iSn	06:42.90	-2.31
RHK3	163.3	90	iPnC	3:06:26.10	0.37
			eSn	06:43.80	-2.30
VOY	175.6	275	ePn	3:06:28.90	1.63
			eSn	06:50.90	2.06
PKS9	181.9	65	iPnC	3:06:28.30	0.24
			eSn	06:54.30	4.06
PKSM	196.3	79	iPnD	3:06:29.00	-0.85
			eSn	06:51.60	-1.84
KBA	253.0	302	iPnC	3:06:42.30	5.38
			iSn	07:10.20	4.19
MOA	261.4	327	iPnC	3:06:39.70	1.73
			iSn	07:07.10	-0.78
KHC	409.6	332	ePn	3:06:57.50	1.05
			eSn	07:40.40	-0.38

24.

2003-04-16 time: 5:35:02.25 UTC ML= 1.9  
 lat: 46.110N lon: 17.173E h= 13.4 km  
 erh= 9.2km erz= 4.5km  
 nr= 8 gap=312 rms=0.64  
 Locality: Bélavár  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	69.5	91	iPgC	5:35:14.60	-0.30
			eSg	35:23.90	-0.86
RHK3	87.2	106	ePg	5:35:18.80	0.81
			eSg	35:30.70	0.42
PKS9	100.3	58	eP*	5:35:21.20	1.20
			eS*	35:34.20	0.35
PKSM	114.0	84	iPnC	5:35:21.30	-0.48
			eSn	35:36.40	-0.62

25.

2003-04-16 time: 19:24:20.84 UTC ML= 1.5  
 lat: 46.396N lon: 17.257E h= 24.5 km  
 erh= 3.5km erz= 1.8km  
 nr= 6 gap=317 rms=0.08  
 Locality: Vése  
 Comments:

## Hypocenter Parameters

sta	dist	azm	phase	hr mn sec	res
RHK1	71.3	118	iPgC	19:24:33.60	0.01
			eSg	24:43.50	-0.04
PKS9	81.3	75	iPnD	19:24:35.10	0.05
			eSn	24:44.40	-1.74
PKSM	108.6	101	iPnC	19:24:38.40	-0.06
			eSn	24:52.30	0.09

26.

2003-04-20 time: 18:43:15.51 UTC ML= 1.6  
lat: 46.082N lon: 17.177E h= 22.1 km  
erh= 9.4km erz= 6.6km  
nr= 10 gap=308 rms=0.64  
Locality: Croatia  
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	69.2	89	ePgC	18:43:28.90	0.97
			eSg	43:38.50	0.89
RHK3	86.0	104	ePg	18:43:29.80	-0.68
			eSg	43:40.00	-2.16
PKS9	101.7	57	ePn	18:43:32.10	-0.39
			eSn	43:45.80	0.07
PKSM	114.0	83	iPnC	18:43:34.20	0.17
			eSn	43:48.40	-0.07
PKS8	145.2	52	ePn	18:43:38.10	0.18
			eSn	43:54.50	-0.90

27.

2003-04-24 time: 11:38:03.01 UTC ML= 1.0  
lat: 47.840N lon: 19.016E h= 0.1 km  
erh= 3.5km erz= 531km  
nr= 8 gap=219 rms=0.22  
Locality: Kismaros  
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK5	16.3	165	iPgC	11:38:05.90	-0.02
			eSg	38:07.70	-0.50
RHK6	25.4	137	iPgD	11:38:07.60	0.05
			eSg	38:11.40	0.31
PSZ	66.3	82	ePg	11:38:14.50	-0.35
			eSg	38:24.40	0.32
PKSG	68.5	223	ePg	11:38:15.50	0.25
			eSg	38:24.60	-0.19

28.

2003-04-28 time: 9:25:47.27 UTC ML= 1.3  
lat: 45.559N lon: 18.058E h= 10.0 km  
erh=13.8km erz=49.4km  
nr= 6 gap=329 rms=0.63  
Locality: Croatia  
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	39.7	22	ePg	9:25:55.20	0.63
			eSg	25:57.20	-3.07
RHK1	59.6	1	iPgC	9:25:57.80	-0.26
			eSg	26:07.30	0.82
PKSM	85.6	32	ePgC	9:26:02.60	-0.05
			eSg	26:14.50	-0.15

29.

2003-05-02 time: 21:31:19.98 UTC ML= 1.0  
lat: 47.774N lon: 18.492E h= 7.2 km  
erh= ---km erz= ---km  
nr= 4 gap=155 rms=0.00  
Locality: Lábatlan  
Comments:

## Földrengés paraméterek

sta	dist	azm	phase	hr mn sec	res
PKSG	43.2	190	ePgC	21:31:27.80	0.00
			eSg	31:33.40	-0.50
RHK5	44.3	101	ePgC	21:31:28.00	0.00
			eSg	31:36.80	2.54
MODS	112.4	306	ePg	21:31:40.10	0.00
			eSg	31:51.70	-4.09
PKSM	174.0	176	iPnC	21:31:47.80	0.00
			eSn	32:06.60	-2.89

30.

2003-05-04 time: 1:24:18.42 UTC ML= 0.4  
lat: 47.618N lon: 18.051E h= 14.1 km  
erh= 423km erz= 278km  
nr= 6 gap=191 rms=0.75  
Locality: Nagyigmánd  
Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	35.9	134	ePgD	1:24:24.40	-0.91
			eSg	24:30.40	-0.28
MODS	101.9	326	iP*	1:24:36.70	0.35
			eS*	24:48.90	-1.44
PSZ	142.2	76	iPnC	1:24:42.20	0.82
			eSn	24:58.40	-0.89

31.

2003-05-06 time: 16:55:56.68 UTC ML= 2.0  
lat: 45.610N lon: 18.022E h= 10.0 km  
erh=12.2km erz= 5.9km  
nr= 5 gap=328 rms=0.31  
Locality: Croatia  
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	35.7	30	ePg	16:56:03.60	0.30
RHK1	54.0	4	ePg	16:56:06.20	-0.29
			eSg	56:14.50	0.36
PKSM	82.3	36	ePgC	16:56:11.10	-0.39
PKS9	110.4	10	ePn	16:56:16.40	0.20

32.

2003-05-08 time: 11:41:43.41 UTC ML= 1.1  
lat: 46.203N lon: 18.262E h= 10.0 km  
erh= 2.5km erz= 4.9km  
nr= 6 gap=218 rms=0.22  
Locality: Komló  
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	19.0	231	ePgC	11:41:47.30	0.06
			eSg	41:50.30	0.07
PKSM	29.3	88	ePgC	11:41:48.80	-0.14
			eSg	41:53.50	0.25
RHK3	35.0	181	ePgC	11:41:50.00	0.09
			eSg	41:54.20	-0.78

33.

2003-05-08 time: 15:04:52.34 UTC ML= 1.8  
lat: 45.588N lon: 17.358E h= 10.0 km  
erh= 9.3km erz= 3.6km  
nr= 6 gap=225 rms=0.52  
Locality: Croatia  
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	79.1	45	ePgC	15:05:07.40	0.83
			eSg	05:16.30	-1.37
PKSM	121.4	55	iPnD	15:05:13.30	0.08
			eSn	05:29.20	-0.32
CRES	150.4	280	ePn	15:05:16.80	-0.05
			eSn	05:35.40	-0.57

## Földrengés paraméterek

34.

2003-05-20 time: 20:13:41.46 UTC ML= 4.3  
 lat: 48.764N lon: 22.089E h= 2.4 km  
 erh= 2.1km erz= 2.5km  
 nr= 34 gap= 81 rms=0.81  
 Locality: Slovakia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
UZH	21.1	134	iPg	20:13:44.80	-0.45
			eSg	13:48.10	-0.10
KWP	106.5	25	ePg	20:14:00.90	0.42
			eSg	14:14.90	-0.42
LVV	183.7	50	iPn	20:14:11.40	0.31
			eSn	14:34.00	-0.20
PSZ	187.9	240	iPnD	20:14:12.00	0.38
			iSn	14:35.80	0.66
KSV	225.5	103	ePn	20:14:16.00	-0.31
			eSn	14:44.00	0.52
OJC	231.8	314	ePn	20:14:17.00	-0.10
			eSn	14:44.20	-0.69
RHK5	253.5	242	iPnC	20:14:20.40	0.60
BUD	268.9	238	ePn	20:14:21.90	0.18
SRO	299.5	249	ePn	20:14:26.20	0.67
			eSn	14:56.70	-3.20
OKC	310.6	293	ePn	20:14:26.70	-0.21
			eSn	15:12.00	9.63
PKSG	315.0	241	ePn	20:14:28.40	0.94
RAC	318.4	297	ePn	20:14:28.20	0.31
			eSn	15:00.40	-3.71
PKS8	330.5	231	iPnC	20:14:28.60	-0.80
MODS	357.8	263	ePn	20:14:33.90	1.10
			eSn	15:12.40	-0.44
ZST	374.0	260	ePn	20:14:34.60	-0.22
			eSn	15:15.80	-0.65
PKS9	374.7	230	ePn	20:14:41.70	6.79
PKSM	384.7	222	iPnC	20:14:35.40	-0.76
RHK1	424.1	226	ePn	20:14:40.20	-0.87
VKA	429.9	263	iPnD	20:14:41.20	-0.60
DPC	453.0	293	ePn	20:14:45.20	0.52
			eSn	15:56.30	22.32
MLR	466.9	141	iPn	20:14:46.30	-0.11
VRI	476.2	133	iPn	20:14:47.30	-0.27
KSP	477.0	299	ePn	20:14:48.00	0.33
			eSn	15:33.50	-5.81
ARSA	518.0	251	iPnC	20:14:53.40	0.62
ISR	528.4	140	iPn	20:14:56.10	2.02
GROS	557.5	243	ePn	20:14:58.70	1.00
PRU	564.8	284	ePn	20:14:57.80	-0.81
			eSn	16:25.30	26.52
PERS	574.3	246	ePn	20:15:00.00	0.20
SUW	588.9	7	ePn	20:15:01.30	-0.32
			eSn	16:03.70	-0.44
MOA	589.2	260	iPnD	20:15:01.90	0.25
			iSn	16:11.40	7.20
CFR	608.8	131	iPn	20:15:04.00	-0.10
OBKA	619.6	246	iPnD	20:15:06.60	1.15
KHC	624.8	274	ePn	20:15:06.10	0.01
			eSn	16:46.60	34.50
KBA	679.9	254	iPnC	20:15:14.00	1.04
			iSn	16:32.00	7.66
WTTA	797.5	258	iPnC	20:15:27.70	0.07
			iSn	16:59.10	8.67
SQTA	830.0	258	iPnD	20:15:31.60	-0.08
			iSn	17:03.80	6.14
DAVA	925.4	260	iPnD	20:15:43.90	0.33
			iSn	17:25.00	6.19

36

## Hypocenter Parameters

35.

2003-05-22 time: 0:25:12.40 UTC ML= 1.8  
 lat: 45.658N lon: 18.791E h= 5.7 km  
 erh= 5.5km erz= 4.0km  
 nr= 12 gap=272 rms=0.66  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	49.1	301	ePgC	0:25:21.00	-0.23
			eSg	25:28.20	0.08
PKSM	62.7	349	ePgC	0:25:23.30	-0.34
			eSg	25:32.30	-0.10
RHK1	74.0	311	ePgC	0:25:25.30	-0.35
			eSg	25:35.70	-0.29
PKS9	110.6	339	iPgC	0:25:32.90	0.72
			eSg	25:48.00	0.39
PKS6	120.6	30	ePn	0:25:31.90	-1.85
			eSn	25:49.30	-1.10
PKS8	136.0	356	iPnC	0:25:36.30	0.63
			eSn	25:53.60	-0.22

36.

2003-06-04 time: 23:39:59.46 UTC ML= 2.3  
 lat: 47.341N lon: 20.946E h= 10.0 km  
 erh= 9.7km erz= 3.9km  
 nr= 8 gap=283 rms=0.46  
 Locality: Karcag  
 Comments: explosion (350 kg)

sta	dist	azm	phase	hr mn sec	res
PKSN	95.6	239	iPgD	23:40:16.90	0.27
PSZ	101.8	309	iPgC	23:40:17.80	0.07
			eSg	40:31.10	-0.87
PKS6	133.6	232	ePnC	23:40:21.60	-0.28
PENC	134.8	292	ePnC	23:40:22.90	0.87
PKS7	139.2	256	ePnD	23:40:22.10	-0.47
PKSG	193.1	272	ePn	23:40:29.30	0.00
PKSM	216.2	234	ePnC	23:40:31.10	-1.08
ZST	303.4	288	iPn	23:40:43.40	0.35
ARSA	410.3	269	iPnC	23:40:56.60	0.22

37.

2003-06-05 time: 8:27:05.69 UTC ML= 0.2  
 lat: 46.038N lon: 18.377E h= 0.2 km  
 erh= 3.0km erz= 500km  
 nr= 5 gap=164 rms=0.47  
 Locality: Hásságy  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK3	19.2	210	eSg	8:27:11.40	-0.39
RHK1	24.5	285	iPgC	8:27:10.30	0.25
			eSg	27:13.20	-0.26
PKSM	28.1	47	ePgC	8:27:11.10	0.39
			eSg	27:13.00	-1.63

38.

2003-06-05 time: 23:19:59.28 UTC ML= 1.7  
 lat: 48.025N lon: 19.424E h= 0.0 km  
 erh= 3.3km erz= 301km  
 nr= 7 gap=266 rms=0.21  
 Locality: Iliny  
 Comments: explosion (350 kg)

sta	dist	azm	phase	hr mn sec	res
PENC	28.2	202	ePgC	23:20:04.30	-0.01
			eSg	20:08.50	0.27
PSZ	37.1	109	iPgC	23:20:06.10	0.20
			eSg	20:10.40	-0.66
RHK6	41.2	199	iPgC	23:20:06.60	-0.03
			eSg	20:12.50	0.14

## Hypocenter Parameters

PKS7 110.5 190 iPgC 23:20:18.90 -0.11  
eSg 20:31.50 -2.90

39.

2003-06-11 time: 12:05:24.18 UTC ML= 1.8  
lat: 45.571N lon: 16.675E h= 12.7 km  
erh=11.9km erz=11.2km  
nr= 7 gap=225 rms=0.49  
Locality: Croatia  
Comments:

sta	dist	azm	phase	hr mn sec	res
GOLS	95.2	301	iP*	12:05:41.90	0.68
			iS*	05:54.20	-0.31
CRES	99.0	287	iP*	12:05:41.20	-0.60
			iS*	05:56.00	0.45
LEGS	113.6	292	iPn	12:05:43.60	-0.16
RHK1	123.2	62	ePn	12:05:45.10	0.15
			eSn	05:59.10	-2.05

40.

2003-06-17 time: 8:58:16.49 UTC ML=2.5  
lat: 48.558N lon: 17.655E h= 10.0 km  
erh= 8.5km  
Locality: Slovakia  
Comments:  
Reported by NEIC

41.

2003-06-21 time: 8:03:01.62 UTC ML= 2.0  
lat: 47.548N lon: 19.936E h= 10.0 km  
erh=97.6km erz=94.6km  
nr= 6 gap=234 rms=0.40  
Locality: Jászódsza  
Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	41.3	356	ePgD	8:03:09.10	-0.11
			iSg	03:15.10	-0.03
PKSG	117.8	262	ePn	8:03:22.20	0.14
			eSn	03:37.60	-0.40
PKS9	165.1	230	ePn	8:03:29.20	1.24
			eSn	03:47.40	-1.10

42.

2003-06-21 time: 20:05:58.09 UTC ML= 3.7  
lat: 47.531N lon: 20.032E h= 12.9 km  
erh= 2.0km erz= 1.2km  
nr= 29 gap=203 rms=0.63  
Locality: Jászapáti  
Comments: felt 5-6 EMS

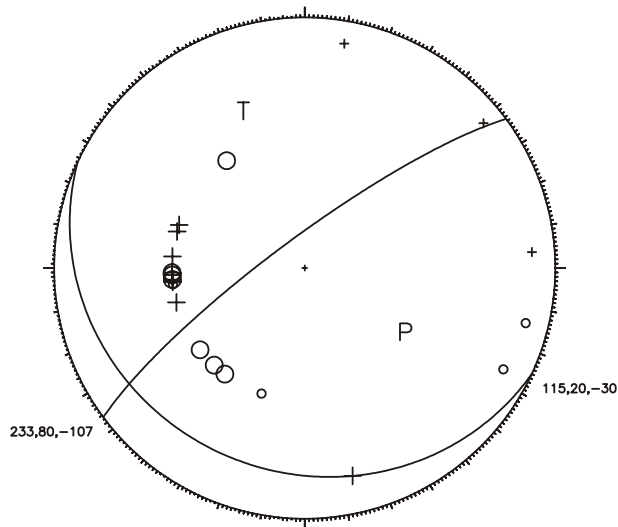
sta	dist	azm	phase	hr mn sec	res
PSZ	44.3	347	iPgC	20:06:06.40	0.08
			iSg	06:12.20	-0.55
PENC	63.3	297	ePgD	20:06:09.70	0.08
			eSg	06:19.30	0.68
PKSN	71.6	190	ePgC	20:06:11.70	0.63
			eSg	06:21.50	0.30
RHK5	74.5	284	ePgD	20:06:11.50	-0.09
			eSg	06:22.10	-0.02
BUD	76.1	266	ePgC	20:06:11.90	0.03
			eSg	06:21.30	-1.32
PKS7	85.0	231	ePgC	20:06:13.50	0.05
			eSg	06:25.80	0.37
PKS6	109.4	199	ePnD	20:06:16.80	-0.31
			eSn	06:31.10	-0.85
PKSG	124.7	263	ePnD	20:06:19.40	0.38
			eSn	06:34.60	-0.74
SRO	132.8	284	iPn	20:06:21.20	1.17
			iSn	06:37.30	0.16
PKS9	169.6	232	iPnD	20:06:24.00	-0.61

## Földrögés paraméterek

RHK1	218.8	223	eSn	06:47.50	2.20
			iPnD	20:06:29.90	-0.85
			eSn	07:03.10	6.88
MODS	226.1	294	ePn	20:06:32.00	0.34
			eSn	06:57.30	-0.54
RHK3	227.7	217	iPnD	20:06:31.10	-0.76
			eSn	06:57.50	-0.71
ZST	231.3	289	iPn	20:06:32.70	0.39
			eSn	06:57.10	-1.90
VKA	289.4	286	iPnD	20:06:40.20	0.65
OKC	291.6	332	ePn	20:06:41.20	1.37
			eSn	07:09.60	-2.79
OJC	299.5	357	ePn	20:06:42.40	1.59
			eSn	07:15.30	1.17
KWP	305.8	40	ePn	20:06:45.60	4.00
RAC	314.3	335	ePn	20:06:52.50	9.84
			eSn	07:29.00	11.58
ARSA	341.8	265	iPnD	20:06:46.90	0.81
			iSn	07:24.30	0.77
DPC	414.9	319	ePn	20:06:56.10	0.90
			eSn	07:38.00	-1.75
OBKA	432.1	255	iPnD	20:06:58.10	0.76
			iSn	07:44.40	0.84
MOA	434.3	275	iPnD	20:06:58.50	0.88
			iSn	07:44.60	0.54
KSP	458.2	324	iPnD	20:07:02.10	1.50
PRU	487.5	304	ePn	20:07:04.20	-0.05
			Sn	07:49.60	-6.25
GEC2	492.9	287	ePn	20:07:05.60	0.68
			eSn	07:57.70	0.65
GERE	492.9	287	Pn	20:07:05.64	0.72
			Sn	07:56.41	-0.64
KBA	508.2	264	iPnD	20:07:08.00	1.16
			iSn	08:00.80	0.34
KHC	510.5	290	ePn	20:07:07.80	0.68
			eSn	08:00.60	-0.37
WET	559.9	289	iPnD	20:07:13.50	0.22
BRG	578.7	310	iPn	20:07:15.40	-0.23
SCE	631.9	265	iPnD	20:07:24.30	2.04
NKC	632.2	298	ePn	20:07:22.60	0.30
WTTA	634.5	267	iPnD	20:07:23.80	1.22
			iSn	08:29.40	0.91
WATA	638.3	268	iPnD	20:07:23.50	0.45
CLL	660.7	309	iPn	20:07:25.90	0.05
			eSn	08:30.00	-4.31
SQTA	667.2	267	iPnD	20:07:27.20	0.53
MOX	705.6	299	ePn	20:07:31.90	0.45
DAVA	766.7	268	iPnD	20:07:39.60	0.54
CLZ	846.0	305	ePn	20:07:50.90	1.95
BFO	878.9	276	ePn	20:07:52.80	-0.26
			eSn	09:17.60	-5.14
BSD	916.0	337	iPn	20:07:57.60	-0.08
CDF	957.5	276	ePn	20:08:01.00	-1.85
			eSn	09:32.80	-7.37
HINF	990.2	272	ePn	20:08:05.80	-1.13
			eSn	09:38.20	-9.24
HAU	27.1	273	ePn	20:08:11.00	-0.54
			eSn	09:45.50	-10.13
LPG	44.0	257	ePn	20:08:12.60	-1.04
LPL	44.8	258	ePn	20:08:12.10	-1.64
CABF	64.1	264	ePn	20:08:13.30	-2.85
			eSn	09:53.20	-10.64
MBDF	71.2	253	ePn	20:08:15.20	-1.83
MEZF	122.8	276	ePn	20:08:24.00	0.54
			eSn	11:12.90	56.04
ORIF	129.8	255	ePn	20:08:23.20	-1.14
FRF	134.7	247	ePn	20:08:23.20	-1.75
SMRF	192.3	251	ePn	20:08:29.90	-2.23
LOR	221.2	269	ePn	20:08:34.80	-0.94
VIVF	222.4	256	ePn	20:08:35.00	-0.88
SMF	233.3	265	ePn	20:08:34.90	-2.35
			eSn	10:30.00	-11.40
SSF	251.1	268	ePn	20:08:38.70	-0.76
AVF	267.5	266	ePn	20:08:40.60	-0.91
BGF	310.5	265	ePn	20:08:44.10	-2.77
LASF	314.8	253	ePn	20:08:46.90	-0.50
TCF	364.8	264	ePn	20:08:50.10	-3.54

## Földrengés paraméterek

## Hypocenter Parameters



43.

2003-06-22 time: 1:46:26.83 UTC ML= 1.4  
 lat: 47.542N lon: 19.945E h= 10.0 km  
 erh= 1.0km erz= 0.7km  
 nr= 10 gap=190 rms=0.15  
 Locality: Jászdózsa  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	42.0	355	ePgD	1:46:34.50	-0.05
			iSg	46:40.50	-0.07
PKSN	71.9	185	iPgD	1:46:39.80	0.00
			eSg	46:49.90	-0.01
PKS7	80.9	227	ePgC	1:46:41.70	0.31
			eSg	46:52.60	-0.14
PKS6	108.7	195	ePn	1:46:46.00	-0.14
			eSn	47:01.20	0.01
PKSG	118.4	262	ePn	1:46:47.60	0.25
			eSn	47:03.00	-0.36

44.

2003-06-22 time: 6:43:53.17 UTC ML= 1.6  
 lat: 47.544N lon: 19.966E h= 10.0 km  
 erh=14.0km erz= 8.8km  
 nr= 8 gap=193 rms=0.46  
 Locality: Jászdózsa  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	41.9	353	iPgC	6:44:00.80	-0.06
			iSg	44:06.90	0.04
PKSN	72.4	186	ePg	6:44:06.20	-0.01
			eSg	44:16.10	-0.29
PKSG	120.0	262	ePnC	6:44:13.80	-0.08
			eSn	44:29.30	-0.74
PKS9	166.6	230	ePnC	6:44:22.40	2.70
			eSn	44:41.90	1.51

45.

2003-06-22 time: 22:14:00.36 UTC ML= 1.4  
 lat: 46.861N lon: 19.485E h= 10.0 km  
 erh= 1.7km erz= 2.1km  
 nr= 14 gap= 86 rms=0.53  
 Locality: Ágasegyháza  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKSN	29.4	82	iPgC	22:14:05.60	-0.31
			Sg	14:10.50	0.26
PKS6	29.6	168	iPgC	22:14:05.80	-0.14
			eSg	14:10.10	-0.19
PKS7	32.3	310	iPgC	22:14:07.00	0.61
			eSg	14:12.00	0.90
PKS9	97.1	252	iPgC	22:14:17.70	-0.09
			eSg	14:30.30	-1.09
PKSG	101.9	305	iPgC	22:14:18.60	-0.05
			eSg	14:31.30	-1.61
PSZ	121.6	15	ePn	22:14:21.10	-0.18
			eSn	14:36.60	-1.00
RHK1	137.9	232	ePn	22:14:25.00	1.69
			eSn	14:41.70	0.49

46.

2003-06-26 time: 4:45:47.42 UTC ML= 1.6  
 lat: 47.517N lon: 19.913E h= 10.0 km  
 erh=12.8km erz=12.2km  
 nr= 6 gap=216 rms=0.19  
 Locality: Jászberény  
 Comments:

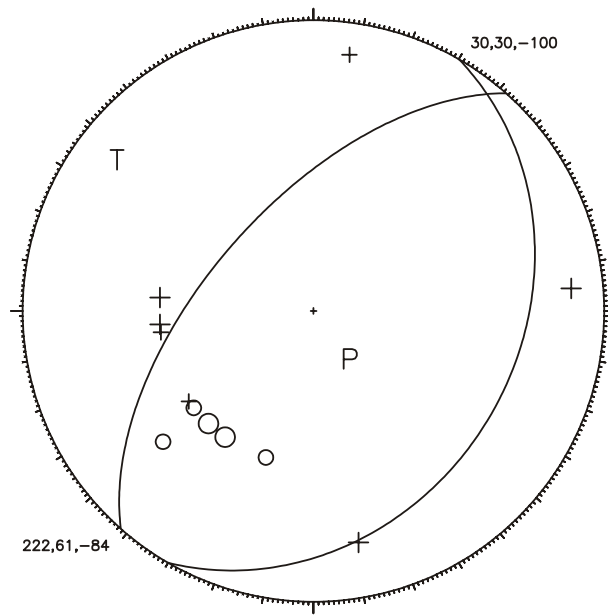
sta	dist	azm	phase	hr mn sec	res
PSZ	44.7	358	iPgC	4:45:55.70	0.10
			iSg	46:01.80	-0.17
PKS8	117.6	233	iPnD	4:46:08.00	0.16
			eSn	46:23.50	-0.26
PKS9	161.6	230	eSn	4:46:33.80	0.26
PKSM	174.5	214	ePnC	4:46:14.60	-0.34
			eSn	46:34.90	-1.50

47.

2003-06-27 time: 1:19:19.34 UTC ML= 2.4  
 lat: 47.536N lon: 20.001E h= 15.8 km  
 erh= 2.0km erz= 1.3km  
 nr= 24 gap=199 rms=0.53  
 Locality: Jászapáti  
 Comments: felt 3-4 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	43.2	349	iPgC	1:19:27.40	-0.16
			iSg	19:33.40	-0.57
PENC	61.0	298	ePg	1:19:31.10	0.50
			eSg	19:38.30	-1.08
PKSN	71.8	188	ePgC	1:19:32.90	0.43
			eSg	19:42.80	0.09
BUD	73.9	265	iPgC	1:19:33.50	0.66
			eSg	19:42.70	-0.66
PKS7	83.7	229	eP*D	1:19:34.60	0.26
			eS*	19:45.50	-0.54
PKS6	109.3	198	ePnD	1:19:38.00	0.01
			eSn	19:51.80	-0.73
PKSG	122.5	262	ePnC	1:19:40.40	0.76
			eSn	19:55.90	0.44
PKS8	124.2	234	ePnC	1:19:39.70	-0.15
			eSn	19:54.50	-1.34
PKS9	168.1	231	ePnD	1:19:45.30	-0.02
			eSn	20:05.70	0.11
PKSM	180.1	215	iPnD	1:19:46.20	-0.62
			eSn	20:07.30	-0.94
RHK1	217.6	223	iPnD	1:19:51.10	-0.40
			eSn	20:15.40	-1.17
ZST	229.0	289	iPn	1:19:53.90	0.99
			eSn	20:19.20	0.11
OKC	290.0	332	ePn	1:20:02.60	2.07
ARSA	339.6	265	iPnC	1:20:07.10	0.40
			iSn	20:42.90	-0.74
DPC	413.0	319	ePn	1:20:17.30	1.44
MOA	432.0	275	iPnC	1:20:20.00	1.78
			iSn	21:09.90	5.75

## Hypocenter Parameters



48.

2003-07-01 time: 11:26:14.48 UTC ML= 3.4  
 lat: 47.871N lon: 20.620E h= 7.7 km  
 erh= 4.5km erz= 2.3km  
 nr= 29 gap=221 rms=0.91  
 Locality: Igrici  
 Comments: felt 5 EMS

sta	dist	azm	phase	hr mn sec	res
PSZ	54.5	275	ePgD	11:26:24.40	0.08
			eSg	26:33.00	1.01
PENC	100.6	265	ePgc	11:26:32.20	-0.31
			eSg	26:46.40	-0.16
RHK5	117.6	261	ePnC	11:26:34.70	-0.49
			eSn	26:50.10	-1.25
PKSN	122.3	208	ePnC	11:26:35.10	-0.68
			eSn	26:52.20	-0.20
BUD	127.4	250	iPnC	11:26:36.00	-0.41
			eSn	26:54.00	0.48
PKS7	143.2	230	ePnD	11:26:38.50	0.12
			eSn	26:57.50	0.47
VYHS	149.7	298	iPn	11:26:38.90	-0.29
			iSn	26:59.50	1.04
SRO	172.8	268	ePn	11:26:41.60	-0.48
			eSn	27:03.10	-0.50
PKSG	175.9	252	ePnC	11:26:41.70	-0.76
			eSn	27:02.80	-1.47
PKS8	183.7	233	ePn	11:26:45.20	1.77
PKS2	186.8	215	ePnC	11:26:46.10	2.28
PKS9	227.7	231	iPnC	11:26:53.20	4.28
PKSM	238.0	219	ePnD	11:26:54.50	4.29
			eSn	27:23.60	5.52
MODS	255.1	283	ePn	11:26:51.90	-0.43
			eSn	27:30.50	8.64
ZST	264.8	278	ePn	11:26:52.80	-0.75
			eSn	27:31.50	7.48
OJC	268.0	347	ePn	11:26:54.70	0.76
RHK1	276.8	224	ePn	11:26:52.60	-2.44
			eSn	27:21.90	-4.77
OKC	284.2	320	ePn	11:26:56.50	0.54
			eSn	27:38.50	10.19
VKA	323.6	278	i n	11:27:01.20	0.32
VRAC	337.3	298	Pn	11:27:02.31	-0.28
			Sn	27:44.56	4.45
ARSA	389.8	260	iPnD	11:27:08.80	-0.33
			iSn	27:48.70	-3.05

## Földrengés paraméterek

DPC	417.7	311	ePn	11:27:12.20	-0.41
			eSn	28:20.00	22.05
KSP	456.1	316	ePn	11:27:17.90	0.50
			eSn	28:14.70	8.22
MOA	475.5	270	iPnC	11:27:19.60	-0.22
			iSn	28:07.20	-3.58
OBKA	484.4	252	iPnD	11:27:20.90	-0.03
			iSn	28:09.80	-2.96
MLR	485.8	123	Pn	11:27:14.38	-6.72
PRU	503.8	298	ePn	11:27:22.00	-1.35
			eSn	28:21.50	4.44
GERE	524.1	282	Pn	11:27:25.69	-0.18
			Sn	28:20.18	-1.38
KHC	539.0	285	ePn	11:27:27.50	-0.23
			eSn	28:26.70	1.84
KBA	555.5	261	iPnC	11:27:29.70	-0.09
			iSn	28:25.30	-3.24
CLL	670.4	305	ePn	11:27:44.00	-0.12
			eSn	29:30.00	35.96

49.

2003-07-01 time: 11:46:01.22 UTC ML= 3.3  
 lat: 47.755N lon: 20.554E h= 10.0 km  
 erh=18.6km erz= 8.0km  
 nr= 14 gap=246 rms=0.97  
 Locality: Mezőszemere  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	52.6	290	ePgD	11:46:10.50	-0.28
			eSg	46:19.30	1.06
PENC	95.4	272	ePgc	11:46:18.30	-0.06
			eSg	46:32.50	0.78
PKSN	108.5	209	ePnC	11:46:19.90	-0.61
			eSn	46:35.90	0.34
RHK5	111.3	267	iPnC	11:46:20.80	-0.06
			eSn	46:36.70	0.52
PKS7	131.3	233	iPnD	11:46:24.70	1.35
			eSn	46:43.60	2.99
VYHS	152.0	303	iPn	11:46:25.40	-0.53
			iSn	46:44.40	-0.81
PKSG	167.7	256	ePnC	11:46:29.80	1.92
			eSn	46:49.60	0.92
PKS8	172.1	236	iPnC	11:46:26.30	-2.14
			eSn	46:48.60	-1.07
PKS2	173.4	216	ePn	11:46:29.70	1.11
			eSn	46:49.60	-0.34
PKSM	224.9	220	ePn	11:46:33.40	-1.62
			eSn	46:59.50	-1.88
MODS	253.7	286	ePn	11:46:38.20	-0.41
			eSn	47:16.20	8.42
ZST	262.3	281	ePn	11:46:38.80	-0.88
			eSn	47:19.20	9.51
RHK1	264.1	226	ePnD	11:46:38.40	-1.51
			eSn	47:08.20	-1.89
RHK3	271.8	220	eSn	11:47:09.60	-2.19
OKC	291.4	323	ePn	11:46:45.00	1.69
			eSn	47:22.50	6.36
ARSA	383.1	262	iPnC	11:46:53.50	-1.25
			iSn	47:35.50	-1.00
DPC	423.1	313	ePn	11:46:58.80	-0.93
			eSn	47:58.80	13.43
KHC	538.3	287	ePn	11:47:10.90	-3.20
			eSn	48:10.50	-0.44

50.

2003-07-01 time: 22:41:17.16 UTC ML= 2.0  
 lat: 47.894N lon: 20.386E h= 10.0 km  
 erh=26.7km erz=18.1km  
 nr= 11 gap=289 rms=1.58  
 Locality: Eger  
 Comments:



## Földrengés paraméterek

sta	dist	azm	phase	hr mn sec	res
PSZ	36.8	274	ePgD	22:41:23.40	-0.58
			eSg	41:32.30	3.00
RHK5	100.8	258	iPgC	22:41:33.80	-1.46
			eSg	41:49.60	0.23
PKS7	131.9	224	ePn	22:41:38.00	-1.36
			eSn	41:56.60	-0.08
PKS6	156.8	203	eSn	22:42:02.60	0.40
PKS9	215.8	228	iPnC	22:41:52.30	2.47
			eSn	42:21.10	5.79
PKSM	229.3	215	ePn	22:41:52.90	1.40
			eSn	42:22.80	4.51

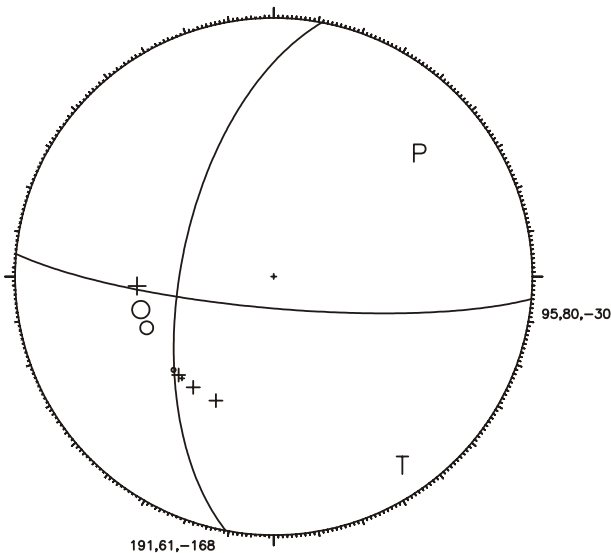
51.

2003-07-03 time: 1:58:14.99 UTC ML= 0.9  
 lat: 46.897N lon: 19.159E h= 1.5 km  
 erh= 3.2km erz=65.4km  
 nr= 12 gap=136 rms=0.76  
 Locality: Újsolt  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS7	16.7	0	iPgC	1:58:17.70	-0.28
			eSg	58:20.00	-0.31
PKS8	36.9	267	iPgC	1:58:21.80	0.22
			eSg	58:26.10	-0.62
PKS6	45.3	137	iPgC	1:58:23.00	-0.09
			eSg	58:29.60	0.20
PKS9	75.6	243	iPgC	1:58:30.00	1.50
			eSg	58:39.40	0.37
PKSG	80.1	313	ePgC	1:58:29.20	-0.10
			eSg	58:38.70	-1.77
PKSM	85.9	208	ePgC	1:58:29.60	-0.74
			eSg	58:40.60	-1.71

52.

2003-07-08 time: 17:04:19.14 UTC ML= 3.0  
 lat: 48.152N lon: 20.743E h= 10.0 km  
 erh=19.2km erz=18.3km  
 nr= 17 gap=280 rms=1.37  
 Locality: Bükkábrány  
 Comments: felt 5 EMS



## Hypocenter Parameters

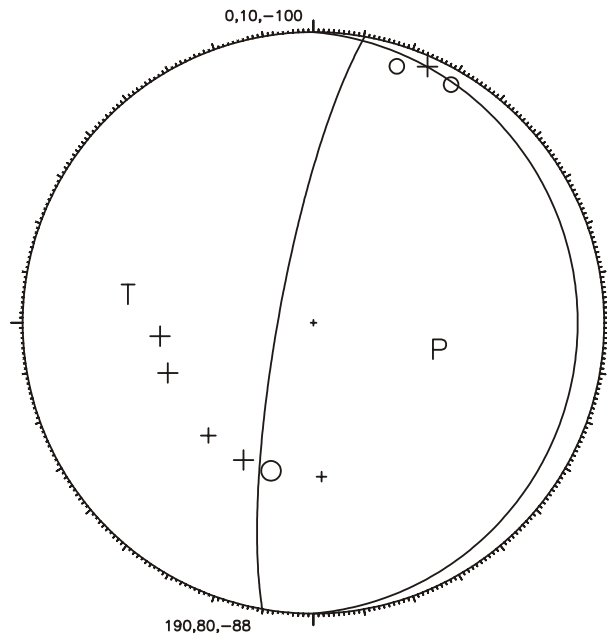
sta	dist	azm	phase	hr mn sec	res
RHK5	134.7	248	ePnD	17:04:43.20	1.51
			eSn	04:59.30	0.03
VYHS	146.5	285	iPn	17:04:41.90	-1.25
			eSn	05:01.10	-0.79
BUD	148.6	240	ePn	17:04:44.40	0.97
			eSn	05:03.40	1.03
PKSN	154.3	205	ePnC	17:04:43.50	-0.63
			eSn	05:00.20	-3.43
PKS7	171.0	224	ePnC	17:04:46.60	0.39
			eSn	05:05.60	-1.73
PKSG	195.5	244	ePn	17:04:50.10	0.83
			eSn	05:11.80	-0.98
PKS2	217.8	212	ePn	17:04:54.20	2.15
			eSn	05:18.80	1.08
PKS9	254.8	227	ePnD	17:05:01.30	4.64
			eSn	05:30.30	4.37
PKSM	268.1	216	ePnC	17:04:55.70	-2.63
			eSn	05:21.80	-7.09
RHK1	305.6	222	ePnC	17:05:09.60	6.61
			eSn	05:30.10	-7.10
ARSA	404.4	256	iPnD	17:05:16.90	1.58
			iSn	05:58.10	-1.04
MOA	484.5	266	iPnC	17:05:26.80	1.49
			iSn	06:17.00	0.08

53.

2003-07-10 time: 2:40:18.17 UTC ML= 2.4  
 lat: 48.151N lon: 19.457E h= 5.9 km  
 erh= 4.0km erz= 2.9km  
 nr= 26 gap=218 rms=1.10  
 Locality: Rimóc  
 Comments: felt 4 EMS

sta	dist	azm	phase	hr mn sec	res
PENC	42.2	198	ePgD	2:40:25.90	0.12
			eSg	40:30.70	-1.02
RHK5	58.0	210	ePgD	2:40:28.90	0.32
			eSg	40:36.10	-0.61
VYHS	59.8	310	iPg	2:40:28.10	-0.79
			iSg	40:36.50	-0.76
BUD	81.0	204	iPgC	2:40:32.70	0.02
			eSg	40:42.30	-1.69
SRO	93.3	246	iPg	2:40:36.20	1.34
			iSg	40:48.20	0.32
PKSG	116.3	223	ePnC	2:40:38.60	-0.34
			eSn	40:53.40	-1.75
PKSN	142.8	168	ePn	2:40:43.10	0.84
			eSn	40:59.20	-1.84
PKS8	153.2	203	ePn	2:40:42.70	-0.85
			eSn	41:00.80	-2.55
MODS	163.7	279	ePn	2:40:47.20	2.34
			eSn	41:08.60	2.92
PKS6	172.7	177	ePnC	2:40:49.30	3.32
ZST	175.2	272	ePn	2:40:50.30	4.01
			eSn	41:08.10	-0.12
PKS9	195.4	207	iPnC	2:40:49.30	0.49
			eSn	41:15.60	2.90
PKSM	224.3	196	iPnD	2:40:51.30	-1.12
			ePn	2:40:55.70	-0.12
RHK1	251.6	205	eSn	41:26.80	1.61
			iPnC	2:41:06.10	2.78
ARSA	311.8	251	iSn	41:39.30	0.76
			ePn	2:41:10.70	4.55
DPC	334.5	317	eSn	42:00.10	16.52
			iPnC	2:41:15.90	2.97
MOA	388.8	265	iSn	41:55.90	0.26
			ePn	2:41:23.80	3.65
KHC	446.7	284	eSn	42:22.60	14.11

## Hypocenter Parameters



54.

2003-07-11 time: 10:52:59.40 UTC ML= 1.7  
 lat: 45.549N lon: 17.789E h= 14.3 km  
 erh= 2.3km erz= 1.1km  
 nr= 6 gap=336 rms=0.10  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr	mn	sec	res
RHK3	52.2	44	iPgC	10:53:09.10			0.04
			eSg		53:16.40		-0.19
RHK1	64.5	20	iPgD	10:53:11.20			0.01
			eSg		53:20.50		0.11
PKSM	99.0	42	eP*	10:53:16.70			-0.17
			eS*		53:30.70		0.21

55.

