Magyarországi földrengések évkönyve
Hungarian Earthquake Bulletin
2005

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GeoRisk

Földrengéskutató Intézet ◆ Earthquake Research Institute

Magyar Tudományos Akadémia
Geodéziai és Geofizikai Kutatóintézet
Szeizmológiai Főosztály

MTA GGKI

Hungarian Academy of Sciences
Geodetic and Geophysical Research Institute
Seismological Observatory

Budapest

MAGYARORSZÁGI FÖLDRENGÉSEK ÉVKÖNYVE

HUNGARIAN EARTHQUAKE BULLETIN

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Hátsó borító: A magyarországi földrengések mélység szerinti eloszlása. Az adott földrajzi tartományban (45.5-49.0É; 16.0-23.0K) összesen mintegy 1298 rengésről van megbízható fészekmélység adatunk. Ezek közül 147 keletkezett a 0-5 km, 299 a 6-9 km, 319 a 11-15 km, 181 a 16-30 km mélységtartományban. 23 rengés fészekmélysége nagyobb 30 km-nél, 329 rengés számított fészekmélysége pedig pontosan 10 km.

Back cover page: Depth distribution of Hungarian earthquakes. 1298 earthquakes have reliable focal depth information in the given geographic region (45.5-49.0N; 16.0-23.0E). Out of them 147 were burst in the 0-5 km, 299 in the 6-9 km, 319 in the 11-15 km, 181 in the 16-30 km depth range. 23 quakes were deeper than 30 km and focal depth estimation for 329 earthquakes resulted 10 km.

TARTALOMJEGYZÉK

CONTENTS

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 – a lakosság által érzékelt valamennyi rengést a hálózat nagy valószínűséggel detektálja. Ez nagyrészt annak a szeizmikus megfigyelő hálózatnak köszönhető, melyet a Nemzetközi Atomenergia Ügynökség javaslatára a Paksi Atomerőmű Rt. létesített az atomerőmű telephely tágabb környezetében.

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

INTRODUCTION

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

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

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

1995 was a milestone in the history of Hungarian seismological observations. The Paks Nuclear Power Plant Ltd. installed a network of high quality digital seismographs, following the recommendations by the International Atomic Energy Agency (IAEA). For the first time, this network made it possible to detect and locate such small magnitude local seismic events that it is very unlikely so as to felt events go undetected in most parts of the country 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 2005. év szeizmikus szempontból csendes időszaknak tekinthető. Az év folyamán 96 szeizmikus eseményről szereztünk tudomást a 45.5-49.0N szélességi és 16.0-23.0E hosszúsági koordináták által határolt területen, amelyek közül 63 volt természetes eredetű földrengés, 33 robbantás. Az események mérete a $0.4 \leq ML \leq 4.1$ lokális magnitúdó tartományba esett.

Az év folyamán 4 olyan földrengés volt, melyet a lakosság is érzett. Mindegyik a Dunántúlon, kettő a Balatontól északra, kettő pedig a Balatontól délre keletkezett.

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

Időrendben az első érezhető szeizmikus esemény a március 26-án reggel Marcali környékén kipattant 2.5 M_L magnitúdójú földrengés volt. A rengésről makroszeizmikus adatok nem állnak rendelkezésre.

Az év legerősebb magyarországi rengése május 15-én pattant ki Pápa környékén. A 3.5 M_L magnitúdójú rengés érezhető volt mintegy 1000 km^2 területen. A legnagyobb megrázottságot (5 EMS) Pápa és Nagygyimód településekről jelentették. A rengés az epicentrum környékén jelentéktelen épület károkat (hajszálrepedések a falakban) is okozott.

Egy nappal az előző rengés után, ugyanazon forrászónában, viszonylag kis területen (300-500 km^2) volt érezhető május 16-án Csót – Valonya környékén egy 2.8 M_L magnitúdójú utórengés, melynek legnagyobb becsült intenzitása 5 EMS volt.

Szeptember 30-án este 2.3 M_L magnitúdójú földrengés keltett riadalmat Somogy-megyében. A rengés intenzitása 4 EMS fokra becsülhető (Szólád – Pusztaszemes). A rengés csak viszonylag kis területen (300-400 km^2) volt érezhető.

1.

SUMMARY

2005 was a quiet year for Hungarian seismicity. Out of the 96 seismic events ($0.4 \leq M_L \leq 4.1$) located within the area bounded by latitudes 45.5-49.0N and longitudes 16.0-23.0E 63 were identified as natural earthquakes, 33 were known quarry blasts.

Four earthquakes were reported as felt. All of those burst in the Trans-Danubian region, two north of Lake Balaton and two south of Lake Balaton.

The highest magnitude assigned to a shock was 3.5 M_L while the highest intensity reported during the year was 5 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, the first felt earthquake was reported from Marcali (2.5 M_L). No macroseismic data available for the event.

The highest magnitude (3.5 M_L) earthquake of the year in Hungary was the Pápa event on May 15th. The earthquake was felt in an area of about 1000 km^2 in NW Hungary. The highest intensity values (5 EMS) were reported from Pápa and Nagygyimód. Minor damage (small cracks in walls) was reported from the epicenter area.

On May 16th, a 2.8 M_L magnitude aftershock followed the 3.5 M_L magnitude Pápa earthquake on the day before, and produced reports of 5 EMS from Csót – Vanyola.

On September 30th late afternoon, a 2.3 M_L magnitude earthquake alarmed people in Somogy County. The shock was felt in a relatively small area of 300-400 km^2 and produced reports of 4 EMS from Szólád – Pusztaszemes.

2.

A MAGYARORSZÁGI FÖLDRENGÉS-MEGFIGYELŐ HÁLÓZAT

2005-ben 16 szeizmográf állomás működött Magyarországon. A megfigyelő hálózat az előző évhez képest nem változott (2.1. Táblázat).

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 létesített RHK5 (Szentendre) és RHK6 (Őrbottyán) állomások is működtek.

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 Obszervatóriuma* által működtetett öt 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 adatcsere is.

Átlagos zaj- (talajnyugtalanság) 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 üzembentartói: a *Paksi Atomerőmű Rt.,* a *GeoRisk Földrengéskutató Intézet,* az *MTA GGKI,* a *Környezetvédelmi Minisztérium* és a *MOL Rt*. (2.2. Táblázat)

2.

SEISMOGRAPH STATIONS IN HUNGARY

In 2005, there were 16 seismograph stations running in Hungary. No modification has been done with the monitoring network compared to the previous year (Table 2.1).

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 potential low and medium activity nuclear waste disposal site vicinity were running throughout the year. Two additional stations (RHK5-Szentendre and RHK6-Őrbottyán) were also running to monitor the Püspökszilágyi 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 five 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.* (Table 2.2)

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

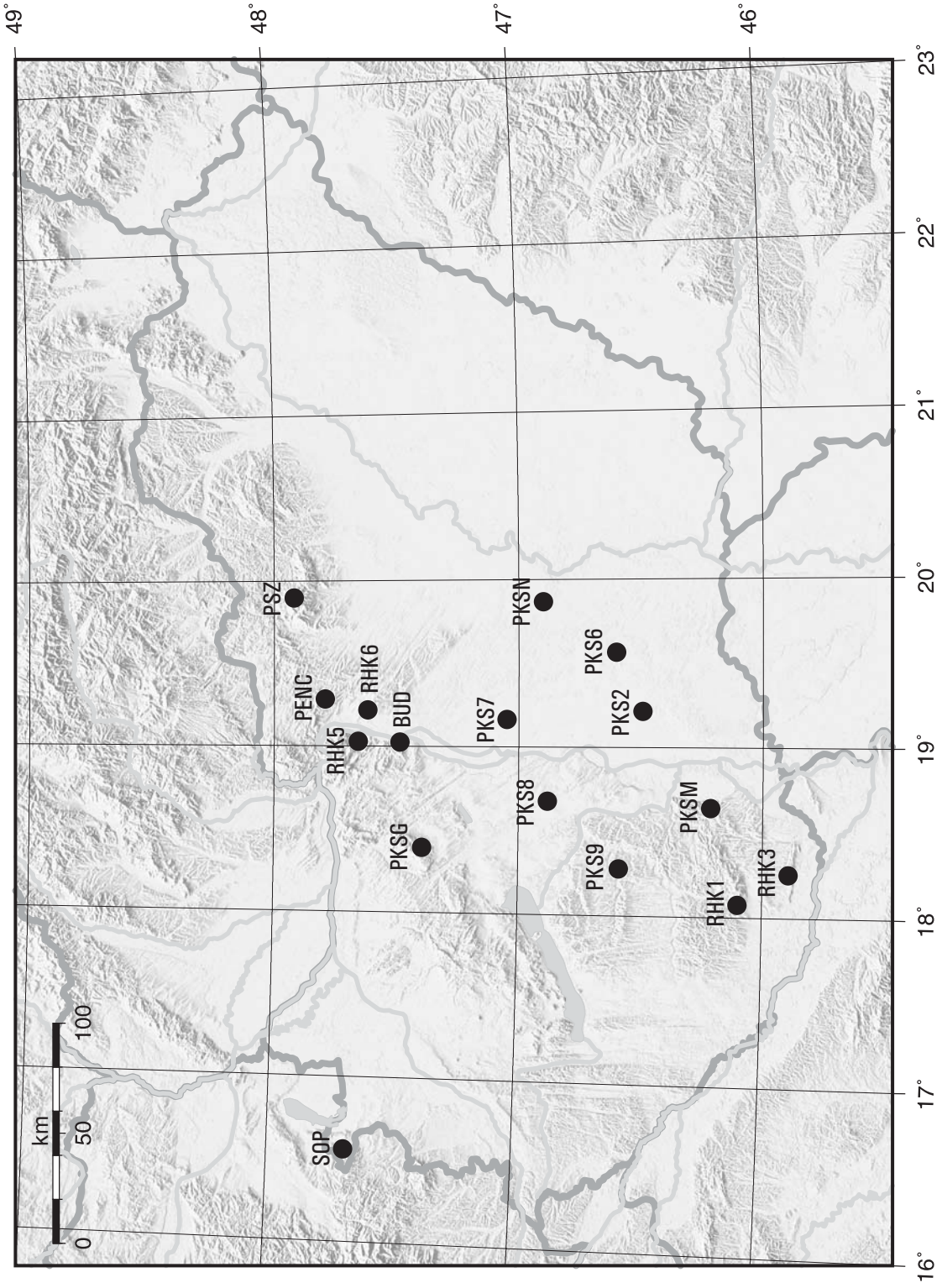
Jel Code	Szélesség Latitude (N)	Hosszúság Longitude (E)	Magasság Elevation (m)	Alapkőzet Foundation	Állomás típusa Station type (1)	Érzékelő típusa Sensor type (2)	Regisztrálás Recording (3)	Szervezet Org. (4)
BUD	47,4836	19,0239	196	dolomit dolomite	3C BB 3C SP	STS-2 LE-3D	D - C D - E	GGKI GR
PENC (RHK4)	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	lösz 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 BB	STS-2	D - C	GGKI
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	mészkő limestone	3C SP	SS-1	D - E	GGKI
RHK3	45,8885	18,2521	420	mészkő limestone	3C SP	LE-3D	D - E	GR
RHK5	47,6983	19,0822	213	mészkő 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 BB	STS-2	D - C	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 – Kinemetrics 1Hz-es szeizmométer / Kinemetrics 1Hz 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 2005-ben (részletek: 2.1. Táblázat)