2003-07-11 time: 12:20:35.17 UTC ML= 1.0  
 lat: 47.421N lon: 18.485E h= 10.0 km  
 erh=14.6km erz= 6.5km  
 nr= 6 gap=289 rms=0.25  
 Locality: Csákvár  
 Comments: explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	7.8	246	iPgC	12:20:37.30			-0.14
			eSg		20:39.60		0.39
PKS9	94.0	190	ePg	12:20:52.40			0.35
			eSg		21:05.00		-0.22
PKSM	134.9	175	iPnC	12:20:57.70			-0.05
			eSn		21:13.70		-1.66

56.

2003-07-13 time: 2:29:09.82 UTC ML= 3.1  
 lat: 48.078N lon: 20.643E h= 13.1 km  
 erh= 6.7km erz= 3.7km  
 nr= 35 gap=165 rms=1.41  
 Locality: Vatta  
 Comments: felt 5 EMS

sta	dist	azm	phase	hr	mn	sec	res
PSZ	58.6	252	iPgD	2:29:20.98			0.44
PENC	106.6	253	ePnC	2:29:28.60			0.13

## Földrengés paraméterek

RHK6	113.5	247	eSn	29:42.80	-0.22
			iPnC	2:29:28.90	-0.44
RHK5	124.8	250	eSn	29:43.60	-0.96
			iPnC	2:29:30.70	-0.04
BUD	138.2	241	eSn	29:46.70	-0.37
			ePnC	2:29:32.60	0.19
BUD	138.2	241	eSn	29:50.90	0.88
			ePnC	2:29:32.60	0.19
VYHS	141.9	289	eSn	29:50.90	0.88
			iPn	2:29:30.10	-2.77
PKS7	159.9	224	iSn	29:49.40	-1.44
			ePnC	2:29:35.00	-0.12
SRO	176.5	260	eSn	29:54.10	-0.75
			ePn	2:29:38.40	1.21
PKS6	183.4	206	iSn	29:59.60	1.07
			ePn	2:29:35.60	-2.45
PKSG	185.4	246	eSn	30:00.50	0.43
			iPnC	2:29:38.00	-0.29
KWP	229.8	41	eSn	30:02.70	2.20
			ePn	2:29:44.96	1.13
PKS9	243.7	227	ePnC	2:29:49.50	3.93
			eSn	30:18.70	5.25
OJC	246.0	345	ePn	2:29:50.20	4.34
MODS	252.2	277	ePn	2:29:49.80	3.17
			eSn	30:17.90	2.56
PKSM	257.1	216	ePnD	2:29:43.90	-3.33
			eSn	30:20.70	4.29
ZST	263.8	273	iPn	2:29:49.20	1.12
			eSn	30:18.60	0.68
OKC	267.8	317	ePn	2:29:52.20	3.63
			eSn	30:21.80	3.01
RAC	285.9	321	ePn	2:30:03.50	12.67
			eSn	30:37.70	14.88
RHK1	294.5	222	ePnC	2:29:57.80	5.90
MORC	295.5	310	ePn	2:29:54.51	2.48
RHK3	303.8	217	ePn	2:29:49.70	-3.36
			eSn	30:33.10	6.30
VKA	322.3	274	iPnD	2:29:56.50	1.13
			iSn	30:36.30	5.40
VRAC	328.0	295	Pn	2:29:58.58	2.50
			Sn	30:34.66	2.49
ARSA	395.4	257	iPnC	2:30:05.20	0.72
			iSn	30:48.60	1.48
DPC	403.7	309	ePn	2:30:08.80	3.28
			eSn	30:51.50	2.54
KSP	440.5	314	ePn	2:30:13.50	3.40
MOA	476.9	267	iPnC	2:30:15.80	1.16
			iSn	31:06.10	0.89
OBKA	492.9	249	iPnC	2:30:16.40	-0.23
			iSn	31:07.80	-0.95
PRU	494.2	295	ePn	2:30:18.30	1.50
			eSn	31:09.70	0.66
MLR	496.6	125	ePn	2:30:13.63	-3.47
GEC2	520.4	279	ePn	2:30:22.00	1.93
			eSn	31:16.60	1.73
GERE	520.4	279	Pn	2:30:21.79	1.72
			Sn	31:16.87	2.00
KHC	534.0	283	ePn	2:30:24.00	2.23
			eSn	31:19.50	1.61
BRG	576.5	303	Pn	2:30:40.90	13.84
PTCC	582.4	251	ePn	2:30:29.06	1.26
FVI	616.6	255	ePn	2:30:33.60	1.53
CLL	658.0	303	ePn	2:30:40.00	2.78
			eSn	31:47.00	1.60
WTTA	682.4	262	iPnC	2:30:40.50	0.23
			iSn	31:52.90	2.08
GRA1	713.9	285	ePn	2:30:46.60	2.40
GRF	713.9	285	ePn	2:30:46.60	2.40
CDF	993.5	272	ePn	2:31:31.40	12.34

## Földrengés paraméterek

## Hypocenter Parameters

57.

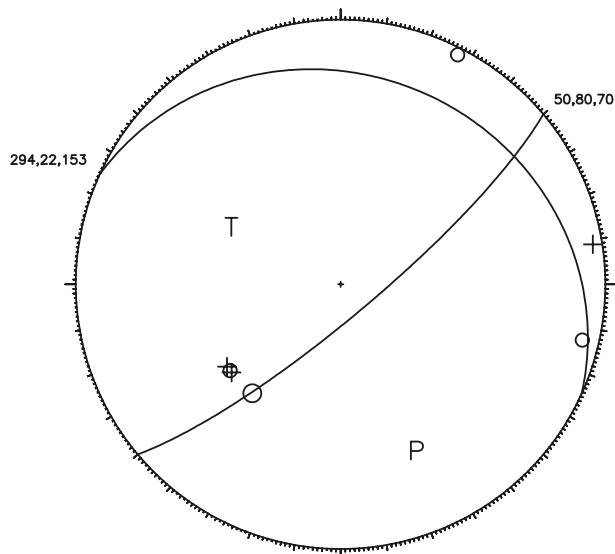
2003-07-13 time: 2:39:55.07 UTC ML= 1.5  
 lat: 47.879N lon: 20.695E h= 10.0 km  
 erh=63.3km erz=58.1km  
 nr= 9 gap=309 rms=1.15  
 Locality: Bükkábrány  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK5	123.3	261	iPnC	2:40:15.90	-0.29
			eSn	40:31.90	-0.77
PKSN	125.7	210	ePn	2:40:16.60	0.10
			eSn	40:33.30	0.08
PKS7	148.1	231	iPnC	2:40:19.50	0.22
			eSn	40:38.50	0.33
PKS6	165.9	211	ePn	2:40:17.50	-4.01
PKS8	188.7	234	ePn	2:40:26.00	1.65
			eSn	40:50.40	3.21

58.

2003-07-16 time: 0:23:01.19 UTC ML= 2.0  
 lat: 47.816N lon: 20.550E h= 6.1 km  
 erh=11.4km erz= 5.8km  
 nr= 18 gap=284 rms=1.76  
 Locality: Mezőkövesd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	50.3	283	ePgD	0:23:10.30	0.06
			eSg	23:18.70	1.39
RHK6	98.8	261	iPgC	0:23:18.40	-0.47
			eSg	23:33.00	0.33
PKSN	114.4	207	ePgD	0:23:21.40	-0.25
			eSg	23:38.00	0.38
PKS7	135.2	231	iPnC	0:23:24.50	0.19
			eSn	23:43.90	1.55
PKS6	154.4	209	ePn	0:23:24.20	-2.51
			eSn	23:50.00	3.39
PKSG	169.1	254	ePn	0:23:27.90	-0.63
			eSn	23:50.20	0.34
PKS8	175.8	234	iPnC	0:23:26.90	-2.47
			eSn	23:48.90	-2.45
PKS9	219.7	232	ePnD	0:23:39.10	4.25
			eSn	24:08.90	7.80
PKSM	229.9	219	iPnD	0:23:40.40	4.28
			eSn	23:59.60	-3.76



59.

2003-07-17 time: 20:52:55.73 UTC ML=2.6  
 lat: 47.935N lon: 16.383E h= 5.0 km  
 erh=11.1km  
 Locality: Austria  
 Comments:  
 Reported by NEIC

60.

2003-07-18 time: 9:46:34.88 UTC ML= 1.1  
 lat: 47.370N lon: 18.390E h= 5.7 km  
 erh= 170km erz=32.3km  
 nr= 6 gap=190 rms=0.35  
 Locality: Gánt  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	2.4	1	iPgC	9:46:36.00	0.02
			eSg	46:36.60	-0.24
PKS8	58.8	158	ePg	9:46:45.20	-0.23
			eSg	46:53.80	0.14
PKSM	130.2	172	ePnC	9:46:58.10	0.68
			eSn	47:14.20	-0.81

61.

2003-07-19 time: 9:12:13.61 UTC ML= 2.8  
 lat: 47.783N lon: 20.538E h= 3.1 km  
 erh= 7.7km erz= 5.1km  
 nr= 24 gap=169 rms=1.70  
 Locality: Mezőkövesd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	50.5	287	ePg	9:12:22.20	-0.44
			eSg	12:31.10	1.42
PENC	94.2	270	ePgC	9:12:29.90	-0.53
			eSg	12:43.90	0.34
PKSN	110.8	207	ePgC	9:12:33.00	-0.41
			eSg	12:50.00	1.15
BUD	118.6	254	iPgD	9:12:34.10	-0.70
			eSg	12:52.20	0.88
PKS7	132.3	232	ePnC	9:12:36.40	-0.35
			eSn	12:55.60	0.81
PKSG	167.3	255	ePnC	9:12:39.40	-1.71
			eSn	13:05.60	3.04
PKS8	173.0	234	iPnC	9:12:38.90	-2.92
			eSn	13:00.70	-3.12
PKS2	175.3	215	iPnC	9:12:44.10	2.00
			eSn	13:08.90	4.57
PKS9	216.8	232	ePnD	9:12:51.00	3.71
			eSn	13:19.40	5.84
KWP	260.2	38	ePn	9:12:57.80	5.10
ZST	260.5	280	ePn	9:12:51.10	-1.64
RHK1	265.5	225	iPnC	9:12:59.20	5.84
			eSn	13:19.90	-4.46
OJC	276.3	349	iPn	9:12:56.60	1.90
			eSn	13:29.10	2.35
ARSA	382.4	261	iPnC	9:13:06.60	-1.33
			iSn	13:47.80	-2.49

62.

2003-07-23 time: 8:11:34.86 UTC ML= 2.6  
 lat: 47.843N lon: 20.559E h= 10.0 km  
 erh=41.8km erz=30.7km  
 nr= 12 gap=287 rms=1.56  
 Locality: Mezőkövesd  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	50.4	280	ePgD	8:11:43.70	-0.33
			eSg	11:52.60	1.42
PKSN	117.4	206	iPnD	8:11:54.80	-0.46

### Hypocenter Parameters

PKS8	178.1	233	eSn	12:11.50	0.33
			ePn	8:12:04.00	1.18
			eSn	12:22.20	-2.43
PKS2	181.6	214	Sn	8:12:26.60	1.19
PKS9	222.1	231	ePnC	8:12:01.40	-6.91
PKSM	232.7	219	ePnC	8:12:13.10	3.47
			eSn	12:33.00	-3.74
RHK1	271.3	224	iPnC	8:12:20.70	6.26
			eSn	12:41.10	-4.21

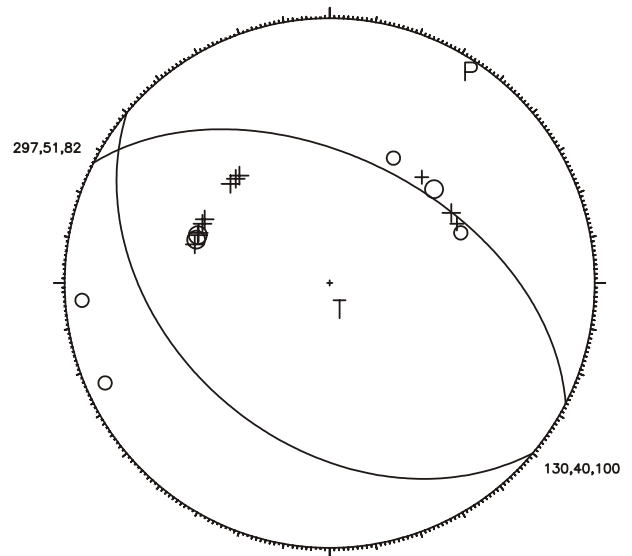
63.

2003-08-02 time: 20:31:47.89 UTC ML= 3.1  
 lat: 45.840N lon: 17.245E h= 10.0 km  
 erh= 5.2km erz= 4.5km  
 nr= 57 gap=170 rms=1.54  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	70.1	66	ePgD	20:32:00.70	0.17
			eSg	32:09.50	-0.89
RHK3	78.4	86	ePgD	20:32:02.20	0.19
			eSg	32:11.50	-1.52
PKS9	115.1	44	ePn	20:32:07.90	-0.10
			eSn	32:23.70	0.01
PKSM	115.7	69	ePnD	20:32:07.30	-0.78
			eSn	32:22.90	-0.92
CRES	138.9	269	iPn	20:32:10.50	-0.47
CESS	139.0	276	iPn	20:32:12.10	1.12
			iSn	32:29.30	0.31
DOBS	141.8	284	iPn	20:32:10.50	-0.83
			eSn	32:29.40	-0.21
LEGS	150.1	275	iPn	20:32:11.70	-0.66
GROS	151.3	297	iPnC	20:32:11.70	-0.81
			eSn	32:28.90	-2.82
VBY	159.4	256	iPn	20:32:15.30	1.78
			iSn	32:32.80	-0.71
PDKS	176.2	279	ePn	20:32:14.90	-0.72
			eSn	32:38.80	1.55
PKSG	193.5	27	ePnD	20:32:17.50	-0.27
			eSn	32:43.70	2.62
PKS6	197.9	65	ePnC	20:32:17.70	-0.62
PKS7	199.2	48	iPnD	20:32:17.60	-0.88
			eSn	32:47.70	5.36
ARSA	205.0	320	iPnC	20:32:19.10	-0.10
			iSn	32:41.60	-2.02
LJU	211.9	276	ePn	20:32:24.00	3.93
			eSn	32:49.00	3.82
OBKA	221.1	290	iPnC	20:32:21.20	-0.01
			iSn	32:46.70	-0.50
BUD	227.8	37	ePn	20:32:24.50	2.45
			eSn	32:54.00	5.30
PKSN	233.5	60	iPnC	20:32:22.20	-0.56
			eSn	32:51.00	1.04
SRO	234.0	20	ePn	20:32:29.10	6.28
			eSn	32:58.20	8.13
ZST	262.1	358	ePn	20:32:25.40	-0.93
			eSn	32:57.90	1.59
MODS	281.6	1	ePn	20:32:26.60	-2.16
			eSn	32:53.00	-7.64
PSZ	306.8	41	ePnC	20:32:30.60	-1.31
			eSn	33:18.40	12.16
MOA	318.6	315	iPnC	20:32:33.40	0.03
			iSn	33:07.20	-1.65
KBA	329.7	295	iPnC	20:32:35.10	0.34
			iSn	33:22.60	11.29
GEC2	428.1	321	ePn	20:32:47.70	0.67
OKC	449.5	9	ePn	20:32:49.70	0.00
			eSn	33:33.30	-4.60
WTA	458.3	290	iPnD	20:32:51.50	0.71
			iSn	33:39.30	-0.56
KHC	458.5	323	ePn	20:32:51.70	0.89
			eSn	33:35.30	-4.59
WATA	465.2	291	iPnC	20:32:52.10	0.45
			iSn	33:40.70	-0.68
SQTA	487.9	288	iPnD	20:32:55.30	0.82

### Földrengés paraméterek

WET	493.1	318	iSn	33:45.60	-0.81
			iPnC	20:32:55.90	0.77
PRU	503.5	336	ePn	20:32:56.20	-0.23
			eSn	33:44.10	-5.79
DPC	506.1	352	ePn	20:32:57.10	0.34
			eSn	33:44.60	-5.87
DAVA	587.1	286	iPnC	20:33:07.00	0.15
			iSn	34:07.80	-0.64
NKC	605.4	324	ePn	20:33:08.70	-0.44
			eSn	34:05.40	-7.11
BRG	610.8	336	Pn	20:33:11.00	1.20
			Sn	34:37.00	23.31
MOX	678.5	322	Pn	20:33:18.50	0.25
			Sn	35:04.20	35.48
CLL	683.8	333	iPn	20:33:18.60	-0.31
			eSn	35:10.00	40.09
PGF	753.9	241	ePn	20:33:26.80	-0.85
			eSn	34:38.60	-6.86
SBF	806.0	254	ePn	20:33:33.60	-0.55
			eSn	34:48.30	-8.73
LPG	818.6	267	ePn	20:33:36.60	0.88
			eSn	34:52.60	-7.22
LPL	819.9	267	ePn	20:33:36.80	0.93
			eSn	34:53.30	-6.80
HINF	822.8	285	ePn	20:33:36.10	-0.14
			eSn	34:55.20	-5.55
MBDF	831.0	261	ePn	20:33:36.30	-0.97
			eSn	34:55.80	-6.78
HAU	864.2	286	ePn	20:33:42.10	0.70
			eSn	35:04.40	-5.54
FRF	877.4	253	ePn	20:33:41.70	-1.34
			eSn	35:03.60	-9.26
ORIF	896.1	263	ePn	20:33:45.90	0.52
			eSn	35:09.50	-7.51



64.

2003-08-05 time: 13:52:11.87 UTC ML= 0.8  
 lat: 47.108N lon: 19.097E h= 10.0 km  
 erh= 8.6km erz= 6.5km  
 nr= 6 gap=139 rms=0.82  
 Locality: Apaj  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS7	8.3	144	ePgC	13:52:14.10	-0.10
			eSg	52:15.60	-0.41
PKS8	40.9	231	iPgD	13:52:20.60	1.21
			eSg	52:23.00	-2.26

## Földrengés paraméterek

PENC 77.1 10 ePg 13:52:25.50 -0.26  
 PKSM 105.6 199 eP\*C 13:52:30.20 -0.54

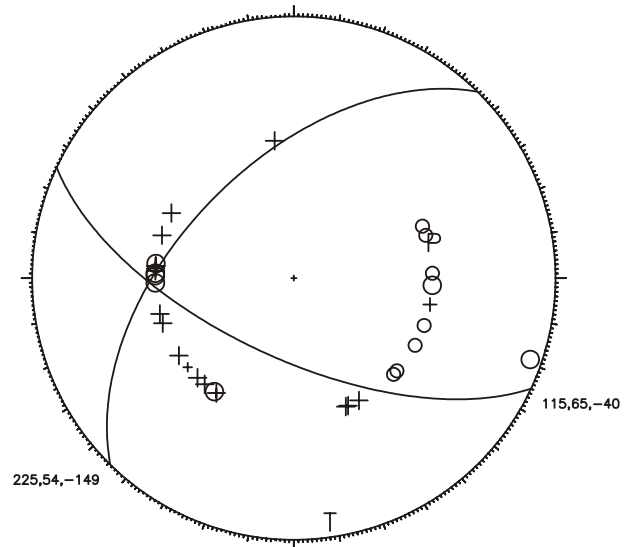
65.

2003-08-09 time: 22:01:17.50 UTC ML= 3.8  
 lat: 46.996N lon: 16.597E h= 8.2 km  
 erh= 1.9km erz= 2.1km  
 nr= 62 gap= 78 rms=1.11  
 Locality: Magyarszecsőd  
 Comments: felt 5-6 EMS

sta	dist	azm	phase	hr mn sec	res
ARSA	86.3	289	iPgD	22:01:32.50	-0.48
			iSg	01:43.30	-1.75
GROS	102.8	235	iPg	22:01:37.20	1.29
BISS	118.7	251	ePn	22:01:37.20	-1.09
			iSn	01:52.90	-1.61
PERS	119.9	250	ePn	22:01:37.30	-1.14
			eSn	01:53.80	-0.98
DOBS	127.9	223	iPn	22:01:39.50	0.07
			iSn	01:55.80	-0.74
GOLS	132.6	214	ePnC	22:01:40.40	0.38
			eSn	01:57.50	-0.09
PKS9	136.2	110	ePnD	22:01:40.50	0.03
			eSn	01:59.40	1.01
ZST	138.7	16	ePn	22:01:38.30	-2.48
			eSn	01:57.50	-1.44
VKA	142.6	352	iPnC	22:01:41.10	-0.17
			iSn	01:59.20	-0.61
PKSG	142.8	72	ePnD	22:01:40.90	-0.40
			eSn	01:59.30	-0.56
CESS	143.3	217	iPn	22:01:41.70	0.35
			iSn	01:59.10	-0.86
RHK1	151.1	132	ePnD	22:01:42.10	-0.23
			eSn	01:58.30	-3.40
LEGS	152.4	220	iPnC	22:01:42.80	0.31
			eSn	02:00.80	-1.19
CRES	156.9	214	iPnC	22:01:43.20	0.14
SRO	158.2	55	iPn	22:01:42.50	-0.71
			eSn	02:00.60	-2.67
PDKS	159.6	230	ePnC	22:01:44.10	0.71
			eSn	02:04.20	0.62
MODS	161.4	18	iPn	22:01:44.80	1.18
			iSn	02:03.90	-0.09
OBKA	165.6	251	iPnC	22:01:45.00	0.86
			iSn	02:06.10	1.17
RHK3	177.0	134	ePnD	22:01:45.50	-0.06
			eSn	02:08.80	1.35
PKSM	179.3	119	ePnD	22:01:45.30	-0.54
			eSn	02:06.40	-1.55
LJU	190.9	236	iPnC	22:01:47.90	0.60
BUD	191.5	74	ePn	22:01:47.80	0.43
			eSn	02:14.10	3.43
PKS7	195.0	88	ePnD	22:01:51.60	3.80
VBY	195.4	212	iPn	22:01:48.20	0.34
MOA	199.9	298	iPnC	22:01:49.80	1.39
			iSn	02:13.60	1.08
RHK6	214.1	69	ePn	22:01:51.50	1.31
CEY	217.8	230	iPn	22:01:51.20	0.55
			iSn	02:16.50	-0.01
KMR	219.9	302	iPn	22:01:54.80	3.89
			iSn	02:22.80	5.82
PKS6	230.8	101	ePnC	22:01:51.90	-0.37
			eSn	02:24.30	4.92
VOY	233.6	243	ePn	22:01:50.30	-2.32
			eSn	02:28.00	7.99
VYHS	236.5	45	iPn	22:01:51.90	-1.07
			eSn	02:24.80	4.16
KBA	247.4	272	iPnD	22:01:55.70	1.36
			iSn	02:24.10	1.03
PKSN	249.2	93	iPnD	22:01:54.20	-0.36
PTCC	256.7	255	iPnC	22:01:56.52	1.02
			eSn	02:30.20	5.07
PSZ	268.9	68	ePnD	22:01:57.10	0.08
			eSn	02:25.50	-2.35

## Hypocenter Parameters

KHC	327.1	317	ePn	22:02:06.20	1.93
			eSn	02:50.10	9.34
OKC	336.1	20	ePn	22:02:05.10	-0.30
PRU	365.8	335	Pn	22:02:09.20	0.10
			eSn	03:01.20	11.86
SCE	371.6	271	iPnD	22:02:12.20	2.37
DPC	373.5	357	ePn	22:02:09.90	-0.16
			eSn	03:04.00	12.94
WTTA	377.6	275	iPnC	22:02:12.40	1.83
			iSn	02:55.90	3.93
WATA	382.6	276	iPnD	22:02:13.30	2.11
			iSn	02:57.20	4.12
SQTA	409.8	273	iPnC	22:02:16.60	2.01
			iSn	03:02.20	3.08
MOTA	418.3	275	iPnC	22:02:17.20	1.55
			iSn	03:03.80	2.79
FUR	420.9	288	iPnC	22:02:17.30	1.33
OGA	424.6	268	iPnD	22:02:19.20	2.77
UPM	459.2	157	iPnC	22:02:21.89	1.14
			eSn	03:08.68	-1.40
PLE	463.0	152	iPnC	22:02:22.25	1.02
			eSn	03:09.73	-1.20
RSM	470.5	224	iPnC	22:02:22.58	0.42
NKC	472.4	320	ePn	22:02:23.30	0.90
			eSn	03:31.30	18.29
NKY	502.1	158	iPnC	22:02:27.33	1.23
			eSn	03:18.50	-1.10
SNTG	505.6	215	iPnD	22:02:26.89	0.35
DAVA	510.6	274	iPnC	22:02:28.40	1.25
			iSn	03:22.20	0.72



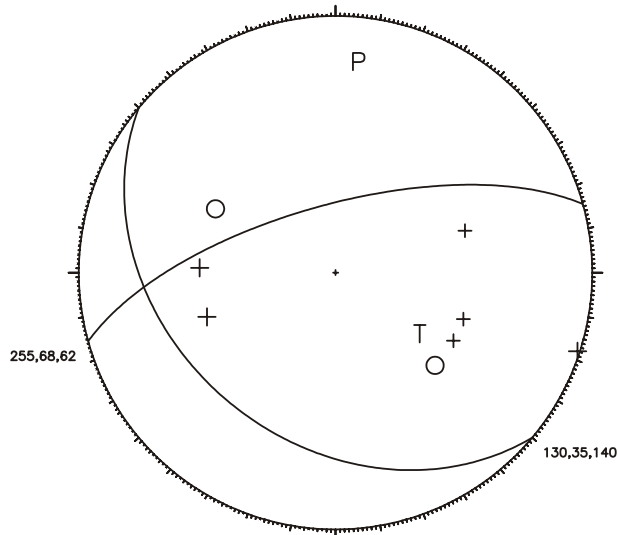
66.

2003-08-10 time: 0:17:24.53 UTC ML= 1.9  
 lat: 47.011N lon: 16.625E h= 1.2 km  
 erh= 1.9km erz= 1.8km  
 nr= 30 gap= 82 rms=0.61  
 Locality: Körmend  
 Comments:

sta	dist	azm	phase	hr mn sec	res
ARSA	87.7	288	iPgC	0:17:40.50	0.30
			iSg	17:52.00	-0.42
GROS	105.4	235	iPg	0:17:43.20	-0.15
BISS	121.2	251	ePg	0:17:45.70	-0.47
PERS	122.4	250	iPg	0:17:46.00	-0.38
DOBS	130.4	223	iPn	0:17:47.80	0.13
PKS9	134.8	110	ePnC	0:17:48.30	0.08
			eSn	18:07.70	1.00
GOLS	135.1	215	iPn	0:17:48.30	0.05

## Hypocenter Parameters

ZST	136.6	15	eSn	18:05.20	-1.56
			ePn	0:17:48.00	-0.45
			eSn	18:04.80	-2.31
PKSG	140.4	72	ePnC	0:17:49.30	0.38
			eSn	18:06.10	-1.84
CESS	145.8	218	ePn	0:17:49.90	0.31
			eSn	18:07.70	-1.43
RHK1	150.6	133	iPnD	0:17:49.90	-0.29
			eSn	18:06.50	-3.71
LEGS	154.9	220	iPn	0:17:50.80	0.07
CREG	159.4	214	iPn	0:17:51.50	0.22
PDKS	162.2	230	iPn	0:17:52.00	0.37
OBKA	168.1	251	iPnC	0:17:53.30	0.93
			iSn	18:14.40	0.31
PKSM	178.2	120	ePnC	0:17:53.00	-0.63
			eSn	18:12.20	-4.13
MOA	200.9	298	iPnD	0:17:58.40	1.93
			iSn	18:21.30	-0.07
CEY	220.4	230	iPn	0:17:59.50	0.60
KBA	249.4	272	iPnC	0:18:02.00	-0.51
			iSn	18:31.20	-0.93
PSZ	266.4	68	ePn	0:18:05.20	0.57
			eSn	18:34.00	-1.91
KHC	327.3	316	ePn	0:18:14.10	1.87
			eSn	18:55.80	6.37



67.

2003-08-16 time: 13:45:04.76 UTC ML= 1.6  
 lat: 45.516N lon: 17.860E h= 5.1 km  
 erh= 5.3km erz= 2.5km  
 nr= 8 gap=336 rms=0.35  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	51.4	36	ePgC	13:45:14.40	0.42
			eSg	45:22.70	1.52
RHK1	66.4	14	ePgD	13:45:16.40	-0.24
			eSg	45:25.70	-0.21
PKSM	98.3	38	ePgC	13:45:22.00	-0.33
			eSg	45:35.90	-0.14
PKS9	123.3	15	ePn	13:45:26.80	0.28
			eSn	45:43.50	0.01

## Földrengés paraméterek

68.

2003-08-17 time: 8:27:54.79 UTC ML= 1.8  
 lat: 46.292N lon: 19.784E h= 6.4 km  
 erh= 3.9km erz= 2.5km  
 nr= 14 gap=255 rms=0.64  
 Locality: Ruzsa  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS2	49.2	297	ePgC	8:28:04.20	0.55
			eSg	28:11.80	1.24
PKSN	67.5	5	ePgC	8:28:06.00	-0.90
			eSg	28:16.20	-0.15
PKSM	88.6	264	ePgC	8:28:09.90	-0.75
			eSg	28:22.60	-0.42
PKS7	96.5	330	iPgC	8:28:12.30	0.23
			eSg	28:25.40	-0.14
PKS9	120.2	286	ePn	8:28:16.30	0.31
			eSn	28:31.00	-1.53
RHK1	134.0	261	ePnC	8:28:18.10	0.39
			eSn	28:35.30	-0.29
PKSG	162.0	319	ePn	8:28:22.20	1.00
			eSn	28:42.10	0.30

69.

2003-08-21 time: 8:09:08.01 UTC ML= 1.7  
 lat: 45.524N lon: 17.838E h= 12.6 km  
 erh= 9.0km erz= 3.6km  
 nr= 7 gap=337 rms=0.46  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	51.8	39	iPgD	8:09:17.70	0.18
			eSg	09:25.70	0.76
RHK1	66.0	16	ePgD	8:09:19.60	-0.40
			eSg	09:29.10	-0.26
PKSM	98.6	39	iP*D	8:09:25.20	-0.38
			eS*	09:39.20	-0.09
PKS9	123.0	16	ePn	8:09:29.70	0.94
			eSn	09:35.20	-9.75

70.

2003-08-21 time: 9:35:31.95 UTC ML= 1.5  
 lat: 47.468N lon: 18.465E h= 10.0 km  
 erh=12.2km erz= 3.8km  
 nr= 5 gap=321 rms=0.97  
 Locality: Bodmér  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	10.2	214	ePgC	9:35:34.60	0.10
			eSg	35:35.40	-1.09
PKS9	99.0	188	ePg	9:35:51.10	1.38
			eSg	36:03.90	0.32
PKSM	140.3	175	eSn	9:36:11.90	-1.44

71.

2003-08-23 time: 17:31:12.52 UTC ML= 1.6  
 lat: 47.542N lon: 19.951E h= 10.0 km  
 erh=13.5km erz= 7.5km  
 nr= 12 gap=191 rms=0.98  
 Locality: Jászdózsa  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	42.0	354	iPgC	17:31:20.20	-0.04
			eSg	31:26.10	-0.15
PKSN	72.0	185	iPgC	17:31:25.60	0.09
			eSg	31:35.40	-0.23
PKSG	118.8	262	ePn	17:31:35.20	2.11
			eSn	31:48.50	-0.64

## Földrengés paraméterek

PKS2 129.5 206 ePn 17:31:35.30 0.87  
 eSn 31:52.30 0.78  
 PKS9 165.6 230 ePn 17:31:37.90 -1.02  
 eSn 32:01.30 1.79  
 PKSM 178.4 214 iPnD 17:31:39.10 -1.43  
 eSn 31:59.90 -2.47

72.

2003-08-23 time: 20:13:28.49 UTC ML=2.5  
 lat: 47.559N lon: 16.023E h= 10.0 km  
 erh=11.6km

Locality: Austria  
 Comments:  
 Reported by NEIC

73.

2003-08-26 time: 8:24:48.64 UTC ML= 1.9  
 lat: 46.170N lon: 16.357E h= 10.0 km  
 erh= 4.8km erz= 3.1km  
 nr= 19 gap=155 rms=0.96

Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
GOLS	59.3	253	iPg	8:24:59.70	0.31
			iSg	25:08.30	0.53
DOBS	68.6	268	iPg	8:25:01.20	0.18
			iSg	25:10.50	-0.18
CESS	72.5	252	iPg	8:25:01.90	0.19
			iSg	25:11.50	-0.41
GROS	73.4	296	iPg	8:25:02.50	0.64
			iSg	25:12.10	-0.07
CRES	79.5	241	iPg	8:25:02.40	-0.55
LEGS	84.1	253	iPgD	8:25:03.40	-0.36
			eSg	25:14.90	-0.66
PKS	105.5	264	iP*	8:25:07.50	-0.01
			iS*	25:20.00	-2.22
PERS	108.5	298	iPn	8:25:08.00	0.08
			iSn	25:21.00	-1.97
RHK1	132.8	94	ePnC	8:25:11.00	0.05
			eSn	25:26.30	-2.06
OBKA	144.2	285	iPnC	8:25:15.00	2.62
			iSn	25:32.60	1.71

74.

2003-08-28 time: 14:59:32.66 UTC ML= 1.5  
 lat: 47.054N lon: 19.408E h= 9.4 km  
 erh= 1.6km erz= 1.0km  
 nr= 5 gap=219 rms=0.06

Locality: Tatárszentgyörgy  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PENC	82.4	353	ePg	14:59:47.50	0.02
PKS9	100.6	239	ePgD	14:59:50.70	0.00
			eSg	15:00:04.80	0.03
PKSM	110.5	212	ePnC	14:59:52.20	-0.07
			eSn	15:00:07.70	0.13

75.

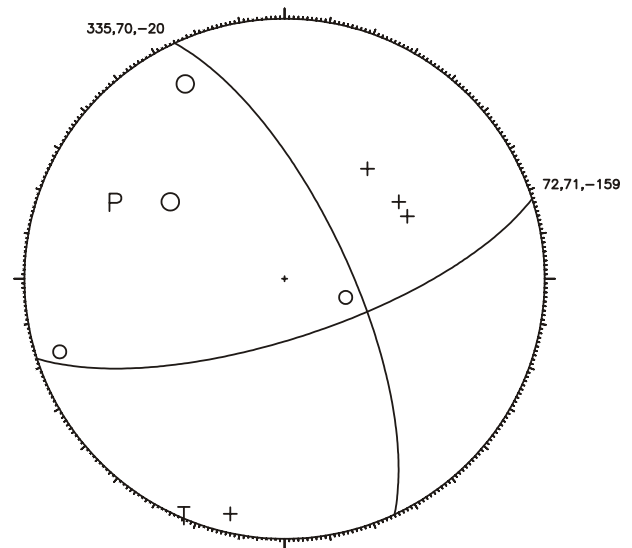
2003-08-31 time: 22:57:21.27 UTC ML= 1.9  
 lat: 46.088N lon: 18.106E h= 7.6 km

erh= 2.3km erz= 1.4km  
 nr= 19 gap=109 rms=0.68  
 Locality: Kővágóóttós  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	2.8	287	ePgD	22:57:22.50	-0.21
			eSg	57:23.20	-0.64
RHK3	24.8	153	iPgD	22:57:26.40	0.49

## Hypocenter Parameters

eSg 57:29.80 0.27  
 ePgD 22:57:28.70 -0.48  
 eSg 57:34.40 -0.94  
 PKS9 57.1 13 ePgC 22:57:31.50 -0.06  
 eSg 57:42.40 2.82  
 PKS6 125.9 63 ePnC 22:57:42.30 -0.74  
 eSn 57:58.90 -1.11  
 PKS7 133.9 37 ePnC 22:57:44.90 0.87  
 eSn 58:02.20 0.41  
 PKSG 146.6 9 ePn 22:57:45.60 -0.02  
 eSn 58:04.10 -0.51  
 PKSN 162.4 56 ePnC 22:57:49.60 2.01  
 GOLS 192.3 267 ePn 22:57:51.10 -0.21  
 DOBS 204.0 272 ePn 22:57:52.60 -0.17  
 CRES 207.4 262 iPn 22:57:53.00 -0.20  
 LEGS 216.5 266 ePn 22:57:54.20 -0.13  
 MOA 351.8 304 iPnD 22:58:12.30 1.09  
 iSn 58:54.10 3.95



76.

2003-09-01 time: 9:51:29.79 UTC ML= 1.5  
 lat: 47.366N lon: 18.340E h= 10.0 km  
 erh= ---km erz= ---km  
 nr= 3 gap=229 rms=0.19

Locality: Csákberény  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	4.8	53	ePgC	9:51:31.90	0.14
			eSg	51:32.90	-0.41
PKS9	86.7	183	ePg	9:51:45.40	0.03

77.

2003-09-02 time: 10:55:32.74 UTC ML= 1.2  
 lat: 45.536N lon: 17.209E h= 7.2 km  
 erh= 0.3km erz= 0.1km  
 nr= 6 gap=343 rms=0.01

Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	90.2	64	ePgD	10:55:48.90	0.01
			eSg	56:01.50	0.00
RHK1	91.4	47	iPgC	10:55:49.10	-0.01
			eSg	56:01.90	0.01
PKSM	134.2	56	iPnD	10:55:55.60	0.01
			eSn	56:13.40	-0.01

## Hypocenter Parameters

78.

2003-09-02 time: 10:56:11.39 UTC ML= 1.3  
 lat: 45.500N lon: 17.254E h= 8.4 km  
 erh= 7.8km erz= 2.4km  
 nr= 6 gap=343 rms=0.26  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	88.9	61	ePgC	10:56:27.50	0.16
			eSg	56:39.40	-0.38
RHK1	91.7	44	iPgD	10:56:27.70	-0.14
			eSg	56:41.50	0.83
PKSM	133.7	54	ePnC	10:56:34.20	0.19
			eSn	56:51.50	-0.16

79.

2003-09-03 time: 9:55:36.75 UTC ML=2.4  
 lat: 47.773N lon: 16.621E h= 10.0 km  
 erh=14.6km  
 Locality: Austria  
 Comments:  
 Reported by NEIC

80.

2003-09-11 time: 10:45:26.23 UTC ML= 1.7  
 lat: 45.564N lon: 17.956E h= 10.0 km  
 erh= 5.2km erz=21.6km  
 nr= 5 gap=332 rms=0.22  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	42.8	33	ePg	10:45:34.40	0.33
RHK1	59.7	9	ePgC	10:45:37.10	0.07
			eSg	45:45.10	-0.36
PKSM	89.5	36	ePgC	10:45:42.10	-0.21
			eSg	45:55.00	0.14

81.

2003-09-15 time: 11:46:09.72 UTC ML= 1.4  
 lat: 45.954N lon: 18.376E h= 0.8 km  
 erh= 0.9km erz=18.0km  
 nr= 5 gap=268 rms=0.43  
 Locality: Pécsdevecser  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	28.2	304	ePgC	11:46:14.70	-0.07
			eSg	46:17.80	-0.90
PKSM	35.2	36	ePgC	11:46:16.10	0.09
			eSg	46:20.50	-0.41
PKS9	70.7	354	ePgC	11:46:22.90	0.55

82.

2003-09-16 time: 9:28:51.57 UTC ML= 1.4  
 lat: 47.406N lon: 18.380E h= 10.0 km  
 erh= ---km erz= ---km  
 nr= 3 gap=341 rms=0.15  
 Locality: Gánt  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	1.7	152	ePgC	9:28:53.50	0.12
			eSg	28:54.50	-0.29
PKSM	134.2	171	eSn	9:29:31.60	0.00

## Földrengés paraméterek

83.

2003-09-16 time: 9:29:20.66 UTC ML= 1.5  
 lat: 47.430N lon: 18.422E h= 10.0 km  
 erh= ---km erz= ---km  
 nr= 3 gap=324 rms=0.31  
 Locality: Gánt  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	4.9	209	ePgC	9:29:22.90	0.25
			eSg	29:23.60	-0.60
PKSM	136.5	173	eSn	9:30:01.20	0.01

84.

2003-09-18 time: 11:07:06.92 UTC ML= 0.3  
 lat: 46.129N lon: 18.222E h= 10.0 km  
 erh= 5.0km erz=10.4km  
 nr= 6 gap=182 rms=0.34  
 Locality: Mánfa  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	12.2	252	iPgC	11:07:09.90	0.16
			eSg	07:11.60	-0.33
RHK3	26.8	175	iPgC	11:07:11.90	-0.13
			eSg	07:24.00	7.98
PKSM	33.7	74	iPgC	11:07:13.20	0.01
			eSg	07:18.10	0.02

85.

2003-09-19 time: 7:49:17.65 UTC ML=2.0  
 lat: 46.135N lon: 16.259E h= 10.0 km  
 erh=22.4km  
 Locality: Croatia  
 Comments:  
 Reported by NEIC

86.

2003-09-19 time: 8:44:02.50 UTC ML= 2.0  
 lat: 48.507N lon: 17.598E h= 5.3 km  
 erh= 2.8km erz= 2.2km  
 nr= 26 gap= 76 rms=0.93  
 Locality: Slovakia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
ZST	50.4	227	ePg	8:44:10.90	-0.65
			eSg	44:17.40	-1.21
VYHS	91.5	91	ePg	8:44:17.70	-1.17
SRO	93.7	145	iPg	8:44:19.90	0.64
			iSg	44:32.50	0.16
VKA	98.5	254	iPgD	8:44:20.00	-0.11
			iSg	44:34.30	0.45
SOP	119.9	220	ePnC	8:44:24.20	0.39
			eSn	44:40.00	-0.43
PKSG	137.4	154	iPnC	8:44:25.60	-0.39
			eSn	44:43.40	-0.91
OKC	153.3	15	ePn	8:44:26.00	-1.97
PSZ	182.8	111	ePn	8:44:33.50	1.85
			eSn	44:56.00	1.61
PKS8	198.3	156	ePnC	8:44:33.60	0.02
			eSn	44:56.90	-0.93
ARSA	208.8	228	iPnC	8:44:37.20	2.31
			iSn	45:03.00	2.85
DPC	224.9	336	ePn	8:44:37.80	0.90
			eSn	45:03.30	-0.43
MOA	258.3	254	iPnC	8:44:39.40	-1.66
			iSn	45:09.20	-1.95
PKSM	267.1	163	iPnC	8:44:42.00	-0.15
			eSn	45:11.00	-2.09
PRU	276.9	307	ePn	8:44:47.70	4.33
			Sn	45:19.30	4.04



## Földrengés paraméterek

GEC2 289.4 277 ePn 8:44:44.70 -0.24  
 KHC 303.2 283 ePn 8:44:46.90 0.24  
 KBA 356.1 244 iPnC 8:44:51.50 -1.75  
 iSn 45:30.80 -2.04  
 BRG 372.5 315 iPn 8:45:02.80 7.50  
 iSn 45:43.60 7.12

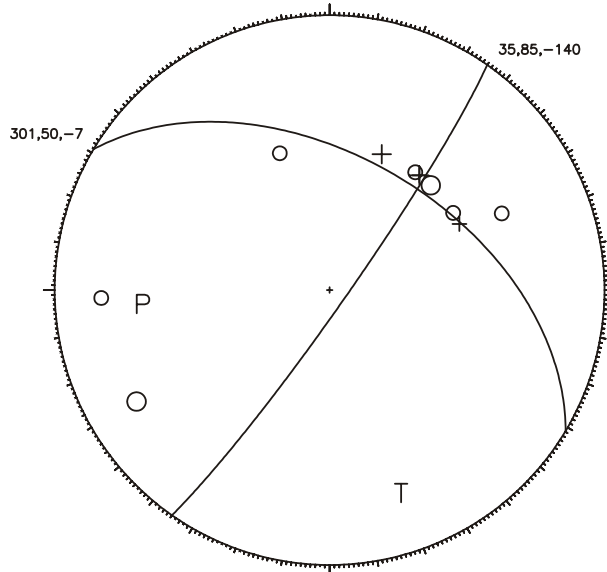
87.

2003-09-19 time: 17:30:11.99 UTC ML= 1.4  
 lat: 45.953N lon: 17.667E h= 14.4 km  
 erh= 4.9km erz= 3.7km  
 nr= 8 gap=295 rms=0.34  
 Locality: Zádor  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK1	35.1	63	iPgD	17:30:18.80	0.03
			eSg	30:24.90	0.85
RHK3	46.0	99	iPgC	17:30:20.70	0.10
			eSg	30:27.80	0.49
PKSM	80.7	69	iPgC	17:30:26.10	-0.52
			eSg	30:37.70	-0.34
PKS9	84.8	34	eP*D	17:30:27.50	0.21
			eS*	30:39.50	0.29

88.

2003-09-21 time: 18:26:25.71 UTC ML= 2.4  
 lat: 45.875N lon: 17.534E h= 17.7 km  
 erh= 3.8km erz= 1.9km  
 nr= 15 gap=183 rms=0.42  
 Locality: Croatia  
 Comments:



sta	dist	azm	phase	hr mn sec	res
RHK1	48.3	60	iPgD	18:26:34.80	-0.10
			eSg	26:36.30	-5.77
RHK3	55.8	88	ePgD	18:26:36.50	0.34
			eSg	26:43.70	-0.61
PKSM	93.6	66	eP*D	18:26:42.00	-0.04
			eS*	26:54.00	-0.77
PKS9	97.8	36	ePnD	18:26:43.20	0.51
			eSn	26:55.50	-0.43
PTJ	122.4	271	ePn	18:26:45.80	0.06
			eSn	27:00.90	-0.47
PKS8	142.1	38	iPnC	18:26:48.00	-0.20
			eSn	27:06.70	0.96
PKS6	176.2	63	ePnC	18:26:52.80	0.35

## Hypocenter Parameters

PKS7 180.6 44 eSn 27:19.30 5.99  
 iPnD 18:26:53.10 0.10  
 PKSG 181.0 21 iPnC 18:26:53.30 0.25  
 eSn 27:10.30 -4.08  
 PKSN 212.5 58 ePnD 18:26:57.40 0.42  
 eSn 27:31.40 10.03  
 SOP 214.4 340 ePnD 18:26:57.70 0.48  
 eSn 27:17.00 -4.80  
 ZST 260.1 353 ePn 18:27:03.10 0.18  
 PSZ 289.8 38 ePnC 18:27:02.10 -4.52

89.

2003-09-22 time: 8:45:47.96 UTC ML= 0.8  
 lat: 47.399N lon: 18.385E h= 10.0 km  
 erh= ---km erz= ---km  
 nr= 4 gap=339 rms=0.63  
 Locality: Gánt  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	0.9	151	iPgC	8:45:49.60	-0.15
			eSg	45:50.20	-0.95
PKSM	133.5	172	ePnC	8:46:11.50	1.15
			eSn	46:27.60	-0.22

90.

2003-09-26 time: 12:21:29.80 UTC ML= 1.0  
 lat: 46.536N lon: 18.213E h= 6.9 km  
 erh= 1.0km erz= 1.6km  
 nr= 8 gap=176 rms=0.15  
 Locality: Kocsola  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS9	7.6	42	iPgD	12:21:31.60	-0.03
			eSg	21:33.10	0.05
PKSM	48.9	138	iPgD	12:21:38.50	-0.12
			eSg	21:45.40	-0.09
RHK1	50.3	192	iPgC	12:21:39.10	0.24
			eSg	21:45.60	-0.33
PKSG	96.1	8	ePgC	12:21:46.90	-0.10
			eSg	21:56.60	-3.81
PKS6	103.9	86	eSg	12:22:03.00	0.10

91.

2003-09-27 time: 0:24:53.42 UTC ML=1.4  
 lat: 46.024N lon: 16.941E h= 10.0 km  
 erh=24.5km  
 Locality: Croatia  
 Comments:  
 Reported by NEIC

92.

2003-09-30 time: 19:43:02.90 UTC ML= 1.8  
 lat: 46.086N lon: 16.947E h= 10.0 km  
 erh= 5.0km erz= 2.1km  
 nr= 22 gap=153 rms=0.77  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PTJ	79.4	255	ePg	19:43:17.10	-0.09
			eSg	43:27.20	-1.14
RHK1	87.0	89	ePgD	19:43:19.10	0.56
			eSg	43:31.20	0.47
GOLS	102.7	265	iPg	19:43:21.70	0.37
			iSg	43:35.60	-0.11
RHK3	103.5	102	eP*C	19:43:21.80	0.35
			eS*	43:34.70	-1.22
DOBS	114.5	274	iPn	19:43:23.10	0.17
			iSn	43:37.40	-1.15
PKS9	116.6	62	iPnC	19:43:23.10	-0.10

## Hypocenter Parameters

GROS	118.9	290	eSn	43:38.90	-0.13
			iPnD	19:43:23.50	0.01
			iSn	43:37.80	-1.74
CRES	119.1	256	iPn	19:43:23.70	0.19
			iSn	43:38.80	-0.78
LEGS	127.1	263	iPn	19:43:24.40	-0.11
			iSn	43:43.00	1.64
PKSM	131.6	84	ePnC	19:43:25.10	0.03
			eSn	43:41.20	-1.16
PDKS	150.8	270	iSn	19:43:48.40	1.78
PERS	153.6	293	iSn	19:43:48.60	1.37

93.

2003-10-01 time: 11:08:56.80 UTC ML= 0.8  
 lat: 46.084N lon: 18.262E h= 3.4 km  
 erh= 3.3km erz=26.8km  
 nr= 8 gap=118 rms=0.64  
 Locality: Pécs  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	14.8	274	iPgC	11:08:59.00	-0.51
			eSg	09:01.00	-0.62
RHK3	21.8	182	iPgC	11:09:01.00	0.26
			eSg	09:04.20	0.39
PKSM	32.5	64	iPgD	11:09:02.20	-0.44
			eSg	09:07.20	0.01
PKS9	55.9	1	ePgC	11:09:08.10	1.31
			eSg	09:17.20	2.61

94.

2003-10-03 time: 15:10:04.74 UTC ML= 0.8  
 lat: 45.900N lon: 17.969E h= 10.2 km  
 erh= 5.4km erz= 8.0km  
 nr= 7 gap=284 rms=0.45  
 Locality: Besence  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	22.0	93	iPgC	15:10:09.30	0.24
			eSg	10:12.70	0.26
RHK1	23.1	20	iPgD	15:10:09.20	-0.04
			eSg	10:12.70	-0.05
PKSM	62.5	56	iPgD	15:10:15.60	-0.44
			eSg	10:23.90	-0.96
PKS9	80.0	17	eSg	15:10:31.40	1.03

95.

2003-10-07 time: 22:08:25.07 UTC ML= 2.6  
 lat: 47.856N lon: 22.012E h= 10.0 km  
 erh=55.4km erz=59.2km  
 nr= 12 gap=219 rms=1.69  
 Locality: Máriapócs  
 Comments: felt 3-4 EMS

sta	dist	azm	phase	hr mn sec	res
UZH	88.6	14	iPg	22:08:40.10	-0.90
			iSg	08:53.80	0.38
PSZ	158.5	272	ePnC	22:08:49.90	-0.69
			eSn	09:10.10	-0.39
PKSN	193.9	237	ePn	22:08:58.90	3.89
PKS6	232.1	233	ePnD	22:08:58.50	-1.27
			eSn	09:24.60	-2.23
PKS7	233.1	247	ePn	22:09:04.30	4.41
			eSn	09:32.90	5.85
PKS8	274.4	247	ePn	22:09:05.40	0.36
			eSn	09:32.10	-4.12
PKSG	277.0	259	ePn	22:09:11.60	6.23
			eSn	09:49.90	13.09
PKSM	314.7	234	ePn	22:09:09.10	-0.97
			eSn	09:40.60	-4.57
PKS9	316.0	243	ePn	22:09:19.00	8.77
			eSn	09:58.60	13.14

## Földrengés paraméterek

RHK1 358.1 237 eSn 22:09:50.50 -4.29

96.

2003-10-08 time: 12:04:27.43 UTC ML= 0.9  
 lat: 47.412N lon: 18.454E h= 10.0 km  
 erh= 7.4km erz= 2.7km  
 nr= 8 gap=279 rms=0.54  
 Locality: Csákvár  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	5.3	245	iPgC	12:04:29.40	-0.05
			eSg	04:31.10	0.08
PKS8	61.7	164	ePg	12:04:38.40	-0.18
			eSg	04:47.90	0.62
PKS9	92.7	188	ePg	12:04:44.40	0.32
			eSg	04:55.70	-1.36
PKSM	134.2	174	ePnC	12:04:50.50	0.59
			eSn	05:05.90	-1.56

97.

2003-10-09 time: 8:15:51.81 UTC ML= 1.4  
 lat: 45.523N lon: 17.752E h= 15.8 km  
 erh= 3.4km erz= 1.2km  
 nr= 6 gap=338 rms=0.15  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	56.3	44	ePg	8:16:02.00	-0.24
			eSg	16:10.50	0.12
RHK1	68.2	21	iPgC	8:16:04.40	0.09
			eSg	16:13.80	-0.27
PKSM	103.1	42	ePnD	8:16:09.80	0.12
			eSn	16:23.60	-0.02

98.

2003-10-09 time: 10:08:23.47 UTC ML= 0.8  
 lat: 47.480N lon: 18.673E h= 11.5 km  
 erh= 3.6km erz= 3.2km  
 nr= 8 gap=177 rms=0.44  
 Locality: Bicske  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
PKSG	23.4	245	ePgC	10:08:27.70	-0.43
			eSg	08:31.80	0.03
PKS8	66.9	180	ePg	10:08:36.40	0.81
			eSg	08:44.10	-0.95
PSZ	103.9	62	iP*C	10:08:42.10	0.16
			eS*	08:55.90	-0.44
PKSM	141.0	181	ePn	10:08:46.60	-0.02
			eSn	09:04.60	-0.07

99.

2003-10-10 time: 5:56:44.13 UTC ML= 1.1  
 lat: 45.527N lon: 18.136E h= 7.6 km  
 erh= 9.6km erz= 5.0km  
 nr= 8 gap=328 rms=0.52  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	41.2	13	ePgC	5:56:51.80	0.19
			eSg	56:57.90	0.45
RHK1	63.3	356	ePgC	5:56:55.40	-0.12
			eSg	57:01.70	-2.70
PKSM	85.6	27	ePgD	5:56:59.20	-0.29
			eSg	57:11.70	0.24
PKS9	118.3	5	ePnC	5:57:05.60	0.65
PKS8	155.9	16	ePnD	5:57:08.60	-1.03

**Földrengés paraméterek****Hypocenter Parameters**

100.

2003-10-11 time: 3:51:20.70 UTC ML= 1.8  
 lat: 45.835N lon: 16.249E h= 5.0 km  
 erh= 3.4km erz= 2.3km  
 nr= 23 gap=166 rms=0.84  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
GOLS	52.2	292	iPg	3:51:30.00	-0.07
			iSg	51:36.80	-0.58
CRES	61.5	269	iPg	3:51:32.00	0.27
			iSg	51:40.80	0.47
CESS	62.9	284	ePg	3:51:31.70	-0.27
			eSg	51:40.40	-0.35
DOBS	69.8	300	ePg	3:51:32.80	-0.40
			eSg	51:42.30	-0.64
LEGS	73.4	280	iPgC	3:51:33.60	-0.24
			iSg	51:43.70	-0.38
VBY	85.6	245	ePg	3:51:36.20	0.18
GROS	90.4	320	iPg	3:51:35.70	-1.17
PKDS	100.7	286	iPg	3:51:38.00	-0.71
BISS	125.1	316	ePnD	3:51:41.20	-1.49
CEY	142.1	266	ePn	3:51:45.10	0.28
			eSn	52:03.00	-0.62
RHK1	144.2	78	ePnC	3:51:45.00	-0.08
			eSn	52:01.20	-2.90
OBKA	151.2	300	iPnC	3:51:46.80	0.85
			iSn	52:07.00	1.37
ARSA	166.9	341	iPnC	3:51:49.70	1.79
			iSn	52:10.90	1.77
VOY	184.0	277	ePn	3:51:51.40	1.36
			eSn	52:16.90	3.98
AQU	449.0	211	Pn	3:52:24.38	1.30

101.

2003-10-12 time: 0:49:30.76 UTC ML= 2.0  
 lat: 45.925N lon: 20.416E h= 10.0 km  
 erh= 5.3km erz= 2.5km  
 nr= 15 gap=290 rms=0.65  
 Locality: Serbia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PKS6	99.7	319	iPgD	0:49:48.90	0.25
			eSg	50:02.60	0.00
PKSN	116.0	339	ePnD	0:49:51.20	0.22
			eSn	50:06.80	0.05
PKSM	141.0	283	ePnD	0:49:54.10	0.01
			eSn	50:10.70	-1.59
PKS7	157.7	322	ePnD	0:49:56.00	-0.17
			eSn	50:17.50	1.51
RHK3	168.0	269	ePn	0:49:57.00	-0.46
			eSn	50:19.40	1.12
PKS8	170.7	308	iPnC	0:49:57.10	-0.70
			eSn	50:18.30	-0.59
RHK1	182.5	276	ePn	0:50:01.80	2.53
			eSn	50:21.80	0.29
PKSG	225.0	316	ePn	0:50:04.10	-0.47
			eSn	50:27.00	-3.94

102.

2003-10-15 time: 11:32:26.11 UTC ML= 1.1  
 lat: 46.144N lon: 18.300E h= 10.0 km  
 erh= 3.4km erz=13.0km  
 nr= 8 gap=113 rms=0.72  
 Locality: Vasas  
 Comments: explosion

sta	dist	azm	phase	hr mn sec	res
RHK1	18.4	253	iPgC	11:32:29.80	-0.05
			eSg	32:32.70	-0.08
PKSM	27.4	74	ePgC	11:32:30.70	-0.62

50

RHK3	28.6	187	eSg	32:35.00	-0.38
			ePg	11:32:31.50	-0.02
			eSg	32:36.30	0.55
PKS9	49.3	358	ePg	11:32:37.30	2.21
			eSg	32:41.60	-0.49

103.

2003-10-16 time: 3:39:16.17 UTC ML=1.6  
 lat: 46.311N lon: 16.226E h= 10.0 km  
 erh=26.6km  
 Locality: Croatia  
 Comments:  
 Reported by NEIC

104.

2003-10-16 time: 8:04:40.09 UTC ML= 1.1  
 lat: 46.410N lon: 16.893E h= 24.4 km  
 erh= 4.6km erz= 5.8km  
 nr= 19 gap=149 rms=0.72  
 Locality: Szepetnek  
 Comments:

sta	dist	azm	phase	hr mn sec	res
GROS	107.1	273	eSn	8:05:09.80	-1.34
GOLS	107.5	246	ePn	8:04:57.00	-0.58
			eSn	05:10.70	-0.53
DOBS	113.5	255	iPn	8:04:57.60	-0.73
			eSn	05:10.60	-1.96
RHK3	120.0	119	ePn	8:04:59.70	0.56
			eSn	05:13.20	-0.80
CESS	120.6	246	iSn	8:05:14.70	0.56
CRES	128.6	240	ePn	8:05:00.60	0.38
			eSn	05:16.60	0.68
LEGS	132.0	247	iPnD	8:05:00.90	0.26
			eSn	05:16.40	-0.27
PKSM	136.5	99	ePn	8:05:00.80	-0.40
			eSn	05:16.90	-0.76
PERS	138.6	280	eSn	8:05:18.30	0.17
PKS8	146.1	69	ePn	8:05:02.30	-0.10
			eSn	05:21.30	1.49
PKDS	150.7	256	iPn	8:05:04.00	1.02
			eSn	05:21.50	0.67

105.

2003-10-19 time: 10:05:57.32 UTC ML= 1.5  
 lat: 46.197N lon: 16.839E h= 10.0 km  
 erh=12.9km erz= 3.2km  
 nr= 10 gap=192 rms=0.55  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
PTJ	75.7	244	ePg	10:06:11.20	0.25
			eSg	06:25.00	3.41
RHK1	96.0	97	ePg	10:06:14.80	0.25
			eSg	06:27.20	-0.79
GOLS	96.1	258	iPg	10:06:14.60	0.03
			iSg	06:27.50	-0.53
CESS	109.2	257	ePn	10:06:16.40	-0.29
			eSn	06:30.80	-1.01
CRES	114.7	249	iPn	10:06:17.40	0.03
PKDS	142.8	265	iPnC	10:06:21.30	0.42

106.

2003-10-25 time: 6:44:58.36 UTC ML= 2.1  
 lat: 47.655N lon: 17.454E h= 10.0 km  
 erh= 3.8km erz= 3.9km  
 nr= 26 gap= 75 rms=1.35  
 Locality: Enese  
 Comments:





## Hypocenter Parameters

BFO	654.4	294	eSn	10:02:45.00	33.85
			ePn	9:61:03.40	-1.15
			eSn	10:02:10.30	-3.26
			ePn	9:61:08.90	0.33
PGF	686.7	237	ePn	9:61:12.50	-1.38
SBF	729.3	252	ePn	9:61:12.50	-1.60
CDF	731.1	292	ePn	9:61:16.40	1.52
LPG	737.3	266	ePn	9:61:16.40	1.52
			eSn	10:02:26.60	-5.35
LPL	738.5	266	ePn	9:61:16.30	1.27
HINF	743.1	286	ePn	9:61:14.20	-1.41
			eSn	10:02:27.20	-6.04
MBDF	751.1	260	ePn	9:61:15.20	-1.40
CABF	783.4	276	ePn	9:61:19.50	-1.13
HAU	784.8	287	ePn	9:61:19.50	-1.30
FRF	800.9	251	ePn	9:61:22.10	-0.71
ORIF	815.5	262	ePn	9:61:24.70	0.07
LMR	821.1	249	ePn	9:61:24.20	-1.13
VIVF	910.5	263	ePn	9:61:34.50	-1.98
SMF	955.9	275	ePn	9:61:40.50	-1.64
AVF	993.5	276	ePn	9:61:45.10	-1.73
BGF	32.4	274	ePn	9:61:49.90	-1.78

115.

2003-11-29 time: 11:05: 7.67 UTC ML=2.6  
lat: 45.947N lon: 16.020E h= 10.0 km  
erh=11.6km

Locality: Croatia  
Comments:  
Reported by NEIC

116.

2003-11-29 time: 23:05:50.75 UTC ML= 1.4  
lat: 46.052N lon: 16.845E h= 34.0 km  
erh=16.0km erz= 346km  
nr= 6 gap=322 rms=0.38

Locality: Croatia  
Comments:

sta	dist	azm	phase	hr	mn	sec	res
RHK3	110.6	99	ePg	23:06:08.60			0.54
			eSg	06:20.90			-0.67
PKS9	125.4	62	ePgC	23:06:09.60			-0.31
			eSg	06:25.10			0.24
PKSM	140.0	83	iPgC	23:06:11.60			-0.13
			eSg	06:28.60			0.50

117.

2003-12-02 time: 10:09:17.62 UTC ML= 1.5  
lat: 47.469N lon: 18.404E h= 10.0 km  
erh=32.9km erz= 3.9km

nr= 5 gap=346 rms=0.82  
Locality: Várgesztes  
Comments: explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	8.7	187	ePgC	10:09:19.90			-0.09
			eSg	09:20.70			-1.13
PKS9	98.6	186	ePgC	10:09:36.40			1.09
PKSM	141.0	173	ePnC	10:09:41.10			0.15
			eSn	09:57.00			-2.15

118.

2003-12-02 time: 10:09:44.60 UTC ML= 1.6  
lat: 47.476N lon: 18.455E h= 10.0 km  
erh=17.9km erz= 5.4km

nr= 6 gap=327 rms=0.79  
Locality: Várgesztes  
Comments: explosion

sta	dist	azm	phase	hr	mn	sec	res
PKSG	10.6	207	ePgC	10:09:47.00			-0.19
			eSg	09:48.00			-1.22

## Földrengés paraméterek

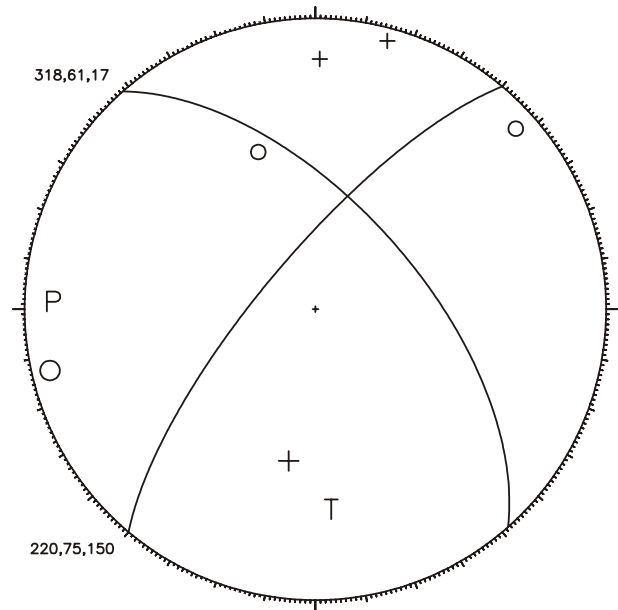
PKS9	99.8	188	ePgC	10:10:03.50	1.00
			eSg	10:16.30	-0.17
PKSM	141.3	174	ePn	10:10:08.00	0.03
			eSn	10:24.40	-1.80

119.

2003-12-02 time: 12:02:03.34 UTC ML= 1.0  
lat: 47.779N lon: 19.028E h= 8.5 km  
erh= 2.8km erz= 2.3km  
nr= 14 gap=208 rms=0.50

Locality: Dunabogdány  
Comments:

sta	dist	azm	phase	hr	mn	sec	res
RHK5	9.5	160	ePgD	12:02:05.60			-0.03
			eSg	02:07.20			-0.21
RHK6	20.3	125	ePg	12:02:07.40			0.13
			eSg	02:10.70			0.37
BUD	32.8	181	ePgC	12:02:08.50			-0.90
			eSg	02:14.80			0.68
PKSG	64.4	228	ePgD	12:02:15.20			0.26
			eSg	02:23.60			-0.39
PSZ	66.7	77	iPgD	12:02:15.30			-0.05
			eSg	02:24.00			-0.72
PKS8	103.5	195	ePgC	12:02:22.70			0.81
			eSg	02:35.80			-0.56
PKSM	176.7	190	iPnC	12:02:31.60			0.28
			eSn	02:51.80			-1.34



120.

2003-12-08 time: 12:25:33.01 UTC ML= 1.1  
lat: 46.164N lon: 18.289E h= 12.9 km  
erh= 0.8km erz= 2.2km  
nr= 5 gap=166 rms=0.06

Locality: Zobákpusztá  
Comments: explosion

sta	dist	azm	phase	hr	mn	sec	res
RHK1	18.4	245	ePg	12:25:37.10			0.07
			eSg	25:40.10			-0.07
PKSM	27.7	79	ePgD	12:25:38.40			-0.07
			eSg	25:42.80			0.07
PKS8	84.8	21	eSg	12:26:00.30			0.01



## Hypocenter Parameters

MORC	383.6	5	ePn	7:07:14.14	1.10
STON	388.7	173	iPn	7:07:16.68	3.01
			iSn	07:57.40	2.48
OKC	396.9	12	ePn	7:07:15.40	0.71
			eSn	07:55.10	-1.64
KHC	406.2	320	ePn	7:07:17.60	1.74
WTTA	427.7	284	iPnD	7:07:20.60	2.07
			iSn	08:04.40	0.83
WATA	433.8	285	iPnD	7:07:20.30	1.00
			iSn	08:05.10	0.17
WET	442.9	315	ePn	7:07:22.20	1.77
PRU	447.2	335	ePn	7:07:21.60	0.63
SQTA	458.5	282	iPnD	7:07:23.60	1.22
			iSn	08:11.30	0.88
MOTA	469.0	284	iPnC	7:07:24.60	0.92
			iSn	08:13.90	1.16
OJC	476.3	25	ePn	7:07:28.20	3.61
NKC	552.5	322	e n	7:07:35.00	0.91
BRG	554.4	335	ePn	7:07:35.70	1.37
KWP	557.4	49	ePn	7:07:41.80	7.10
GRA1	574.0	310	ePn	7:07:37.90	1.12
GRF	574.0	310	ePn	7:07:37.90	1.12
MOX	626.1	320	ePn	7:07:44.10	0.83
			eSn	09:21.90	34.29
CLL	628.1	332	iPn	7:07:44.20	0.68
SPAK	657.7	287	Pn	7:07:47.40	0.19
FELD	709.4	284	Pn	7:07:53.40	-0.25
TOD	716.4	300	Pn	7:07:54.70	0.17
PGF	768.7	237	ePn	7:07:59.60	-1.45
			eSn	09:14.10	-5.16

126.

2003-12-16 time: 12:24:30.35 UTC ML= 1.5  
 lat: 45.521N lon: 17.744E h= 13.8 km  
 erh= 3.3km erz= 1.1km  
 nr= 6 gap=338 rms=0.15  
 Locality: Croatia  
 Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	56.8	44	ePg	12:24:40.60	-0.19
			eSg	24:49.10	0.17
RHK1	68.6	22	ePgD	12:24:43.00	0.15
			eSg	24:52.40	-0.20
PKSM	103.6	42	ePnD	12:24:48.60	0.06
			eSn	25:02.70	-0.03

127.

2003-12-17 time: 7:39:14.42 UTC ML= 1.8  
 lat: 47.803N lon: 18.063E h= 14.5 km  
 erh= 3.1km erz= 3.0km  
 nr= 13 gap=135 rms=0.68  
 Locality: Komárom  
 Comments:

sta	dist	azm	phase	hr mn sec	res
SRO	18.7	87	iPg	7:39:18.60	-0.05
			eSg	39:20.80	-1.14
PKSG	51.9	152	iPgC	7:39:24.00	-0.05
			eSg	39:31.00	-0.56
BUD	80.4	116	eSg	7:39:40.80	0.41
ZST	84.0	301	eP*	7:39:29.60	0.01
			eS*	39:39.90	-1.52
MODS	86.3	317	iP*	7:39:31.00	1.06
			eS*	39:41.50	-0.56
VYHS	95.9	37	eP*	7:39:31.50	0.09
			eS*	39:43.10	-1.56
PKSM	182.3	166	ePnC	7:39:42.80	0.47
			eSn	40:02.70	-1.41

## Földrengés paraméterek

128.

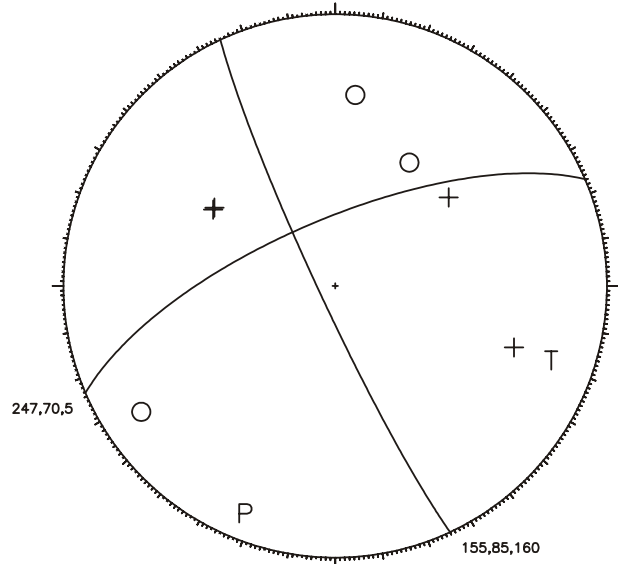
2003-12-17 time: 10:33:57.96 UTC ML=1.7  
 lat: 46.221N lon: 16.104E h= 10.0 km  
 erh=34.4km  
 Locality: Croatia  
 Comments:  
 Reported by NEIC

129.

2003-12-21 time: 17:46:15.33 UTC ML=2.0  
 lat: 48.005N lon: 16.929E h= 5.0 km  
 erh=15.1km  
 Locality: Austria  
 Comments:  
 Reported by NEIC

130.

2003-12-31 time: 20:43:49.06 UTC ML= 2.6  
 lat: 46.046N lon: 18.275E h= 10.0 km  
 erh= 1.9km erz= 1.5km  
 nr= 14 gap=129 rms=0.48  
 Locality: Magyararslós  
 Comments: felt 4-5 EMS



sta	dist	azm	phase	hr mn sec	res
RHK1	16.7	289	iPgC	20:43:52.90	0.37
			iSg	43:55.10	-0.14
RHK3	17.6	186	iPgD	20:43:52.70	0.03
			eSg	43:54.70	-0.79
PKSM	33.8	57	iPgD	20:43:55.50	0.15
			eSg	44:00.00	-0.25
PKSG	149.9	3	ePn	20:44:13.90	0.40
			eSn	44:30.90	-1.67
PKSN	154.6	52	iPnC	20:44:14.40	0.31
			eSn	44:33.60	-0.02
BUD	169.8	20	eSn	20:44:40.50	3.52
PSZ	241.9	31	iPnD	20:44:24.20	-0.77
			eSn	44:51.30	-1.69
ARSA	249.7	302	iPnC	20:44:26.30	0.35
			iSn	44:52.50	-2.22
MOA	365.2	303	iPnC	20:44:41.80	1.45
			iSn	45:18.30	-2.06
KHC	492.5	314	ePn	20:44:57.50	1.28
			eSn	45:48.10	-0.50
DPC	500.2	343	ePn	20:44:59.00	1.82



## Földrengés paraméterek

	eSn	45:48.60	-1.71
PRU 519.4 328	ePn	20:44:59.50	-0.08
	eSn	45:51.50	-3.08

131.

---

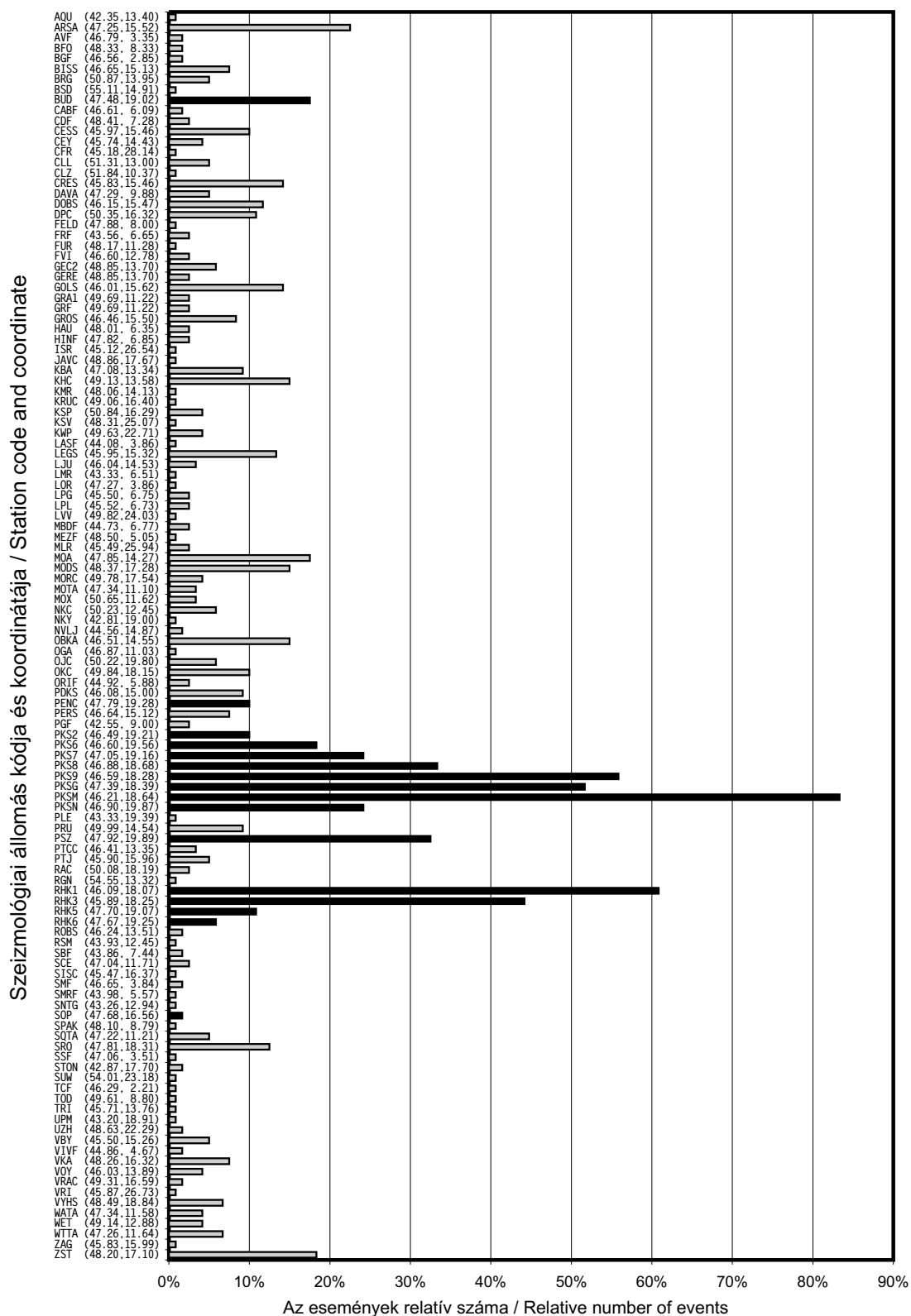
2003-12-31 time: 21:36:01.67 UTC ML= 1.6  
lat: 46.038N lon: 18.287E h= 9.4 km  
erh= 1.1km erz= 1.2km  
nr= 8 gap=134 rms=0.18  
Locality: Kozármisleny  
Comments:

## Hypocenter Parameters

sta	dist	azm	phase	hr	mn	sec	res
RHK3	16.8	189	iPgD	21:36:05.20			0.09
			eSg			36:07.40	-0.39
RHK1	17.8	291	iPgC	21:36:05.30			0.04
			eSg			36:07.60	-0.45
PKSM	33.6	55	iPgD	21:36:08.00			0.11
			eSg			36:12.60	-0.14
PKSG	150.7	3	ePn	21:36:26.00			-0.30
			eSn			36:45.80	0.29

## Hypocenter Parameters

## Földrengés paraméterek



3.4. ábra Az egyes állomások részvétele a hipocentrum meghatározásban

Figure 3.4. Contribution of individual stations to the hypocenter determination

**Földrengés paraméterek**

**Hypocenter Parameters**

## 4.

### JELENTŐS FÖLDRENGÉSEK 2003-BAN (Magyarországon érezhető földrengések)

2003. február 3.	- Hegyeshalom
2003. április 3.	- Noszvaj
2003. június 21.	- Jászapáti
2003. június 27.	- Jászapáti
2003. július 1.	- Igrici
2003. július 8.	- Bükkábrány
2003. július 10.	- Rimóc
2003. július 13.	- Vatta
2003. augusztus 9.	- Magyarszecsőd
2003. szeptember 10.	- Pócspetri
2003. szeptember 10.	- Máriapócs
2003. október 7.	- Máriapócs
2003. október 11.	- Máriapócs
2003. december 16.	- Pogányszentpéter
2003. december 31.	- Magyarsarlós

#### 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 2003 (Earthquakes that were felt in Hungary)

3 February 2003	-	Hegyeshalom
3 April 2003	-	Noszvaj
21 June 2003	-	Jászapáti
27 June 2003	-	Jászapáti
1 July 2003	-	Igrici
8 July 2003	-	Bükkábrány
10 July 2003	-	Rimóc
13 July 2003	-	Vatta
9 August 2003	-	Magyarszecsőd
10 September 2003	-	Pócspetri
10 September 2003	-	Máriapócs
7 October 2003	-	Máriapócs
11 October 2003	-	Máriapócs
16 December 2003	-	Pogányszentpéter
31 December 2003	-	Magyarsarlós

#### **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)

**2003. február 3. - Hegyeshalom / 3 February 2003 - Hegyeshalom****FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/02/03
Kipattanási idő / Origin Time:	19:32:46.3 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.896 N 17.094 E (S.D. 4.1 km)
Mélység / Depth:	10 km (S.D. 5 km)
Magnitúdó / Magnitude:	2.7 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

**LEÍRÁS**

Február 3-án egy 2.7  $M_L$  magnitúdójú földrengés keletkezett és volt érezhető ÉNY Magyarországon kb. 200-250 km<sup>2</sup> területen. A legnagyobb intenzitást Hegyeshalomból jelentették, mely 5 EMS volt.

Az esemény szeizmogramja a 4.1. ábrán látható.

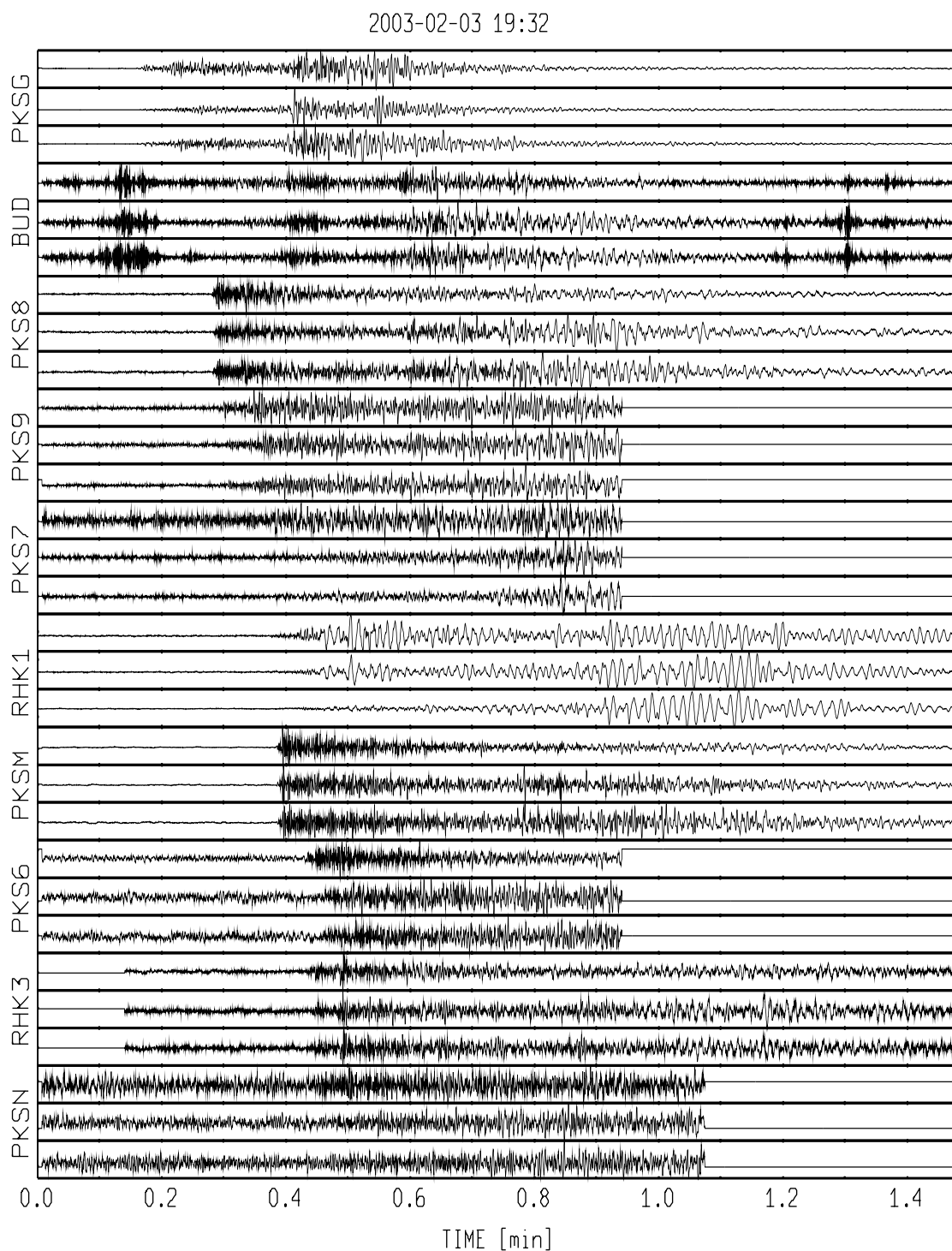
A rengés intenzitás eloszlását a 4.1. táblázat tartalmazza és a 4.2. ábra mutatja.

**DISCUSSION**

On February 3<sup>rd</sup>, an earthquake of magnitude 2.7  $M_L$  was felt in NW Hungary in an area of about 200-250 km<sup>2</sup>. Maximum intensity of 5 EMS was reported from Hegyeshalom.