Figure 2.1. Seismograph station network in Hungary in 2005 (See Table 2.1. for details)

2.2. Táblázat Gyorsulásmérő állomások, műszerek és alapkőzet
Table 2.2. Strong motion accelerograph stations

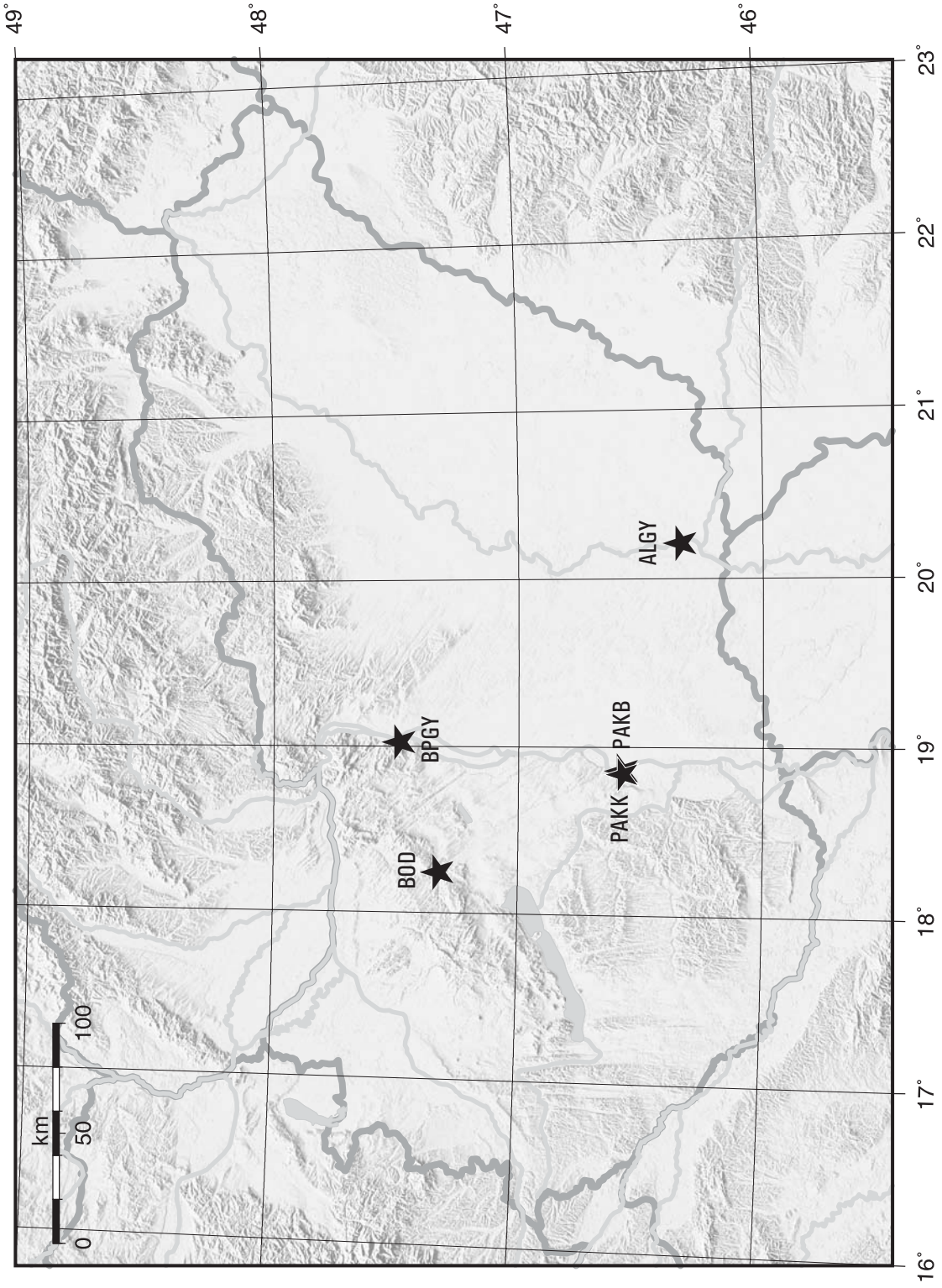
Jel Code	Szélesség Latitude (N)	Hosszúság Longitude (E)	Magasság Elevation (m)	Alapkőzet Foundation	Állomás típusa Station type (1)	Érzékelő típusa Sensor type (2)	Regisztrálás Recording (3)	Szervezet Org. (4)
ALGY	46.3332	20.2092	90	laza homok loose sand	3C SM	AC-23	D – E	MO-GR
BOD	47.322	18.241	250	mészkő 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 2005-ben (részletek: 2.2. táblázat)

Figure 2.2. Strong motion accelerograph stations in Hungary in 2005 (See Table 2.2. for details)

A PAKSI MIKROSZEIZMIKUS MEGFIGYELŐ HÁLÓZAT

A hálózat keretében - beleértve a radioaktív hulladéktárolók megfigyelésére létesített állomásokat is - 2005-ben 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 modemes 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 öt digitális szeizmológiai állomást üzemeltetett. Piszkéstető 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 100 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 üzemel. A másik három szélessávú állomás, Mórágy (PKSM), Budapest (BUD) és Sopron (SOP) hasonlóan működik.

A Bakonya (RHK1) állomáson 3 komponenses rövid periódusú adatok gyűjtése folyik KINEMETRICS gyártmányú K2 típusú digitális eseményregisztrálón. A mintavételi frekvencia 100 Hz, az A/D konverter felbontása 16 bit. Az érzékelők szintén KINEMETRICS 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^{SA} termékei).

2005. 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

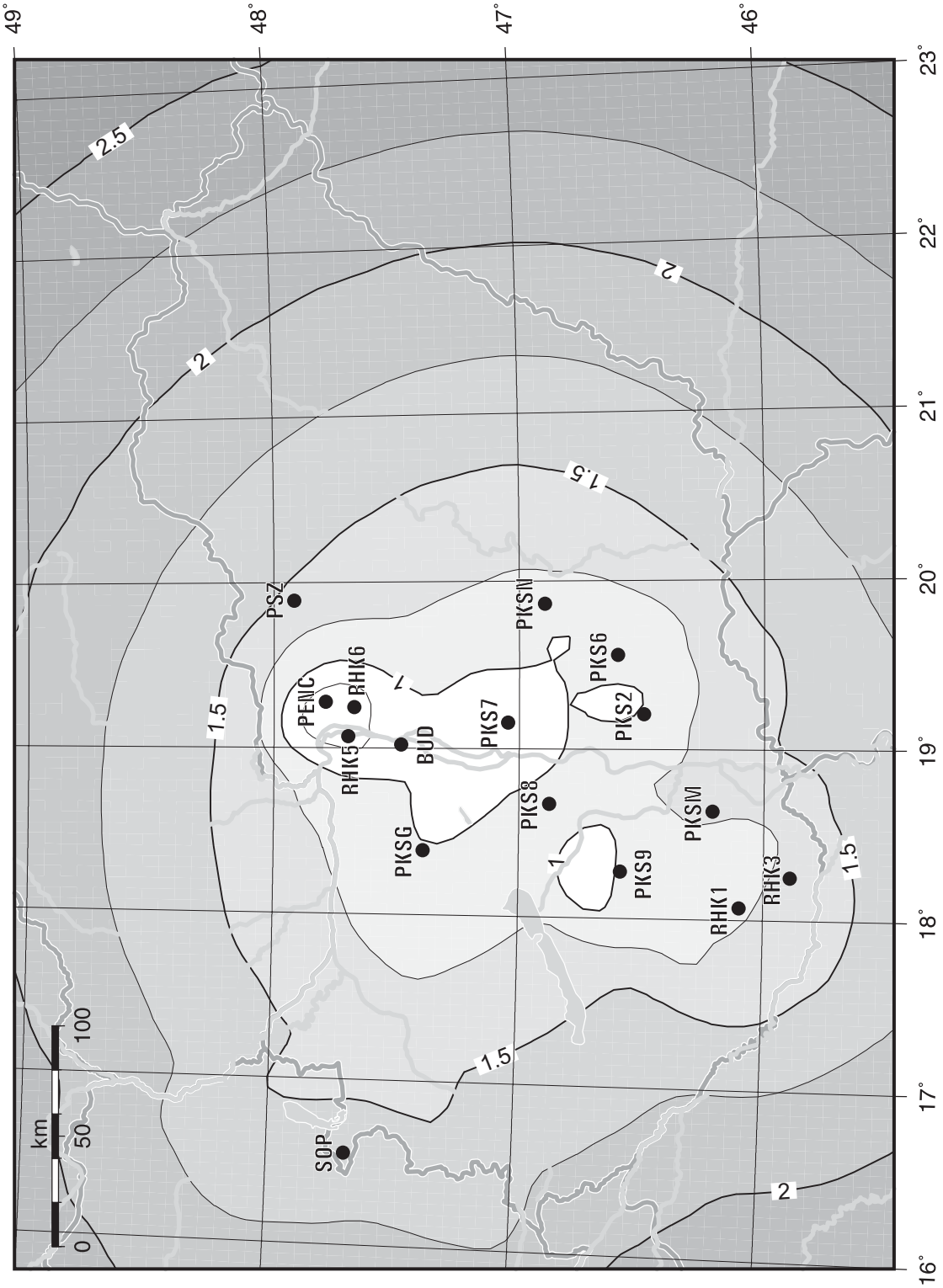
During 2005 GGKI operated five digital seismic stations. Piszkés *(PSZ)* has been installed as an ‘Open Station’ with the primary goal of nuclear test ban monitoring (Tóth, 1992). The station is equipped with a triaxial STS-2 broad-band seismometer and data acquisition system with a 24 bit high resolution 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. The configuration of the other three broadband stations, Mórágy (PKSM), Budapest (BUD) and Sopron (SOP) is similar.

RHK1 (Bakonya) is a three component short period station where Kinemetrics K2 16bit digitizer and event recorder samples and records the output of three component SS-1 Ranger seismometers.

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^{SA}, Switzerland).

During 2005, 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)

3.

ESEMÉNYLISTA
ÉS
FÖLDRENGÉS FÉSZEKPARAMÉTEREK

A FÖLDRENGÉS FÉSZEKPARAMÉTEREK MEGHATÁROZÁSA

A fészekparaméterek rutinszerű kiszámításához a HYPO71PC programot használtuk (Lee and Lahr, 1975). Az eredeti kódot kissé módosítottuk a könnyebb kezelhetőség érdekében, és kiegészítettük egy rutinnal, amely a Richter-féle lokális magnitúdót (M_L) számolja Bakun és Joyner (1984) módszerével.