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 2003. február 3-i, hegyeshalmi földrengés (19:32:46 UTC) szeizmogramja

Figure 4.1. Seismograms of the Hegyeshalom earthquake 3<sup>rd</sup> February 2003 (19:32:46 UTC)

**4.1. Táblázat**

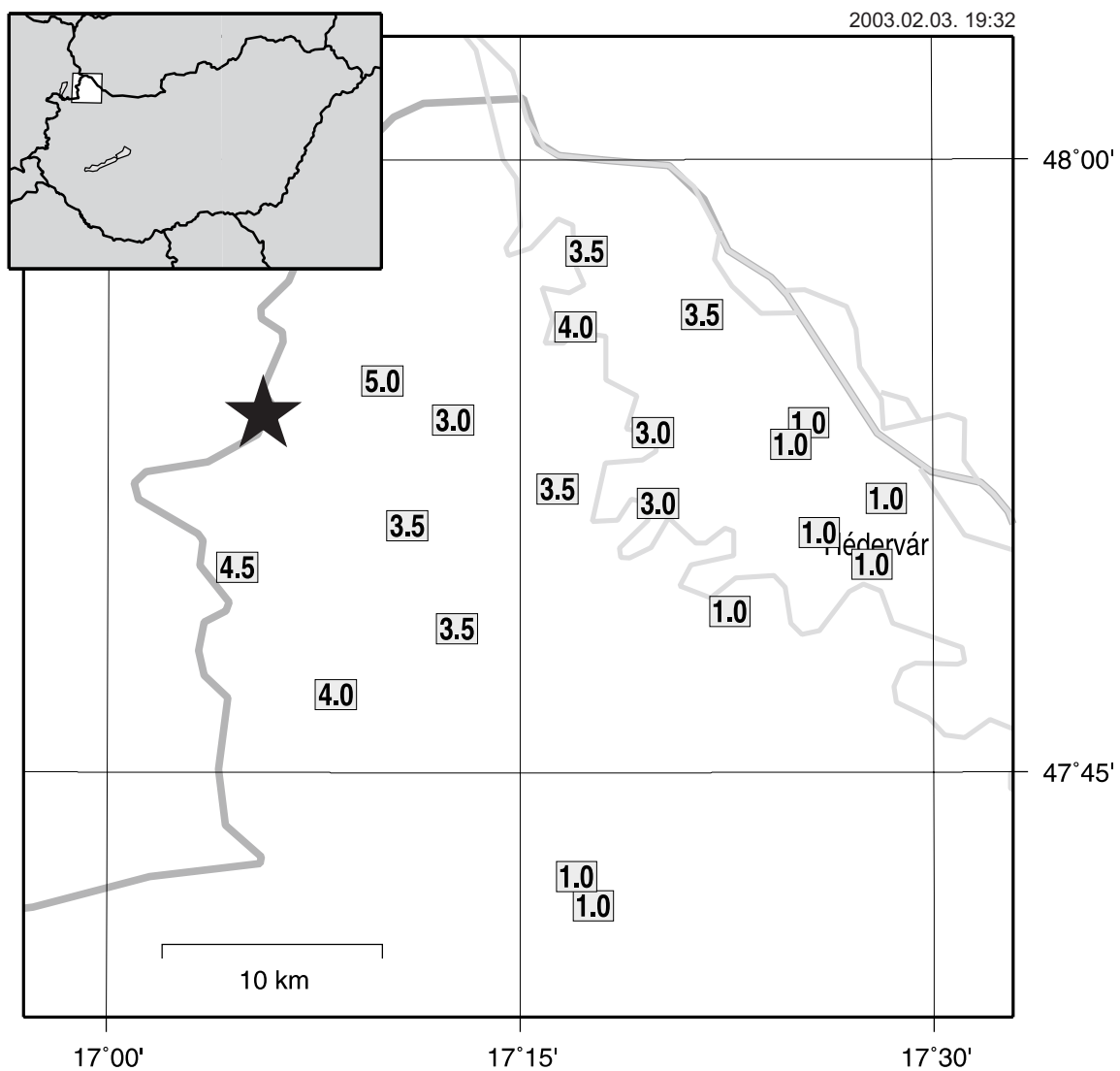
A 2003. február 3-i, hegyeshalmi földrengés (19:32:46 UTC) intenzitás eloszlása

**Table 4.1.**

Intensity distribution of the Hegyeshalom earthquake 3<sup>rd</sup> February 2003 (19:32:46 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	Cakóháza	47.696	17.293	1.0	0%	1
2	Darnózseli	47.848	17.430	1.0	0%	2
3	Dunakiliti	47.963	17.290	3.5	36%	1
4	Dunasziget	47.937	17.360	3.5	38%	1
5	Feketeerdő	47.932	17.283	4.0	34%	2
6	Halászi	47.889	17.330	3.0	27%	2
7	Hegyeshalom	47.910	17.166	5.0	23%	2
8	Hédervár	47.835	17.462	1.0	0%	2
9	Jánossomorja	47.782	17.138	4.0	30%	1
10	Kimle	47.816	17.376	1.0	0%	2
11	Kisbodak	47.893	17.424	1.0	0%	1
12	Levél	47.894	17.209	3.0	30%	2
13	Lipót	47.862	17.471	1.0	0%	1
14	Máriakálnok	47.860	17.333	3.0	31%	1
15	Mosonmagyaróvár	47.866	17.272	3.5	34%	2
16	Mosonszolnok	47.851	17.181	3.5	40%	2
17	Püski	47.884	17.413	1.0	0%	2
18	Rábcakapi	47.708	17.283	1.0	0%	4
19	Újrónafő	47.809	17.211	3.5	33%	2
20	Várbalog	47.834	17.078	4.5	31%	2





**4.2. ábra** A 2003. február 3-i, hegyeshalmi földrengés (19:32:46 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.2.** Intensity distribution of the Hegyeshalom earthquake 3<sup>rd</sup> February 2003 (19:32:46 UTC) (star - instrumental epicentre)

**2003. április 3. - Noszvaj / 3 April 2003 - Noszvaj****FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/04/03
Kipattanási idő / Origin Time:	04:59 UTC (makroszeizmikus)
Szélesség és hosszúság / Latitude and Longitude:	47. 94 N 20.48 E (makroszeizmikus)
Mélység / Depth:	n.a.
Magnitúdó / Magnitude:	n.a.
Maximális intenzitás / Maximum Intensity:	3-4 EMS

**LEÍRÁS**

Április 3-án hajnalban kisebb földrengést éreztek és jelentettek Noszvaj, Bükkzsérc, Cserépfalu, Cserépváralja településekről. A makroszeizmikus adatgyűjtés során kiderült, hogy az esemény nagyon kis területen, (30-50 km<sup>2</sup>) volt érezhető, a legnagyobb intenzitás 3-4 EMS volt.

Az eseményt a szeizmológiai megfigyelő hálózat nem regisztrálta.

A rengés intenzitás eloszlását a 4.2. táblázat tartalmazza és a 4.3. ábra mutatja.

**DISCUSSION**

On early morning April 3<sup>rd</sup>, a small earthquake was felt and reported from Noszvaj, Bükkzsérc, Cserépfalu, Cserépváralja. Maximum intensity of 3-4 EMS was reported from a very small epicentral area of 30-50 km<sup>2</sup>.

The event did not trigger the seismic network.

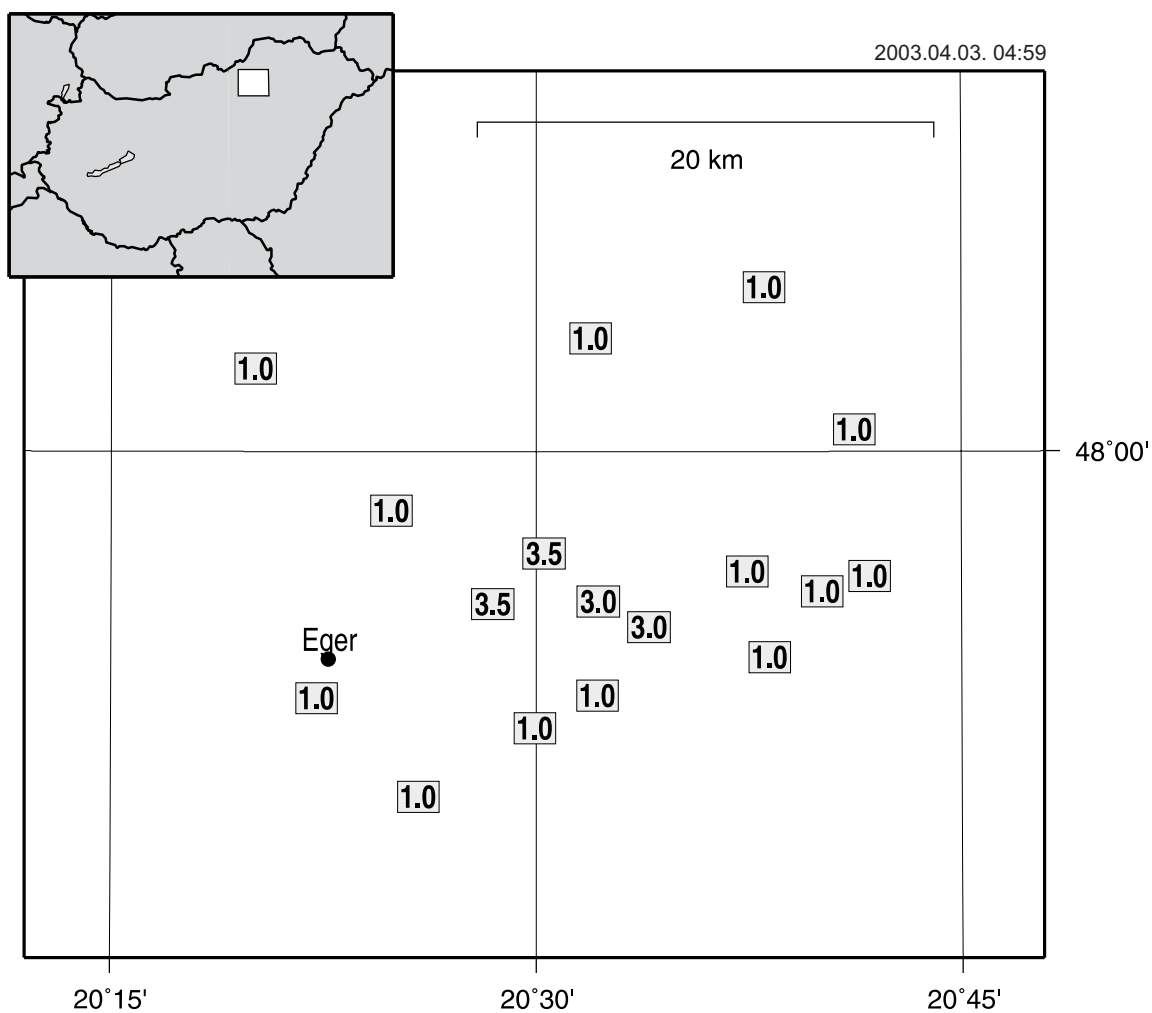
The intensity distribution of the event is shown in Table 4.2. and Figure 4.3.

**4.2. Táblázat**

A 2003. április 3-i, noszvalyi földrengés (04:59 UTC) intenzitás eloszlása

**Table 4.2.**Intensity distribution of the Noszvaly earthquake 3<sup>rd</sup> April 2003 (04:59 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	Bogács	47.904	20.535	1.0	0%	1
2	Borsodgeszt	47.951	20.695	1.0	0%	1
3	Bükkszentkereszt	48.065	20.633	1.0	0%	2
4	Bükkzsérc	47.960	20.504	3.5	35%	2
5	Cserépfalu	47.941	20.536	3.0	30%	2
6	Cserépváralja	47.931	20.566	3.0	26%	1
7	Eger	47.903	20.370	1.0	0%	2
8	Felsőtárkány	47.977	20.414	1.0	0%	2
9	Kács	47.953	20.623	1.0	0%	1
10	Kisgyőr	48.009	20.686	1.0	0%	1
11	Mónosbél	48.033	20.334	1.0	0%	1
12	Noszvaj	47.940	20.474	3.5	34%	1
13	Ostoros	47.864	20.430	1.0	0%	1
14	Répáshuta	48.045	20.531	1.0	0%	2
15	Sály	47.945	20.667	1.0	0%	1
16	Szomolya	47.891	20.498	1.0	0%	1
17	Tibolddaróc	47.919	20.636	1.0	0%	1



**4.3. ábra** A 2003. április 3-i, noszvalyi földrengés (04:59 UTC) intenzitás eloszlása (az eseményt a szeizmológiai hálózat nem regisztrálta)

**Figure 4.3.** Intensity distribution of the Noszvaly event 3<sup>rd</sup> April 2003 (04:59 UTC) (the event did not trigger the seismic network)

**2003. június 21. - Jászapáti / 21 June 2003 - Jászapáti****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/06/21
Kipattanási idő / Origin Time:	20:05:58.1 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.531 N 20.032 E (S.D. 2.0 km)
Mélység / Depth:	12.9 km (S.D. 1 km)
Magnitúdó / Magnitude:	3.7 ML
Maximális intenzitás / Maximum Intensity:	5-6 EMS

**LEÍRÁS**

A Jászságban ebben az évben is több földrengés volt. Az év egyik legnagyobb magyarországi rengése (3.7  $M_L$ ) pattant ki június 21-én, Jászapáti környékén, mely mintegy 2000 km<sup>2</sup> területen volt érezhető Jászberénytől keleti irányban. A legnagyobb intenzitást (5-6 EMS) Jászapáti, Alattyán, Jászkisér, Jászdózsa településekről jelentették.

Az esemény szeizmogramja a 4.4. ábrán látható.

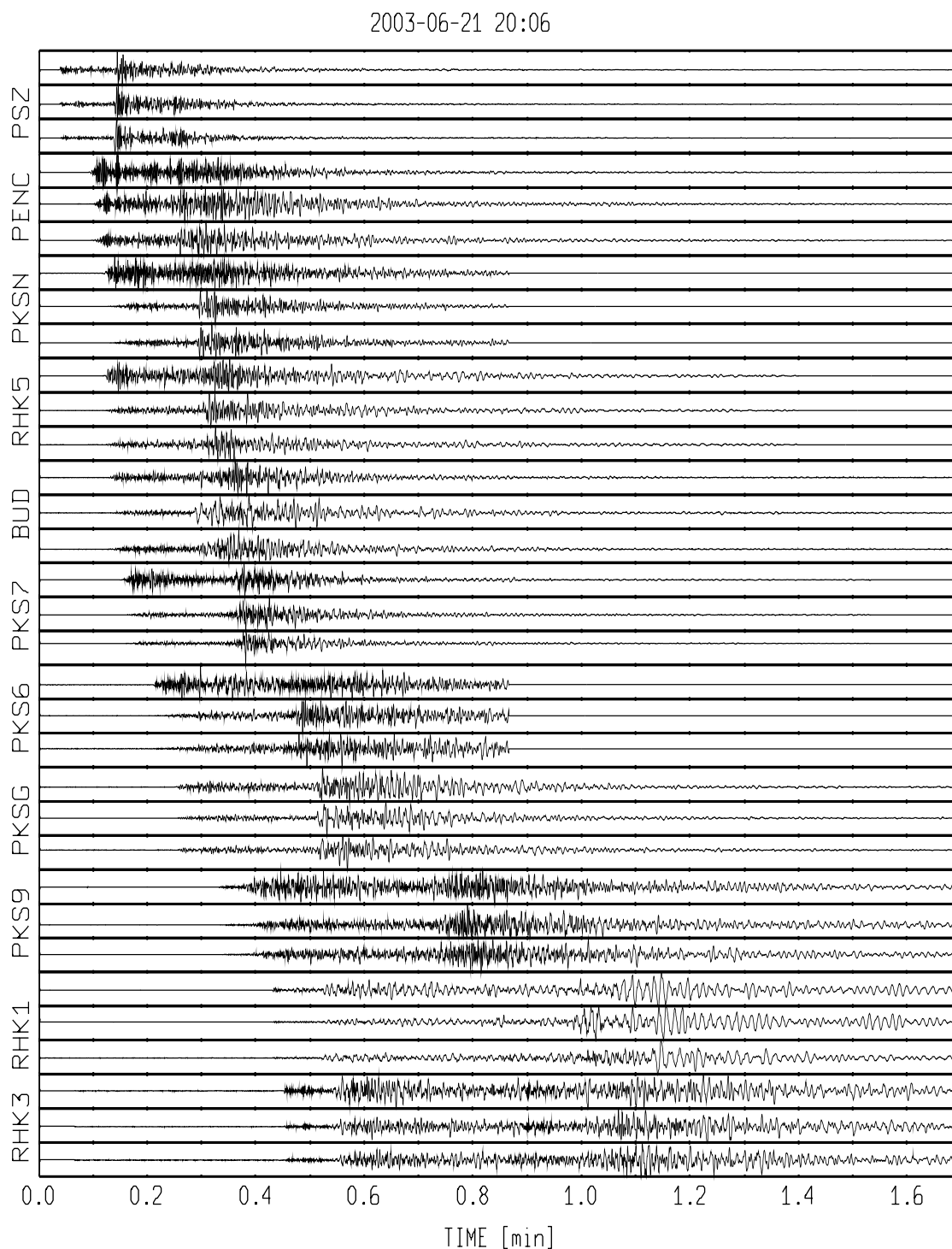
A rengés intenzitás eloszlását a 4.3. táblázat tartalmazza és a 4.5. ábra mutatja.

**DISCUSSION**

There were a number of earthquakes in the Jászság region in this year. One of the largest magnitude (3.7  $M_L$ ) event of the year was felt in an area of 2000 km<sup>2</sup> and produced reports of 5-6 EMS from Jászapáti, Alattyán, Jászkisér, Jászdózsa.

Seismograms of the event are shown in Figure 4.4.

The intensity distribution of the event is shown in Table 4.3. and Figure 4.5.



4.4. ábra A 2003. június 21-i, jászapáti földrengés (20:05:58 UTC) szeizmogramja

Figure 4.4. Seismograms of the Jászapáti earthquake 21<sup>st</sup> June 2003 (20:05:58 UTC)

## 4.3. Táblázat

A 2003. június 21-i, jászapáti földrengés (20:05:58 UTC) intenzitás eloszlása

Table 4.3.

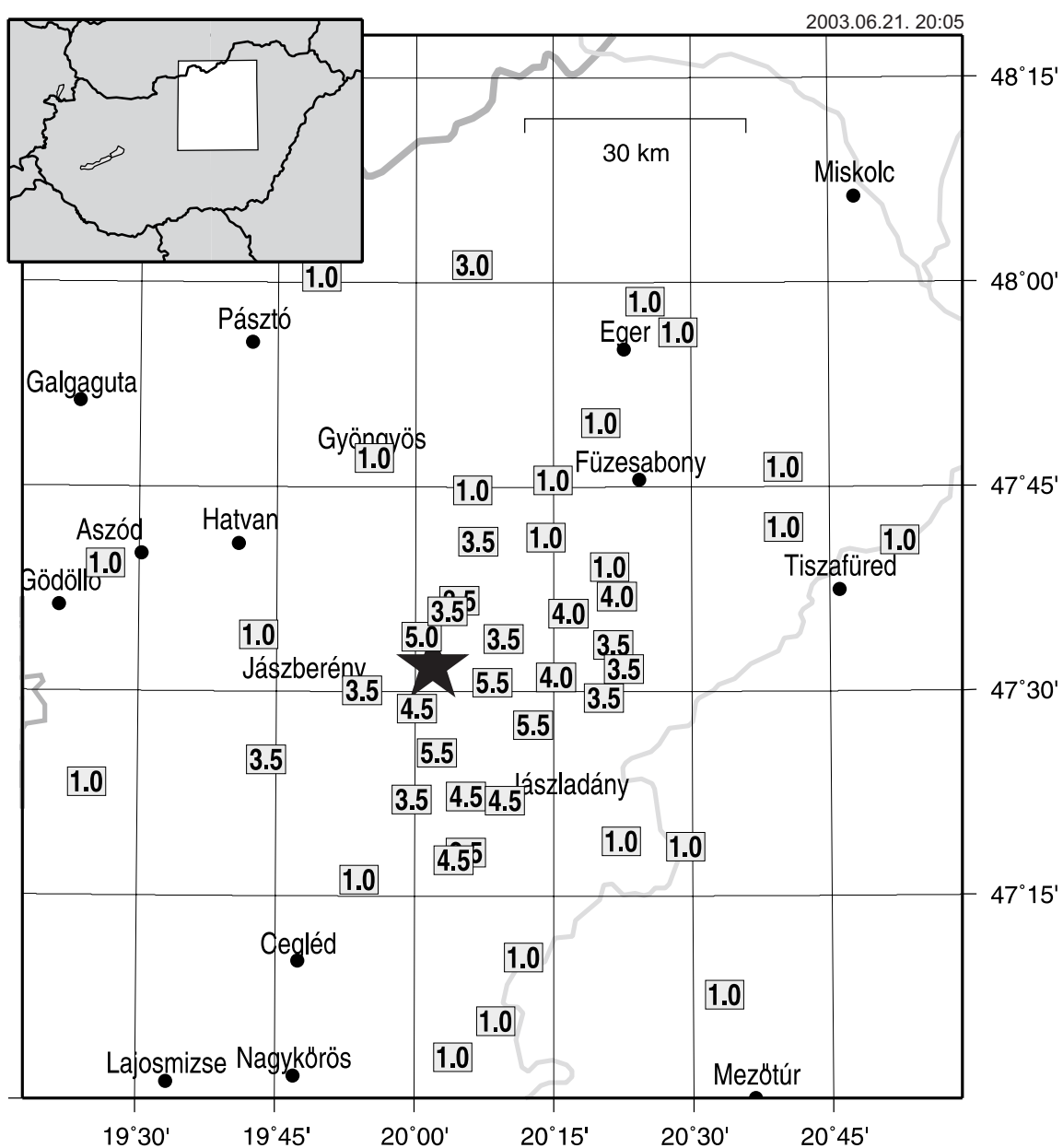
Intensity distribution of the Jászapáti earthquake 21<sup>st</sup> June 2003 (20:05:58 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Alattyan	47.426	20.039	5.5	35%	3
2	Átány	47.617	20.363	4.0	31%	1
3	Borsodivánka	47.701	20.664	1.0	0%	2
4	Demjén	47.829	20.333	1.0	0%	2
5	Detk	47.747	20.101	1.0	0%	1
6	Domony	47.656	19.436	1.0	0%	1
7	Erk	47.612	20.078	3.5	34%	1
8	Felsőtárkány	47.977	20.414	1.0	0%	2
9	Gyöngyös	47.786	19.922	1.0	0%	1
10	Heves	47.596	20.276	4.0	31%	3
11	Hevesvezekény	47.558	20.357	3.5	42%	2
12	Hunyadfalva	47.318	20.369	1.0	0%	1
13	Jászsalsószentgyörgy	47.373	20.091	4.5	38%	1
14	Jászapáti	47.512	20.138	5.5	34%	3
15	Jászboldogháza	47.369	19.993	3.5	38%	2
16	Jászberény	47.502	19.903	3.5	46%	1
17	Jászdózsa	47.568	20.010	5.0	53%	1
18	Jászfényszaru	47.570	19.714	1.0	0%	2
19	Jászivány	47.518	20.253	4.0	31%	2
20	Jászkarajenő	47.054	20.066	1.0	0%	2
21	Jászkisér	47.460	20.212	5.5	32%	2
22	Jászladány	47.368	20.161	4.5	33%	2
23	Jászszentandrás	47.565	20.158	3.5	39%	2
24	Jásztelek	47.480	20.002	4.5	31%	1
25	Kápolna	47.759	20.246	1.0	0%	1
26	Kuncsorba	47.130	20.553	1.0	0%	1
27	Mátraterenye	48.007	19.825	1.0	0%	2
28	Nagyfüged	47.684	20.113	3.5	35%	2
29	Nagykátá	47.417	19.731	3.5	38%	2
30	Noszvaj	47.940	20.474	1.0	0%	2
31	Pély	47.493	20.339	3.5	37%	1
32	Péteri	47.389	19.406	1.0	0%	1
33	Pétervására	48.022	20.101	3.0	44%	1
34	Szászberek	47.304	20.091	2.5	43%	1

**Significant Earthquakes****Jelentős földrengések**

35	Szentistván	47.775	20.663	1.0	0%	1
36	Szolnok	47.176	20.193	1.0	0%	1
37	Tarnabod	47.689	20.233	1.0	0%	1
38	Tarnaörs	47.599	20.057	3.5	31%	4
39	Tarnaszentmiklós	47.528	20.376	3.5	42%	1
40	Tenk	47.653	20.348	1.0	0%	1
41	Tiszabő	47.311	20.484	1.0	0%	1
42	Tiszadorogma	47.685	20.874	1.0	0%	2
43	Tószeg	47.098	20.143	1.0	0%	2
44	Újszász	47.295	20.069	4.5	31%	2
45	Újszilvás	47.271	19.897	1.0	0%	2





4.5. ábra A 2003. június 21-i, jászapáti földrengés (20:05:58 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.5. Intensity distribution of the Jászapáti event 21<sup>st</sup> June 2003 (20:05:58 UTC) (star - instrumental epicentre)

**2003. június 27. - Jászapáti / 27 June 2003 - Jászapáti****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/06/27
Kipattanási idő / Origin Time:	01:19:19.3 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.536 N 20.001 E (S.D. 2.0 km)
Mélység / Depth:	15.8 km (S.D. 1 km)
Magnitúdó / Magnitude:	2.4 ML
Maximális intenzitás / Maximum Intensity:	3-4 EMS

**LEÍRÁS**

Június 27-én kisebb (2.4  $M_L$ ) utóregés követte a június 21-i jászapáti földrengést. Az eseményt csupán Jászapátiból jelentették 3-4 EMS intenzitással.

Az esemény szeizmogramja a 4.6. ábrán látható.

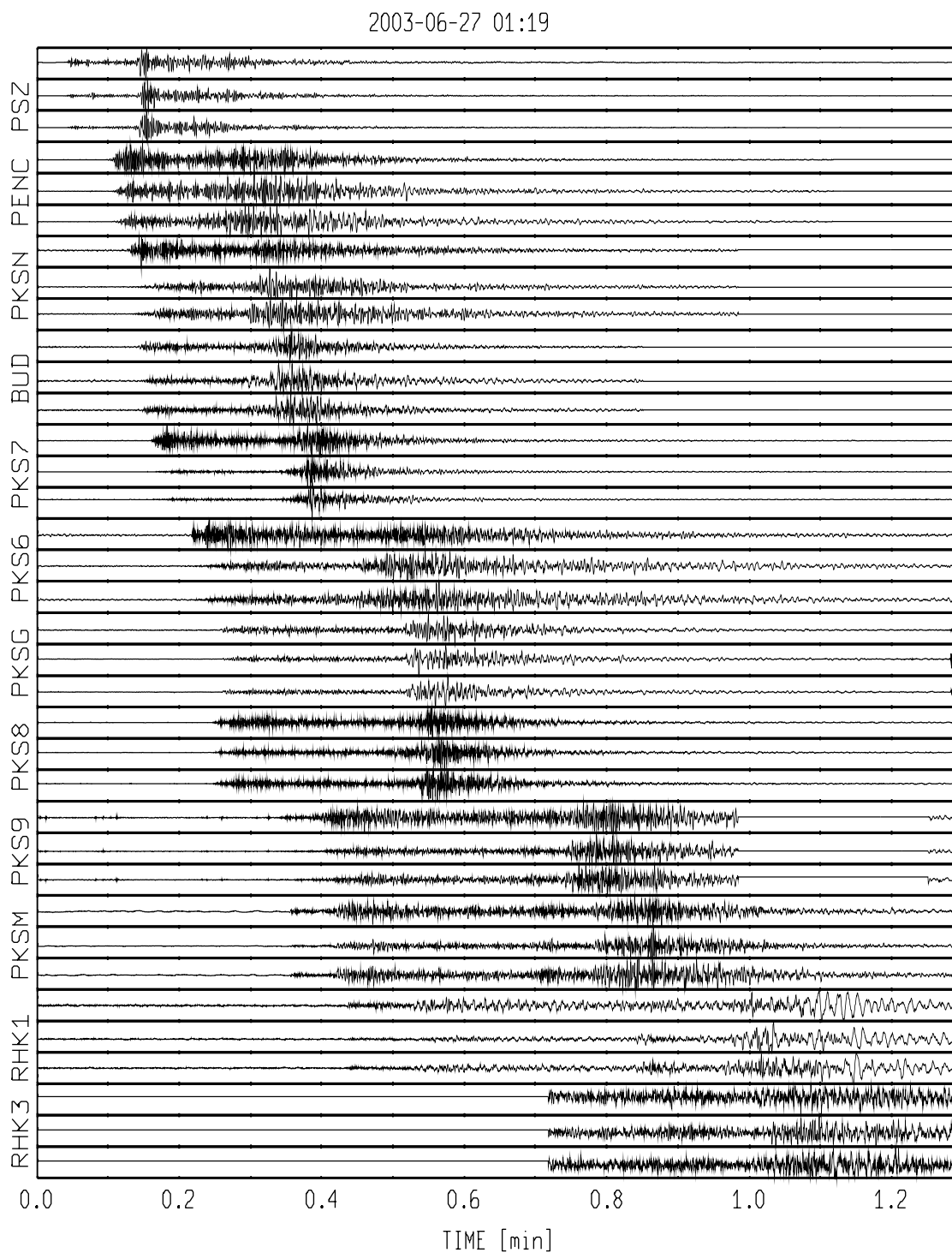
A rengés intenzitás eloszlását a 4.4. táblázat tartalmazza és a 4.7. ábra mutatja.

**DISCUSSION**

Following the 21<sup>st</sup> June Jászapáti earthquake, a smaller magnitude aftershock (2.4  $M_L$ ) was reported on 27<sup>th</sup> June from Jászapáti with 3-4 EMS.

Seismograms of the event are shown in Figure 4.6.

The intensity distribution of the event is shown in Table 4.4. and Figure 4.7.



**4.6. ábra** A 2003. június 27-i, jászapáti földrengés (01:19:19 UTC) szeizmogramja  
**Figure 4.6.** Seismograms of the Jászapáti earthquake 27<sup>th</sup> June 2003 (01:19:19 UTC)

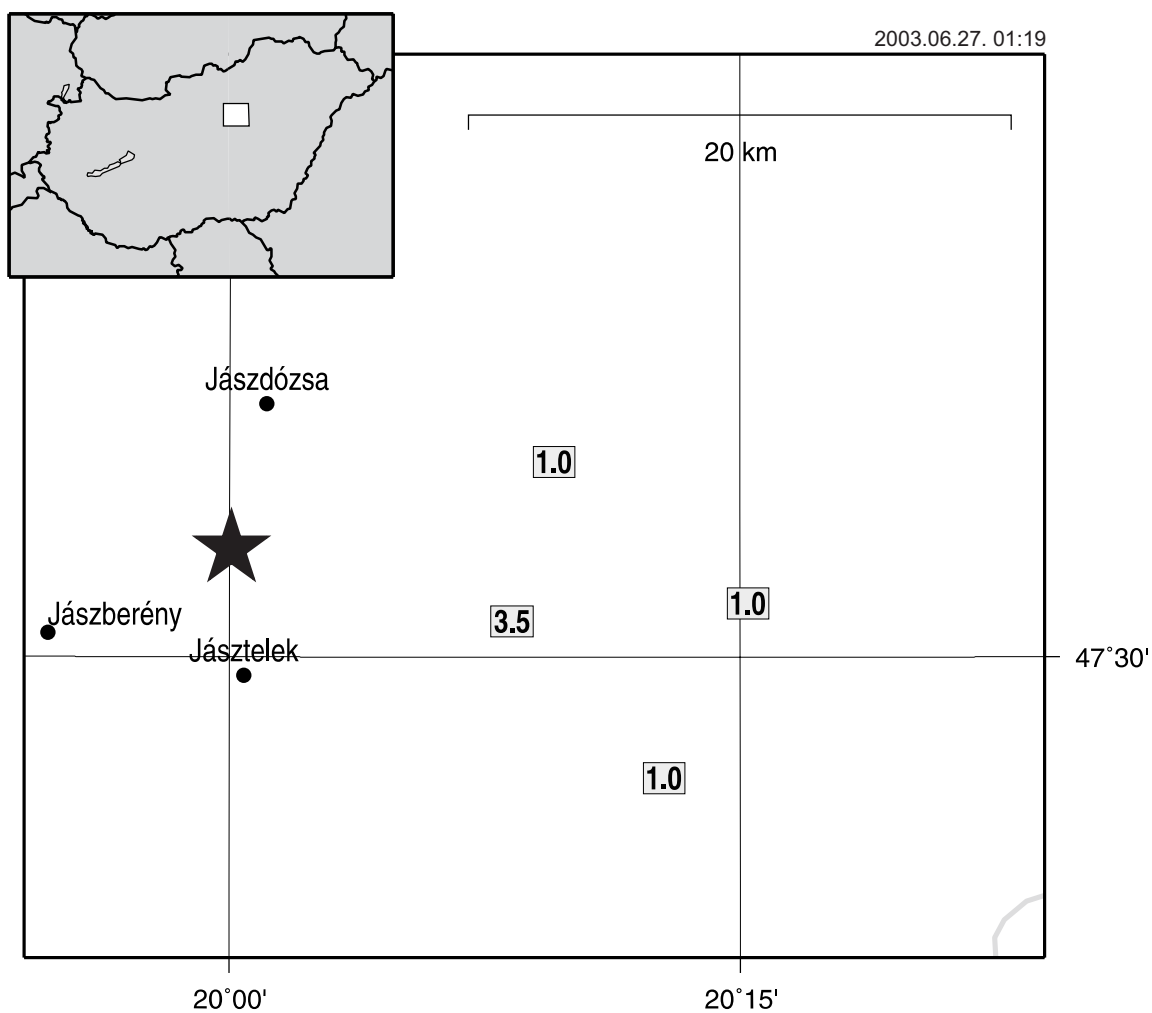
**4.4. Táblázat**

A 2003. június 27-i, jászapáti földrengés (01:19:19 UTC) intenzitás eloszlása

**Table 4.4.**

Intensity distribution of the Jászapáti earthquake 27<sup>th</sup> June 2003 (01:19:19 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	Jászapáti	47.512	20.138	3.5	40%	2
2	Jászivány	47.518	20.253	1.0	0%	2
3	Jáskisér	47.460	20.212	1.0	0%	2
4	Jászszentandrás	47.565	20.158	1.0	0%	1



**4.7. ábra** A 2003. június 27-i, jászapáti földrengés (01:19:19 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.7.** Intensity distribution of the Jászapáti earthquake 27<sup>th</sup> June 2003 (01:19:19 UTC) (star - instrumental epicentre)

**2003. július 1. - Igrici / 1 July 2003 - Igrici****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/07/01
Kipattanási idő / Origin Time:	11:26:14.5 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.871 N 20.620 E (S.D. 4.5 km)
Mélység / Depth:	10 km (S.D. 2 km)
Magnitúdó / Magnitude:	3.4 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

**LEÍRÁS**

Július 1-én Igrici – Gelej körzetben mozdult meg a föld, egy  $M_L$  3.4 rengés volt érezhető kb. 1000 km<sup>2</sup> területen. Az epicentrális intenzitás 5 EMS.

Az esemény szeizmogramja a 4.8. ábrán látható.

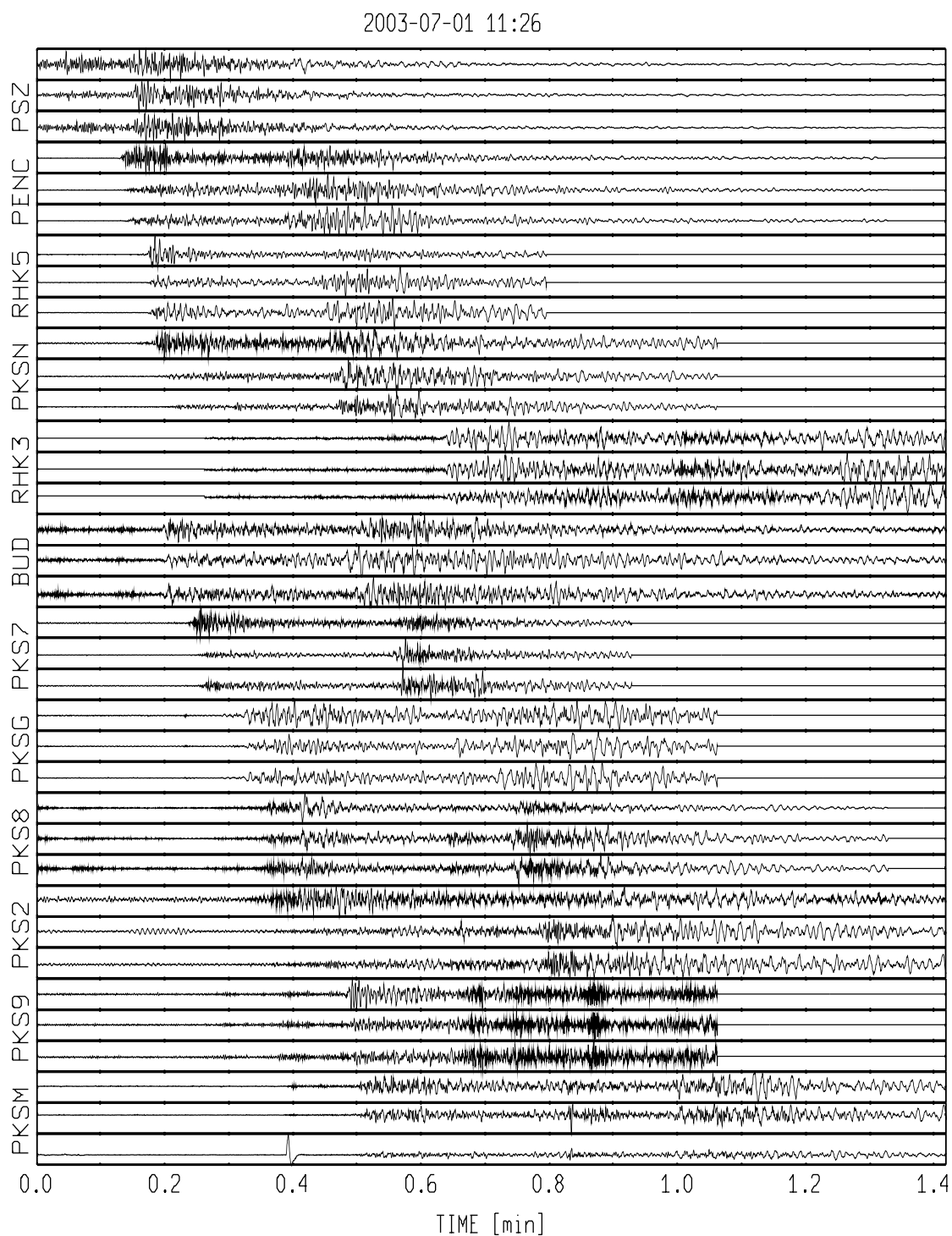
A rengés intenzitás eloszlását a 4.5. táblázat tartalmazza és a 4.9. ábra mutatja.

**DISCUSSION**

On July 1<sup>st</sup>, an earthquake of magnitude 3.4  $M_L$  was felt in an area of about 1000 km<sup>2</sup> and produced reports of 5 EMS from Igrici – Gelej.

Seismograms of the event are shown in Figure 4.8.

The intensity distribution of the event is shown in Table 4.5. and Figure 4.9.