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

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).

Sebesség (v_P) [km/s]	*Mélység [km]*	*Vastagság [km]*	v_P/v_S
5,60	0,0	20,0	1,78
6,57	20,0	11,0	
8,02	31,0	∞	

3.

LIST OF ORIGINS AND HYPOCENTER PARAMETERS

METHOD FOR HYPOCENTER PARAMETER DETERMINATION

HYPO71PC (Lee and Lahr, 1975) was used for the routine calculation of hypocenter parameters. The original program has been modified and a routine for Richter local magnitude calculation implemented. For the magnitude calculations, the method published by Bakun and Joyner (1984) has been used.

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

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).

Velocity (v_P) [km/s]	*Depth [km]*	*Thickness [km]*	v_P/v_S
5.60	0.0	20.0	1.78
6.57	20.0	11.0	
8.02	31.0	∞	

ESEMÉNYLISTA / LIST OF EVENTS

Nap	Kipattanási idő (UTC) óó pp mp	Földrajzi koordináták Lat	Long	Mélység (km)	ML	I_{MAX} (EMS)	Helyszín
Day	Origin time UTC hr mn sec	Geographic coordinates Lat	Long	Depth (km)	ML	I_{MAX} (EMS)	Locality/Region
JANUÁR / JANUARY, 2005							
12	12:18:00.1	48.590N	20.792E	0		-	Slovakia (expl.)
FEBRUÁR / FEBRUARY, 2005							
03	17:33:17.2	45.758N	18.101E	12	1.4	-	Croatia
06	3:05:49.3	47.444N	22.465E	10		-	Romania
06	20:20:50.7	47.312N	19.329E	16	2.1	-	Vasad
10	11:39:51.4	48.599N	20.770E	0		-	Slovakia (expl.)
14	11:32:39.6	48.686N	20.657E	0		-	Slovakia (expl.)
17	15:30:55.3	47.550N	18.570E	10	1.0	-	Nagyegyháza
18	12:12:50.9	45.714N	17.896E	17	1.1	-	Croatia
25	12:14:36.7	48.648N	20.691E	0		-	Slovakia (expl.)
MÁRCIUS / MARCH, 2005							
02	15:47:23.1	47.586N	18.492E	13	1.2	-	Tarján
04	12:17:01.5	48.683N	20.677E	0		-	Slovakia (expl.)
14	10:58:32.7	47.428N	19.918E	10	2.4	-	Portelek
16	12:46:10.9	47.745N	18.628E	10	1.1	-	Tát
24	12:17:37.8	48.618N	20.734E	0		-	Slovakia (expl.)
25	11:38:22.8	48.502N	22.926E	10		-	Ukraine
26	5:52:48.8	46.541N	17.491E	15	2.5	-	Marcali
29	10:36:01.0	48.360N	19.823E	0		-	Slovakia (expl.)
ÁPRILIS / APRIL, 2005							
02	15:40:38.4	45.896N	16.161E	4	2.4	-	Croatia
05	12:01:20.1	48.583N	20.927E	0		-	Slovakia (expl.)
06	8:48:53.6	47.394N	18.381E	0	0.4	-	Gánt (expl.)
07	13:15:25.1	47.304N	18.755E	3	1.1	-	Baracska
07	13:36:20.5	47.396N	18.376E	10	0.7	-	Gánt
08	8:11:35.0	48.535N	20.751E	0		-	Komjáti (expl.)
09	16:47:54.6	46.911N	19.024E	10	1.2	-	Dunavecse
13	1:46:12.8	46.568N	18.176E	10	1.2	-	Nagykónyi
13	10:25:57.4	47.907N	19.081E	0	2.0	-	Nógrád (expl.)
20	8:18:06.3	48.571N	20.789E	0		-	Tornanádaska (expl.)

22	10:52:23.2	48.659N	20.658E	0		-	Slovakia (expl.)
23	14:59:05.5	47.559N	18.475E	0	1.2	-	Tatabánya (expl.)
26	10:05:41.2	48.602N	20.747E	0		-	Slovakia (expl.)
27	10:52:44.9	47.553N	16.439E	2	2.0	-	Austria

MÁJUS / MAY, 2005

05	7:56:24.2	47.294N	18.137E	0	1.0	-	Balinka (expl.)
06	11:11:32.8	48.644N	20.691E	0		-	Slovakia (expl.)
13	9:29:45.0	45.919N	18.650E	2	2.0	-	Sátorhely
13	16:43:24.1	48.186N	18.728E	2		-	Slovakia
14	0:28:08.9	46.245N	16.160E	9	2.5	-	Croatia
14	20:05:30.0	46.487N	16.701E	10		-	Zajk
14	20:39:49.7	46.465N	16.669E	10	2.2	-	Murarátka
14	22:12:27.1	46.474N	16.647E	15	2.1	-	Szemenyecsörnye
15	13:30:48.8	47.323N	17.444E	10	3.5	5.0	Pápa
16	13:39:44.0	47.298N	17.443E	7	2.8	5.0	Csót
17	2:52:23.1	46.755N	22.964E	10	3.1	-	Romania
25	9:08:19.8	47.492N	18.468E	0	1.6	-	Szárliget (expl.)
26	16:36:35.0	47.570N	18.679E	10	1.1	-	Szomor
30	10:21:56.5	45.580N	17.716E	1	1.5	-	Croatia

JÚNIUS / JUNE, 2005

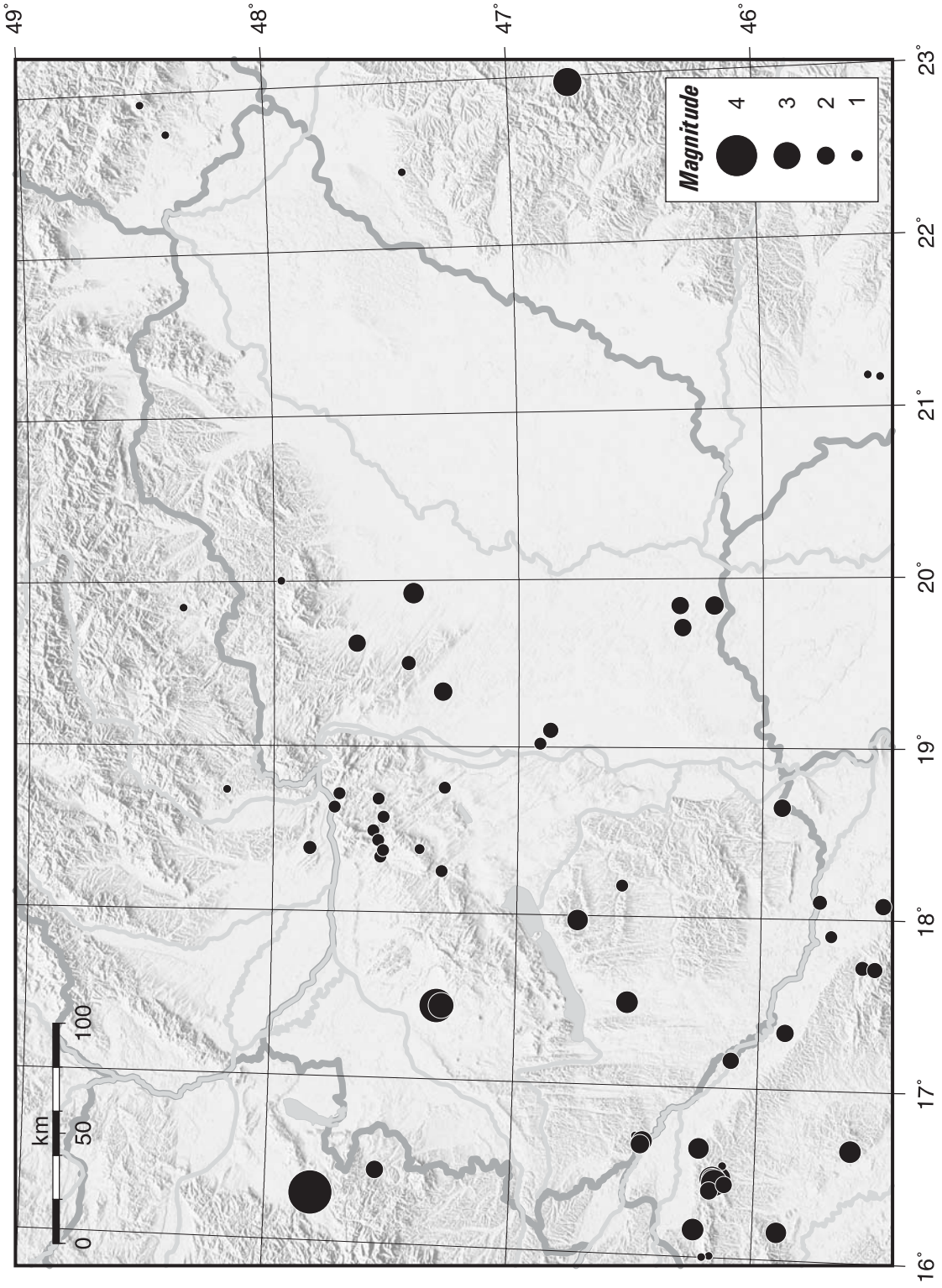
12	13:57:53.4	47.543N	18.266E	0	0.6	-	Kömlőd (expl.)
13	9:07:11.0	45.833N	18.421E	0		-	Nagyharsány (expl.)
13	18:38:31.0	47.559N	18.334E	10	1.1	-	Környe
15	22:36:43.1	47.656N	19.624E	10	2.0	-	Kerekharaszt
16	20:17:15.8	45.890N	17.332E	10	1.9	-	Croatia
23	6:46:18.7	46.202N	19.842E	10	2.1	-	Mórahalom
23	14:54:53.1	46.866N	19.097E	10	1.6	-	Újsolt
29	5:30:22.3	47.478N	18.324E	0	1.2	-	Oroszlány (expl.)

JÚLIUS / JULY, 2005

03	13:57:01.9	46.332N	19.712E	6	1.9	-	Pusztamérges
07	19:56:17.9	48.40 N	22.74 E	10		-	Ukraine
11	7:40:33.7	47.472N	18.360E	0	0.7	-	Oroszlány (expl.)
11	7:40:58.4	47.480N	18.143E	0	1.3	-	Császár (expl.)
15	6:24:04.2	47.471N	18.392E	0	0.7	-	Várgesztes (expl.)
17	7:30:58.6	45.562N	21.181E	5		-	Romania
17	7:39:21.6	45.515N	21.174E	3		-	Romania
25	3:06:58.2	47.811N	16.286E	10	4.1	6.0	Austria
25	10:14:24.1	47.577N	18.537E	0	1.2	-	Tarján (expl.)
28	17:01:00.2	47.568N	18.434E	10	1.0	-	Tatabánya
29	16:04:27.4	48.398N	19.058E	0		-	Slovakia (expl.)