**4.8. ábra** A 2003. július 1-i, igrici földrengés (11:26:15 UTC) szeizmogramja  
**Figure 4.8.** Seismograms of the Igric earthquake 1<sup>st</sup> July 2003 (11:26:15 UTC)

**4.5. Táblázat**

A 2003. július 1-i, igríci földrengés (11:26:15 UTC) intenzitás eloszlása

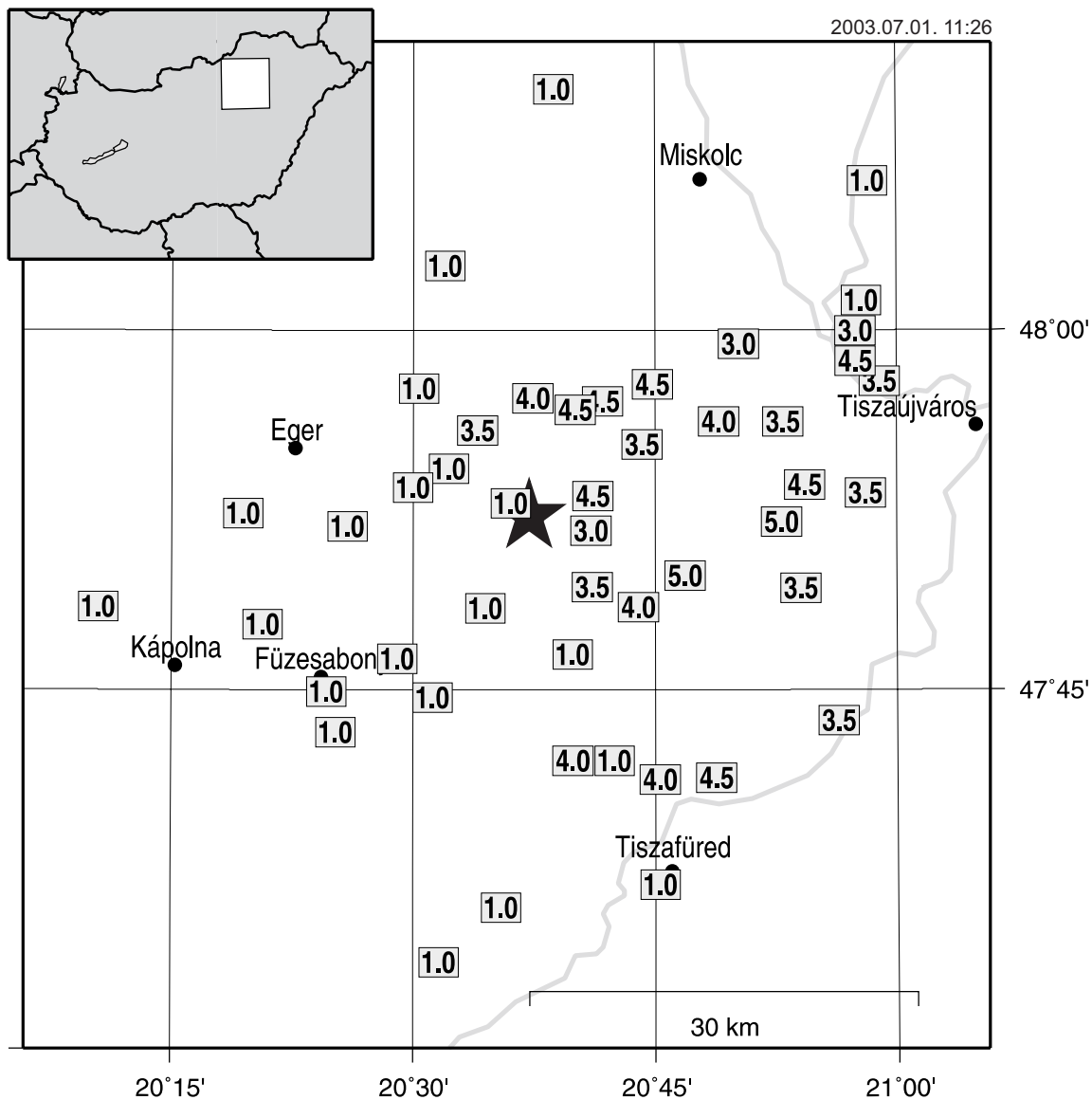
**Table 4.5.**Intensity distribution of the Igric earthquake 1<sup>st</sup> July 2003 (11:26:15 UTC)

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	Ároktő	47.729	20.939	3.5	35%	2
2	Berzék	48.021	20.962	1.0	0%	1
3	Bogács	47.904	20.535	1.0	0%	1
4	Borsodgeszt	47.951	20.695	4.5	33%	2
5	Borsodivánka	47.701	20.664	4.0	35%	2
6	Bükkábrány	47.885	20.685	4.5	32%	1
7	Bükkzsérc	47.960	20.504	1.0	0%	2
8	Cserépváralja	47.931	20.566	3.5	33%	1
9	Dormánd	47.721	20.418	1.0	0%	2
10	Egerszalók	47.873	20.322	1.0	0%	1
11	Emőd	47.937	20.815	4.0	34%	2
12	Füzesabony	47.749	20.409	1.0	0%	1
13	Gelej	47.830	20.780	5.0	22%	1
14	Gesztely	48.104	20.969	1.0	0%	2
15	Girincs	47.965	20.982	3.5	37%	1
16	Harsány	47.963	20.747	4.5	34%	1
17	Hejőpapi	47.893	20.904	4.5	33%	2
18	Hejőszalonta	47.937	20.882	3.5	41%	1
19	Igríci	47.867	20.880	5.0	34%	2
20	Kács	47.953	20.623	4.0	35%	1
21	Kerecsend	47.796	20.343	1.0	0%	2
22	Köröm	47.979	20.957	4.5	44%	2
23	Mezőcsát	47.821	20.900	3.5	34%	2
24	Mezőkeresztes	47.822	20.684	3.5	41%	2
25	Mezőkövesd	47.807	20.573	1.0	0%	1
26	Mezőnagymihály	47.808	20.732	4.0	50%	2
27	Mezőnyárad	47.861	20.683	3.0	29%	2
28	Mezőszemere	47.745	20.518	1.0	0%	1
29	Nemesbikk	47.887	20.967	3.5	35%	1
30	Négyes	47.701	20.706	1.0	0%	2
31	Nyékládháza	47.991	20.836	3.0	23%	1
32	Ostoros	47.864	20.430	1.0	0%	2
33	Parasznya	48.168	20.643	1.0	0%	2
34	Répáshuta	48.045	20.531	1.0	0%	2



**Jelentős földrengések****Significant Earthquakes**

35	Sajóhídvég	48.000	20.957	3.0	33%	1
36	Sarud	47.599	20.589	1.0	0%	1
37	Sály	47.945	20.667	4.5	36%	1
38	Szentistván	47.775	20.663	1.0	0%	1
39	Szihalom	47.772	20.482	1.0	0%	2
40	Szilvásvár	48.111	20.393	1.0	0%	1
41	Szomolya	47.891	20.498	1.0	0%	1
42	Tard	47.880	20.599	1.0	0%	1
43	Tiszabábólna	47.689	20.812	4.5	34%	2
44	Tiszanána	47.561	20.525	1.0	0%	1
45	Tiszafüred	47.615	20.753	1.0	0%	2
46	Tiszavalk	47.688	20.754	4.0	32%	1
47	Vatta	47.921	20.736	3.5	43%	2
48	Vécs	47.808	20.173	1.0	0%	1



**4.9. ábra** A 2003 július 1-i, igrici földrengés (11:26:15 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.9.** Intensity distribution of the Igric earthquake 1<sup>st</sup> July 2003 (11:26:15 UTC) (star - instrumental epicentre)

**2003. július 8. - Bükkábrány / 8 July 2003 - Bükkábrány****FÉSZÉKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/07/08
Kipattanási idő / Origin Time:	17:04:19.1 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.152 N 20.743 E (S.D. 19.2 km)
Mélység / Depth:	10 km (S.D. 18 km)
Magnitúdó / Magnitude:	3.0 M <sub>L</sub>
Maximális intenzitás / Maximum Intensity:	5 EMS

**LEÍRÁS**

Egy héttel az előző rengés után, viszonylag kis területen (100-150 km<sup>2</sup>) volt érezhető július 8-án délután Bükkábrány környékén egy 3.0 M<sub>L</sub> magnitúdójú földrengés. A legnagyobb intenzitás 5 EMS volt.

Az esemény szeizmogramja a 4.10. ábrán látható.

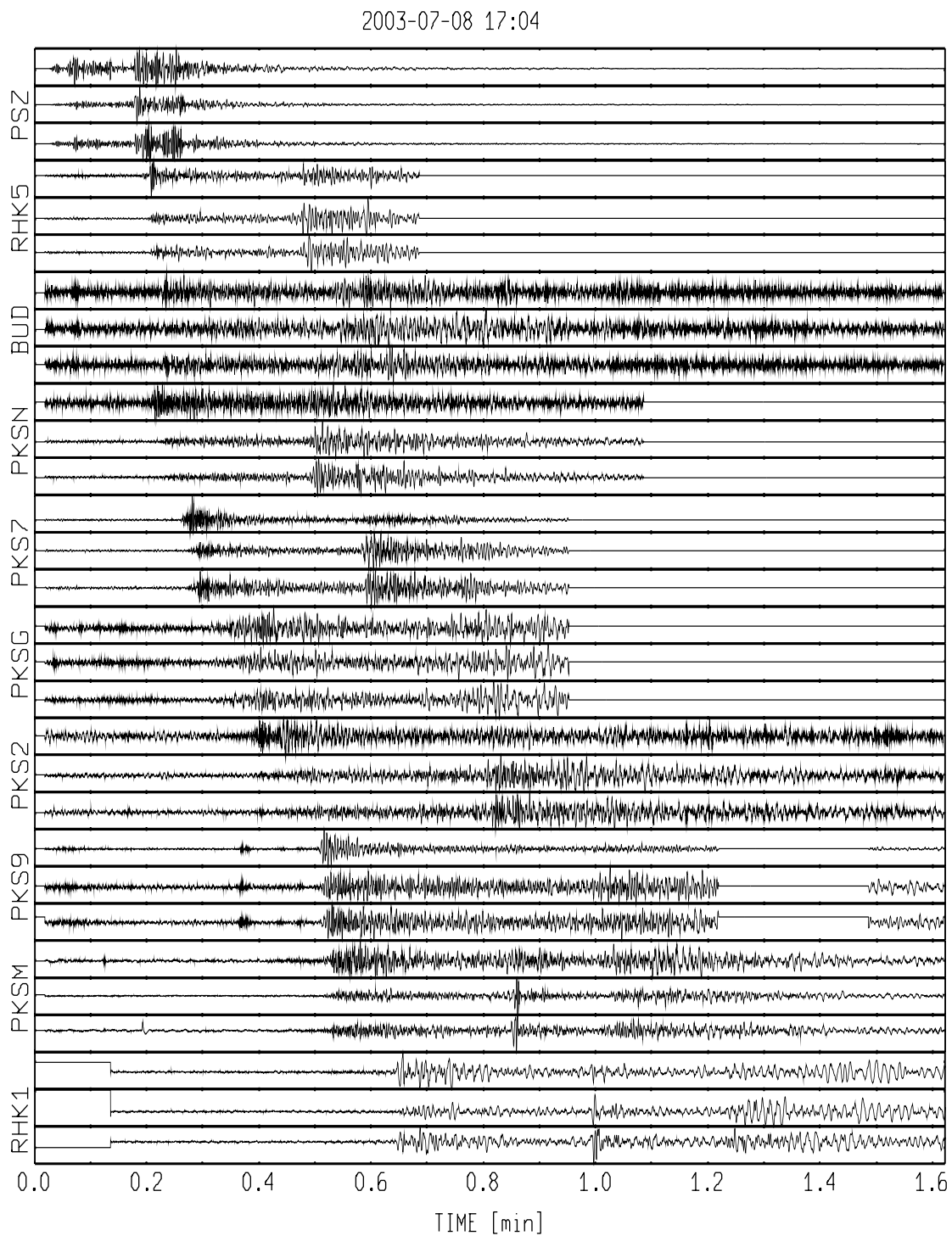
A rengés intenzitás eloszlását a 4.6. táblázat tartalmazza és a 4.11. ábra mutatja.

**DISCUSSION**

One week after the Igrici earthquake, a smaller magnitude event (3.0 M<sub>L</sub>) was felt and reported from a relatively small area of 100-150 km<sup>2</sup>. The epicentral intensity was estimated 5 EMS in Bükkábrány.

Seismograms of the event are shown in Figure 4.10.

The intensity distribution of the event is shown in Table 4.6. and Figure 4.11.



**4.10. ábra** A 2003. július 8-i, bükkábrányi földrengés (17:04:19 UTC) szeizmogramja  
**Figure 4.10.** Seismograms of the Bükkábrány earthquake 8<sup>th</sup> July 2003 (17:04:19 UTC)

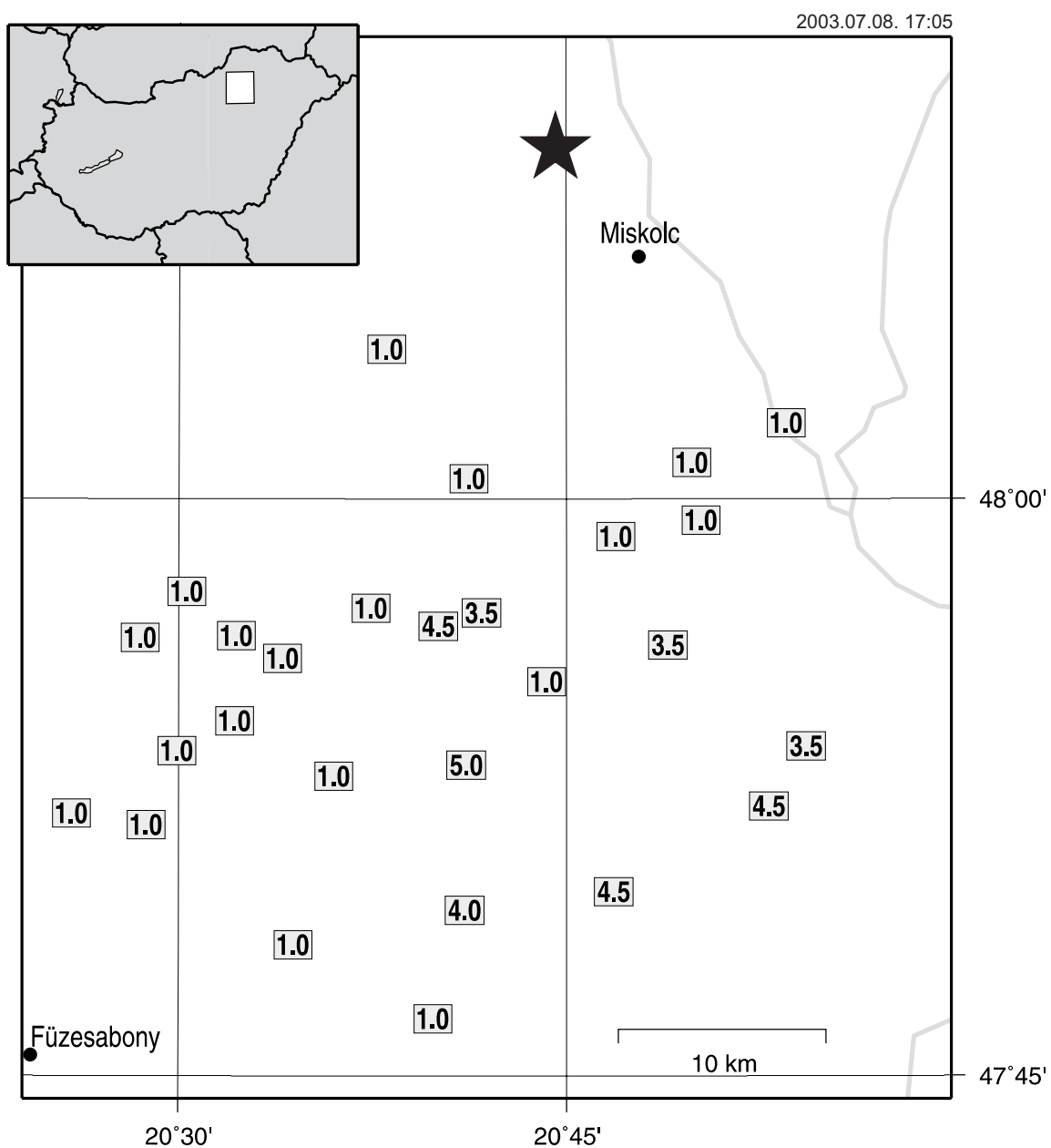
**4.6. Táblázat**

A 2003. július 8-i, bükkábrányi földrengés (17:04:19 UTC) intenzitás eloszlása

**Table 4.6.**

Intensity distribution of the Bükkábrány earthquake 8<sup>th</sup> July 2003 (17:04:19 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	Bogács	47.904	20.535	1.0	0%	2
2	Borsodgeszt	47.951	20.695	3.5	40%	1
3	Bükkaranyos	47.984	20.781	1.0	0%	1
4	Bükkábrány	47.885	20.685	5.0	32%	2
5	Bükkszentkereszt	48.065	20.633	1.0	0%	1
6	Bükkszécs	47.960	20.504	1.0	0%	2
7	Cserépfalu	47.941	20.536	1.0	0%	1
8	Cserépváralja	47.931	20.566	1.0	0%	1
9	Emőd	47.937	20.815	3.5	34%	1
10	Gelej	47.830	20.780	4.5	32%	2
11	Hejőpapi	47.893	20.904	3.5	33%	2
12	Igrici	47.867	20.880	4.5	33%	1
13	Kács	47.953	20.623	1.0	0%	1
14	Kisgyőr	48.009	20.686	1.0	0%	1
15	Mályi	48.016	20.830	1.0	0%	2
16	Mezőkeresztes	47.822	20.684	4.0	39%	1
17	Mezőkövesd	47.807	20.573	1.0	0%	1
18	Noszvaj	47.940	20.474	1.0	0%	2
19	Novaj	47.859	20.478	1.0	0%	1
20	Nyékládháza	47.991	20.836	1.0	0%	1
21	Ostoros	47.864	20.430	1.0	0%	2
22	Sajópetri	48.033	20.891	1.0	0%	1
23	Sály	47.945	20.667	4.5	30%	1
24	Szentistván	47.775	20.663	1.0	0%	2
25	Szomolya	47.891	20.498	1.0	0%	1
26	Tard	47.880	20.599	1.0	0%	1
27	Vatta	47.921	20.736	1.0	0%	1



**4.11. ábra** A 2003. július 8-i, bükkábrányi földrengés (17:04:19 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.11.** Intensity distribution of the Bükkábrány earthquake 8<sup>th</sup> July 2003 (17:04:19 UTC) (star - instrumental epicentre)

**2003. július 10. - Rimóc / 10 July 2003 - Rimóc****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/07/10
Kipattanási idő / Origin Time:	02:40:18.2 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.151 N 19.457 E (S.D. 4.0 km)
Mélység / Depth:	5.9 km (S.D. 3 km)
Magnitúdó / Magnitude:	2.4 ML
Maximális intenzitás / Maximum Intensity:	4 EMS

**LEÍRÁS**

Július 10-én hajnalban újabb kisebb (2.4  $M_L$ ) földrengést éreztek és jelentettek Rimóc – Hollókő – Nógrádsipek környékéről. Az esemény nagyon kis területen volt érezhető, a legnagyobb intenzitás 4 EMS volt.

Az esemény szeizmogramja a 4.12. ábrán látható.

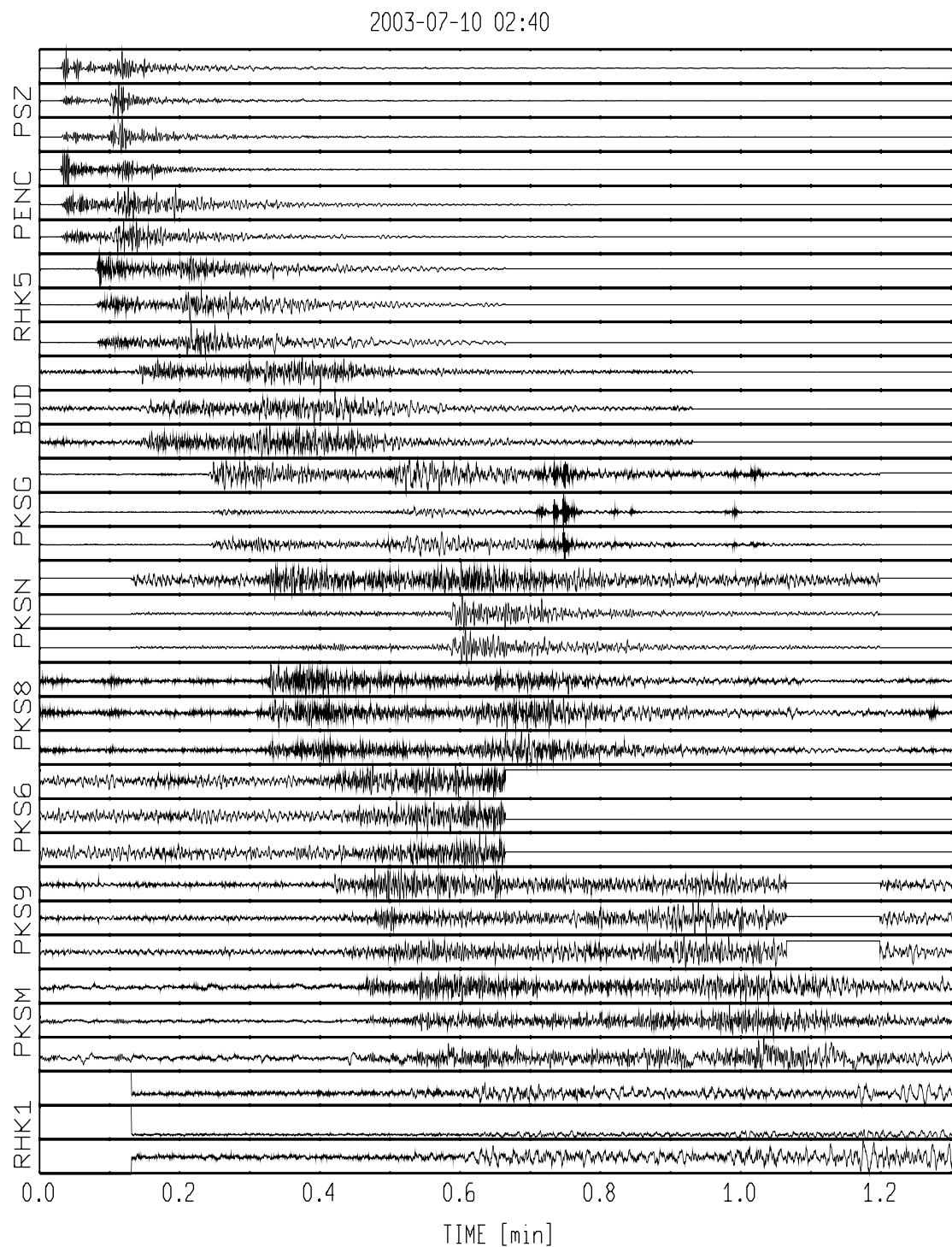
A rengés intenzitás eloszlását a 4.7. táblázat tartalmazza és a 4.13. ábra mutatja.

**DISCUSSION**

On early morning July 10<sup>th</sup>, an other small magnitude (2.4  $M_L$ ) event was felt and produced reports of intensity 4 EMS from a very small epicentral area at Rimóc – Hollókő – Nógrádsipek.

Seismograms of the event are shown in Figure 4.12.

The intensity distribution of the event is shown in Table 4.7. and Figure 4.13.



**4.12. ábra** A 2003. július 10-i, rimóci földrengés (02:40:18 UTC) szeizmogramja  
**Figure 4.12.** Seismograms of the Rimóc earthquake 10<sup>th</sup> July 2003 (02:40:18 UTC)



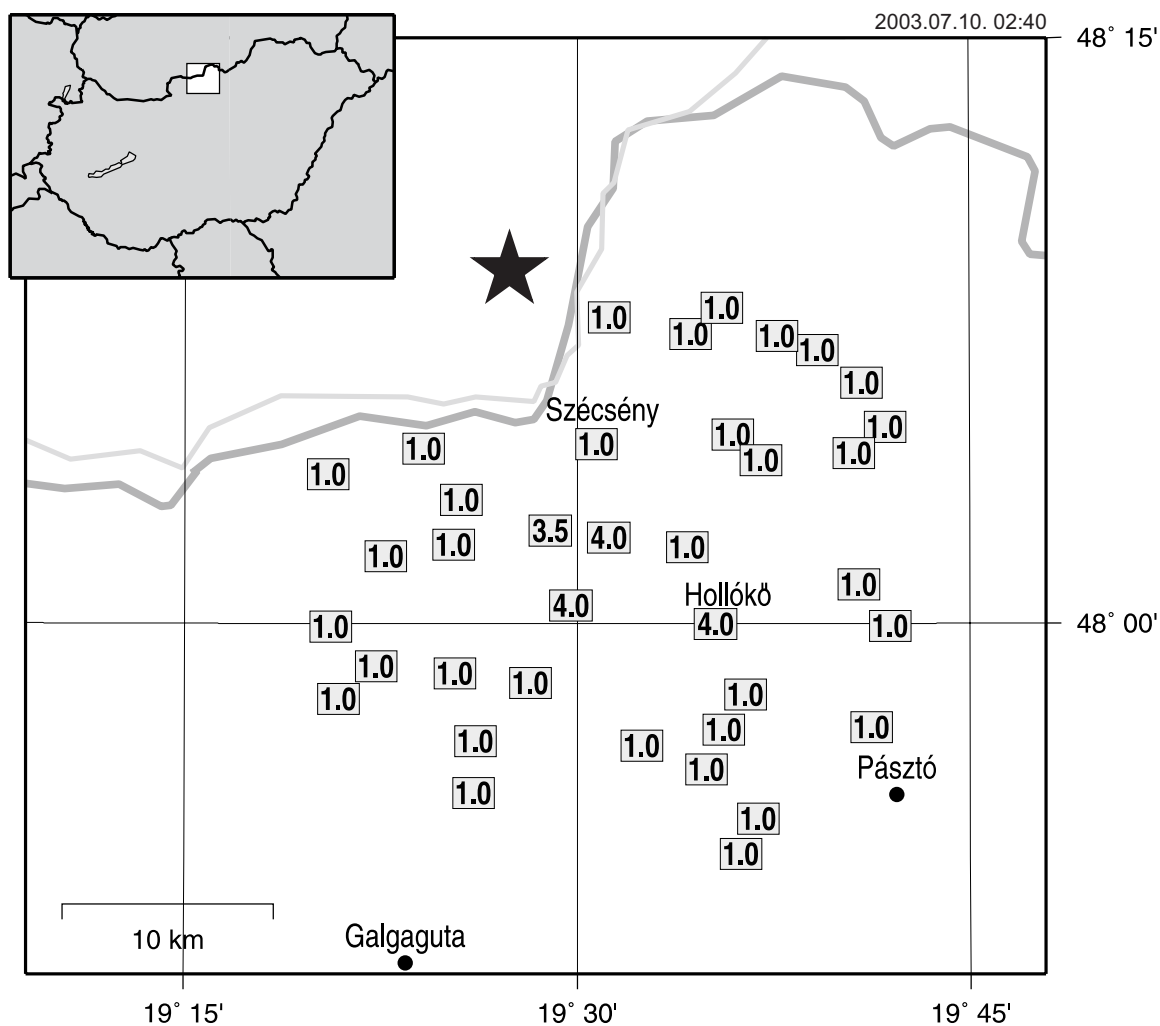
## 4.7. Táblázat

A 2003. július 10-i, rimóci földrengés (02:40:18 UTC) intenzitás eloszlása

Table 4.7.

Intensity distribution of the Rimóc earthquake 10<sup>th</sup> July 2003 (02:40:18 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	Alsótold	47.955	19.593	1.0	0%	1
2	Cserháthaláp	47.982	19.372	1.0	0%	1
3	Cserhátsurány	47.979	19.422	1.0	0%	2
4	Cserhátszentiván	47.938	19.582	1.0	0%	1
5	Csitár	48.053	19.426	1.0	0%	1
6	Ecseg	47.902	19.604	1.0	0%	1
7	Endrefalva	48.124	19.572	1.0	0%	1
8	Felsőtold	47.970	19.607	1.0	0%	1
9	Herencsény	47.975	19.470	1.0	0%	1
10	Hollókő	48.000	19.588	4.0	60%	1
11	Iliny	48.034	19.421	1.0	0%	2
12	Karancsság	48.117	19.653	1.0	0%	1
13	Kisbárcány	48.017	19.679	1.0	0%	2
14	Kishartyán	48.084	19.696	1.0	0%	2
15	Kozárd	47.917	19.615	1.0	0%	1
16	Kutasó	47.948	19.541	1.0	0%	1
17	Ludányhalászi	48.131	19.520	1.0	0%	1
18	Magyargéc	48.081	19.599	1.0	0%	1
19	Magyarnándor	47.968	19.348	1.0	0%	2
20	Mátraszőlős	47.956	19.687	1.0	0%	2
21	Mohora	47.999	19.343	1.0	0%	1
22	Nagybárcány	47.999	19.699	1.0	0%	2
23	Nagylóc	48.033	19.570	1.0	0%	1
24	Nógrádmarcfal	48.029	19.378	1.0	0%	2
25	Nógrádmegyer	48.070	19.617	1.0	0%	2
26	Nógrádsipek	48.008	19.496	4.0	39%	2
27	Órhalom	48.075	19.402	1.0	0%	2
28	Patvarc	48.064	19.341	1.0	0%	1
29	Piliny	48.135	19.592	1.0	0%	2
30	Rimóc	48.037	19.520	4.0	47%	2
31	Ságújfalu	48.103	19.681	1.0	0%	1
32	Sóshartyán	48.073	19.676	1.0	0%	1
33	Szanda	47.928	19.434	1.0	0%	2
34	Szalmatércs	48.123	19.627	1.0	0%	1
35	Szécsény	48.077	19.512	1.0	0%	2
36	Terény	47.950	19.435	1.0	0%	2
37	Varsány	48.040	19.483	3.5	35%	2



**4.13. ábra** A 2003. július 10-i, rimóci földrengés (02:40:18 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.13.** Intensity distribution of the Rimóc earthquake 10<sup>th</sup> July 2003 (02:40:18 UTC) (star - instrumental epicentre)

**2003. július 13. - Vatta / 13 July 2003 - Vatta****FÉSZÉKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/07/13
Kipattanási idő / Origin Time:	02:29:09.8 UTC
Szélesség és hosszúság / Latitude and Longitude:	48.078 N 20.643 E (S.D. 6.7 km)
Mélység / Depth:	13.1 km (S.D. 4 km)
Magnitúdó / Magnitude:	3.1 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

**LEÍRÁS**

Július 13-án 3.1  $M_L$  magnitúdójú földrengés keletkezett Egertől K-re, mely érezhető volt mintegy 800 km<sup>2</sup> területen. Az esemény legjobban Vatta, Mezőnyárad, Szakáld, Ónod, Emőd, Bükkábrány településeken volt érezhető, a legnagyobb intenzitás 5 EMS-re tehető.

Az esemény szeizmogramja a 4.14. ábrán látható.

A rengés intenzitás eloszlását a 4.8. táblázat tartalmazza és a 4.15. ábra mutatja.

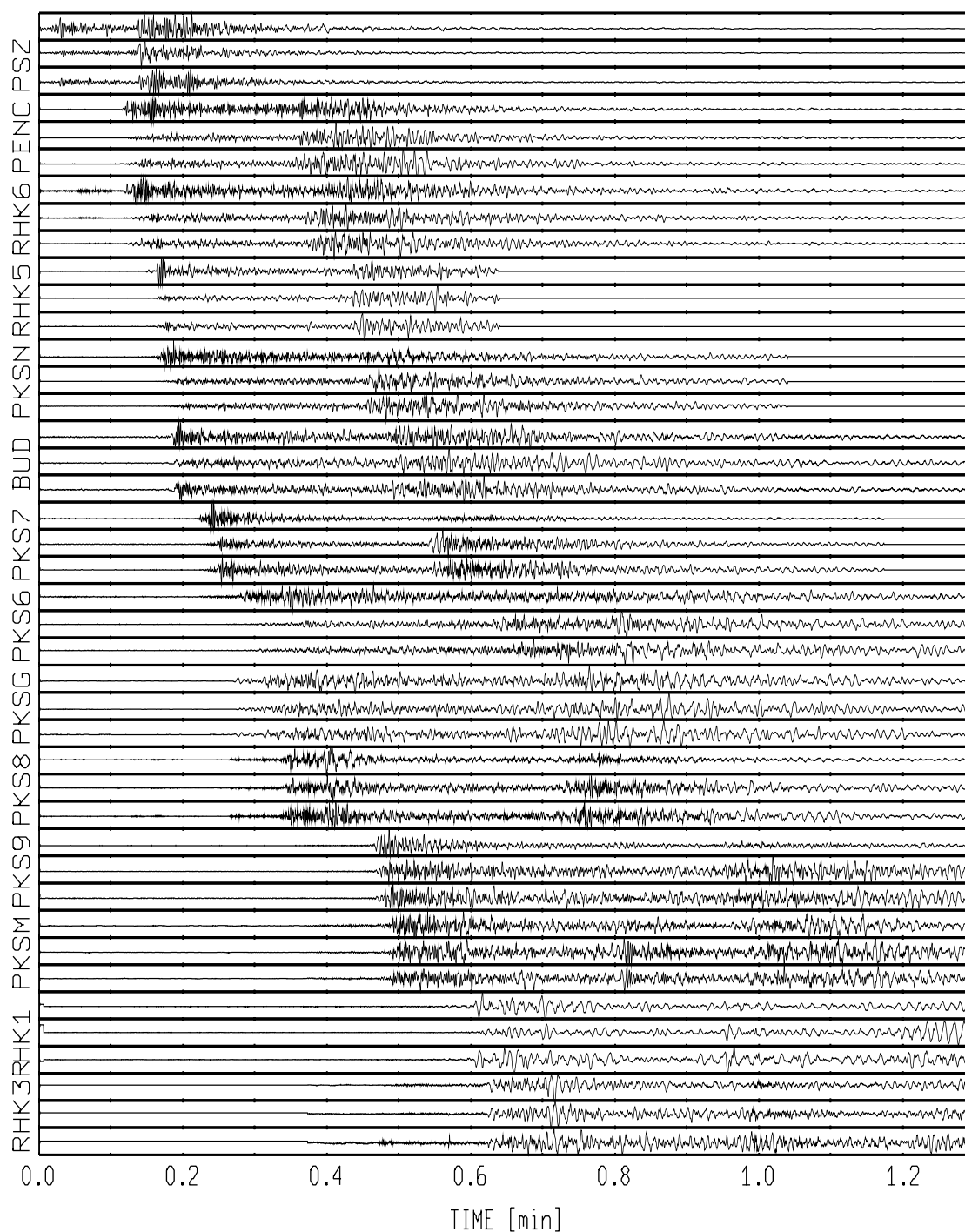
**DISCUSSION**

On July 13<sup>th</sup>, an 3.1  $M_L$  event was felt at about 800 km<sup>2</sup> area and produced reports of max intensity 5 EMS. The earthquake was felt at Vatta, Mezőnyárad, Szakáld, Ónod, Emőd, Bükkábrány.

Seismograms of the event are shown in Figure 4.14.

The intensity distribution of the event is shown in Table 4.8. and Figure 4.15.

2003-07-13 02:29



4.14. ábra A 2003. július 13-i, vattai földrengés (02:29:10 UTC) szeizmogramja

Figure 4.14. Seismograms of the Vatta earthquake 13<sup>th</sup> July 2003 (02:29:10 UTC)

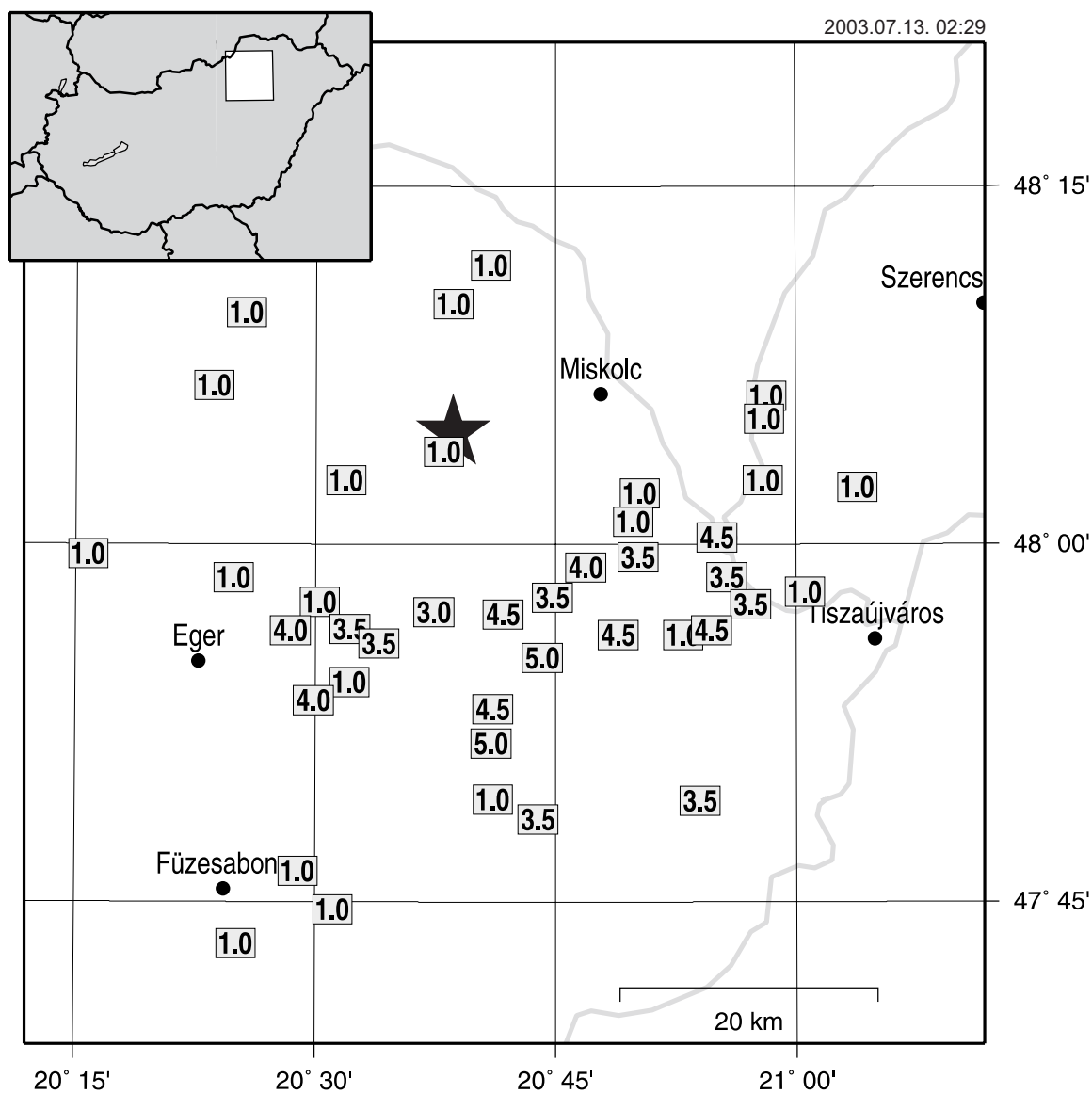
## 4.8. Táblázat

A 2003. július 13-i, vattai földrengés (02:29:10 UTC) intenzitás eloszlása

Table 4.8.

Intensity distribution of the Vatta earthquake 13<sup>th</sup> July 2003 (02:29:10 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	Bátor	47.993	20.263	1.0	0%	1
2	Bogács	47.904	20.535	1.0	0%	1
3	Borsodgeszt	47.951	20.695	4.5	34%	2
4	Bócs	48.045	20.965	1.0	0%	1
5	Bükkaranyos	47.984	20.781	4.0	24%	2
6	Bükkábrány	47.885	20.685	4.5	34%	2
7	Bükkzentkereszt	48.065	20.633	1.0	0%	2
8	Bükkzsérc	47.960	20.504	1.0	0%	2
9	Cserépfalu	47.941	20.536	3.5	43%	2
10	Cserépváralja	47.931	20.566	3.5	43%	1
11	Dormánd	47.721	20.418	1.0	0%	1
12	Emőd	47.937	20.815	4.5	32%	2
13	Felsőtárkány	47.977	20.414	1.0	0%	2
14	Gesztely	48.104	20.969	1.0	0%	2
15	Harsány	47.963	20.747	3.5	37%	2
16	Hejőszalonta	47.937	20.882	1.0	0%	1
17	Hernádkak	48.088	20.967	1.0	0%	1
18	Kács	47.953	20.623	3.0	40%	1
19	Kiscsécs	47.967	21.009	1.0	0%	1
20	Kistokaj	48.036	20.837	1.0	0%	2
21	Mályi	48.016	20.830	1.0	0%	2
22	Mezőcsát	47.821	20.900	3.5	43%	1
23	Mezőkeresztes	47.822	20.684	1.0	0%	1
24	Mezőnagymihály	47.808	20.732	3.5	35%	1
25	Mezőnyárad	47.861	20.683	5.0	25%	1
26	Mezőszemere	47.745	20.518	1.0	0%	1
27	Muhi	47.977	20.928	3.5	37%	1
28	Nagycsécs	47.958	20.953	3.5	31%	1
29	Nekézseny	48.162	20.427	1.0	0%	2
30	Noszvaj	47.940	20.474	4.0	58%	1
31	Nyékládháza	47.991	20.836	3.5	31%	2
32	Ónod	48.005	20.918	4.5	30%	2
33	Parasznya	48.168	20.643	1.0	0%	2
34	Répáshuta	48.045	20.531	1.0	0%	1
35	Sajókápolna	48.195	20.682	1.0	0%	1
36	Szakáld	47.940	20.912	4.5	36%	1
37	Szihalom	47.772	20.482	1.0	0%	2
38	Szilvásvár	48.111	20.393	1.0	0%	1
39	Szomolya	47.891	20.498	4.0	50%	2
40	Tiszalúc	48.040	21.064	1.0	0%	1
41	Vatta	47.921	20.736	5.0	35%	2



**4.15. ábra** A 2003. július 13-i, vattai földrengés (02:29:10 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.15.** Intensity distribution of the Vatta earthquake 13<sup>th</sup> July 2003 (02:29:10 UTC) (star - instrumental epicentre)

**2003. augusztus 9. - Magyarszecsőd / 9 August 2003 - Magyarszecsőd****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/08/09
Kipattanási idő / Origin Time:	22:01:17.5 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.996 N 16.597 E (S.D. 1.9 km)
Mélység / Depth:	8.2 km (S.D. 2 km)
Magnitúdó / Magnitude:	3.8 ML
Maximális intenzitás / Maximum Intensity:	5-6 EMS

**LEÍRÁS**

Az év legerősebb magyarországi rengése augusztus 9-én éjjel pattant ki Magyarszecsőd környékén az osztrák határ közelében. A 3.8  $M_L$  magnitúdójú rengés érezhető volt mintegy 1500  $km^2$  területen, Körmend környékén. A legnagyobb megrázottságot (5-6 EMS) Magyarszecsőd, Molnaszecsőd, Nádasd, Katafa, Kemenestaródfa településekről jelentették.

Az esemény szeizmogramja a 4.16. ábrán látható.

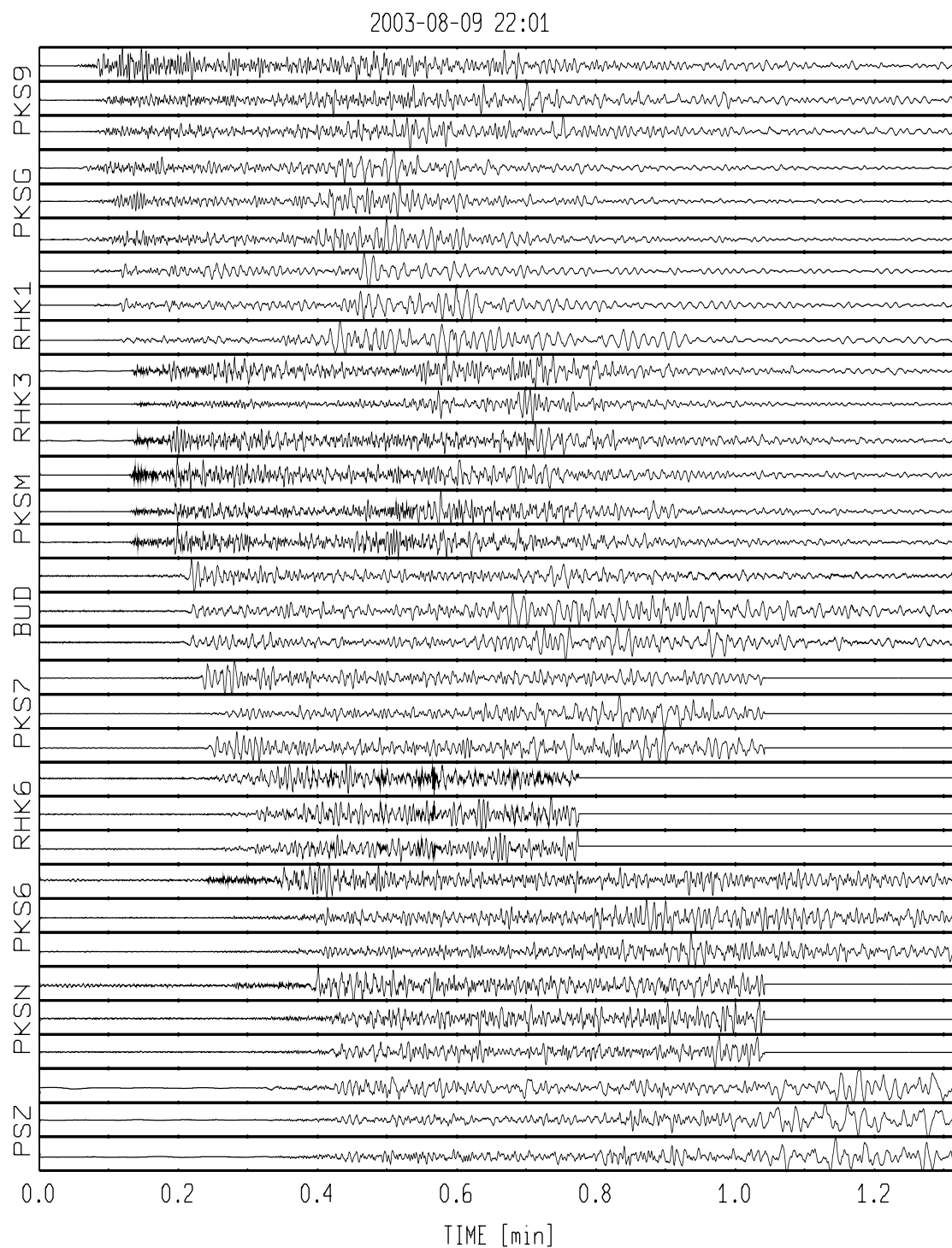
A rengés intenzitás eloszlását a 4.9. táblázat tartalmazza és a 4.17. ábra mutatja.