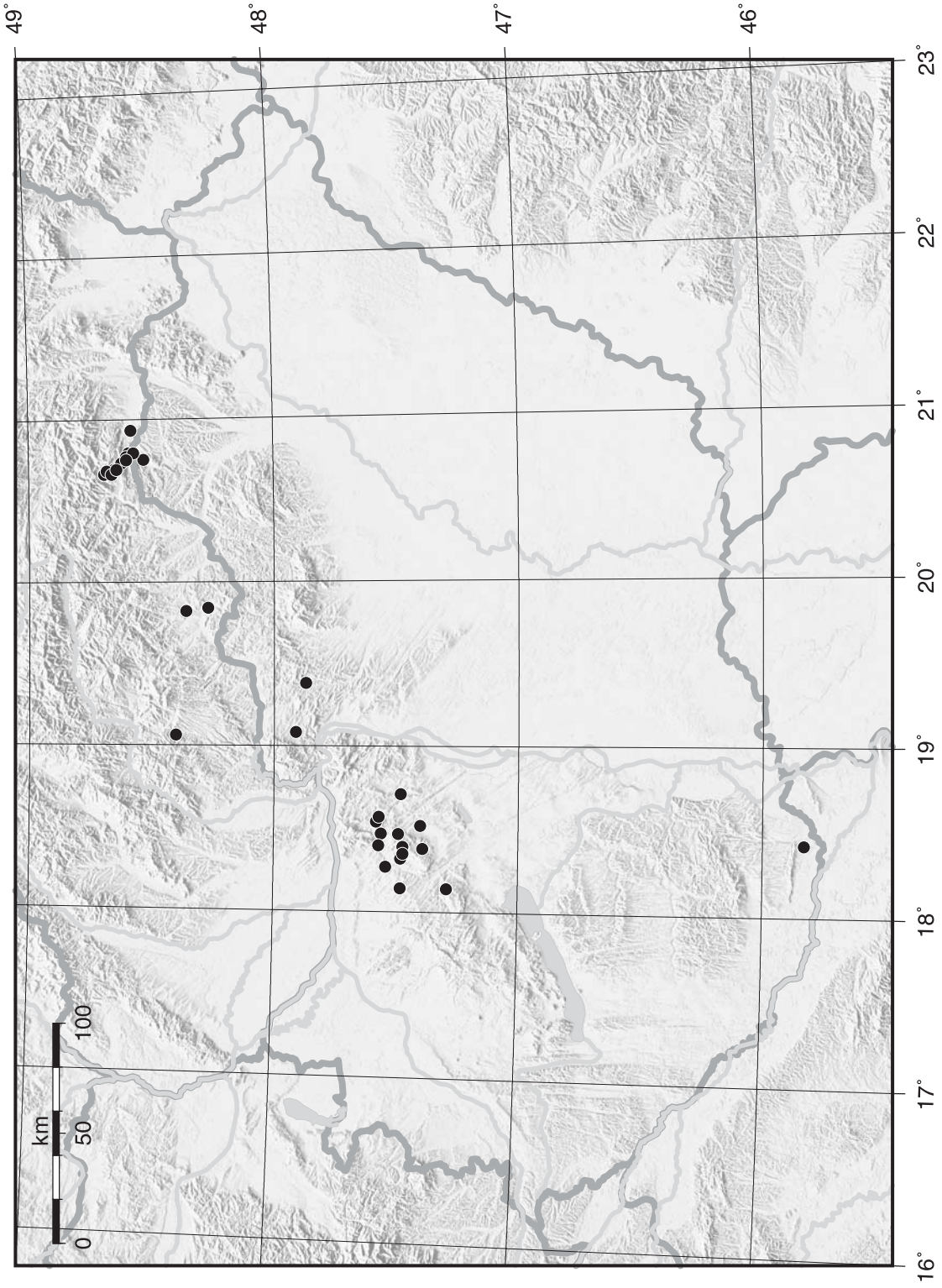
AUGUSZTUS / AUGUST, 2005

02	10:47:34.8	46.140N	16.467E	11	2.5	-	Croatia
02	13:37:41.5	46.134N	16.536E	8		-	Croatia
07	22:13:11.6	47.312N	18.250E	10	1.0	-	Fehérvárcsurgó
15	13:12:08.0	47.481N	18.708E	0	0.4	-	Herceghalom (expl.)
19	10:54:47.3	45.504N	18.084E	6	1.8	-	Croatia
19	13:06:34.4	46.173N	16.008E	1		-	Croatia
19	15:50:24.2	47.575N	18.405E	0	1.2	-	Tatabánya (expl.)
30	19:52:21.3	46.234N	16.640E	8	2.3	-	Croatia
SZEPTEMBER / SEPTEMBER, 2005							
20	10:53:28.7	47.871N	19.385E	0	1.9	-	Nógrádkövesd (expl.)
20	13:27:10.8	47.734N	18.707E	10	1.0	-	Dorog
22	13:05:09.4	47.570N	18.572E	0	0.9	-	Gyermely (expl.)
23	7:45:28.0	47.467N	18.347E	0	1.5	-	Oroszlány (expl.)
30	20:56:38.4	46.748N	17.972E	10	2.3	4.0	Szólád
OKTÓBER / OCTOBER, 2005							
04	9:16:45.0	47.852N	18.384E	0	1.3	-	Slovakia
05	16:24:30.6	46.199N	16.000E	13		-	Croatia
11	11:47:18.0	48.374N	19.840E	4		-	Slovakia
14	9:51:25.9	47.970N	20.000E	10		-	Mátraballa
16	16:09:55.9	47.446N	19.503E	18	1.5	-	Sülysáp
28	10:41:07.4	45.533N	17.714E	1	1.6	-	Croatia
NOVEMBER / NOVEMBER, 2005							
07	15:25:17.2	45.605N	16.647E	6	2.5	-	Croatia
07	15:38:02.0	47.551N	18.370E	11	1.1	-	Környe
09	13:13:31.1	48.271N	19.837E	0		-	Slovakia (expl.)
22	11:49:40.1	47.396N	18.520E	0	1.2	-	Csákvár (expl.)
27	0:59:00.5	46.335N	19.843E	5	1.9	-	Üllés
DECEMBER / DECEMBER, 2005							
07	5:22:02.9	46.174N	16.463E	9	2.8	-	Croatia
07	6:08:03.4	46.173N	16.462E	7	2.3	-	Croatia
08	6:27:39.5	46.184N	16.395E	8	1.8	-	Croatia
09	5:16:20.7	46.175N	16.396E	8	1.9	-	Croatia
09	6:50:13.4	46.163N	16.444E	10	2.9	-	Croatia
13	16:21:32.2	46.177N	16.386E	8	2.0	-	Croatia
26	7:11:06.4	46.106N	17.164E	10	1.8	-	Bélavár
26	22:11:14.9	46.124N	16.431E	11	1.8	-	Croatia



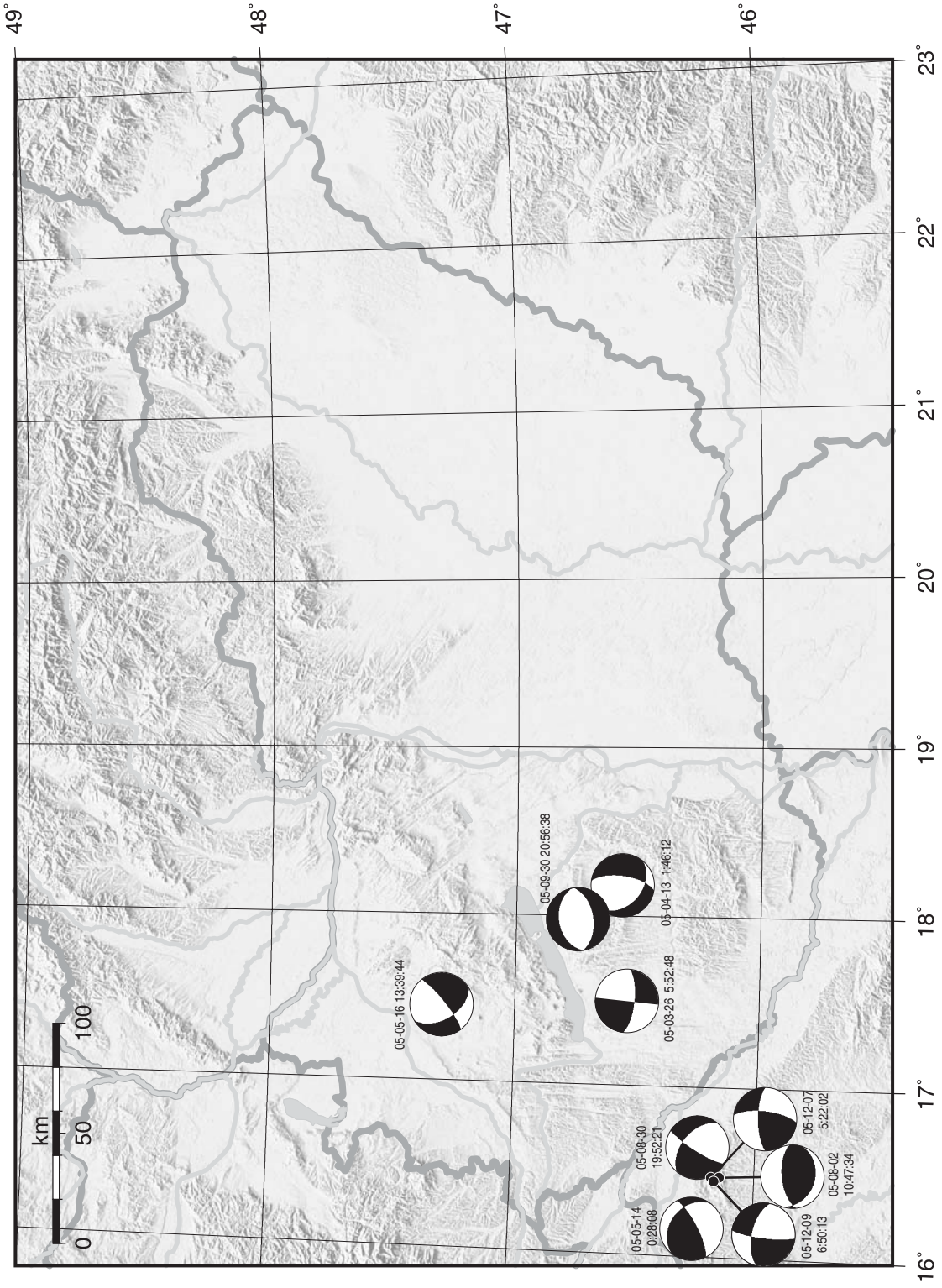
3.1. ábra A 2005-ben regisztrált földrengések epicentrumai

Figure 3.1. Epicenters of 2005 earthquakes



3.2. ábra A 2005-ben regisztrált robbantások epicentrumai

Figure 3.2. Epicenters of 2005 explosions



3.3. ábra A 2005-ben regisztrált földrengések fészekmechanizmusai

Figure 3.3. Fault plane solutions of 2005 earthquakes

FÉSZEKPARAMÉTEREK ÉS FÁZISADATOK

A listában alkalmazott jelek és rövidítések magyarázata:

time: Az esemény kipattanásának ideje (óra:perc:másodperc; UTC).