**DISCUSSION**

The highest magnitude (3.8  $M_L$ ) earthquake of the year was the Magyarszecsőd event on August 9<sup>th</sup>. The earthquake was felt in an area of about 1500  $km^2$  in W Hungary, near the Austrian border. The highest intensity values (5-6 EMS) were reported from Magyarszecsőd, Molnaszecsőd, Nádasd, Katafa, Kemenestaródfa.

Seismograms of the event are shown in Figure 4.16.

The intensity distribution of the event is shown in Table 4.9. and Figure 4.17.



**4.16. ábra** A 2003. augusztus 9-i, magyarszecsődi földrengés (22:01:18 UTC) szeizmogramja

**Figure 4.16.** Seismograms of the Magyarszecsőd earthquake 9<sup>th</sup> August 2003 (22:01:18 UTC)



**4.9. Táblázat**

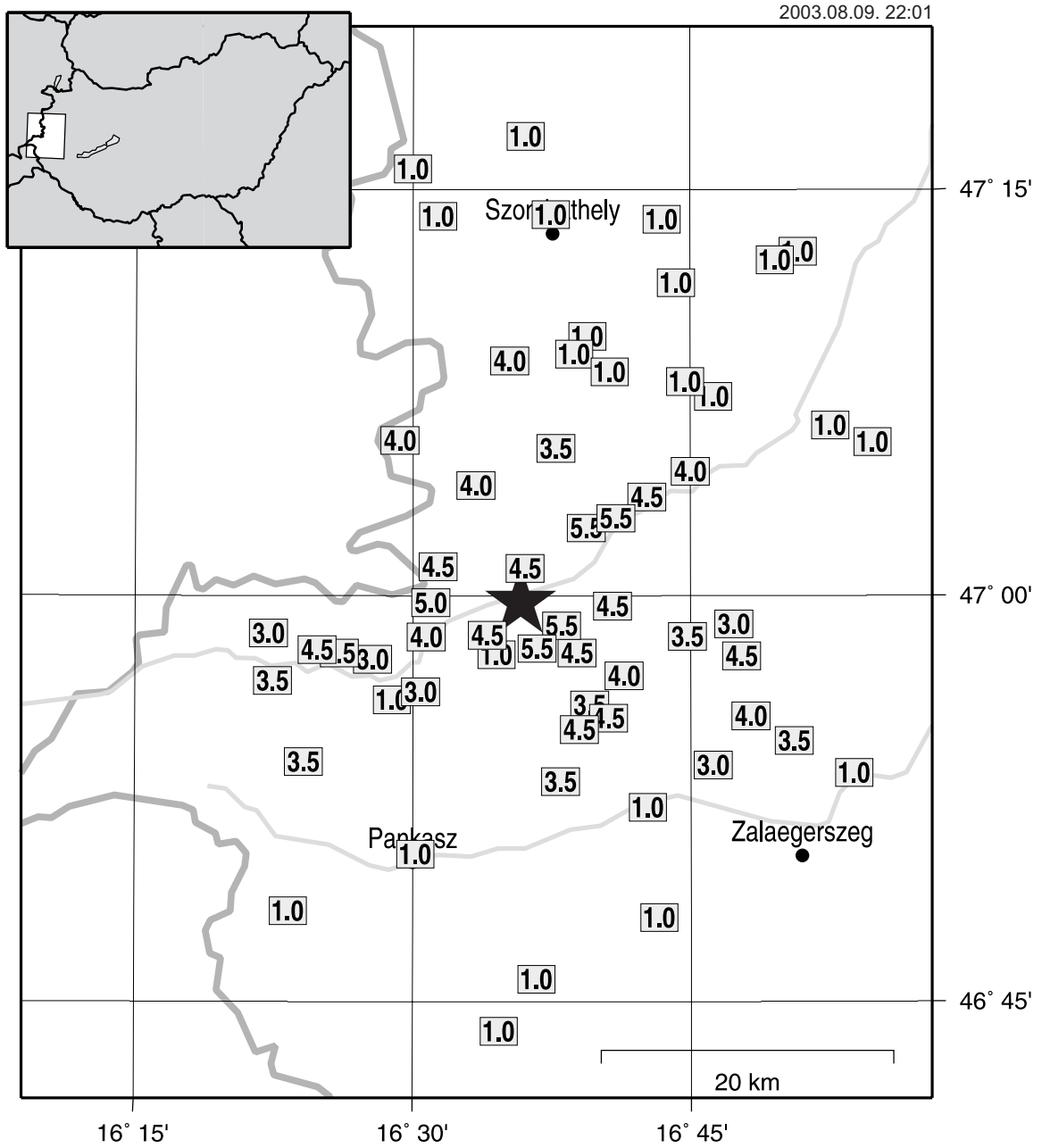
A 2003. augusztus 9-i, magyarszecsődi földrengés (22:01:18 UTC) intenzitás eloszlása

**Table 4.9.**Intensity distribution of the Magyarszecsőd earthquake 9<sup>th</sup> August 2003 (22:01:18 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	Andrásfa	46.963	16.796	4.5	45%	1
2	Bajánsénye	46.806	16.388	1.0	0%	1
3	Balogunyom	47.160	16.657	1.0	0%	1
4	Bucsu	47.263	16.499	1.0	0%	2
5	Csákánydoroszló	46.975	16.512	4.0	37%	2
6	Csonkahegyhát	46.802	16.721	1.0	0%	1
7	Csörötnek	46.948	16.374	3.5	35%	1
8	Daraboshegy	46.964	16.575	1.0	0%	1
9	Dozmat	47.234	16.522	1.0	0%	1
10	Egyházashollós	47.061	16.711	4.5	42%	1
11	Egyházasaródóc	47.091	16.629	3.5	41%	1
12	Gasztony	46.961	16.464	3.0	36%	1
13	Gencsapáti	47.283	16.601	1.0	0%	1
14	Gersekarát	46.975	16.747	3.5	35%	2
15	Gyanógeregye	47.123	16.770	1.0	0%	1
16	Halastó	46.951	16.690	4.0	34%	2
17	Halogy	46.976	16.567	4.5	38%	1
18	Hegyháthodász	46.933	16.659	3.5	37%	1
19	Hegyhátsál	46.965	16.648	4.5	36%	1
20	Hegyhátszentmárton	46.936	16.481	1.0	0%	1
21	Ivánc	46.941	16.507	3.0	23%	1
22	Ják	47.145	16.587	4.0	30%	2
23	Katafa	46.982	16.634	5.5	36%	1
24	Kám	47.105	16.876	1.0	0%	1
25	Kemenestaródfa	46.996	16.516	5.0	36%	2
26	Kisunyom	47.149	16.645	1.0	0%	1
27	Kondorfa	46.898	16.402	3.5	41%	2
28	Körmend	47.017	16.601	4.5	31%	4
29	Magyarszecsőd	47.042	16.656	5.5	37%	2
30	Megyehíd	47.212	16.847	1.0	0%	1
31	Molnaszecsőd	47.048	16.683	5.5	36%	1
32	Nagykölked	47.068	16.557	4.0	33%	1
33	Nagykutas	46.926	16.804	4.0	39%	2
34	Nagypáli	46.911	16.843	3.5	40%	1

**Significant Earthquakes****Jelentős földrengések**

35	Nádasd	46.968	16.612	5.5	36%	2
36	Ozmánbük	46.925	16.676	4.5	36%	1
37	Pusztapáti	46.764	16.611	1.0	0%	1
38	Rátót	46.965	16.434	3.5	36%	1
39	Rábahídvég	47.077	16.750	4.0	47%	2
40	Rönök	46.977	16.370	3.0	44%	2
41	Pankász	46.841	16.502	1.0	0%	1
42	Pecöl	47.207	16.826	1.0	0%	1
43	Petőmihályfa	46.983	16.789	3.0	33%	1
44	Pórszombat	46.732	16.577	1.0	0%	1
45	Sorkifalud	47.132	16.745	1.0	0%	2
46	Sorokpolány	47.138	16.677	1.0	0%	1
47	Szarvaskend	46.994	16.680	4.5	32%	2
48	Szemenye	47.095	16.914	1.0	0%	2
49	Szentpéterfa	47.096	16.488	4.0	32%	2
50	Szombathely	47.235	16.624	1.0	0%	2
51	Tanakajd	47.193	16.737	1.0	0%	1
52	Vasalja	47.018	16.523	4.5	34%	2
53	Vaspör	46.918	16.650	4.5	33%	1
54	Vasszentmihály	46.967	16.414	4.5	36%	1
55	Vép	47.232	16.724	1.0	0%	1
56	Zalaboldogfa	46.896	16.770	3.0	32%	1
57	Zalaháshágy	46.886	16.633	3.5	43%	1
58	Zalaszentgyörgy	46.870	16.711	1.0	0%	1
59	Zalaszentiván	46.891	16.896	1.0	0%	1



**4.17. ábra** A 2003. augusztus 9-i, magyarzsécsői földrengés (22:01:18 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.17.** Intensity distribution of the Magyarzsécsőd earthquake 9<sup>th</sup> August 2003 (22:01:18 UTC) (star - instrumental epicentre)

**2003. szeptember 10. - Pócspetri / 10 September 2003 - Pócspetri****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/09/10
Kipattanási idő / Origin Time:	06:36 UTC (makroszeizmikus)
Szélesség és hosszúság / Latitude and Longitude:	47.88 N 21.98 E (makroszeizmikus)
Mélység / Depth:	n.a.
Magnitúdó / Magnitude:	n.a.
Maximális intenzitás / Maximum Intensity:	4 EMS

**LEÍRÁS**

Négy kisebb földrengés volt érezhető szeptember és október hónap folyamán a kelet-magyarországi Máriapócs – Pócspetri települések környékén. Először szeptember 10-én reggel, majd aznap délben jelentettek földmozgást, melyek intenzitása 3-4 EMS körül volt.

Az eseményt a szeizmológiai hálózat nem regisztrálta.

A rengés intenzitás eloszlását a 4.10. táblázat tartalmazza és a 4.18. ábra mutatja.

**DISCUSSION**

During September and October, four smaller shocks were reported from Máriapócs – Pócspetri, E-Hungary. First, in the morning September 10<sup>th</sup>, next early afternoon on the same day, earthquakes were felt and reported from the area and produced reports of intensity 3-4 EMS

The event did not trigger the seismic network.

The intensity distribution of the event is shown in Table 4.10. and Figure 4.18.

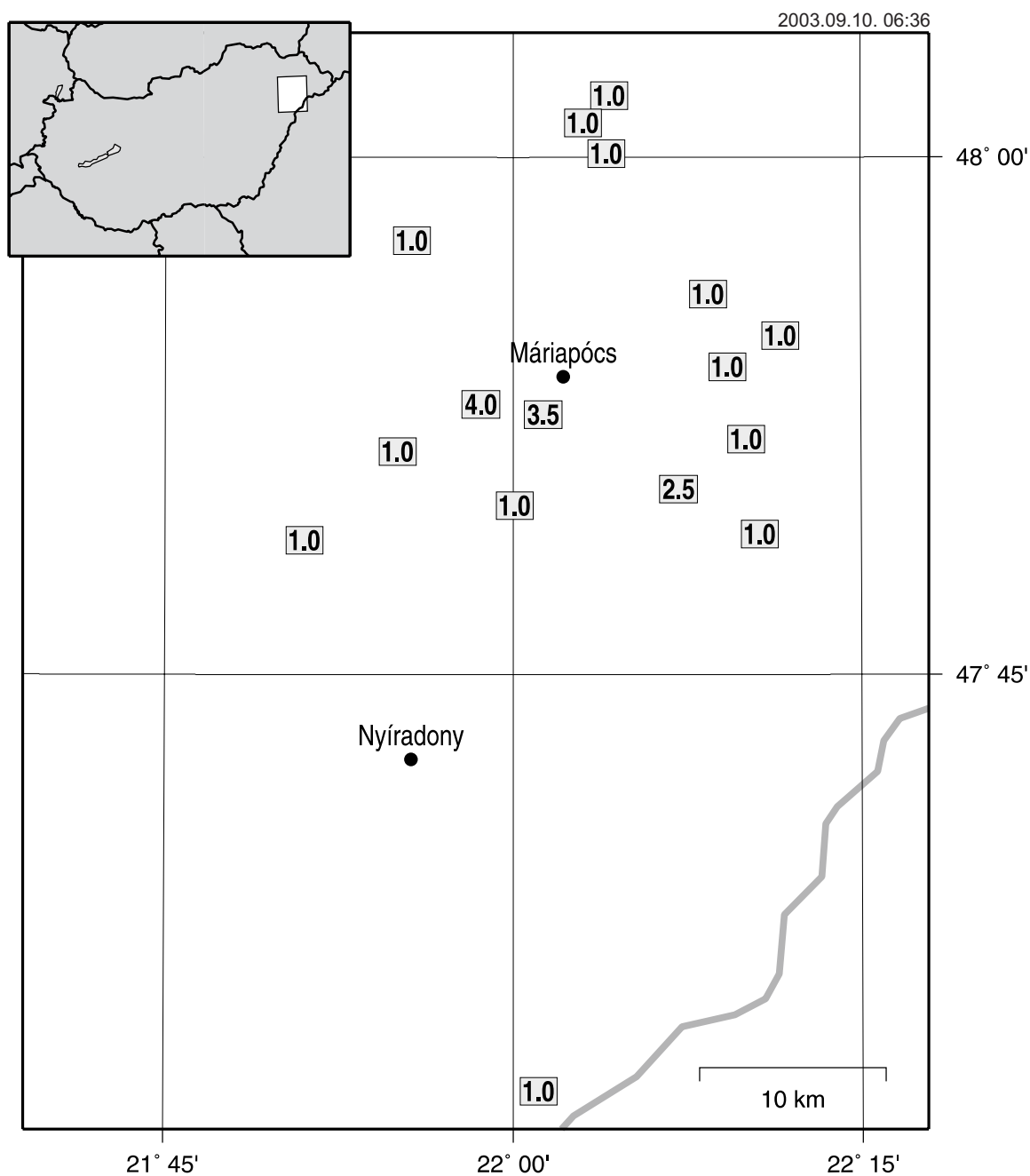
**4.10. Táblázat**

A 2003. szeptember 10-i, pócspetri földrengés (06:36 UTC) intenzitás eloszlása

**Table 4.10.**

Intensity distribution of the Pócspetri earthquake 10<sup>th</sup> September 2003 (06:36 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	Apagy	47.960	21.927	1.0	0%	2
2	Baktalórántháza	48.002	22.067	1.0	0%	1
3	Biri	47.815	21.850	1.0	0%	1
4	Hodász	47.914	22.192	1.0	0%	2
5	Kállósemjén	47.858	21.917	1.0	0%	2
6	Kántorjánosi	47.934	22.140	1.0	0%	1
7	Kisléta	47.832	22.001	1.0	0%	1
8	Máriapócs	47.876	22.022	3.5	40%	2
9	Nyírábrány	47.549	22.018	1.0	0%	1
10	Nyírbátor	47.840	22.119	2.5	44%	2
11	Nyírcsászári	47.864	22.167	1.0	0%	1
12	Nyírderzs	47.899	22.154	1.0	0%	2
13	Nyírbákó	48.030	22.069	1.0	0%	1
14	Nyírkécs	48.017	22.050	1.0	0%	2
15	Nyírvasvári	47.818	22.177	1.0	0%	2
16	Pócspetri	47.881	21.977	4.0	24%	2



**4.18. ábra** A 2003. szeptember 10-i, pócspetri földrengés (06:36 UTC) intenzitás eloszlása (az eseményt a szeizmológiai hálózat nem regisztrálta)

**Figure 4.18.** Intensity distribution of the Pócspetri earthquake 10<sup>th</sup> September 2003 (06:36 UTC) (the event did not trigger the seismic network)

**2003. szeptember 10. - Máriapócs / 10 September 2003 - Máriapócs****FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/09/10
Kipattanási idő / Origin Time:	12:40 UTC (makroszeizmikus)
Szélesség és hosszúság / Latitude and Longitude:	47.89 N 22.03 E (makroszeizmikus)
Mélység / Depth:	n.a.
Magnitúdó / Magnitude:	n.a.
Maximális intenzitás / Maximum Intensity:	3-4 EMS

**LEÍRÁS**

Több kisebb földrengés volt érezhető szeptember – október hónap folyamán a kelet-magyarországi Máriapócs – Pócspetri települések környékén. Először szeptember 10-én reggel, majd aznap délben jelentettek földmozgást, melyek intenzitása 3-4 EMS körül volt.

Az eseményt a szeizmológiai hálózat nem regisztrálta.

A rengés intenzitás eloszlását a 4.11. táblázat tartalmazza és a 4.19. ábra mutatja.

**DISCUSSION**

During September – October, a number of smaller shocks were reported from Máriapócs – Pócspetri, E-Hungary. First, in the morning September 10<sup>th</sup>, next early afternoon on the same day, earthquakes were felt and reported from the region and produced reports of intensity 3-4 EMS

The event did not trigger the seismic network.

The intensity distribution of the event is shown in Table 4.11. and Figure 4.19.

**4.11. Táblázat**

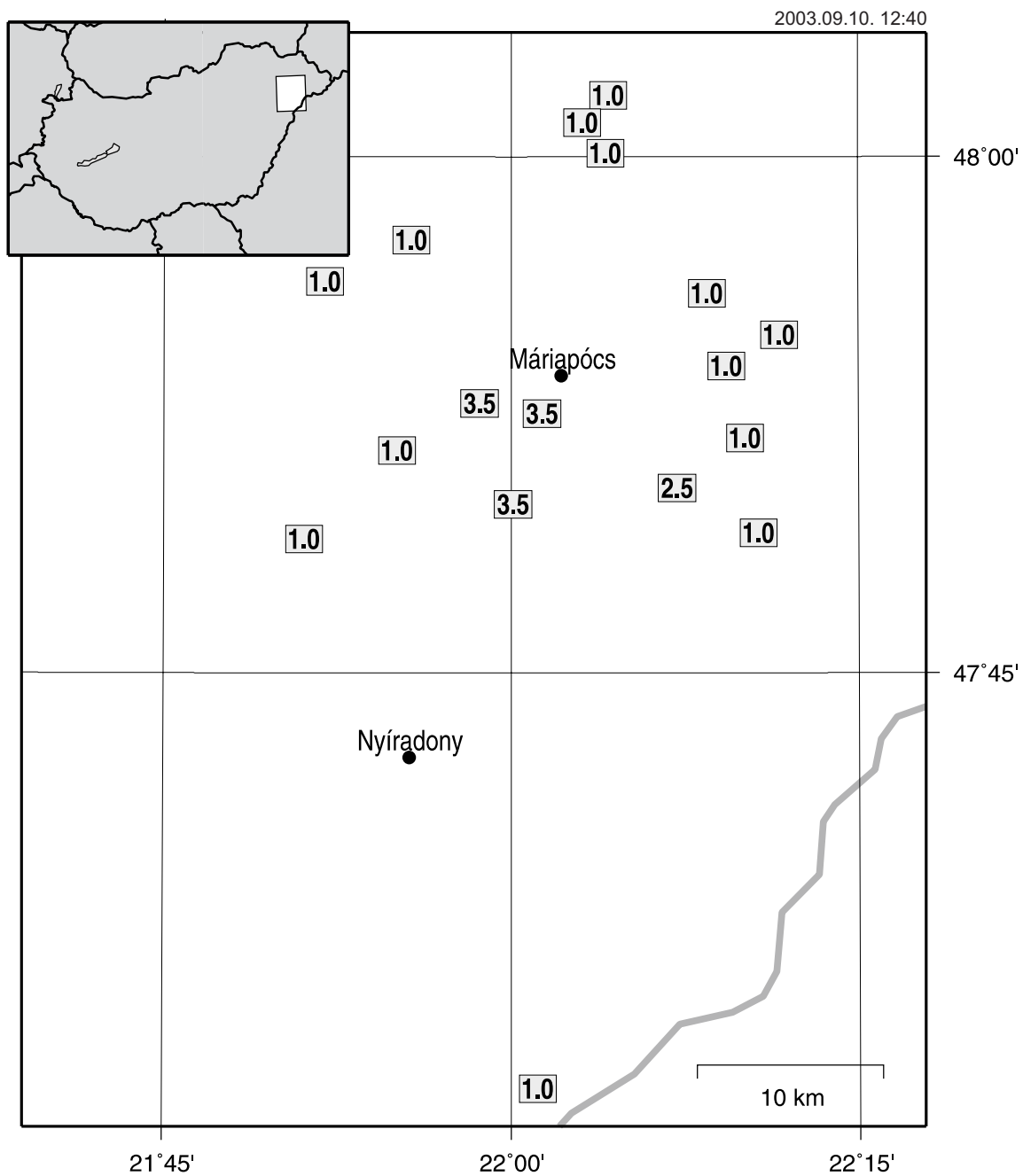
A 2003. szeptember 10-i, máriapócsi földrengés (12:40 UTC) intenzitás eloszlása

**Table 4.11.**

Intensity distribution of the Máriapócs earthquake 10<sup>th</sup> September 2003 (12:40 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	Apagy	47.960	21.927	1.0	0%	2
2	Baktalórántháza	48.002	22.067	1.0	0%	1
3	Biri	47.815	21.850	1.0	0%	1
4	Hodász	47.914	22.192	1.0	0%	2
5	Kállósején	47.858	21.917	1.0	0%	2
6	Kántorjánosi	47.934	22.140	1.0	0%	1
7	Kisléta	47.832	22.001	3.5	34%	1
8	Máriapócs	47.876	22.022	3.5	43%	1
9	Napkor	47.940	21.865	1.0	0%	1
10	Nyírábrány	47.549	22.018	1.0	0%	1
11	Nyírbátor	47.840	22.119	2.5	44%	2
12	Nyírcsászári	47.864	22.167	1.0	0%	1
13	Nyírderzs	47.899	22.154	1.0	0%	2
14	Nyírkákó	48.030	22.069	1.0	0%	1
15	Nyírkércs	48.017	22.050	1.0	0%	2
16	Nyírvasvári	47.818	22.177	1.0	0%	2
17	Pócspetri	47.881	21.977	3.5	34%	1





**4.19. ábra** A 2003. szeptember 10-i, máriapócsi földrengés (12:40 UTC) intenzitás eloszlása (az eseményt a szeizmológiai hálózat nem regisztrálta)

**Figure 4.19.** Intensity distribution of the Máriapócs earthquake 10<sup>th</sup> September 2003 (12:40 UTC) (the event did not trigger the seismic network)

**2003. október 7. - Máriapócs / 7 October 2003 - Máriapócs****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/10/07
Kipattanási idő / Origin Time:	22:08:25.1 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.856 N 22.012 E (S.D. 55.4 km)
Mélység / Depth:	10 km (S.D. 59 km)
Magnitúdó / Magnitude:	2.6 ML
Maximális intenzitás / Maximum Intensity:	3-4 EMS

**LEÍRÁS**

Több kisebb földrengés volt érezhető szeptember – október hónap folyamán a kelet-magyarországi Máriapócs – Pócspetri települések környékén. Október 7-én este 2.6  $M_L$  magnitúdójú rengés volt érezhető Máriapócs, Pócspetri, Nyírgyulaj, Nyírbátor településeken melynek intenzitása 3-4 EMS körül volt.

Az esemény szeizmogramja a 4.20. ábrán látható.

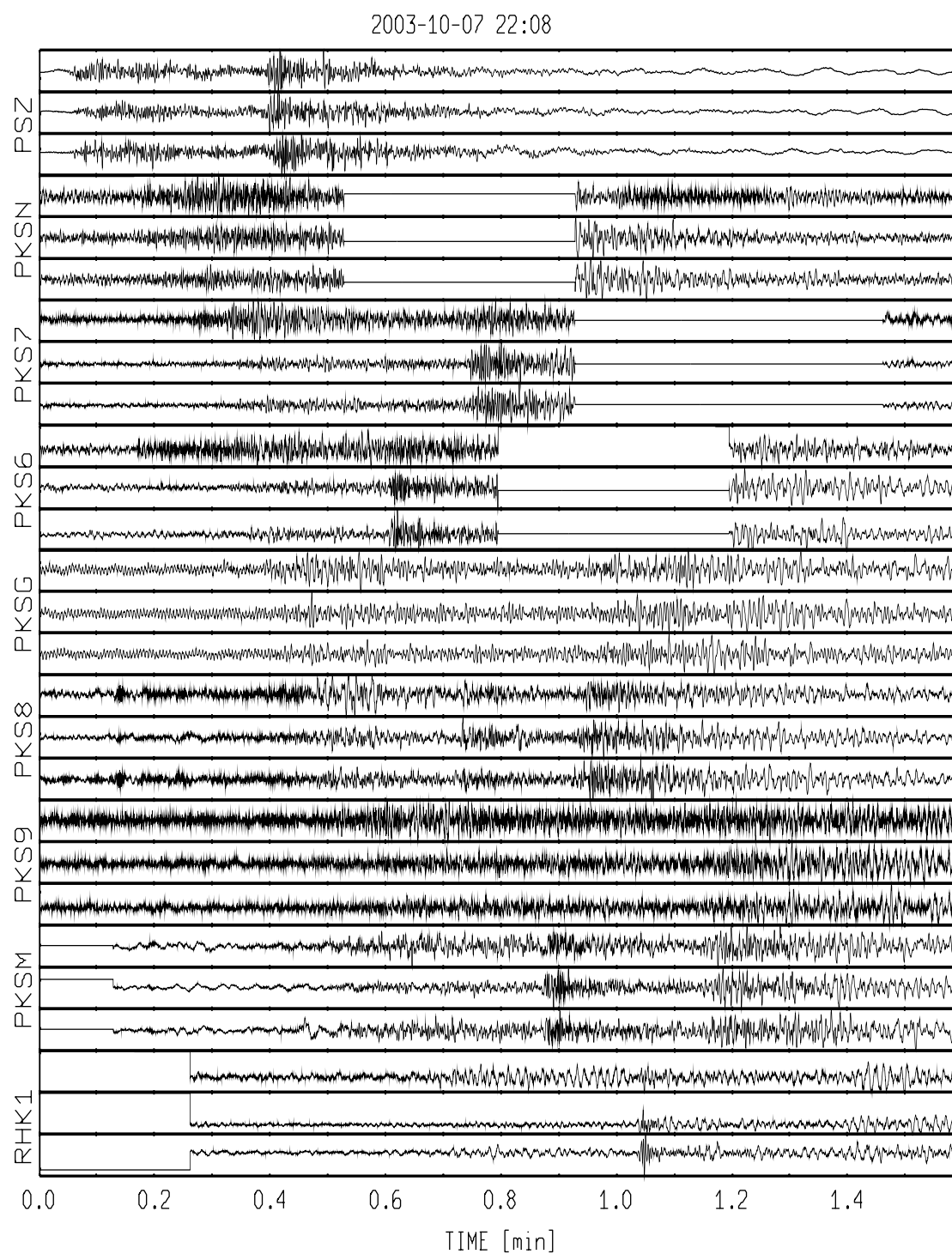
A rengés intenzitás eloszlását a 4.12. táblázat tartalmazza és a 4.21. ábra mutatja.

**DISCUSSION**

During September – October, a number of smaller shocks were reported from Máriapócs – Pócspetri, E-Hungary. On 7<sup>th</sup> October, 2.6  $M_L$  earthquake was felt and reported from Máriapócs, Pócspetri, Nyírgyulaj, Nyírbátor and produced reports of intensity 3-4 EMS.

Seismograms of the event are shown in Figure 4.20.

The intensity distribution of the event is shown in Table 4.12. and Figure 4.21.



**4.20. ábra** A 2003. október 7-i, máriapócsi földrengés (22:08:28 UTC) szeizmogramja  
**Figure 4.20.** Seismograms of the Máriapócs earthquake 7<sup>th</sup> October 2003 (22:08:28 UTC)

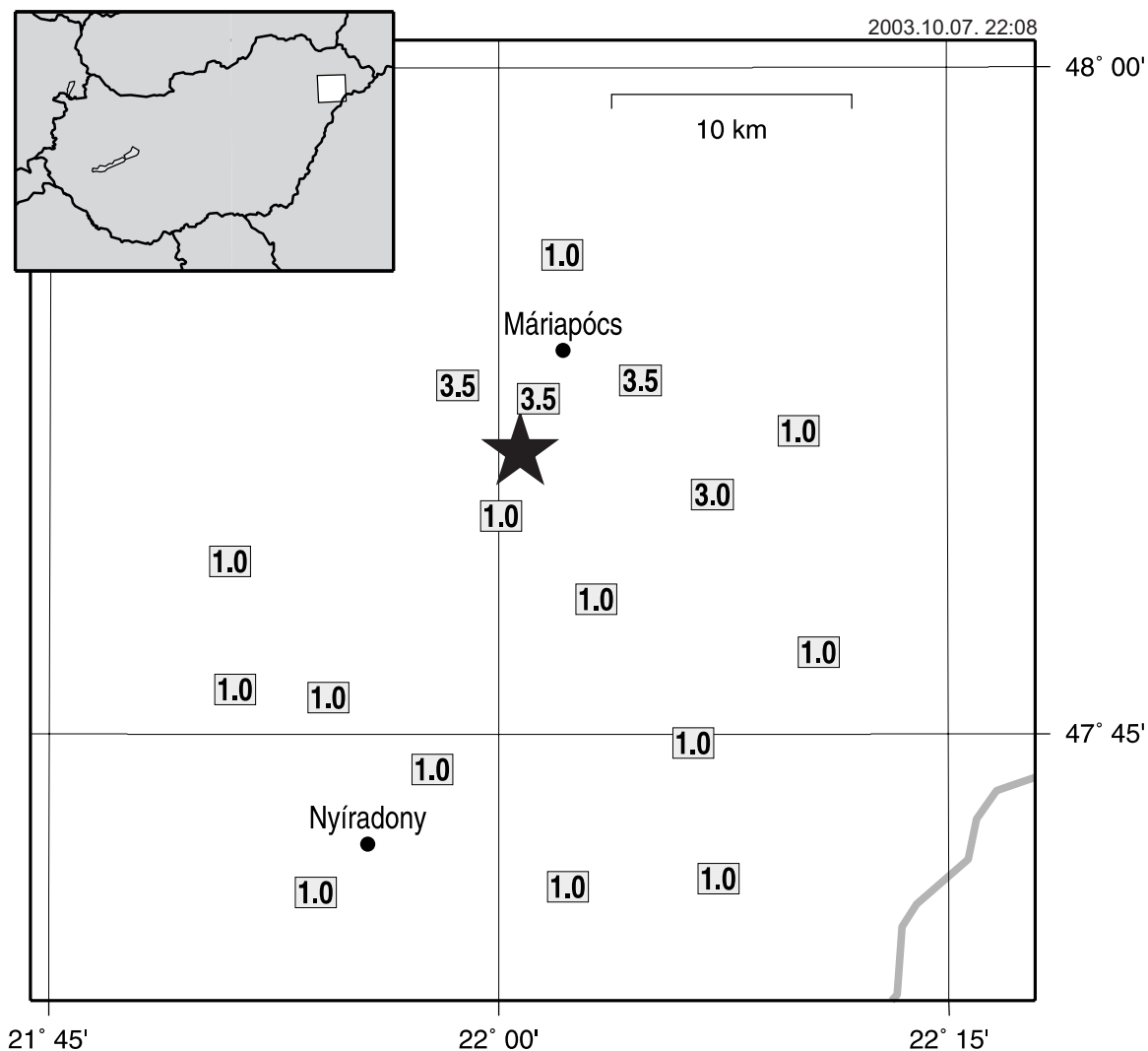
**4.12. Táblázat**

A 2003. október 7-i, máriapócsi földrengés (22:08:28 UTC) intenzitás eloszlása

**Table 4.12.**

Intensity distribution of the Máriapócs earthquake 7<sup>th</sup> October 2003 (22:08:28 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	Balkány	47.767	21.853	1.0	0%	2
2	Biri	47.815	21.850	1.0	0%	1
3	Encsencs	47.747	22.108	1.0	0%	1
4	Kisléta	47.832	22.001	1.0	0%	1
5	Máriapócs	47.876	22.022	3.5	33%	2
6	Nyíradony	47.691	21.898	1.0	0%	2
7	Nyírbátor	47.840	22.119	3.0	40%	2
8	Nyírbéltek	47.696	22.122	1.0	0%	1
9	Nyírbogát	47.801	22.054	1.0	0%	1
10	Nyírcsászári	47.864	22.167	1.0	0%	2
11	Nyírgyulaj	47.883	22.079	3.5	35%	1
12	Nyírlugos	47.693	22.038	1.0	0%	2
13	Nyírmihálydi	47.737	21.963	1.0	0%	2
14	Nyírpilis	47.781	22.178	1.0	0%	2
15	Ófehértó	47.930	22.035	1.0	0%	2
16	Pócspetri	47.881	21.977	3.5	41%	2
17	Szakoly	47.764	21.905	1.0	0%	1



**4.21. ábra** A 2003. október 7-i, máriapócsi földrengés (22:08:28 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.21.** Intensity distribution of the Máriapócs earthquake 7<sup>th</sup> October 2003 (22:08:28 UTC) (star - instrumental epicentre)

**2003. október 11. - Máriapócs / 11 October 2003 - Máriapócs****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/10/11
Kipattanási idő / Origin Time:	05:57 UTC (makroszeizmikus)
Szélesség és hosszúság / Latitude and Longitude:	47.89 N 22.03 E (makroszeizmikus)
Mélység / Depth:	n.a.
Magnitúdó / Magnitude:	n.a.
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

Több kisebb földrengés volt érezhető szeptember – október hónap folyamán a kelet-magyarországi Máriapócs – Pócspetri települések környékén. Október 11-én hajnalban ismét rengés volt érezhető Máriapócs, Pócspetri, Nyírgyulaj, Kisléta településeken melyek intenzitása 4-5 EMS körül volt.

Az eseményt a szeizmológiai hálózat nem regisztrálta.

A rengés intenzitás eloszlását a 4.13. táblázat tartalmazza és a 4.22. ábra mutatja.

**DISCUSSION**

During September – October, a number of smaller shocks were reported from Máriapócs – Pócspetri, E-Hungary. On 11<sup>th</sup> October, earthquake was felt and reported again from Máriapócs, Pócspetri, Nyírgyulaj, Kisléta and produced reports of intensity 4-5 EMS.

The event did not trigger the seismic network.

The intensity distribution of the event is shown in Table 4.13. and Figure 4.22.

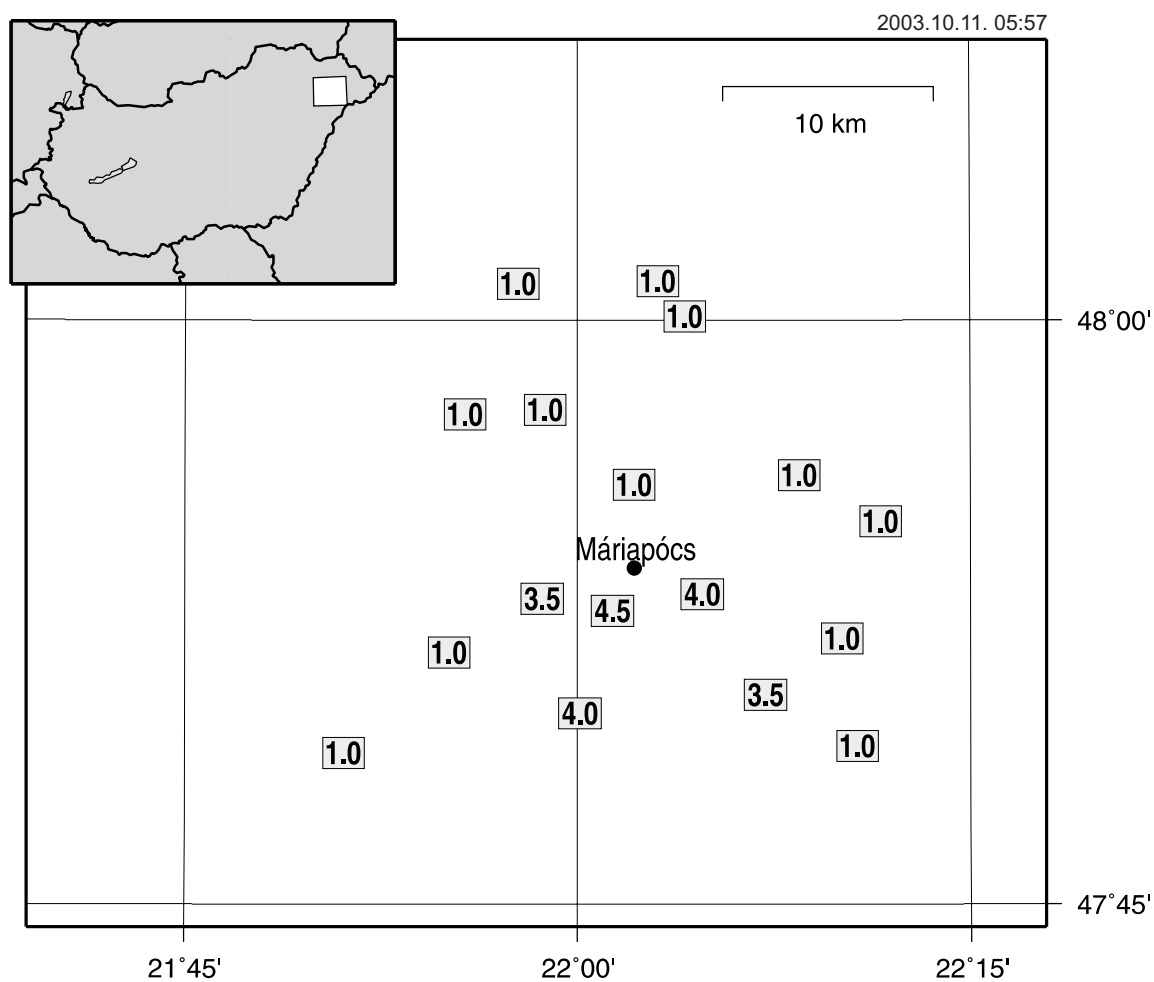
**4.13. Táblázat**

A 2003. október 11-i, máriapócsi földrengés (05:57 UTC) intenzitás eloszlása

**Table 4.13.**

Intensity distribution of the Máriapócs earthquake 11<sup>th</sup> October 2003 (05:57 UTC)

Helység / Location		Koordináta Coordinates		I Intenzitás Intensity	R Rel. megbízhatóság Rel. reliability	N Jelentések száma No. of reports
		Szélesség Latitude (N)	Hosszúság Longitude (E)			
1	Apagy	47.960	21.927	1.0	0%	1
2	Baktalórántháza	48.002	22.067	1.0	0%	1
3	Biri	47.815	21.850	1.0	0%	1
4	Hodász	47.914	22.192	1.0	0%	2
5	Kállósemjén	47.858	21.917	1.0	0%	2
6	Kántorjánosi	47.934	22.140	1.0	0%	2
7	Kisléta	47.832	22.001	4.0	32%	1
8	Levelek	47.962	21.978	1.0	0%	1
9	Máriapócs	47.876	22.022	4.5	30%	2
10	Nyírbátor	47.840	22.119	3.5	38%	1
11	Nyírcsászári	47.864	22.167	1.0	0%	2
12	Nyírgyulaj	47.883	22.079	4.0	37%	1
13	Nyíribrony	48.016	21.961	1.0	0%	1
14	Nyírkécs	48.017	22.050	1.0	0%	2
15	Nyírvasvári	47.818	22.177	1.0	0%	2
16	Ófehértó	47.930	22.035	1.0	0%	1
17	Pócspetri	47.881	21.977	3.5	38%	2



**4.22. ábra** A 2003. október 11-i, máriapócsi földrengés (05:57 UTC) intenzitás eloszlása (az eseményt a szeizmológiai hálózat nem regisztrálta)

**Figure 4.22.** Intensity distribution of the Máriapócs earthquake 11<sup>th</sup> October 2003 (05:57 UTC) (the event did not trigger the seismic network)



**2003. december 16. - Pogányszentpéter / 16 December 2003 -  
Pogányszentpéter****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/12/16
Kipattanási idő / Origin Time:	07:06:20.8 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.341 N 17.075 E (S.D. 1.1 km)
Mélység / Depth:	20.7 km (S.D. 2 km)
Magnitúdó / Magnitude:	3.8 ML
Maximális intenzitás / Maximum Intensity:	5-6 EMS

**LEÍRÁS**

December 16-án, Nagykanizsától délre, Pogányszentpéter, Liszó, Iharosberény környékén éreztek földrengést. A 3.8  $M_L$  magnitúdójú rengés 800-1000 km<sup>2</sup> területen volt érezhető DNy Magyarországon. Az epicentrális intenzitás 5-6 EMS.

Az esemény szeizmogramja a 4.23. ábrán látható.