ML: A rengés Richter-féle lokális magnitúdója.

lat: Az esemény földrajzi szélessége (fok).

lon: Az esemény földrajzi hosszúsága (fok).

h: A fészek mélysége (km).

erh: Horizontális hiba km-ben. ($erh = \sqrt{SDX^2 + SDY^2}$, ahol *SDX* és *SDY* az epicentrum földrajzi szélességének és hosszúságának meghatározási hibái.) Ha *erh* = ---, a kevés rendelkezésre álló adat miatt *erh* nem volt meghatározható.

erz: A fészekmélység meghatározásának hibája (km). *erz* = --- azt jelzi, hogy *erz* nem volt meghatározható a kevés rendelkezésre álló adat miatt.

nr: A számításnál felhasznált fázisadatok száma. Azonos állomásról származó P és S beérkezések 2 adatnak számítanak.

gap: Az állomások közötti legnagyobb irányeltérés (fok).

rms: A számított beérkezési idők átlagnégyzetes hibája (mp). ($rms = \sqrt{\sum R_i^2 / nr}$, ahol R_i az *i* –edik állomás időhibája (reziduál).)

Locality: A rengés földrajzi helyének megnevezése, általában a legközelebbi település neve.

Comments: Az eseménnyel kapcsolatos egyéb közlemény (pl. epicentrális intenzitás).

sta: Az állomás neve. (L. 2. fejezet.)

dist: Az állomás távolsága az epicentrumtól (km).

azm: Az állomás irányszöge az 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 forth 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 (Reasenberg and Oppenheimer, 1985). The results are summarized in Fig. 3.3.

1.

2005-01-12 time: 12:18:00.12 UTC ML=
lat: 48.590N lon: 20.792E h= 0.0 km
erh= 3.2km erz= 1.4km
nr= 9 gap=151 rms=0.32
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
KECS	25.5	242	iPg	12:18:04.50		-0.37
			iSg	18:08.70		0.13
CRVS	60.3	55	iPg	12:18:11.10		0.13
			iSg	18:19.20		-0.22
PSZ	100.1	222	iPgC	12:18:18.10		0.06
			eSg	18:31.80		-0.22
KOLS	115.4	71	iSn	12:18:36.80		0.22
VYHS	144.8	266	iPn	12:18:25.00		0.73
			iSn	18:42.70		-0.40

2.

2005-02-03 time: 17:33:17.24 UTC ML= 1.4
lat: 45.758N lon: 18.101E h= 12.4 km
erh= 3.6km erz= 1.5km
nr= 10 gap=317 rms=0.34
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
RHK3	18.7	39	ePgD	17:33:21.40		0.16
			eSg	33:25.00		0.64
RHK1	37.5	357	ePg	17:33:24.30		0.00
			eSg	33:29.50		-0.30
PKSM	65.6	40	iPgD	17:33:29.20		0.05
			eSg	33:38.00		-0.45
PKS9	93.2	8	eP*C	17:33:34.10		0.10
			eS*	33:45.70		-1.38
PKS8	132.2	20	ePnC	17:33:38.80		-0.38
			eSn	33:57.40		1.11

3.

2005-02-06 time: 3:05:49.32 UTC ML=
lat: 47.444N lon: 22.465E h= 10.0 km
erh=32.1km erz=32.2km
nr= 8 gap=290 rms=0.81
Locality: Romania
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOLS	166.2	355	ePn	3:06:16.10		0.30
			eSn	06:37.20		0.75
CRVS	178.5	335	ePn	3:06:16.60		-0.73
			iSn	06:38.60		-0.58
KECS	187.6	308	ePn	3:06:20.30		1.84
			iSn	06:40.70		-0.50
PSZ	200.1	285	iPnC	3:06:19.80		-0.22
			eSn	06:45.90		1.93

4.

2005-02-06 time: 20:20:50.66 UTC ML= 2.1
lat: 47.312N lon: 19.329E h= 16.3 km
erh= 1.5km erz= 1.3km
nr= 15 gap=106 rms=0.47
Locality: Vasad
Comments:

sta	dist	azm	phase	hr mn	sec	res
BUD	29.9	310	eSg	20:21:01.80		0.31
PKS7	32.1	203	ePgC	20:20:56.90		-0.19
			eSg	21:02.00		-0.10
PKSN	61.6	138	ePgD	20:21:01.80		-0.24
			eSg	21:11.60		0.68
PKSG	71.5	277	ePg	20:21:04.00		0.25
			eSg	21:13.40		-0.56
PSZ	79.7	32	eP*D	20:21:05.40		0.39
			eS*	21:15.10		-1.10
PKS9	113.6	225	ePnC	20:21:10.00		0.22
			eSn	21:26.30		1.62
PKSM	133.1	203	ePnD	20:21:12.10		-0.12
			eSn	21:27.50		-1.53
RHK1	166.0	215	ePn	20:21:16.50		0.18
			eSn	21:35.00		-1.33
KHC	472.8	295	ePn	20:21:55.00		0.43

5.

2005-02-10 time: 11:39:51.36 UTC ML=
lat: 48.599N lon: 20.770E h= 0.0 km
erh= 3.1km erz= 3.4km
nr= 8 gap=151 rms=0.26
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
KECS	24.6	238	ePg	11:39:55.50		-0.26
			eSg	39:59.40		0.21
CRVS	61.0	56	ePg	11:40:02.60		0.35
			eSg	40:10.80		0.06
PSZ	99.8	221	ePgC	11:40:09.40		0.22
			eSg	40:22.90		-0.18
KOLS	116.6	71	eSg	11:40:28.20		-0.22
VYHS	143.3	265	ePn	11:40:15.90		-0.35
			eSn	40:33.00		-2.67
VISS	546.5	235	ePn	11:40:58.00		-8.53
			eSn	41:11.50		-53.67

6.

2005-02-14 time: 11:32:39.62 UTC ML=
lat: 48.686N lon: 20.657E h= 0.0 km
erh=13.0km erz=11.3km
nr= 6 gap=167 rms=0.68
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
CRVS	63.8	68	ePg	11:32:51.30		0.29
			eSg	32:59.10		-0.80
PSZ	102.4	214	ePgC	11:32:57.70		-0.21
			eSg	33:11.40		-0.78
VYHS	136.0	261	ePn	11:33:05.00		1.38
			eSn	33:22.00		-0.33

7.

2005-02-17 time: 15:30:55.30 UTC ML= 1.0
lat: 47.550N lon: 18.570E h= 10.0 km
erh=23.5km erz=11.7km
nr= 6 gap=316 rms=1.65
Locality: Nagyegyháza
Comments:

sta	dist	azm	phase	hr mn	sec	res
PKSG	22.2	217	iPgD	15:30:59.70		0.05
			eSg	31:02.50		-0.55
PKS8	75.1	174	ePg	15:31:11.00		2.16
			eSg	31:20.10		0.71
PKSM	148.9	178	ePn	15:31:15.70		-3.93
			eSn	31:38.40		-0.20

8.

2005-02-18 time: 12:12:50.93 UTC ML= 1.1
lat: 45.714N lon: 17.896E h= 16.6 km
erh= 1.6km erz= 0.6km
nr= 6 gap=323 rms=0.08
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
RHK3	33.8	55	iPgD	12:12:57.60		-0.06
			eSg	13:03.10		0.18
RHK1	44.5	18	ePg	12:12:59.50		0.09
			eSg	13:05.90		-0.13
PKSM	80.0	46	eP*D	12:13:05.30		0.01
			eS*	13:16.50		0.01

9.

2005-02-25 time: 12:14:36.72 UTC ML=
lat: 48.648N lon: 20.691E h= 0.0 km
erh= 3.4km erz= 2.6km
nr= 5 gap=161 rms=0.66
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
CRVS	63.3	63	ePg	12:14:48.40		0.38
			eSg	14:55.60		-1.24
PSZ	100.4	216	ePgC	12:14:54.20		-0.44
VYHS	137.9	263	ePn	12:15:01.80		0.85
			eSn	15:19.70		-0.15

10.

2005-03-02 time: 15:47:23.15 UTC ML= 1.2
lat: 47.586N lon: 18.492E h= 12.7 km
erh= 5.5km erz= 2.7km
nr= 13 gap=156 rms=1.12
Locality: Tarján
Comments:

sta	dist	azm	phase	hr mn	sec	res
SRO2	21.0	339	ePg	15:47:27.20		-0.33
			iSg	47:31.00		0.06
PKSG	22.9	200	iPgD	15:47:26.70		-1.13
			eSg	47:29.50		-1.98
SRO1	27.6	315	iSg	15:47:33.00		0.19
SRO	28.6	332	ePg	15:47:28.60		-0.14
			iSg	47:33.80		0.70
PKS8	79.9	170	ePgD	15:47:39.70		2.11
			eSg	47:47.10		-1.76
VYHS	104.1	14	iPn	15:47:42.80		1.26
			iSn	47:55.10		-0.79
ZST	124.1	303	iSn	15:47:58.50		-1.83
SMOL	130.1	322	iSn	15:48:02.30		0.64

11.

2005-03-04 time: 12:17:01.47 UTC ML=
lat: 48.683N lon: 20.677E h= 0.0 km
erh=11.2km erz= 9.7km
nr= 5 gap=166 rms=0.74
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
CRVS	62.6	67	eSg	12:17:21.20		-0.17
PSZ	102.9	214	ePgC	12:17:19.90		0.05
			eSg	17:32.70		-1.48
VYHS	137.4	261	ePn	12:17:26.90		1.26
			eSn	17:43.90		-0.59

12.

2005-03-14 time: 10:58:32.68 UTC ML= 2.4
lat: 47.428N lon: 19.918E h= 10.0 km
erh= 4.7km erz= 3.2km
nr= 11 gap=209 rms=0.74
Locality: Portelek
Comments:

sta	dist	azm	phase	hr mn	sec	res
PSZ	54.5	358	iPgC	10:58:42.50		-0.08
			eSg	58:49.30		-0.99
BUD	67.7	275	eSg	10:58:55.20		0.77
PKSG	115.3	268	ePnC	10:58:52.40		-0.42
			eSn	59:06.80		-1.72
PKS2	117.1	207	ePn	10:58:53.90		0.86
			eSn	59:08.50		-0.42
VYHS	143.4	326	iPn	10:58:56.50		0.18
			iSn	59:15.40		0.65
RHK1	204.6	224	ePn	10:59:07.50		3.55
			eSn	59:25.80		-2.54

13.

2005-03-16 time: 12:46:10.95 UTC ML= 1.1
lat: 47.745N lon: 18.628E h= 10.0 km
erh= 4.6km erz=17.0km
nr= 11 gap=106 rms=1.22
Locality: Tát
Comments:

sta	dist	azm	phase	hr mn	sec	res
SRO2	17.7	276	ePg	12:46:14.90		0.32
			eSg	46:17.10		-0.30
SRO	24.8	288	ePg	12:46:16.80		1.08
			eSg	46:19.80		0.36
SRO1	29.7	274	ePg	12:46:17.50		0.95
			eSg	46:21.50		0.59
RHK5	33.7	99	ePg	12:46:17.40		0.17
			eSg	46:26.10		3.97
PKSG	43.2	204	ePg	12:46:16.40		-2.47
			eSg	46:24.20		-0.84
VYHS	84.7	11	eSg	12:46:37.00		-1.05

14.

2005-03-24 time: 12:17:37.82 UTC ML=
lat: 48.618N lon: 20.734E h= 0.0 km
erh= 6.2km erz= 4.0km
nr= 10 gap=155 rms=0.47
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
KECS	23.6	231	iPg	12:17:41.80		-0.33
			eSg	17:45.50		0.01
CRVS	62.2	59	ePg	12:17:48.90		-0.05
			eSg	17:57.10		-0.54
PSZ	99.6	219	ePgD	12:17:55.70		0.06
			eSg	18:09.80		0.27
KOLS	118.5	73	ePg	12:18:00.00		1.01
			eSg	18:13.20		-2.31
VYHS	140.8	264	ePn	12:18:02.10		0.30
			eSn	18:20.10		-0.41

15.

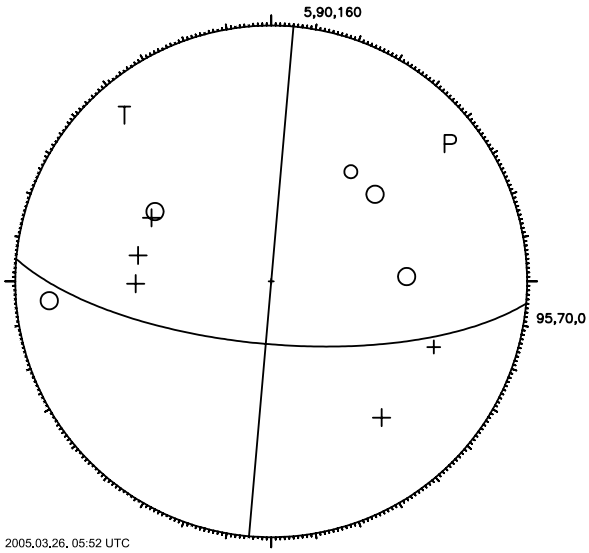
2005-03-25 time: 11:38:22.80 UTC ML=
lat: 48.502N lon: 22.926E h= 10.0 km
erh=37.3km erz=23.6km
nr= 7 gap=299 rms=1.34
Locality: Ukraine
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOLS	67.9	315	ePg	11:38:35.60		0.55

```
                 eSg      38:44.30   -0.30
CRVS 116.6 292   ePn   11:38:42.70   -0.40
KECS 180.4 269   ePn   11:38:52.50    1.45
                 eSn      39:11.30   -1.78
PSZ  234.5 254   ePn   11:38:54.20   -3.59
                 eSn      39:28.40    3.31
VYHS 302.3 270   ePn   11:39:05.80   -0.44
```

16.

```
 2005-03-26  time:  5:52:48.82 UTC  ML= 2.5
   lat: 46.541N  lon: 17.491E  h= 14.8 km
                 erh= 2.0km    erz= 2.2km
   nr= 30        gap=102       rms=0.68
   Locality: Marcali
   Comments: felt

sta   dist azm  phase  hr mn  sec     res
PKS9  60.7  85   iPgD   5:53:00.00    0.03
                 eSg      53:08.60   -0.07
RHK1  66.8 138   ePg    5:53:01.30    0.26
                 eSg      53:10.00   -0.57
RHK3  93.3 141   iP*C   5:53:06.00    0.62
                 eS*      53:17.70   -0.60
PKSM  95.8 112   eP*C   5:53:05.90    0.14
                 eS*      53:18.70   -0.26
PKSG 116.8  36   ePnD   5:53:07.40   -1.13
                 eSn      53:23.40   -0.51
SOP  145.4 331    Pn    5:53:13.10    1.00
                  Sn      53:29.30   -0.95
SRO  154.6  24   iPn    5:53:14.90    1.65
BUD  156.8  48   ePn    5:53:13.20   -0.32
                 eSn      53:30.80   -1.98
PKS6 159.1  88   iPnD   5:53:13.50   -0.31
ARSA 169.4 298   iPnC   5:53:14.90   -0.19
CRES 176.0 243   iPn    5:53:15.70   -0.21
                 iSn      53:42.20    5.17
ZST  186.4 351   iPn    5:53:16.90   -0.31
                 iSn      53:40.00    0.66
SMOL 219.4 359   iPn    5:53:21.10   -0.23
                 iSn      53:47.10    0.42
OBKA 225.8 269   iPnC   5:53:22.00   -0.11
                 iSn      53:47.50   -0.58
KOLL 236.8  17   iPn    5:53:23.40   -0.09
PSZ  237.9  50   iPnD   5:53:23.20   -0.43
                 eSn      53:52.10    1.32
VYHS 239.7  25   iPn    5:53:23.90    0.05
MOA  284.4 301   iPnD   5:53:28.90   -0.53
                 iSn      54:00.50   -0.60
KECS 312.3  46   ePn    5:53:33.30    0.39
KBA  322.1 281   iPnC   5:53:33.60   -0.52
                 iSn      54:08.90   -0.56
MORC 359.9   1   ePn    5:53:38.71   -0.13
KHC  410.8 315   ePn    5:53:46.90    1.71
                 eSn      54:27.30   -1.85
DPC  432.4 348   ePn    5:53:48.30    0.42
```



17.

```
 2005-03-29  time: 10:36:01.03 UTC  ML=
   lat: 48.360N  lon: 19.823E  h=  0.0 km
                 erh= 2.2km    erz= 4.8km
   nr= 10        gap=140       rms=0.51
   Locality: Slovak Republic
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PSZ   49.4 174   iPgC  10:36:10.00    0.15
                 eSg      36:16.70   -0.03
KECS  50.9  74   ePg   10:36:09.70   -0.42
                 eSg      36:17.30    0.09
VYHS  74.6 282   ePg   10:36:14.70    0.35
                 eSg      36:24.20   -0.54
KOLL 107.9 283   ePg   10:36:20.80    0.50
                 eSg      36:33.70   -1.62
CRVS 135.0  63   ePn   10:36:25.20    0.31
                 eSn      36:41.60   -1.90
```

18.

```
 2005-04-02  time: 15:40:38.43 UTC  ML= 2.4
   lat: 45.896N  lon: 16.161E  h=  4.2 km
                 erh= 2.8km    erz= 2.1km
   nr= 25        gap=148       rms=0.51
   Locality: Croatia
   Comments:

sta   dist azm  phase  hr mn  sec     res
GCIS  43.0 265   iPgC  15:40:46.20    0.06
                 iSg      40:51.40   -0.75
GOLS  43.5 287   iPgC  15:40:46.40    0.17
CESS  54.8 279   iPg   15:40:48.80    0.56
                 iSg      40:55.30   -0.60
CRES  55.2 262   iPgC  15:40:48.30   -0.02
                 iSg      40:55.40   -0.63
DOBS  60.5 298   iPgC  15:40:49.40    0.14
LEGS  65.7 275   iPgC  15:40:50.20    0.02
                 iSg      40:59.50    0.15
GROS  80.8 321   iPg   15:40:52.80   -0.08
                 iSg      41:03.30   -0.86
BOJS  83.1 238   iPg   15:40:53.20   -0.09
                 iSg      41:03.10   -1.78
PDKS  92.4 283   iPg   15:40:54.60   -0.35
                 eSg      41:07.90    0.07
VISS 103.3 264   iPg   15:40:56.20   -0.68
                 iSg      41:10.90   -0.38
PERS 115.1 316   ePg   15:40:58.30   -0.69
LJU  127.7 277   iPn   15:41:00.20   -0.65
                 iSn      41:15.90   -2.44
```

```
CEY  135.9 263   iPn   15:41:02.10    0.22
                 eSn      41:20.00   -0.17
OBKA 141.9 299   iPnC  15:41:02.90    0.28
                 iSn      41:18.50   -2.99
ARSA 158.3 342   iPnC  15:41:04.80    0.13
                 iSn      41:22.60   -2.54
RHK3 162.3  90   ePn   15:41:05.10   -0.07
                 eSn      41:22.60   -3.43
GORS 173.5 286   ePn   15:41:06.70    0.13
VOY  176.4 275   eSn   15:41:30.30    1.14
VOJS 176.9 275   iPn   15:41:08.70    1.71
PKS9 180.5  65   ePnC  15:41:12.10    4.66
                 eSn      41:32.90    2.83
PKSM 195.1  80   ePn   15:41:08.00   -1.26
                 eSn      41:36.90    3.59
PKS8 222.2  61   ePn   15:41:12.10   -0.54
PTCC 224.2 285   ePn   15:41:16.15    3.27
                 eSn      41:44.07    4.31
PKSG 238.3  46   ePn   15:41:20.20    5.55
KBA  253.1 301   iPnC  15:41:16.10   -0.38
                 iSn      41:51.90    5.73
MOA  260.8 326   iPnC  15:41:17.20   -0.25
                 iSn      41:45.50   -2.40
ZST  265.5  16   ePn   15:41:18.60    0.56
                 eSn      41:45.70   -3.24
FVI  272.1 287   ePn   15:41:19.78    0.92
                 eSn      41:57.19    6.79
VYHS 352.9  35   ePn   15:41:29.80    0.87
                 eSn      42:03.90   -4.42
KHC  408.9 332   ePn   15:41:36.30    0.38
                 eSn      42:18.20   -2.56
```

19.

```
 2005-04-05  time: 12:01:20.13 UTC  ML=
   lat: 48.583N  lon: 20.927E  h=  0.0 km
                 erh=75.5km    erz=48.1km
   nr=  6        gap=178       rms=0.20
   Locality: Slovak Republic
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
CRVS  53.0  48   iPg   12:01:29.60    0.02
                 eSg      01:36.70   -0.26
PSZ  106.5 226   ePgD  12:01:39.60    0.45
                 eSg      01:53.80   -0.18
VYHS 154.8 266   iPn   12:01:46.50    0.04
                 iSn      02:06.80   -0.19
```