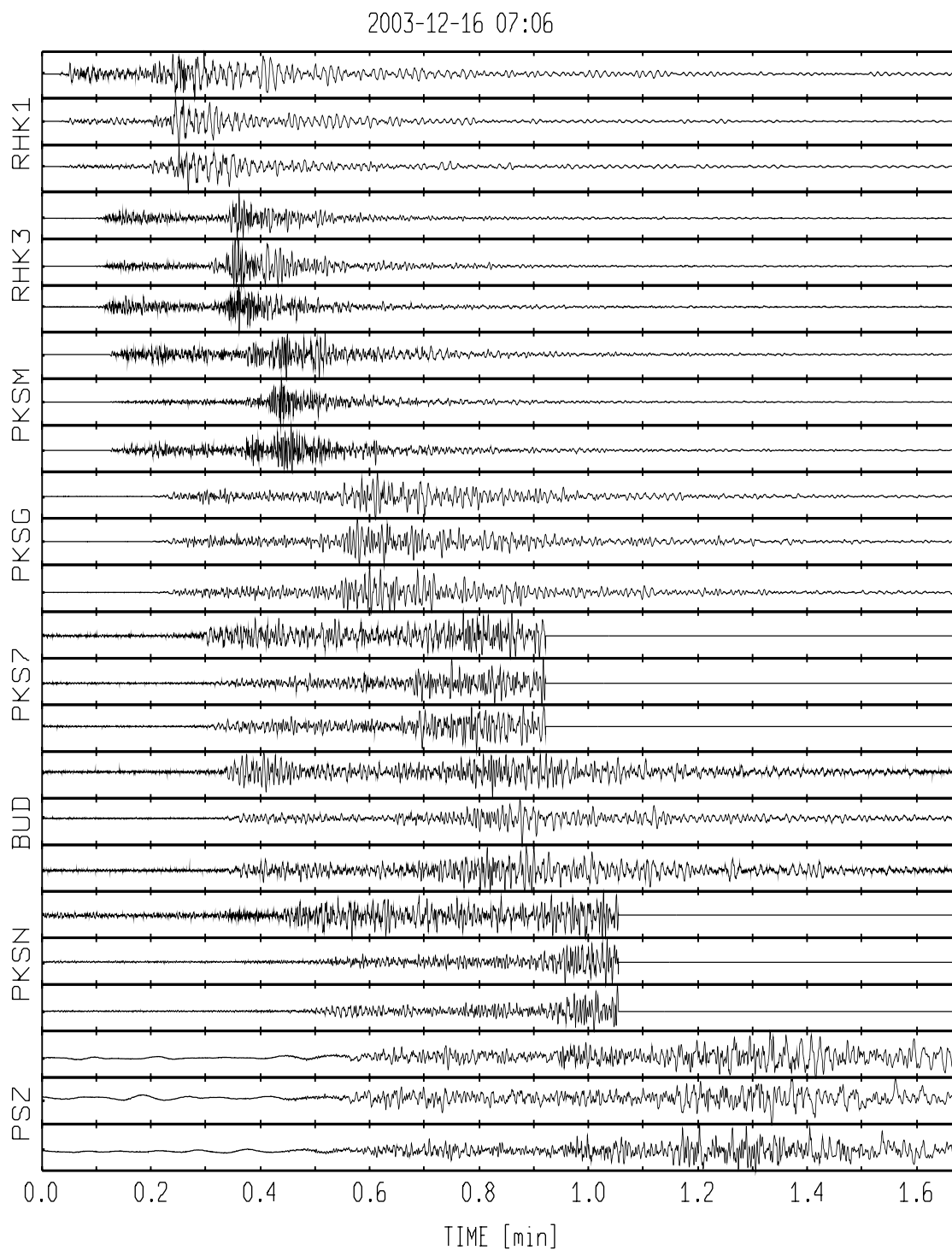
A rengés intenzitás eloszlását a 4.14. táblázat tartalmazza és a 4.24. ábra mutatja.

**DISCUSSION**

On December 16<sup>th</sup>, a 3.8  $M_L$  magnitude event was felt in an area of about 800-1000 km<sup>2</sup>, in Pogányszentpéter, Liszó, Iharosberény region SW of Hungary. 5-6 EMS epicentral intensity was reported.

Seismograms of the event are shown in Figure 4.23.

The intensity distribution of the event is shown in Table 4.14. and Figure 4.24.



**4.23. ábra** A 2003. december 16-i, pogányszentpéteri földrengés (07:06:21 UTC) szeizmogramja

**Figure 4.23.** Seismograms of the Pogányszentpéter earthquake 16<sup>th</sup> December 2003 (07:06:21 UTC)

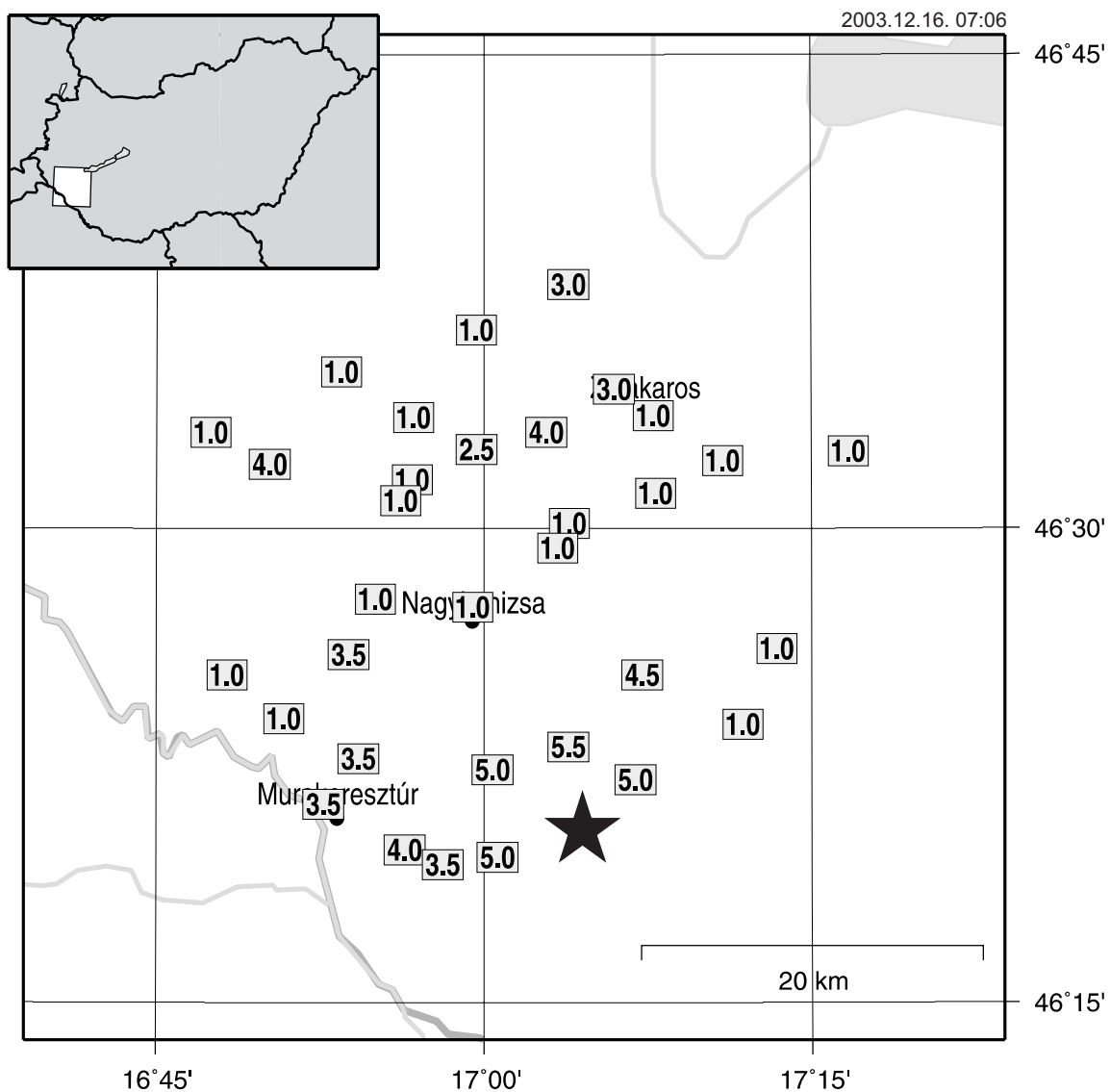
## 4.14. Táblázat

A 2003. december 16-i, pogányszentpéteri földrengés (07:06:21 UTC) intenzitás eloszlása

Table 4.14.

Intensity distribution of the Pogányszentpéter earthquake 16<sup>th</sup> December 2003 (07:06:21 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	Bánokszentgyörgy	46.551	16.790	1.0	0%	1
2	Belezná	46.331	16.939	4.0	43%	2
3	Birján	46.000	18.375	1.0	0%	1
4	Börzönce	46.583	16.890	1.0	0%	1
5	Csákány	46.541	17.277	1.0	0%	2
6	Fityeház	46.379	16.904	3.5	42%	1
7	Füzvölgy	46.526	16.944	1.0	0%	1
8	Galambok	46.519	17.130	1.0	0%	1
9	Gelse	46.605	16.993	1.0	0%	2
10	Hosszúvölgy	46.515	16.935	1.0	0%	1
11	Iharosberény	46.368	17.115	5.0	35%	1
12	Inke	46.397	17.196	1.0	0%	1
13	Kisrécse	46.503	17.064	1.0	0%	2
14	Liszó	46.373	17.006	5.0	25%	1
15	Magyarszerdahely	46.559	16.945	1.0	0%	1
16	Murakeresztúr	46.355	16.877	3.5	39%	2
17	Nagybakónak	46.551	17.047	4.0	26%	1
18	Nagykanizsa	46.459	16.990	1.0	0%	3
19	Nagyrécse	46.490	17.055	1.0	0%	2
20	Nemespátró	46.327	17.010	5.0	26%	1
21	Oltárc	46.534	16.836	4.0	75%	2
22	Orosztony	46.629	17.064	3.0	43%	1
23	Pogányszentpéter	46.385	17.064	5.5	32%	1
24	Sand	46.423	17.120	4.5	33%	1
25	Semjénháza	46.400	16.846	1.0	0%	1
26	Sormás	46.463	16.916	1.0	0%	2
27	Surd	46.323	16.968	3.5	26%	1
28	Szepetnek	46.434	16.896	3.5	32%	2
29	Tótszentmárton	46.423	16.803	1.0	0%	1
30	Újudvar	46.542	16.994	2.5	50%	1
31	Varászló	46.437	17.222	1.0	0%	1
32	Zalakaros	46.560	17.128	1.0	0%	1
33	Zalakomár	46.536	17.181	1.0	0%	1
34	Zalamerenye	46.574	17.099	3.0	31%	1



**4.24. ábra** A 2003. december 16-i, pogányszentpéteri földrengés (07:06:21 UTC) intenzitás eloszlása  
(a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.24.** Intensity distribution of the Pogányszentpéter earthquake 16<sup>th</sup> December 2003 (07:06:21 UTC)  
(star - instrumental epicentre)

**2003. december 31. - Magyarsarlós / 31 December 2003 - Magyarsarlós****FÉSZKEPARAMÉTEREK / HYPOCENTER PARAMETERS**

Dátum / Date:	2003/12/31
Kipattanási idő / Origin Time:	20:43:49.1 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.046 N 18.275 E (S.D. 1.9 km)
Mélység / Depth:	10 km (S.D. 2 km)
Magnitúdó / Magnitude:	2.6 ML
Maximális intenzitás / Maximum Intensity:	4-5 EMS

**LEÍRÁS**

December 31-én este 2.6  $M_L$  magnitúdójú földrengés keltett riadalmat Pécs város déli részén és Magyarsarlós környékén. A rengés intenzitása 4-5 EMS fokra becsülhető (Magyarsarlós – Kökény – Egerág). A rengés mintegy 400-500 km<sup>2</sup> területen volt érezhető, főleg Pécestől D-DK-i irányban.

Az esemény szeizmogramja a 4.25. ábrán látható.

A rengés intenzitás eloszlását a 4.15. táblázat tartalmazza és a 4.26. ábra mutatja.

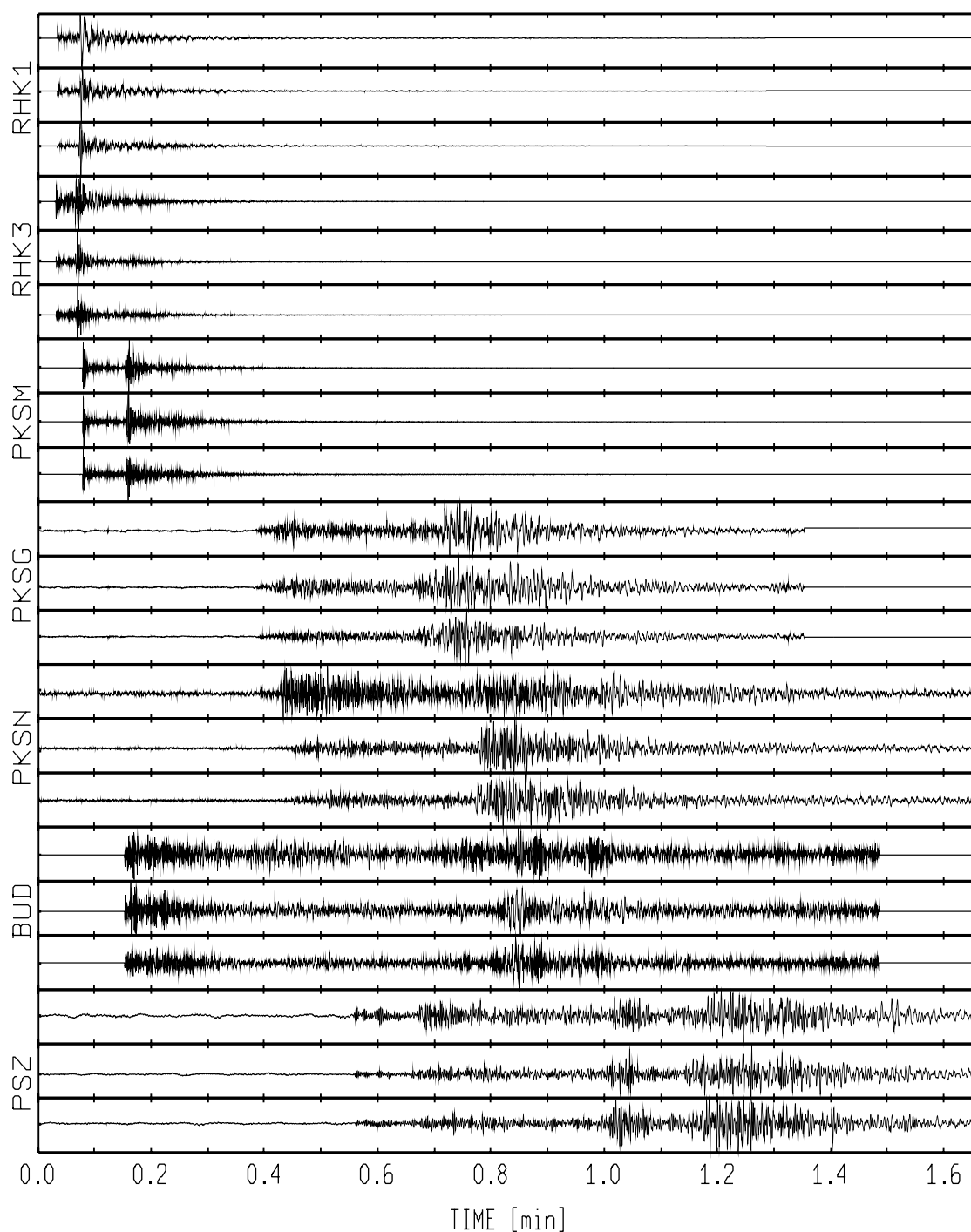
**DISCUSSION**

On December 31<sup>st</sup> night, a 2.6  $M_L$  magnitude earthquake alarmed people in the southern part of Pécs city and Magyarsarlós. The shock was felt in an area of 400-500 km<sup>2</sup> and produced reports of 4-5 EMS from Magyarsarlós – Kökény – Egerág.

Seismograms of the event are shown in Figure 4.25.

The intensity distribution of the event is shown in Table 4.15. and Figure 4.26.

2003-12-31 20:43



**4.25. ábra** A 2003. december 31-i, magyarorsarlósi földrengés (20:43:49 UTC) szeizmogramja

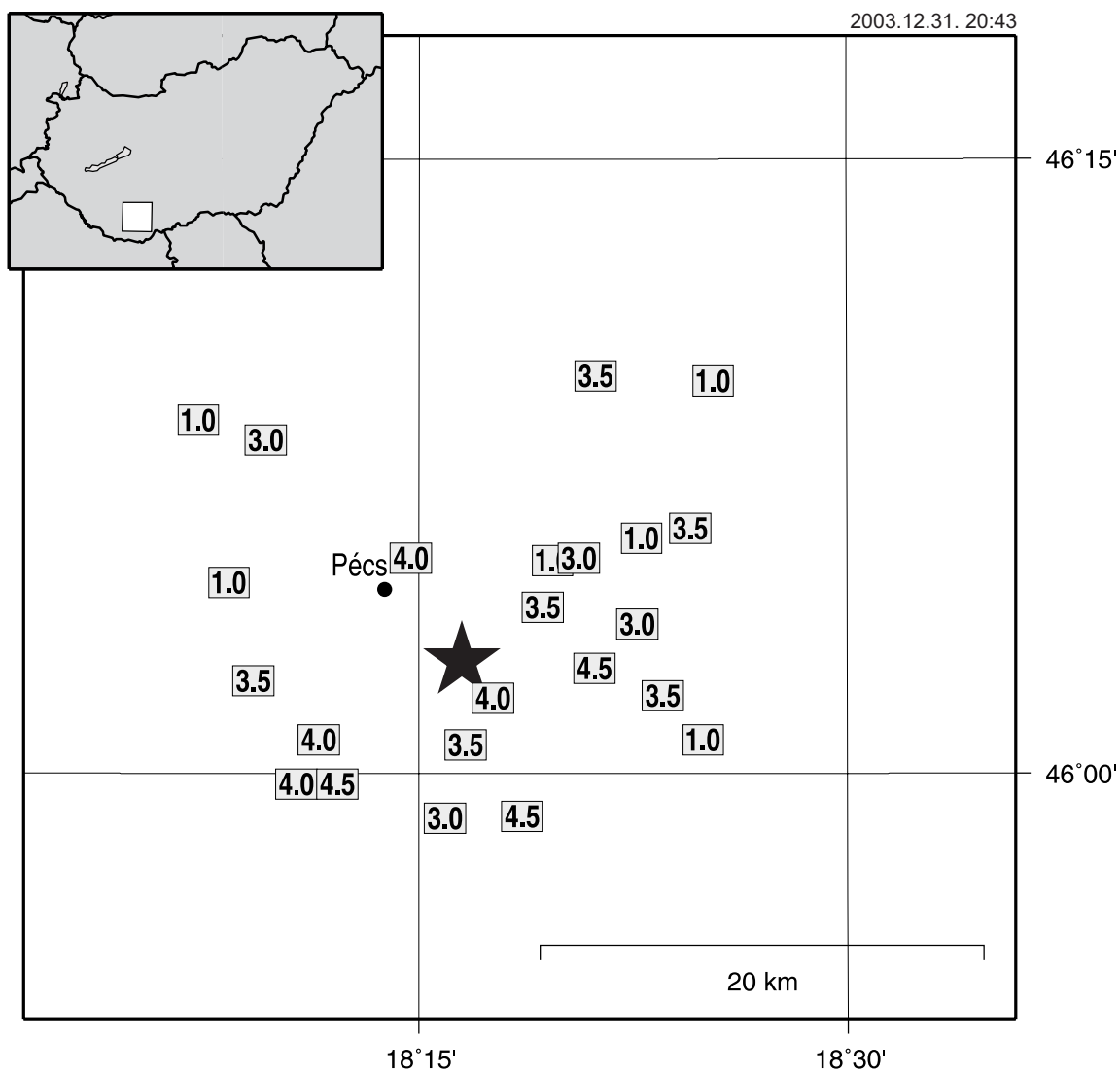
**Figure 4.25.** Seismograms of the Magyarorsarlós earthquake 31<sup>st</sup> December 2003 (20:43:49 UTC)

**4.15. Táblázat**

A 2003. december 31-i, magyarsarlósi földrengés (20:43:49 UTC) intenzitás eloszlása

**Table 4.15.**Intensity distribution of the Magyarsarlós earthquake 31<sup>st</sup> December 2003 (20:43:49 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	Abaliget	46.144	18.120	1.0	0%	1
2	Bogád	46.087	18.327	1.0	0%	1
3	Cserkút	46.078	18.138	1.0	0%	1
4	Gyód	45.996	18.178	4.0	47%	1
5	Egerág	45.983	18.310	4.5	35%	1
6	Ellend	46.061	18.377	3.0	33%	1
7	Hásságy	46.032	18.392	3.5	38%	1
8	Hosszúhetény	46.162	18.353	3.5	38%	1
9	Keszü	46.014	18.191	4.0	40%	2
10	Kozármisleny	46.031	18.293	4.0	35%	3
11	Kökény	45.996	18.202	4.5	29%	1
12	Magyarsarlós	46.043	18.352	4.5	36%	1
13	Nagykozár	46.068	18.322	3.5	41%	2
14	Olasz	46.014	18.415	1.0	0%	1
15	Orfű	46.136	18.160	3.0	31%	1
16	Pellérd	46.038	18.153	3.5	44%	1
17	Pereked	46.096	18.379	1.0	0%	1
18	Pécs	46.088	18.245	4.0	38%	2
19	Pécsudvard	46.012	18.277	3.5	39%	1
20	Pécsvárad	46.160	18.421	1.0	0%	1
21	Pogány	45.982	18.265	3.0	38%	1
22	Romonya	46.088	18.343	3.0	33%	1
23	Szilágy	46.100	18.408	3.5	44%	1



**4.26. ábra** A 2003. december 31-i, magyararlósi földrengés (20:43:49 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

**Figure 4.26.** Intensity distribution of the Magyararlós earthquake 31<sup>st</sup> December 2003 (20:43:49 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 ☞ **Kisebb károkat okozó**

Épületen belül szinte mindenki, szabadban sokan érzik. Épületben tartózkodók közül sokan megijednek, és a szabadba menekülnek. Kisebb tárgyak leesnek. Hagyományos épületek közül sokban keletkezik kisebb kár, hajszálrepedés a vakolatban, kisebb 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: kisebb 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

2003

Forrás:

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

## APPENDIX B

# SIGNIFICANT EARTHQUAKES OF THE WORLD

2003

Source:

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

## Halálos áldozatot követelő földrengések a világon 2003-ban

## Deaths from Earthquakes in 2003

Dátum Date	Ország, terület Region	Magnitúdó Magnitude	Áldozatok száma Number killed
2003/01/21	Near the Coast of Guatemala	6.5	1
2003/01/22	Offshore Colima, Mexico	7.6	29
2003/01/27	Turkey	6.1	1
2003/02/24	Southern Xinjiang, China	6.3	261
2003/02/25	Southern Xinjiang, China	5.4	5
2003/03/25	Flores Region, Indonesia	6.5	4
2003/03/29	Hindu Kush Region, Afghanistan	5.9	1
2003/05/01	Eastern Turkey	6.4	177
2003/05/04	Southern Xinjiang, China	5.8	1
2003/05/21	Northern Algeria	6.8	2266
2003/05/26	Halmahera, Indonesia	7.0	1
2003/05/27	Northern Algeria	5.8	9
2003/06/24	Western Iran	4.6	1
2003/07/10	Southern Iran	5.7	1
2003/07/21	Yunnan, China	6.0	16
2003/07/26	India-Bangladesh Border Region	5.6	2
2003/08/16	Eastern Nei Mongol, China	5.4	4
2003/09/22	Dominican Republic Region	6.5	3
2003/09/27	Southwestern Siberia, Russia	7.3	3
2003/10/16	Yunnan, China	5.6	3
2003/10/25	Gansu-Qinghai Region, China	5.8	9
2003/11/13	Gansu, China	5.1	1
2003/11/14	Sichuan-Yunnan Region, China	5.0	4
2003/11/18	Samar, Philippines	6.5	1
2003/12/01	Kazakhstan Border Region	6.0	11
2003/12/22	Central California	6.5	2
2003/12/25	Panama-Costa Rica Border Region	6.5	2
2003/12/26	Southeastern Iran	6.6	43200
	<b>Összesen / Total</b>		<b>46019</b>

## A 7.0 vagy annál nagyobb magnitúdójú földrengések a világon 2003-ban

## Earthquakes of magnitude 7.0 and greater in 2003

	Év Year	Hónap Month	Nap Day	Idő Time (UTC)	Szélesség Latitude	Hosszúság Longitude	Mélység Depth (km)	Magnitúdó Magnitude	Ország, terület Region
1	2003	01	20	08:43	-10.491	160.770	33	7.3	Solomon Islands
2	2003	01	22	02:06	18.770	-104.104	24	7.6	Offshore Colima, Mexico
3	2003	03	17	16:36	51.272	177.978	33	7.1	Alaska
4	2003	05	26	09:24	38.849	141.568	68	7.0	East Coast of Honshu, Japan
5	2003	05	26	19:23	2.354	128.855	31	7.0	Halmahera, Indonesia
6	2003	06	20	06:19	-7.606	-71.722	558	7.1	Amazonas, Brazil
7	2003	07	15	20:27	-2.598	68.382	10	7.6	Carlsberg Ridge
8	2003	08	04	04:37	-60.532	-43.411	10	7.5	Scotia Sea
9	2003	08	21	12:12	-45.104	167.144	28	7.2	South Island of New Zealand
10	2003	09	25	19:50	41.815	143.910	27	8.3	Hokkaido, Japan Region
11	2003	09	25	21:08	41.774	143.593	33	7.4	Hokkaido, Japan Region
12	2003	09	27	11:33	50.038	87.813	16	7.3	Southwestern Siberia, Russia
13	2003	10	31	01:06	37.830	142.629	10	7.0	Off the East Coast of Honshu, Japan
14	2003	11	17	06:43	51.146	178.650	33	7.8	Alaska
15	2003	12	27	16:00	-22.015	169.766	10	7.3	Southeast of the Loyalty Islands

**A 6.5 vagy annál nagyobb magnitúdójú,  
és a jelentősebb károkat okozó földrengések a világon 2003-ban**

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

DÁTUM	IDŐ Ó M S	KOORDINÁTA SZÉL HOSSZ	MÉLYSÉG KM	MAG	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 04	05 15 03.8	20.570 S 177.661 W	378 D	6.5	1.0 376	FIJI REGION. MW 6.5 (GS), 6.5 (HRV). mb 6.0 (GS). ME 6.0 (GS). Mo 6.0*10**18 Nm (GS). 6.0*10**18 Nm (HRV). Es 2.1*10**13 Nm (GS).
JAN 10	13 11 56.9	5.311 S 153.701 E	72 D	6.7	1.1 323	NEW IRELAND REGION, PAPUA NEW GUINEA. MW 6.7 (GS), 6.6 (HRV). mb 5.9 (GS). ME 6.2 (GS). Mo 8.7*10**18 Nm (HRV), 1.1*10**19 Nm (GS). Es 4.8*10**13 Nm (GS).
JAN 11	17 45 30.6	29.590 N 51.474 E	33 N	5.2	1.3 146	SOUTHERN IRAN. MW 5.2 (HRV). mb 5.2 (GS). MS 5.0 (GS). Mo 7.1*10**16 Nm (HRV). Several people injured, about 650 houses destroyed and at least 1,350 houses damaged in the Kazerun-Nurabad area.
JAN 20	08 43 06.0	10.491 S 160.770 E	33 N	7.3	0.8 457	SOLOMON ISLANDS. MW 7.3 (HRV), 7.2 (GS). mb 6.7 (GS). MS 7.8 (GS). ME 7.3 (GS). Mo 9.3*10**19 Nm (HRV), 7.7*10**19 Nm (GS). 1.1*10**20 Nm (PPT). Es 1.9*10**15 Nm (GS). Felt at Honiara. Local tsunami observed on San Cristobal.
JAN 21	02 46 47.7	13.626 N 90.774 W	24 G	6.5	1.0 316	NEAR THE COAST OF GUATEMALA. MW 6.5 (HRV), 6.3 (GS). mb 5.5 (GS). MS 6.3 (GS). ME 5.9 (GS). MD 5.7 (SNET), 5.6 (UNM). Mo 5.4*10**18 Nm (HRV), 3.7*10**18 Nm (GS). Es 1.7*10**13 Nm (GS). One person died of a heart attack at Escuintla. Felt strongly and utilities disrupted at Coban, Coatepeque, Guatemala City, Quetzaltenango, San Marcos and Solola. Felt throughout Guatemala. Felt (VI) at San Salvador; felt at Antigua Cuscatlan and Nueva San Salvador, El Salvador. Also felt in Honduras and in southern Mexico.
JAN 22	02 06 34.6	18.770 N 104.104 W	24 G	7.6	1.4 551	OFFSHORE COLIMA, MEXICO. MW 7.6 (GS), 7.5 (HRV). mb 6.5 (GS). MS 7.6 (GS). ME 7.4 (GS). MD 7.6 (UNM). Mo 3.1*10**20 Nm (GS). 2.0*10**20 Nm (HRV), 1.5*10**20 Nm (PPT). Es 2.7*10**15 Nm (GS). At least 29 people killed, 300 injured, about 10,000 homeless, 2,005 houses destroyed and 6,615 damaged. Most of the deaths and damage occurred in the Villa de Alvarez-Colima area. Extensive damage (VIII) at Colima and Tecoman. Some deaths and damage occurred in Jalisco and Michoacan and a few buildings were damaged in Guanajuato and Morelos. Felt strongly (VI) in parts of Mexico City. Felt in central and southwestern Mexico from Nayarit and San Luis Potosi to Puebla and Tlaxcala. Also felt at Corpus Christi, Dallas, El Paso and by people in high-rise buildings at Houston, Texas. Landslides closed a segment of the Colima-Guadalajara Highway and the port at Manzanillo. Power and telephone outages occurred in Mexico City. The following maximum accelerations were recorded on strong-motion instruments: .002g at Acapulco, .008g at Cuernavaca and .045g at a site in the lake bed area of Mexico City. A local tsunami was generated with wave heights (peak-to-trough) of about 1.2 meters at Manzanillo, 70 cm at Zihuatanejo and 25 cm at Lazaro Cardenas. A seiche was observed on Lake Pontchartrain and sediment was stirred up in wells in Louisiana. This shallow earthquake occurred in a seismically active zone near the coast of central Mexico. The earthquake occurred near the juncture of three tectonic plates: the North American Plate to the northeast, the Rivera Plate to the northwest, and the Cocos Plate to the south. Both the Rivera Plate and the Cocos Plate are being consumed beneath the North American Plate. The slower subducting Rivera Plate is moving northwest at about 2 cm per year relative to the North American Plate and the faster Cocos Plate is moving in a similar direction at a rate of about 4.5 cm per year. More information (in Spanish) about this earthquake may be obtained from UNAM.



## A világ jelentős földrengései

## Significant Earthquakes of the World

online at <http://www.ssn.unam.mx/> and from CENAPRED at <http://www.cenapred.unam.mx/>.

JAN 23	00 08 22.8	8.807 S	118.524 E	33 N	5.5	1.4	79	SUMBAWA REGION, INDONESIA. MW 5.5 (HRV). mb 5.3 (GS). MS 5.1 (GS). Mo $2.2 \times 10^{17}$ Nm (HRV). At least two people injured and 500 buildings damaged (VI) in the Dompu area.
JAN 27	05 26 23.0	39.500 N	39.878 E	10 G	6.1	1.1	384	EASTERN TURKEY. MW 6.1 (HRV), 6.0 (GS). mb 5.6 (GS). MS 6.0 (GS). Mo $1.4 \times 10^{18}$ Nm (HRV), $1.1 \times 10^{18}$ Nm (GS). One person killed, several injured and several buildings damaged in the Erzincan-Pulumur area.
JAN 27	17 56 25.8	46.048 S	35.057 E	10 G	6.5	1.1	120	PRINCE EDWARD ISLANDS REGION. MW 6.5 (HRV), 6.4 (GS). mb 5.6 (GS). MS 6.3 (GS). Mo $5.4 \times 10^{18}$ Nm (HRV), $4.7 \times 10^{18}$ Nm (GS).
FEB 19	03 32 36.3	53.645 N	164.643 W	19 G	6.6	1.1	542	UNIMAK ISLAND REGION, ALASKA. MW 6.6 (GS), 6.6 (HRV). mb 5.8 (GS). MS 6.6 (GS). ME 6.4 (GS). Mo $7.8 \times 10^{18}$ Nm (GS), $1.0 \times 10^{19}$ Nm (HRV), $1.3 \times 10^{19}$ Nm (PPT). Es $8.3 \times 10^{13}$ Nm (GS). Felt (IV) at Dutch Harbor and False Pass. Also felt at Akutan and Unalaska.
FEB 24	02 03 41.4	39.610 N	77.230 E	11 G	6.3	0.9	424	SOUTHERN XINJIANG, CHINA. MW 6.3 (GS), 6.3 (HRV). mb 5.8 (GS). MS 6.3 (GS). ME 5.7 (GS). Mo $3.7 \times 10^{18}$ Nm (HRV), $2.8 \times 10^{18}$ Nm (GS). Es $8.5 \times 10^{12}$ Nm (GS). At least 261 people killed and 4,000 injured; 71,000 buildings collapsed and 40,119 damaged; utilities disrupted; about 38,259 livestock killed in Bachu County. Felt as far as Urumqi. Also felt at Almaty, Kazakhstan.
FEB 25	03 52 41.0	39.483 N	77.393 E	10 G	5.4	0.9	173	SOUTHERN XINJIANG, CHINA. MW 5.4 (HRV). mb 5.1 (GS). MS 5.3 (GS). Mo $1.2 \times 10^{17}$ Nm (HRV). Five people killed and additional damage in Bachu County.
MAR 11	07 27 32.6	4.694 S	153.238 E	40	6.8	1.0	431	NEW IRELAND REGION, PAPUA NEW GUINEA. MW 6.8 (HRV), 6.6 (GS). mb 6.0 (GS). MS 6.8 (GS). ME 6.4 (GS). Mo $9.9 \times 10^{18}$ Nm (GS), $1.9 \times 10^{19}$ Nm (HRV). Es $8.1 \times 10^{13}$ Nm (GS). Items knocked from shelves (VII), rockfalls occurred and utilities disrupted on the Gazelle Peninsula, New Britain.
MAR 17	16 36 17.3	51.272 N	177.978 E	33 N	7.1	1.3	607	RAT ISLANDS, ALEUTIAN ISLANDS, ALASKA. MW 7.1 (GS), 7.0 (HRV), 7.1 (OBN). mb 5.9 (GS). MS 6.7 (GS). ME 6.5 (GS). ML 6.3 (PMR). Mo $4.3 \times 10^{19}$ Nm (GS), $4.2 \times 10^{19}$ Nm (HRV), $5.5 \times 10^{19}$ Nm (OBN), $4.2 \times 10^{19}$ Nm (PPT). Es $1.2 \times 10^{14}$ Nm (GS). Felt (III) on Shemya.
MAR 25	02 53 25.0	8.294 S	120.743 E	33 N	6.5	1.3	247	FLORES REGION, INDONESIA. MW 6.5 (HRV), 6.3 (GS). mb 6.2 (GS). MS 6.1 (GS). ME 6.3 (GS). Mo $5.4 \times 10^{18}$ Nm (HRV), $3.6 \times 10^{18}$ Nm (GS). Es $6.5 \times 10^{13}$ Nm (GS). Four people killed by rockslides, at least 20 injured and several buildings and a pier damaged in the Reo area. Felt (VI) at Ruteng and (IV) at Ende and Maumere. Also felt (IV) at Waingapu, Sumba and (III) at Makasar, Sulawesi. Felt at Kupang, Timor.
MAR 29	11 46 48.9	35.976 N	70.585 E	114 D	5.9	0.9	427	HINDU KUSH REGION, AFGHANISTAN. MW 5.9 (GS), 5.8 (HRV). mb 5.9 (GS). ME 5.3 (GS). Mo $9.0 \times 10^{17}$ Nm (GS), $6.6 \times 10^{17}$ Nm (HRV). Es $1.9 \times 10^{12}$ Nm (GS). One person killed and two injured at Bajaur, Pakistan. Felt at Chitral, Islamabad, Peshawar and Rawalpindi. Felt at Kabul and in other parts of Afghanistan. Also felt at Dushanbe, Tajikistan. Felt (III) at Andijon, Samarqand and Tashkent, Uzbekistan. Also felt (III) at Gowurdak, Turkmenistan.
APR 10	00 40 15.1	38.221 N	26.958 E	10 G	5.7	1.1	471	NEAR THE COAST OF WESTERN TURKEY. MW 5.7 (GS), 5.7 (HRV). mb 5.3 (GS). MS 5.6 (GS). ML 5.4 (NIC), 5.3 (ATH), 5.0 (THE). Mo $4.7 \times 10^{17}$ Nm (GS), $4.4 \times 10^{17}$ Nm (HRV). At least 90 people injured and some buildings damaged at Izmir. Several houses collapsed and some buildings damaged at Seferihisar. Felt strongly in the Izmir-Seferihisar-Urla area.
APR 11	09 26 58.2&	44.792 N	8.892 E	4	5.0		356	NORTHERN ITALY. <GEN>. mb 5.0 (GS). ML 5.2 (GRF), 5.1 (GEN), 5.1 (ZAMG), 4.9 (STR), 4.9 (FBB), 4.7 (FUR), 4.7 (ROM). MD 4.9 (PDG). Two people injured in the Turin area. Felt throughout the Genoa-Milan-Turin area. Also felt at Nice, France.
APR 17	14 50 48.5	54.624 S	1.432 E	10 G	6.5	1.3	78	BOUVET ISLAND REGION. MW 6.5 (GS), 6.5 (HRV). mb 5.5 (GS). MS 6.0 (GS). Mo $6.9 \times 10^{18}$ Nm (HRV), $5.4 \times 10^{18}$ Nm (GS).
MAY 01	00 27 04.7	39.007 N	40.464 E	10 G	6.4	1.1	504	EASTERN TURKEY. MW 6.4 (GS), 6.4 (HRV). mb 5.7 (GS). MS 6.4 (GS).