20.

```
 2005-04-06  time:  8:48:53.63 UTC  ML= 0.4
   lat: 47.394N  lon: 18.381E  h=  0.0 km
                 erh= ***km    erz= ***km
   nr=  6        gap=284       rms=0.61
   Locality: Gánt
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG   0.8 109   iPgC   8:48:53.30   -0.48
                 eSg      48:54.30    0.41
PKS8  61.6 159   ePgC   8:49:05.90    1.28
                 eSg      49:12.70   -0.50
PKS9  90.1 185   ePg    8:49:09.70   -0.02
                 eSg      49:22.20   -0.06
```

21.

```
 2005-04-07  time: 13:15:25.10 UTC  ML= 1.1
   lat: 47.304N  lon: 18.755E  h=  2.6 km
                 erh= 7.6km    erz=76.7km
   nr=  6        gap=258       rms=0.84
   Locality: Baracska
   Comments:
```

```
sta   dist azm  phase  hr mn  sec     res
PKSG  29.2 290   ePgC  13:15:30.20   -0.13
                 eSg      15:33.50   -0.92
PKS8  47.6 187   ePg   13:15:34.00    0.38
                 eSg      15:37.50   -2.76
PKS9  87.5 204   ePgC  13:15:41.40    0.66
                 eSg      15:53.40    0.47
```

22.

```
 2005-04-07  time: 13:36:20.45 UTC  ML= 0.7
   lat: 47.396N  lon: 18.376E  h= 10.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=280       rms=0.17
   Locality: Gánt
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKSG   1.2 112   iPgC  13:36:22.10   -0.14
                 eSg      36:24.20    0.55
BUD   49.8  79   ePg   13:36:29.60    0.08
PKS8  61.8 158   ePg   13:36:31.70    0.07
```

23.

```
 2005-04-08  time:  8:11:34.99 UTC  ML=
   lat: 48.535N  lon: 20.751E  h=  0.0 km
                 erh= 104km    erz=76.1km
   nr=  6        gap=171       rms=0.97
   Locality: Komjáti
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
CRVS  66.4  52   iPg    8:11:47.50    0.66
                 iSg      11:55.60   -0.48
PSZ   93.5 223   ePg    8:11:49.80   -1.89
                 eSg      12:04.60   -0.12
VYHS 141.5 268   iPn    8:12:00.90    1.23
                 iSn      12:18.20   -0.72
```

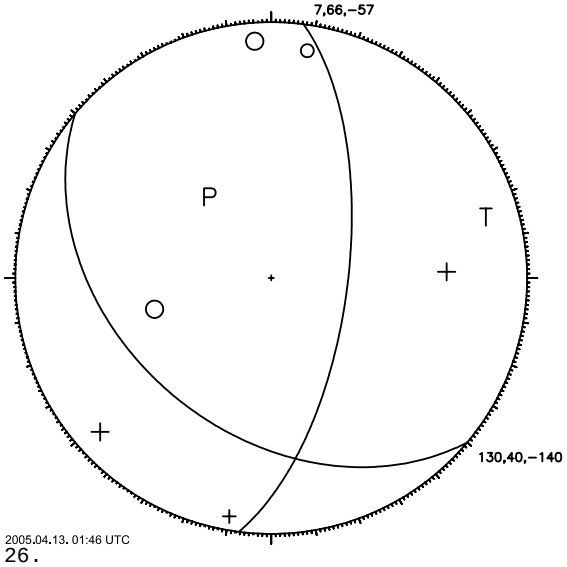
24.

```
 2005-04-09  time: 16:47:54.62 UTC  ML= 1.2
   lat: 46.911N  lon: 19.024E  h= 10.0 km
                 erh= 9.4km    erz=12.6km
   nr=  6        gap=203       rms=0.35
   Locality: Dunavecse
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKS7  18.4  35   ePgC  16:47:58.20   -0.16
                 eSg      48:01.00   -0.28
PKS8  26.7 262   iPgD  16:47:59.80    0.09
                 eSg      48:03.40   -0.29
PKS9  67.4 238   ePg   16:48:07.40    0.62
                 eSg      48:15.60   -0.67
```

25.

```
 2005-04-13  time:  1:46:12.83 UTC  ML= 1.2
   lat: 46.568N  lon: 18.176E  h= 10.0 km
                 erh= 2.3km    erz= 1.5km
   nr= 11        gap=181       rms=0.34
   Locality: Nagykónyi
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKS9   8.2  75   iPgD   1:46:15.40    0.26
                 eSg      46:17.10    0.16
PKS8  51.6  48   iPgC   1:46:21.90   -0.32
                 eSg      46:28.90   -0.64
RHK1  53.2 189   ePgD   1:46:22.40   -0.09
                 eSg      46:29.30   -0.73
RHK3  75.7 176   iPgD   1:46:26.30   -0.17
                 eSg      46:37.90    0.79
PKSG  93.1  10   ePgC   1:46:29.60    0.05
```

```
                 eSg      46:40.40   -2.19
PKS6 106.5  88   iP*C   1:46:32.30    0.45
                 eS*      46:46.50   -0.18
```



26.

```
 2005-04-13  time: 10:25:57.37 UTC  ML= 2.0
   lat: 47.907N  lon: 19.081E  h=  0.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=318       rms=0.24
   Locality: Nógrád
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PENC  19.8 131   iPgC  10:26:01.10    0.19
                 eSg      26:03.20   -0.47
PSZ   60.8  89   ePg   10:26:08.00   -0.23
                 eSg      26:16.80    0.09
```

27.

```
 2005-04-20  time:  8:18:06.33 UTC  ML=
   lat: 48.571N  lon: 20.789E  h=  0.0 km
                 erh= 1.9km    erz= 2.2km
   nr=  9        gap=153       rms=0.22
   Locality: Tornanádaska
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
KECS  24.4 247   ePg    8:18:10.60   -0.09
                 eSg      18:14.20    0.10
CRVS  61.7  53   ePg    8:18:17.70    0.36
                 eSg      18:26.00    0.07
PSZ   98.4 223   iPgC   8:18:24.00    0.11
                 eSg      18:37.50   -0.10
KOLS 116.3  70   eSg    8:18:43.00   -0.30
VYHS 144.5 267   ePn    8:18:31.10   -0.28
                 eSn      18:49.30   -1.62
```

28.

```
 2005-04-22  time: 10:52:23.21 UTC  ML=
   lat: 48.659N  lon: 20.658E  h=  0.0 km
                 erh= 5.7km    erz= 5.0km
   nr=  6        gap=163       rms=0.52
   Locality: Slovak Republic
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
CRVS  65.0  65   ePg   10:52:34.90    0.09
                 eSg      52:43.00   -0.86
PSZ  100.0 215   ePgC  10:52:41.30    0.24
                 eSg      52:54.40   -0.59
VYHS 135.7 262   ePn   10:52:47.90    0.74
                 eSn      53:05.30   -0.54
```

29.

```
 2005-04-23  time: 14:59:05.47 UTC  ML= 1.2
   lat: 47.559N  lon: 18.475E  h=  0.0 km
                 erh= 4.5km    erz= 844km
   nr=  6        gap=176       rms=0.49
   Locality: Tatabánya
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  19.6 199   ePgC  14:59:08.70   -0.28
                 eSg      59:12.00    0.29
VYHS 107.4  15   ePg   14:59:25.00    0.35
                 eSg      59:37.60   -2.01
PSZ  113.7  69   ePgC  14:59:26.00    0.22
                 eSg      59:41.50   -0.12
```

30.

```
 2005-04-26  time: 10:05:41.24 UTC  ML=
   lat: 48.602N  lon: 20.747E  h=  0.0 km
                 erh= 2.6km    erz= 2.0km
   nr=  6        gap=162       rms=0.35
   Locality: Slovak Republic
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
CRVS  62.3  58   ePg   10:05:52.50    0.14
                 eSg      06:00.50   -0.54
PSZ   98.9 220   ePgD  10:05:59.20    0.30
                 eSg      06:12.20   -0.47
VYHS 141.6 265   ePn   10:06:06.20    0.27
                 eSn      06:24.70   -0.48
```

31.

```
 2005-04-27  time: 10:52:44.93 UTC  ML= 2.0
   lat: 47.553N  lon: 16.439E  h=  2.3 km
                 erh= 6.1km    erz= 2.8km
   nr=  7        gap=212       rms=0.81
   Locality: Austria
   Comments:

sta   dist azm  phase  hr mn  sec     res
SOP   17.1  32   ePg   10:52:48.00   -0.01
                 eSg      52:49.70   -0.71
ARSA  76.8 244   iPgD  10:52:59.00    0.34
                 iSg      53:07.90   -1.47
MOA  166.4 281   iPnC  10:53:13.30    0.89
                 iSn      53:34.00    0.15
KBA  239.8 257   iPnC  10:53:22.70    1.14
```

32.

```
 2005-05-05  time:  7:56:24.18 UTC  ML= 1.0
   lat: 47.294N  lon: 18.137E  h=  0.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=282       rms=1.59
   Locality: Balinka
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  22.1  60   iPgC   7:56:27.30   -0.82
                 eSg      56:31.10   -0.09
PKS8  61.7 138   eSg    7:56:43.30   -0.51
PSZ  149.3  62   ePn    7:56:53.80    3.97
```

33.

2005-05-06 time: 11:11:32.82 UTC ML=
lat: 48.644N lon: 20.691E h= 0.0 km
erh=16.6km erz=14.1km
nr= 6 gap=160 rms=0.52
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
CRVS	63.5	63	ePg	11:11:44.30		0.14
			eSg	11:52.20		-0.81
PSZ	100.0	216	ePgC	11:11:50.50		-0.18
			eSg	12:04.50		-0.10
VYHS	137.9	263	ePn	11:11:58.00		0.96
			eSn	12:15.40		-0.54

34.

2005-05-13 time: 9:29:45.04 UTC ML= 2.0
lat: 45.919N lon: 18.650E h= 1.8 km
erh= 1.3km erz= 1.3km
nr= 8 gap=229 rms=0.17
Locality: Sátorhely
Comments:

sta	dist	azm	phase	hr mn	sec	res
RHK3	31.1	264	ePgC	9:29:50.70		0.10
			eSg	29:55.30		0.37
PKSM	32.6	359	ePgD	9:29:50.70		-0.17
			iSg	29:55.50		0.08
RHK1	48.9	294	ePgD	9:29:53.80		0.03
			eSg	30:00.10		-0.49
PKS2	77.1	34	ePgC	9:29:58.80		-0.02
			eSg	30:11.60		2.03
PKSG	165.0	353	eSn	9:30:33.80		0.03

35.