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											ME 6.9 (GS). Mo $4.1 \times 10^{18}$ Nm (GS). $4.1 \times 10^{18}$ Nm (HRV). Es $5.2 \times 10^{14}$ Nm (GS). At least 177 people killed in the Bingol area, including 85 which were at Celtiksuyu Boarding School. At least 521 people injured, 718 buildings destroyed, 2,593 damaged and 1,662 livestock killed in the Bingol area. Felt strongly in much of eastern Turkey.
MAY 04	13 15 18.6	30.531 S	178.232 W	62 D	6.7	1.0	518	KERMADEC ISLANDS, NEW ZEALAND. MW 6.7 (GS). 6.7 (HRV). mb 6.0 (GS). MS 6.5 (GS). ME 6.3 (GS). Mo $1.3 \times 10^{19}$ Nm (GS). $1.2 \times 10^{19}$ Nm (HRV). $1.1 \times 10^{19}$ Nm (PPT). Es $6.8 \times 10^{13}$ Nm (GS).			
MAY 04	15 44 35.5	39.430 N	77.219 E	10 G	5.8	1.0	216	SOUTHERN XINJIANG, CHINA. MW 5.8 (HRV). mb 5.0 (GS). MS 5.6 (GS). Mo $5.0 \times 10^{17}$ Nm (HRV). One person died from a heart attack, three injured, 1,600 houses destroyed, several thousand buildings damaged and 1,000 livestock killed in Yopurga County.			
MAY 11	15 57 06.5	35.794 N	139.904 E	67	5.1	0.8	246	NEAR THE SOUTH COAST OF HONSHU, JAPAN. mb 5.1 (GS). Three people injured in the Tokyo area. Felt in Chiba, Ibaraki, Kanagawa, Saitama and Tokyo Prefectures. Recorded (4 JMA) in Ibaraki, Saitama and Tokyo; (3 JMA) in Chiba, Gumma, Kanagawa, Shizuoka and Tochigi Prefectures.			
MAY 14	06 03 35.8	18.266 N	58.633 W	42 D	6.6	0.7	722	NORTH ATLANTIC OCEAN. MW 6.6 (GS). 6.6 (HRV). mb 6.5 (GS). MS 6.5 (GS). Mo $9.8 \times 10^{18}$ Nm (GS). $1.0 \times 10^{19}$ Nm (HRV). $7.3 \times 10^{18}$ Nm (PPT). Felt (IV) at Mayaguez and in northeastern Puerto Rico. Also felt on Antigua, Martinique, St. Kitts and St. Vincent.			
MAY 21	18 44 20.1	36.964 N	3.634 E	12 G	6.8	1.1	534	NORTHERN ALGERIA. MW 6.8 (HRV). 6.7 (GS). mb 6.5 (GS). MS 6.9 (GS). ME 6.7 (GS). ML 6.2 (LDG). mbLg 5.6 (MDD). Mo $2.1 \times 10^{19}$ Nm (HRV). $1.3 \times 10^{19}$ Nm (GS). $3.7 \times 10^{19}$ Nm (PPT). Es $2.2 \times 10^{14}$ Nm (GS). At least 2,266 people killed, 10,261 injured, 150,000 homeless, more than 1,243 buildings damaged or destroyed (X) and the infrastructure was damaged in the Algiers-Boumerdes-Reghia-Thenia area. Underwater telecommunication cables were damaged. Damage estimated at 100 million U.S. dollars. A tsunami generated with an estimated wave height of 2 m caused damage to boats off the coast of the Balearic Islands and was also recorded on the coast of Alicante, Castellon and Murcia, Spain. Felt (III) at Palma de Mallorca and Soller, Mallorca and (II) at Calvia and Mahon, Mallorca and Ibiza, Ibiza. Also felt (II) at Albacete, Alcantarilla, Alicante, Barcelona, Cartagena, Castellon, Elda, Molina de Segura, Murcia, Sagunto and Villafranca del Panades, Spain. Felt in Monaco.			
MAY 26	09 24 33.4	38.849 N	141.568 E	68 G	7.0	1.0	690	NEAR THE EAST COAST OF HONSHU, JAPAN. MW 7.0 (GS). 7.0 (HRV). mb 6.7 (GS). ME 7.0 (GS). Mo $4.1 \times 10^{19}$ Nm (GS). $3.9 \times 10^{19}$ Nm (HRV). $4.6 \times 10^{19}$ Nm (PPT). Es $6.1 \times 10^{14}$ Nm (GS). Seventy people injured in Iwate, 58 in Miyagi, 10 in Yamagata, 4 in Akita and 1 in Aomori Prefectures. At least 720 buildings and some roads damaged in Tohoku District. At least five fires and 63 landslides occurred and some power and water lines broke in Iwate and Miyagi Prefectures. Several concrete pillars were damaged along the Tohoku Shinkansen railway line. Felt throughout northern Japan and as far south as Numazu. Possible liquefaction with ground subsidence of at least 10 cm occurred at Ofunato. Recorded (6L JMA) in Iwate and Miyagi; (5L JMA) in Aomori, Fukushima and Yamagata; (4 JAM) in Akita, Chiba, Ibaraki, Saitama and Tochigi; (3 JMA) in Gumma, Kanagawa, Nagano, Niigata, Shizuoka, Tokyo and Yamagata Prefectures. Also recorded (4 JMA) in south-central Hokkaido and (3 JMA) throughout southern and central Hokkaido.			
MAY 26	19 23 27.9	2.354 N	128.855 E	31 G	7.0	1.1	473	HALMAHERA, INDONESIA. MW 7.0 (HRV). 6.8 (GS). mb 6.5 (GS). MS 7.1 (GS). ME 7.0 (GS). Mo $3.0 \times 10^{19}$ Nm (HRV). $1.5 \times 10^{19}$ Nm (GS). $4.1 \times 10^{19}$ Nm (PPT). Es $7.2 \times 10^{14}$ Nm (GS). One person killed and 7 injured on Morotai. At least 28 houses destroyed and 20 damaged at Berebere and power lines broken at Daruba, Morotai. Felt (III) on Ternate and (II) at Manado, Sulawesi.			
MAY 26	23 13 29.7	6.761 N	123.707 E	566 D	6.8	1.0	544	MORO GULF, MINDANAO, PHILIPPINES. MW 6.8 (GS). 6.8 (HRV). mb 6.2 (GS). Mo $2.1 \times 10^{19}$ Nm (GS). $2.1 \times 10^{19}$ Nm (HRV). Felt (II PIVS) at General Santos. Also felt (II PIVS) at Palo, Leyte and Iloilo, Panay.			
MAY 27	17 11 28.8	36.939 N	3.578 E	8 G	5.8	1.1	468	NORTHERN ALGERIA. MW 5.8 (GS). 5.7 (HRV). mb 5.5 (GS). MS 5.5 (GS). ME 5.4 (GS). Mo $5.4 \times 10^{17}$ Nm (GS). $4.0 \times 10^{17}$ Nm (HRV). Es $3.2 \times 10^{12}$ Nm (GS). At least 9 people killed, 200 injured and			

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									several buildings previously weakened by the earthquake of May 21 at 18:44 UTC were destroyed in the Algiers-Boumerdes-Reghaia area.
JUN 07	00 32 45.5	5.095 S	152.502 E	33 N	6.6	1.1	419	NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.6 (HRV), 6.5 (GS). mb 6.0 (GS). MS 6.8 (GS). Mo 7.5*10**18 Nm (HRV), 7.4*10**18 Nm (GS), 7.1*10**18 Nm (PPT).	
JUN 15	19 24 33.1	51.552 N	176.923 E	20 G	6.5	1.0	615	RAT ISLANDS, ALEUTIAN ISLANDS, ALASKA. MW 6.5 (GS), 6.5 (HRV). mb 6.0 (GS). MS 6.4 (GS). ME 6.1 (GS). Mo 7.3*10**18 Nm (HRV), 5.8*10**18 Nm (GS), 7.7*10**18 Nm (PPT). Es 3.5*10**13 Nm (GS). Felt (III) on Shemya.	
JUN 16	22 08 02.1	55.492 N	159.999 E	175 D	6.9	0.8	733	KAMCHATKA PENINSULA, RUSSIA. MW 6.9 (GS), 6.9 (HRV). mb 6.3 (GS). Mo 2.9*10**19 Nm (GS), 2.4*10**19 Nm (HRV), 4.4*10**19 Nm (PPT). Felt (V) at Krutoberegovo and Ust'-Kamchatsk; (IV) at Petropavlovsk-Kamchatskiy; (III) at Klyuchi; (II) at Yelizovo.	
JUN 20	06 19 38.9	7.606 S	71.722 W	558 D	7.1	0.9	672	AMAZONAS, BRAZIL. MW 7.1 (HRV), 7.0 (GS). mb 6.4 (GS). ME 6.6 (GS). Mo 4.4*10**19 Nm (HRV), 4.0*10**19 Nm (GS), 1.9*10**19 Nm (PPT). Es 1.5*10**14 Nm (GS). Felt (IV) at Pucallpa; (III) at Aguaytia, Contamana, Huanuco, Moyobamba and Tarapoto; (II) at Cajamarca, Chimbote, Huancayo, Huaraz and Lima, Peru. Also felt throughout central Peru and in northern and central Chile.	
JUN 20	13 30 41.6	30.608 S	71.637 W	33 N	6.8	0.9	398	NEAR THE COAST OF CENTRAL CHILE. MW 6.8 (HRV), 6.7 (GS). mb 6.4 (GS). MS 6.8 (GS). ME 6.5 (GS). Mo 1.7*10**19 Nm (HRV), 1.3*10**19 Nm (GS), 1.6*10**19 Nm (PPT). Es 1.2*10**14 Nm (GS). One person injured in San Juan, Argentina. Some buildings and transformers damaged (VI) and utilities disrupted at Ovalle. Felt (V) at Coquimbo, Illapel, La Serena, Salamanca and San Felipe; (IV) at Copiapo, San Antonio, Santiago, Vallenar, Valparaiso and Vina del Mar; (III) at Huasco; (II) at Curico, Linares, Rancagua, San Fernando and Talca. Also felt throughout western Argentina and by people in high-rise buildings at Buenos Aires.	
JUN 23	12 12 34.4	51.439 N	176.783 E	20 G	6.9	1.0	685	RAT ISLANDS, ALEUTIAN ISLANDS, ALASKA. MW 6.9 (HRV), 6.8 (GS). mb 6.3 (GS). MS 7.0 (GS). ME 6.8 (GS). Mo 2.6*10**19 Nm (HRV), 2.1*10**19 Nm (GS), 2.3*10**19 Nm (PPT). Es 3.4*10**14 Nm (GS). Felt (IV) on Shemya.	
JUN 24	13 01 32.8	32.927 N	49.475 E	33 N	4.6	1.4	109	WESTERN IRAN. mb 4.6 (GS). One person killed in the Aligudarz area and a landslide killed 85 livestock.	
JUL 10	17 06 37.6	28.355 N	54.169 E	10 G	5.7	0.9	475	SOUTHERN IRAN. MW 5.7 (HRV), 5.6 (GS). mb 5.9 (GS). MS 5.5 (GS). Mo 4.5*10**17 Nm (HRV), 2.5*10**17 Nm (GS). One person killed, at least 25 people injured, at least 3,500 homes destroyed and utilities disrupted in the Gajjiabad area.	
JUL 12	05 54 57.0*	28.025 N	53.974 E	10 G	4.2	1.3	27	SOUTHERN IRAN. mb 4.2 (GS). Several people injured at Darreh Shor.	
JUL 15	18 46 38.1	3.828 S	152.174 E	33 N	6.5	1.1	156	NEW IRELAND REGION, PAPUA NEW GUINEA. MW 6.5 (GS), 6.5 (HRV). mb 5.9 (GS). MS 6.5 (GS). Mo 6.1*10**18 Nm (GS), 6.0*10**18 Nm (HRV), 1.3*10**19 Nm (PPT).	
JUL 15	20 27 50.5	2.598 S	68.382 E	10 G	7.6	1.0	522	CARLSBERG RIDGE. MW 7.6 (HRV). mb 6.1 (GS). MS 7.6 (GS). ME 7.6 (GS). Mo 2.9*10**20 Nm (HRV). Es 6.1*10**15 Nm (GS). Felt strongly in Maldives.	
JUL 21	15 16 31.9	25.975 N	101.290 E	10 G	6.0	1.1	316	YUNNAN, CHINA. MW 6.0 (GS), 5.9 (HRV). mb 5.4 (GS). MS 6.0 (GS). Mo 9.2*10**17 Nm (HRV), 1.0*10**18 Nm (GS). At least 16 people killed and 584 injured; 264,878 buildings destroyed and 1,186,000 houses and 1 power station damaged; landslides blocked roads, infrastructure damaged and 1,508 livestock killed in Yunnan. Damage estimated at 75 million U.S. dollars.	
JUL 25	15 13 07.7	38.432 N	141.003 E	10 G	5.5	1.0	312	NEAR THE EAST COAST OF HONSHU, JAPAN. MW 5.5 (HRV), 5.3 (GS). mb 5.6 (GS). MS 4.9 (GS). Mo 1.7*10**17 Nm (HRV), 1.1*10**17 Nm (GS). At least 569 people injured, 1,025 buildings damaged or destroyed, some roads damaged and power outages and landslides occurred in Miyagi Prefecture. A train derailed on the JR Ishinomaki Line. Recorded (6L JMA) in Miyagi; (4 JMA) in Iwate; (3 JMA) in Akita, Aomori, Fukushima and Yamagata; (2 JMA) in Ibaraki, Niigata and Tochigi; (1 JMA) in Chiba, Kanagawa and Saitama Prefectures. Also recorded (1 JMA) on Sadoga-shima.	

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JUL 25	22 13 29.9	38.415 N	140.996 E	6 G	6.1	0.8	554	EASTERN HONSHU, JAPAN. MW 6.1 (HRV), 5.9 (GS). mb 6.0 (GS). MS 5.8 (GS). ME 5.9 (GS). Mo $9.2 \times 10^{17}$ Nm (GS), $1.5 \times 10^{18}$ Nm (HRV). Es $1.5 \times 10^{13}$ Nm (GS). Casualties and damage are included with the event at 15:13 UTC.
JUL 26	01 00 57.6	38.111 N	28.887 E	10 G	4.5	1.0	245	WESTERN TURKEY. mb 4.5 (GS). ML 5.0 (ISK), 4.5 (ATH). Several people injured and at least 48 houses damaged at Buldan.
JUL 26	07 56 43.4	38.484 N	141.002 E	10 G	5.2	0.8	277	NEAR THE EAST COAST OF HONSHU, JAPAN. MW 5.2 (HRV). mb 5.4 (GS). Mo $8.2 \times 10^{16}$ Nm (HRV). Casualties and damage are included with the event of July 25 at 15:13 UTC. Recorded (6L JMA) in Miyagi; (5L JMA) in Iwate; (3 JMA) in Ibaraki, Fukushima and Yamagata; (2 JMA) in Akita, Aomori, Niigata and Tochigi; (1 JMA) in Nagano and Saitama Prefectures.
JUL 26	08 36 49.1	38.019 N	28.927 E	10 G	5.4	1.0	463	WESTERN TURKEY. MW 5.4 (HRV). mb 5.0 (GS). MS 5.2 (GS). ML 5.6 (ISK), 4.8 (NIC). MD 4.8 (ATH). Mo $1.6 \times 10^{17}$ Nm (HRV). At least 10 people injured, one house destroyed and dozens of buildings damaged at Buldan. Felt as far away as Izmir.
JUL 26	23 18 17.9	22.854 N	92.306 E	10 G	5.6	0.8	379	INDIA-BANGLADESH BORDER REGION. MW 5.6 (GS), 5.6 (HRV). mb 5.5 (GS). MS 5.5 (GS). Mo $3.2 \times 10^{17}$ Nm (GS), $3.2 \times 10^{17}$ Nm (HRV). Two people killed at Rangamati, Bangladesh. At least 25 people injured, 500 buildings damaged or destroyed and power outages, landslides and subsidence occurred in the Chittagong-Cox's Bazar-Rangamati area, Bangladesh. Felt at Dhaka, Bangladesh.
JUL 27	02 04 11.5	21.080 S	176.585 W	213 D	6.6	0.8	498	FIJI REGION. MW 6.6 (GS), 6.6 (HRV). mb 5.9 (GS). Mo $9.9 \times 10^{18}$ Nm (GS), $9.1 \times 10^{18}$ Nm (HRV).
JUL 27	06 25 31.9	47.151 N	139.248 E	470 D	6.8	0.8	735	PRIMOR'YE, RUSSIA. MW 6.8 (GS), 6.8 (HRV). mb 6.3 (GS). Mo $1.6 \times 10^{19}$ Nm (GS), $1.5 \times 10^{19}$ Nm (HRV). Felt in Aomori and Iwate Prefectures, Honshu. Recorded (3 JMA) in Aomori, Iwate and Miyagi; (2 JMA) in Akita, Fukushima and Yamagata; (1 JMA) in Ibaraki, Ishikawa, Kanagawa, Nagano, Niigata, Saitama, Shizuoka, Tochigi and Tokyo Prefectures, Honshu. Recorded (2 JMA) in northern and southern Hokkaido and (1 JMA) throughout Hokkaido. Also recorded (1 JMA) on Miyake-jima and Mikura-jima.
JUL 27	07 32 52.4*	22.743 N	92.168 E	10 G	4.3	0.7	11	INDIA-BANGLADESH BORDER REGION. mb 4.3 (GS). Casualties and damage are included with the event of July 26 at 23:18 UTC. Felt in the Chittagong-Rangamati area, Bangladesh.
JUL 27	12 07 29.4	22.825 N	92.343 E	10 G	5.2	0.8	142	INDIA-BANGLADESH BORDER REGION. mb 5.2 (GS). Casualties and damage are included with the event of July 26 at 23:18 UTC. Felt in the Chittagong-Rangamati area, Bangladesh. Also felt in Tripura, India.
AUG 04	04 37 20.1	60.532 S	43.411 W	10 G	7.5	1.1	315	SCOTIA SEA. MW 7.5 (HRV), 7.1 (GS). mb 6.2 (GS). MS 7.5 (GS). ME 7.1 (GS). Mo $5.2 \times 10^{19}$ Nm (GS), $2.3 \times 10^{20}$ Nm (HRV). Es $1.0 \times 10^{15}$ Nm (GS). Minor damage at Orcadas Base on Laurie Island.
AUG 14	05 14 54.7	39.160 N	20.605 E	10 G	6.3	1.1	572	GREECE. MW 6.3 (HRV), 6.2 (GS). mb 5.6 (GS). MS 6.2 (GS). ME 6.7 (GS). ML 6.0 (PDG), 5.9 (ATH). Mo $2.9 \times 10^{18}$ Nm (HRV), $2.0 \times 10^{18}$ Nm (GS). Es $2.2 \times 10^{14}$ Nm (GS). At least 50 people injured, some buildings and infrastructure damaged and landslides occurred on Lefkada. Damage to buildings in the Preveza area. Felt in much of southern and western Greece. Felt (IV) at Bitola and (III) at Skopje, former Yugoslav Republic of Macedonia. Also felt in parts of southern Italy.
AUG 16	10 58 42.7	43.770 N	119.643 E	24 D	5.4	0.9	449	EASTERN NEI MONGOL, CHINA. MW 5.4 (GS), 5.4 (HRV). mb 5.5 (GS). MS 5.1 (GS). Mo $1.5 \times 10^{17}$ Nm (GS), $1.4 \times 10^{17}$ Nm (HRV). At least 4 people killed, more than 1,000 injured, 7,900 houses destroyed and 83,000 damaged in the Lindong-Tianshan area. Felt as far as Beijing.
AUG 21	12 12 49.7	45.104 S	167.144 E	28 G	7.2	1.1	428	SOUTH ISLAND OF NEW ZEALAND. MW 7.2 (HRV), 7.1 (GS). mb 6.6 (GS). MS 7.5 (GS). ME 6.9 (GS). ML 7.1 (WEL). Mo $7.4 \times 10^{19}$ Nm (HRV), $4.7 \times 10^{19}$ Nm (GS). Es $5.3 \times 10^{14}$ Nm (GS). Minor damage in Otago and Southland. Chimneys fell and walls cracked at Dunedin, Invercargill and Te Anau. More than 200 landslides were observed and minor damage occurred to park infrastructure in Fiordland National Park. A small tsunami with a maximum wave height of 0.6 meters was recorded in Jackson Bay in Westland. Felt strongly on

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											much of the South Island. Felt as far north as Wellington on the North Island. Also felt at Sydney, New South Wales and Hobart, Tasmania, Australia.
SEP 14	21 42 51.8	44.329 N	11.450 E	10 G	5.2	1.1	288	NORTHERN ITALY. mb 5.1 (GS). MS 5.2 (GS). ML 5.6 (ZAMG). 5.5 (FUR). 5.3 (LDG). 5.2 (FBB). 5.1 (STR). 5.0 (ROM). 5.0 (GEN). MD 5.2 (PDG). Some people slightly injured and at least 10 buildings damaged (VII) in the Loiano-Monghidoro-Monzuno area. Felt (V) at Bologna, Forli, Modena and Ravenna; (IV) at Firenze, Milano, Pisa and Venezia. Felt in much of central and northern Italy. Felt (III) at Villach, Austria. Felt at Jesenice and Ljubljana, Slovenia.			
SEP 20	03 54 50.7	34.998 N	140.172 E	52 D	5.7	1.0	375	NEAR THE EAST COAST OF HONSHU, JAPAN. MW 5.7 (HRV). 5.6 (GS). mb 5.4 (GS). Mo $3.6 \times 10^{17}$ Nm (HRV). $3.3 \times 10^{17}$ Nm (GS). At least 7 people injured and some buildings damaged at Tokyo. Recorded (4 JMA) in Chiba, Gumma, Ibaraki, Kanagawa, Saitama, Tochigi and Tokyo; (3 JMA) in Fukushima, Nagano, Niigata and Yamanashi; (2 JMA) in Miyagi and Shizuoka; (1 JMA) in Aichi, Aomori, Iwate and Yamagata Prefectures. Also recorded (2 JMA) on Kozu-shima, Mikura-jima, Miyaki-jima, Nii-jima and O-shima; (1 JMA) on Aoga-shima and Hachijo-jima.			
SEP 21	18 16 13.4	19.917 N	95.672 E	10 G	6.6	0.9	518	MYANMAR. MW 6.6 (GS). 6.6 (HRV). mb 6.1 (GS). MS 6.9 (GS). ME 6.8 (GS). Mo $8.6 \times 10^{18}$ Nm (HRV). $7.8 \times 10^{18}$ Nm (GS). $6.8 \times 10^{18}$ Nm (PPT). Es $3.3 \times 10^{14}$ Nm (GS). Three temples, a bridge and other structures damaged at Taungdwingyi. Felt in much of central Myanmar. Minor cracks in buildings at Bangkok; felt in Chiang Mai and Mae Hong Son, Thailand.			
SEP 22	04 45 36.2	19.777 N	70.673 W	10 G	6.5	1.1	494	DOMINICAN REPUBLIC REGION. MW 6.5 (HRV). 6.4 (GS). mb 6.2 (GS). MS 6.6 (GS). ML 6.6 (SSNC). Mo $5.7 \times 10^{18}$ Nm (HRV). $4.8 \times 10^{18}$ Nm (GS). $2.3 \times 10^{18}$ Nm (PPT). One person killed at Puerto Plata, two people died of heart attacks at San Francisco de Macoris and 15 people injured in the Puerto Plata-Santiago area. Many buildings destroyed or damaged at Puerto Plata, San Francisco de Macoris and Santiago. Maximum intensity (X). Felt (VI) at Santo Domingo. Felt throughout the Dominican Republic. Communications systems damaged and landslides occurred along several highways in the epicentral area. Felt (V) in western Puerto Rico. Also felt at Port-au-Prince, Haiti.			
SEP 25	19 50 06.3	41.815 N	143.910 E	27 G	8.3	0.9	669	HOKKAIDO, JAPAN REGION. MW 8.3 (HRV). 8.1 (GS). mb 6.9 (GS). MS 8.1 (GS). ME 7.9 (GS). Mo $3.0 \times 10^{21}$ Nm (HRV). $1.6 \times 10^{21}$ Nm (GS). $1.5 \times 10^{21}$ Nm (PPT). Es $1.7 \times 10^{16}$ Nm (GS). At least 755 people injured, extensive damage, landslides and power outages occurred and many roads damaged in southeastern Hokkaido. Damage estimated at 90 million U.S. dollars. A tsunami generated with an estimated wave height of 4.0 meters along the southeastern coast of Hokkaido. Felt strongly in much of Hokkaido. Also felt in northern and much of central Honshu as far south as Tokyo. Recorded (6L JMA) in southern Hokkaido, (5L JMA) in central Hokkaido and (4 JMA) in parts of northern and southwestern Hokkaido. Also recorded (4 JMA) in northern Honshu and (2 JMA) as far south as Shizuoka Prefecture, Honshu. Recorded (1 JMA) on Hachijo-jima, Miyaki-jima and Sadoga-shima.			
SEP 25	21 08 00.0	41.774 N	143.593 E	33 N	7.4	1.0	514	HOKKAIDO, JAPAN REGION. MW 7.4 (HRV). mb 6.4 (GS). MS 7.4 (GS). Mo $1.2 \times 10^{20}$ Nm (HRV). Felt in much of Hokkaido and as far south as Tokyo. Recorded (6L JMA) in the Urakawa area; (5L JMA) in the Tomakomai area; (4 JMA) in south-central and southwestern Hokkaido; (3 JMA) in central and eastern Hokkaido; (1 JMA) in northern Hokkaido and on Rishiri-to. Also recorded (5L JMA) in Aomori Prefecture, (4 JMA) in parts of northern Honshu and (1 JMA) as far south as Shizuoka Prefecture, Honshu.			
SEP 27	11 33 25.0	50.038 N	87.813 E	16 D	7.3	1.0	667	SOUTHWESTERN SIBERIA, RUSSIA. MW 7.3 (GS). 7.3 (HRV). mb 6.5 (GS). MS 7.5 (GS). ME 7.6 (GS). Mo $1.0 \times 10^{20}$ Nm (GS). $1.0 \times 10^{20}$ Nm (HRV). $1.0 \times 10^{20}$ Nm (PPT). Es $4.8 \times 10^{15}$ Nm (GS). Unconfirmed reports of 3 people who died from heart attacks, more than 5 injured, 1,800 homeless, 300 houses destroyed (X), 1,942 buildings damaged, infrastructure damaged and landslides occurred in the Kosh-Agach and Ust-Ulagan area. Significant damage also reported at Ongudai and Shebalino. Damage estimated at 10.6 million U.S. dollars. Ground subsidence occurred in the Chaganuzun area which created a flood of the Chuya River. Felt			

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										(VI) at Prokop'yevsk and Tashtagol; (V) at Novosibirsk; (IV) at Abakan; (III) at Barnaul, Kemerovo, Krasnoyarsk and Zaysan. Felt throughout southern Siberia. Also felt (IV) at Ust'-Kamenogorsk and Semipalatinsk; (III) at Alma-ata, Astana, and Taldyqorghan, Kazakhstan.
SEP 29	02 36 53.1	42.450 N	144.380 E	25 G	6.5	0.8	586	HOKKAIDO, JAPAN REGION. MW 6.5 (HRV), 6.4 (GS), mb 6.1 (GS), MS 6.3 (GS), ME 6.3 (GS), Mo 5.7*10**18 Nm (HRV), 3.9*10**18 Nm (GS), Es 7.4*10**13 Nm (GS). Felt at Misawa, Honshu. Recorded (4 JMA) in the Kushiro area; (3 JMA) in eastern and south-central Hokkaido; (2 JMA) in central and southwestern Hokkaido. Also recorded (2 JMA) in Aomori, Iwate and Miyagi; (1 JMA) in Akita and Fukushima Prefectures, Honshu.		
OCT 01	01 03 25.2	50.211 N	87.721 E	10 G	6.7	0.9	643	SOUTHWESTERN SIBERIA, RUSSIA. MW 6.7 (GS), 6.7 (HRV), mb 6.3 (GS), MS 7.1 (GS), ME 7.3 (GS), Mo 1.3*10**19 Nm (GS), 1.1*10**19 Nm (HRV), 1.5*10**19 Nm (PPT), Es 1.7*10**15 Nm (GS). Additional damage to buildings and infrastructure and landslides occurred in the Kosh-Agach area previously affected by the earthquake on September 27 at 11:33 UTC. Some minor damage to buildings at Barnaul and Gorno-Altaysk. Felt (VI) at Aktash; (IV) at Mugur-Aksy; (III) at Novosibirsk, Omsk, Tomsk, Krasnoyarsk, Kemerovo, Nizhnevartovsk; (II) at Kyzyl. Felt at Belokurikha, Novokuznetsk and Sayanogorsk. Also felt at Ust'-Kamenogorsk, Kazakhstan.		
OCT 08	09 06 55.3	42.648 N	144.570 E	32 G	6.7	0.9	556	HOKKAIDO, JAPAN REGION. MW 6.7 (HRV), 6.6 (GS), mb 6.0 (GS), MS 6.6 (GS), ME 6.4 (GS), Mo 1.1*10**19 Nm (HRV), 1.0*10**19 Nm (GS), 1.2*10**19 Nm (PPT), Es 8.4*10**13 Nm (GS). Felt at Amagasaki, Kakogawa, Misawa and Nemuro. Recorded (4 JMA) in eastern Hokkaido, (3 JMA) in south-central Hokkaido, (2 JMA) in central Hokkaido and (1 JMA) in the Shibetsu area and in southwestern Hokkaido. Also recorded (2 JMA) in Aomori and Miyagi; (1 JMA) in Akita and Iwate Prefectures, Honshu.		
OCT 16	12 28 09.0	25.954 N	101.254 E	33 N	5.6	0.9	147	YUNNAN, CHINA. MW 5.6 (HRV), 5.5 (GS), mb 5.2 (GS), MS 5.6 (GS), Mo 3.0*10**17 Nm (HRV), 2.1*10**17 Nm (GS). At least three people killed, 32 injured and 12,000 buildings damaged or destroyed in the Dayao area. Also felt in Yaoan, Yongren and Yuanmou.		
OCT 25	12 41 35.2	38.400 N	100.951 E	10 G	5.8	0.9	493	GANSU-QINGHAI BORDER REGION, CHINA. MW 5.8 (GS), 5.8 (HRV), mb 5.8 (GS), MS 5.7 (GS), Mo 5.2*10**17 Nm (GS), 4.8*10**17 Nm (HRV). At least nine people killed, more than 43 injured and thousands homeless; 10,000 houses destroyed and 45,000 damaged; 2 reservoirs and infrastructure damaged; one temple and a Buddha statue damaged; 16,000 livestock killed in Minle and Shandan Counties. Damage estimated at 40 million U.S. dollars.		
OCT 25	12 47 58.8	38.383 N	100.975 E	10 G	5.8	0.8	423	GANSU-QINGHAI BORDER REGION, CHINA. MW 5.8 (HRV), 5.7 (GS), mb 5.7 (GS), MS 5.5 (GS), Mo 5.4*10**17 Nm (HRV), 4.0*10**17 Nm (GS). Casualties and damage are included with the event at 12:41 UTC.		
OCT 31	01 06 28.2	37.812 N	142.619 E	10 G	7.0	0.8	568	OFF THE EAST COAST OF HONSHU, JAPAN. MW 7.0 (GS), 7.0 (HRV), mb 6.1 (GS), MS 6.8 (GS), ME 6.6 (GS), Mo 3.7*10**19 Nm (HRV), 3.4*10**19 Nm (GS), 2.6*10**19 Nm (PPT), Es 2.1*10**14 Nm (GS). Felt strongly in Miyagi Prefecture. Felt in much of Tohoku District. A tsunami of about 30 cm was recorded along the coast of Miyagi Prefecture. Recorded (4 JMA) in Miyagi; (3 JMA) from Aomori to Shizuoka; (1 JMA) as far south as Aichi Prefecture. Also recorded (2 JMA) in the Esashi area and (1 JMA) in eastern and south-central Hokkaido.		
NOV 06	10 38 04.2	19.262 S	168.892 E	114 D	6.6	1.0	475	VANUATU ISLANDS. MW 6.6 (GS), 6.6 (HRV), mb 6.0 (GS), Mo 8.9*10**18 Nm (HRV), 1.0*10**19 Nm (GS), 1.2*10**19 Nm (PPT). Felt at Port-Vila.		
NOV 09	19 52 36.8	0.674 S	19.689 W	10 G	6.6	1.2	276	CENTRAL MID-ATLANTIC RIDGE. MW 6.6 (HRV), 6.3 (GS), mb 5.5 (GS), MS 6.0 (GS), Mo 8.8*10**18 Nm (HRV), 3.6*10**18 Nm (GS).		
NOV 13	02 35 10.3	34.712 N	103.834 E	10 G	5.1	0.9	245	GANSU, CHINA. mb 5.1 (GS), MS 5.1 (GS). At least one person killed and 30 injured; 10 buildings destroyed and many damaged; some roads damaged in the Jone-Lintan-Minxian area.		
NOV 14	18 49 46.5	27.372 N	103.971 E	33 N	5.0	1.3	97	SICHUAN-YUNNAN-GUIZHOU REGION, CHINA. mb 5.0 (GS). At least 4 people killed, 65 injured, 600 houses destroyed, 98,000		

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										buildings damaged and power outages occurred in Ludian and Zhaotong Counties.
NOV 17	06 43 06.8	51.146 N	178.650 E	33 N	7.8	1.1	604	RAT ISLANDS, ALEUTIAN ISLANDS, ALASKA. MW 7.8 (HRV). 7.7 (GS). mb 6.2 (GS). MS 7.2 (GS). ME 7.4 (GS). Mo 5.2*10**20 Nm (HRV), 4.4*10**20 Nm (GS), 4.8*10**20 Nm (PPT). Es 3.3*10**15 Nm (GS). Felt (IV) on Shemya. A local tsunami generated with recorded wave heights (peak-to-trough) of 50 cm on Shemya and 12 cm on Adak.		
NOV 18	17 14 22.6	12.025 N	125.416 E	35 G	6.5	0.9	487	SAMAR, PHILIPPINES. MW 6.5 (GS). 6.5 (HRV). mb 6.1 (GS). MS 6.5 (GS). ME 6.3 (GS). Mo 7.4*10**18 Nm (GS), 7.3*10**18 Nm (HRV), 1.4*10**19 Nm (PPT). Es 6.8*10**13 Nm (GS). One person killed, 21 injured, one school collapsed and many concrete structures damaged (VII PIVS) at Can-Avid. A landslide blocked a highway near Taft. Power outages occurred throughout Eastern Samar. Felt (VI PIVS) at Borongan; (V PIVS) at Calbayog and Catbalogan; (IV PIVS) at Catarman. Also felt (IV PIVS) at Dimasalang, Masbate and at Palo, Leyte; (II PIVS) at Lapu-Lapu, Cebu; Legaspi, Luzon; Butuan and Surigao, Mindanao.		
NOV 25	20 19 46.2	5.581 S	150.880 E	35 G	6.6	0.9	384	NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.6 (GS), 6.6 (HRV). mb 6.1 (GS). MS 6.4 (GS). ME 6.1 (GS). Mo 8.0*10**18 Nm (HRV), 7.5*10**18 Nm (GS). Es 3.2*10**13 Nm (GS). Felt strongly at Biella and Kimbe.		
NOV 26	13 38 57.8	27.283 N	103.753 E	33 N	4.7	1.1	60	SICHUAN-YUNNAN-GUIZHOU REGION, CHINA. mb 4.7 (GS). Four people injured and thousands of buildings damaged or destroyed in Ludian.		
DEC 01	01 38 31.9	42.905 N	80.515 E	10 G	6.0	1.0	502	KAZAKHSTAN-XINJIANG BORDER REGION. MW 6.0 (HRV), 5.9 (GS). mb 6.0 (GS). MS 5.9 (GS). Mo 6.9*10**17 Nm (GS), 1.0*10**18 Nm (HRV). At least 11 people killed, 47 injured, 769 houses destroyed and many damaged in Zhaosu County, Xinjiang, China. Felt strongly in southeastern Kazakhstan. Also felt at Bishkek, Kyrgyzstan.		
DEC 05	21 26 09.4	55.538 N	165.780 E	10 G	6.7	0.9	565	KOMANDORSKIYE OSTROVA, RUSSIA REGION. MW 6.7 (GS), 6.7 (HRV). mb 6.1 (GS). MS 6.5 (GS). ME 6.4 (GS). Mo 1.4*10**19 Nm (GS), 1.2*10**19 Nm (HRV). Es 8.6*10**13 Nm (GS).		
DEC 10	04 38 11.5	23.039 N	121.362 E	10 G	6.8	1.1	447	TAIWAN. MW 6.8 (GS), 6.8 (HRV). mb 6.0 (GS). MS 6.7 (GS). ML 6.6 (TAP). Mo 2.1*10**19 Nm (HRV), 1.7*10**19 Nm (GS). One person injured; several roads and bridges damaged; some landslides occurred in T'ai-tung County. A gas line broke causing a fire at Kao-hsiung. Recorded (6 TAP) in T'ai-tung; (4 TAP) in Chia-i, Chang-hua, Hua-lien, Kao-hsiung, Nan-t'ou, P'ing-tung, T'ai-nan and Yun-lin; (3 TAP) in I-lan, Miao-li, Su-ao, T'ai-chung and T'ai-pei; (2 TAP) in Hsin-chu and T'ao-yuan Counties. Also recorded (1 JMA) on Hateruma-jima, Iriomote-jima, Ishigaki-jima, Tarama-shima and Yonaguni-jima, Ryukyu Islands.		
DEC 11	16 28 17.3	31.953 N	49.209 E	33 N	5.0	0.9	168	WESTERN IRAN. mb 5.0 (GS). At least five people injured, two houses destroyed and 142 damaged at Masjed-e Soleyman.		
DEC 21	07 40 45.8	0.769 S	20.601 W	10 G	6.6	1.0	324	CENTRAL MID-ATLANTIC RIDGE. MW 6.6 (HRV), 6.5 (GS). mb 5.5 (GS). MS 5.8 (GS). Mo 7.6*10**18 Nm (HRV), 6.3*10**18 Nm (GS).		
DEC 22	19 15 56.0&	35.706 N	121.102 W	8	6.5		472	CENTRAL CALIFORNIA. <NC>. MW 6.5 (HRV), 6.4 (GS), 6.5 (BRK). mb 6.1 (GS). MS 6.4 (GS). ME 6.1 (GS). Mo 7.4*10**18 Nm (HRV), 4.2*10**18 Nm (GS), 5.9*10**18 Nm (BRK), 2.3*10**19 Nm (PPT). Es 3.3*10**13 Nm (GS). Two people killed and about 40 buildings collapsed or severely damaged (VIII) at Paso Robles. At least 40 people injured in the Paso Robles-Templeton area. Buildings damaged and small fires occurred at Atascadero, Cambria and Morro Bay. Road damage was sustained on State Routes 41 and 46 between State Route 1 and U.S. 101. Damage also occurred to the Templeton Road Bridge and to a bridge near Oceano. The airport at Oceano was closed due to cracks in the runway. More than 10,000 homes and businesses were without power in the Paso Robles area. Damage estimated at 300 million U.S. dollars. Felt (VIII) at Templeton; (VII) at Atascadero, Bradley, Cayucos, Grover Beach, Oceano, San Miguel and Shandon; (VI) at Arroyo Grande, Cambria, Creston, Guadalupe, Lockwood, Lompoc, Los Osos, Morro Bay, Nipomo, Pismo Beach, San Luis Obispo, San Simeon, Santa Margarita and Santa Maria; (V) at Avenal, Buellton, King City, Santa Inez, Solvang and Taft. Felt in much of central and		

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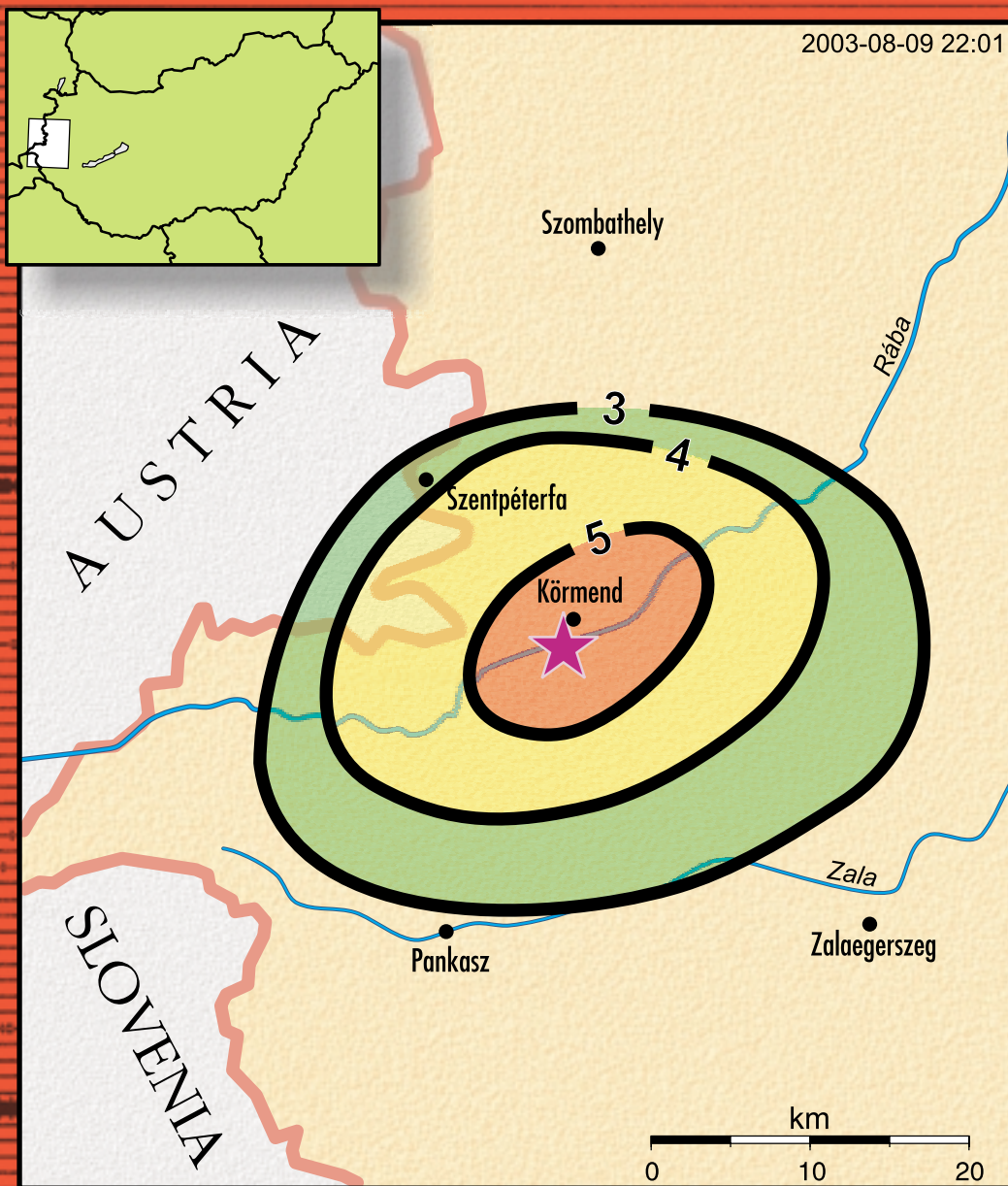
southern California from Sacramento and Santa Rosa to San Diego and as far east as Carson City, Las Vegas and Reno, Nevada and at Bullhead City, Arizona. The maximum recorded acceleration was 0.5g horizontal motion and 0.3g vertical motion at Templeton. Landslides blocked several mountain passes in the Santa Lucia Mountains. Liquefaction was observed in the Oceano area.

DEC 25	07 11 11.5	8.416 N	82.824 W	33 N	6.5	1.2	405	PANAMA-COSTA RICA BORDER REGION. MW 6.5 (GS), 6.5 (HRV). mb 6.0 (GS). MS 6.4 (GS). Mo $6.7 \times 10^{18}$ Nm (GS). $6.5 \times 10^{18}$ Nm (HRV). At least two people killed, 75 injured and many buildings damaged or destroyed at Puerto Armuelles, Panama. Some people injured and damage to buildings and highways in Costa Rica along the Panama-Costa Rica border. Felt throughout Costa Rica and in Panama as far east as Panama City.
DEC 25	20 42 33.7	22.252 S	169.488 E	10 G	6.5	1.0	480	SOUTHEAST OF THE LOYALTY ISLANDS. MW 6.5 (HRV), 6.4 (GS). mb 6.3 (GS). MS 6.3 (GS). Mo $6.4 \times 10^{18}$ Nm (HRV), $4.6 \times 10^{18}$ Nm (GS), $7.9 \times 10^{18}$ Nm (PPT).
DEC 26	01 56 52.4	28.995 N	58.311 E	10 G	6.6	1.1	552	SOUTHEASTERN IRAN. MW 6.6 (HRV), 6.5 (GS). mb 6.0 (GS). MS 6.8 (GS). ME 7.1 (GS). Mo $8.8 \times 10^{18}$ Nm (HRV), $6.6 \times 10^{18}$ Nm (GS), $8.8 \times 10^{18}$ Nm (PPT). Es $9.3 \times 10^{14}$ Nm (GS). At least 43,200 people killed, 30,000 injured, 85 percent of buildings damaged or destroyed and infrastructure damaged in the Bam area. Maximum intensities IX at Bam and VIII at Baravat. Felt (V) at Kerman. Surface faulting observed on the Bam Fault between Bam and Baravat. Maximum acceleration of 0.98g recorded at Bam. Landslides occurred in the epicentral area. Believed to be the largest earthquake in this area in more than 2000 years. A detailed report on this earthquake can be obtained from the International Institute of Earthquake Engineering and Seismology (IIEES), online at <a href="http://www.iiees.ac.ir/English/Bam_report_english.html">http://www.iiees.ac.ir/English/Bam_report_english.html</a> .
DEC 26	21 26 04.1	22.273 S	169.314 E	10 G	6.8	1.2	322	SOUTHEAST OF THE LOYALTY ISLANDS. MW 6.8 (HRV), 6.7 (GS). mb 6.1 (GS). MS 6.8 (GS). Mo $1.6 \times 10^{19}$ Nm (HRV), $1.3 \times 10^{19}$ Nm (GS), $2.8 \times 10^{19}$ Nm (PPT).
DEC 27	16 00 59.4	22.015 S	169.766 E	10 G	7.3	1.3	235	SOUTHEAST OF THE LOYALTY ISLANDS. MW 7.3 (HRV), 7.2 (GS). mb 6.1 (GS). MS 7.1 (GS). Mo $9.0 \times 10^{19}$ Nm (HRV), $7.6 \times 10^{19}$ Nm (GS), $1.1 \times 10^{20}$ Nm (PPT). Felt on Mare and at Noumea. New Caledonia: felt slightly on Tiga.
DEC 27	22 38 01.8	21.672 S	169.835 E	10 G	6.7	1.1	270	SOUTHEAST OF THE LOYALTY ISLANDS. MW 6.7 (GS), 6.7 (HRV). mb 5.8 (GS). MS 6.7 (GS). Mo $1.4 \times 10^{19}$ Nm (HRV), $1.2 \times 10^{19}$ Nm (GS).

Compiled by Waverly J. Person and Pamela J. Benfield,  
USGS NEIC







A 2003. augusztus 9-i, magyarzecsődi földrengés (22:01 UTC) izoseizma térképe (3.8 ML)

Isoseismal Map of Magyarzecsőd Earthquake  
9th August 2003, 22:01 UTC (3.8 ML)



Műszeresen meghatározott epicentrum  
Instrumental Epicentre