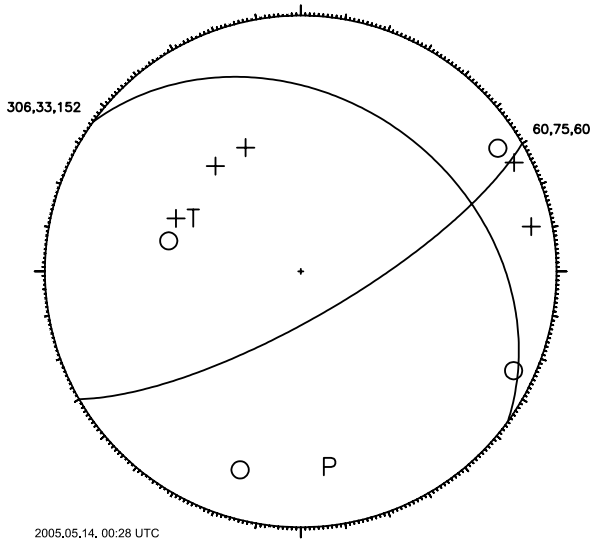
2005-05-13 time: 16:43:24.08 UTC ML=
lat: 48.186N lon: 18.728E h= 1.5 km
erh= ---km erz= ---km
nr= 4 gap=162 rms=0.06
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
PSZ	91.9	109	ePg	16:43:40.50		0.01
ZST	120.9	271	ePg	16:43:45.60		-0.07
			eSg	44:02.60		0.09
CRVS	216.9	68	ePn	16:43:58.00		0.03

36.

2005-05-14 time: 0:28:08.95 UTC ML= 2.5
lat: 46.245N lon: 16.160E h= 8.8 km
erh= 2.7km erz= 1.8km
nr= 29 gap=124 rms=0.86
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	23.6	17	iPgD	0:28:13.80		0.35
			iSg	28:17.50		0.54
GOLS	48.9	238	iPgD	0:28:18.10		0.29
			iSg	28:24.70		-0.03
DOBS	54.3	259	iPgC	0:28:18.80		0.02
GROS	56.0	295	iPgD	0:28:19.20		0.12
			iSg	28:26.50		-0.47
CRES	71.6	229	iPg	0:28:21.70		-0.13
			iSg	28:30.90		-0.98
LEGS	72.9	243	iPgC	0:28:22.10		0.03
BISS	91.1	299	iPg	0:28:24.70		-0.59
PERS	91.2	298	ePg	0:28:24.00		-1.30
PDKS	91.6	258	iPg	0:28:25.10		-0.28
BOJS	108.4	221	eP*	0:28:27.50		-0.86
VISS	113.5	244	iPn	0:28:28.60		-0.42
ARSA	121.9	336	iPnC	0:28:29.80		-0.26
			iSn	28:44.10		-2.43
OBKA	127.3	283	iPnD	0:28:31.40		0.66
			iSn	28:47.40		-0.34
LJU	128.1	260	ePn	0:28:31.90		1.07
CEY	145.6	247	iPn	0:28:34.90		1.88
RHK1	148.6	96	ePn	0:28:32.60		-0.80
			eSn	28:49.20		-3.27
VOJS	177.1	262	iPn	0:28:38.60		1.65
			eSn	29:00.80		2.01
CADS	187.2	269	ePn	0:28:40.40		2.19
MOA	229.2	321	iPnC	0:28:44.00		0.56
			iSn	29:10.40		0.06
KBA	234.5	293	iPnC	0:28:44.70		0.59
			iSn	29:18.90		7.37
KHC	374.9	329	ePn	0:29:03.40		1.79
			eSn	29:43.90		1.22



37.

2005-05-14 time: 20:05:30.01 UTC ML=
lat: 46.487N lon: 16.701E h= 10.0 km
erh= 2.9km erz= 2.8km
nr= 16 gap=131 rms=0.51
Locality: Zajk
Comments:

sta	dist	azm	phase	hr mn	sec	res
GOLS	98.5	238	iPg	20:05:47.60		-0.08
GCIS	109.2	231	iPn	20:05:49.10		-0.27
RHK1	114.3	112	iPnD	20:05:50.20		0.18
			eSn	06:04.60		-1.02
CRES	120.9	233	ePn	20:05:51.00		0.16
PKS9	121.6	85	iPnC	20:05:51.30		0.38
			eSn	06:07.90		0.67
BISS	122.0	278	ePn	20:05:50.40		-0.57
LEGS	122.4	241	iPn	20:05:50.90		-0.12
			eSn	06:05.70		-1.71
PERS	122.6	278	ePn	20:05:50.40		-0.65
ARSA	123.5	313	iPnC	20:05:51.30		0.13
			iSn	06:06.50		-1.17
PDKS	138.9	251	iPn	20:05:53.30		0.22
OBKA	165.2	271	iPnC	20:05:57.10		0.74
			iSn	06:17.80		0.88

38.

2005-05-14 time: 20:39:49.71 UTC ML= 2.2
lat: 46.465N lon: 16.669E h= 10.0 km
erh= 2.6km erz= 2.1km
nr= 32 gap=108 rms=0.75
Locality: Murarátka
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	32.2	267	iPgC	20:39:56.30		0.57
			eSg	40:01.30		0.88
GOLS	95.0	238	iPg	20:40:06.80		0.03
			eSg	40:19.20		-0.88
DOBS	98.8	249	iPg	20:40:07.20		-0.24
GCIS	105.7	231	iP*	20:40:08.40		-0.19
RHK1	115.7	111	iPnD	20:40:09.60		-0.29
			eSn	40:23.80		-1.83
CRES	117.5	233	iPn	20:40:10.20		0.09
LEGS	119.0	241	iPnC	20:40:10.30		0.00
BISS	120.0	280	iPn	20:40:09.90		-0.52
			eSn	40:25.20		-1.38
PERS	120.6	279	ePn	20:40:09.70		-0.79
			eSn	40:25.40		-1.31
ARSA	123.5	315	iPnC	20:40:10.60		-0.27
			iSn	40:26.10		-1.27
PKS9	124.3	84	ePn	20:40:11.30		0.34
			eSn	40:28.10		0.57
PDKS	135.8	252	iPn	20:40:12.40		0.01
RHK3	138.0	118	eSn	20:40:31.40		0.81
BOJS	153.1	226	iPn	20:40:15.00		0.44
PKSM	154.5	100	iPnC	20:40:13.90		-0.82
			eSn	40:34.80		0.57
VISS	159.4	243	iPn	20:40:15.40		0.06
OBKA	162.9	272	iPnD	20:40:16.00		0.23
			iSn	40:38.50		2.41
PKSG	166.8	52	iPnC	20:40:17.60		1.34
			eSn	40:41.60		4.63
PKS6	222.7	86	eSn	20:40:59.30		9.93
CADS	227.6	263	iPn	20:40:23.90		0.06
MOA	238.5	310	iPnC	20:40:25.10		-0.10
			iSn	40:53.10		0.21
KBA	262.9	285	iPnC	20:40:28.00		-0.24
			iSn	41:07.60		9.30
GEC2	346.0	320	ePn	20:40:40.20		1.59
KHC	376.2	322	ePn	20:40:43.70		1.34
			eSn	41:22.00		-1.44
PRU	422.5	338	ePn	20:40:48.60		0.46
			eSn	41:31.60		-2.12

39.

2005-05-14 time: 22:12:27.07 UTC ML= 2.1
lat: 46.474N lon: 16.647E h= 14.9 km
erh= 2.2km erz= 1.8km
nr= 30 gap=114 rms=0.60
Locality: Szemenyecsörnye
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	30.6	265	iPgC	22:12:33.20		0.05
			eSg	12:38.20		0.32
GROS	87.9	269	iP*	22:12:42.20		-0.61
GOLS	94.2	237	iP*	22:12:43.70		-0.05
			eS*	12:55.70		-1.06
DOBS	97.6	248	iP*	22:12:44.10		-0.18
GCIS	105.0	230	iPn	22:12:45.20		-0.10
CRES	116.8	232	iPnC	22:12:47.00		0.23
RHK1	117.7	111	iPnC	22:12:46.30		-0.58
			eSn	13:00.60		-1.72
LEGS	118.0	240	iPnC	22:12:47.20		0.28
BISS	118.1	279	ePn	22:12:46.80		-0.13
			eSn	13:02.10		-0.32
PERS	118.7	279	iPn	22:12:46.80		-0.21
			eSn	13:02.20		-0.35
ARSA	121.6	315	iPnD	22:12:47.50		0.13
			iSn	13:03.00		-0.20
PKS9	125.9	84	ePn	22:12:48.80		0.90
			eSn	13:05.50		1.36
PDKS	134.5	251	iPn	22:12:49.30		0.33
BOJS	152.6	225	ePn	22:12:52.20		0.96
VISS	158.4	242	iPn	22:12:52.20		0.24
OBKA	161.1	271	iPnD	22:12:52.80		0.51
			iSn	13:15.50		3.53
PKSG	167.5	52	ePn	22:12:54.60		1.51
			eSn	13:19.10		5.72
CADS	226.0	263	iPn	22:12:59.00		-1.38
SMOL	234.3	15	ePn	22:12:59.40		-2.02
MOA	236.6	310	iPnC	22:13:01.40		-0.31
			iSn	13:29.90		1.18
VYHS	278.7	36	ePn	22:13:06.10		-0.86
KHC	374.3	322	ePn	22:13:20.20		1.32
			eSn	13:58.20		-1.09

40.

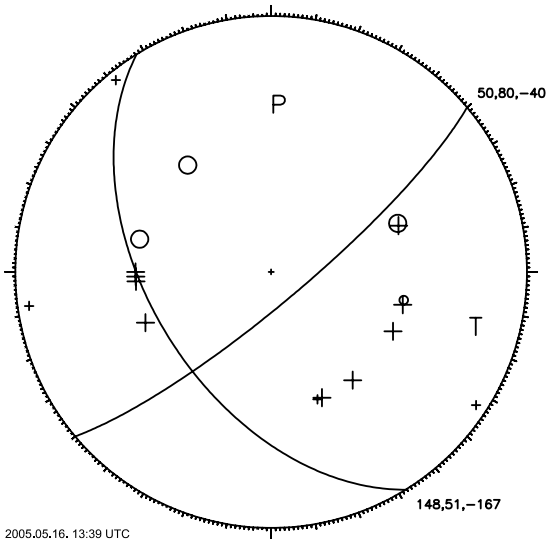
2005-05-15 time: 13:30:48.75 UTC ML= 3.5
lat: 47.323N lon: 17.444E h= 9.8 km
erh= 1.3km erz= 1.4km
nr= 60 gap= 48 rms=0.85
Locality: Pápa
Comments: felt 5 EMS

sta	dist	azm	phase	hr mn	sec	res
PKSG	71.9	84	ePgC	13:31:01.10		-0.61
			eSg	31:10.00		-1.82
SOP	77.8	301	iPgC	13:31:02.90		0.14
			eSg	31:13.40		-0.29
SRO	85.1	50	ePg	13:31:03.90		-0.16
			eSg	31:16.00		0.01
ZST	100.4	345	ePg	13:31:07.10		0.34
			eSg	31:20.10		-0.71
PKS9	103.6	142	ePgD	13:31:07.00		-0.34
			eSg	31:23.70		1.86
BEH	107.7	208	iPn	13:31:07.79		-0.17
			iSn	31:25.20		2.26
BUD	120.6	81	ePnC	13:31:09.50		-0.07
			eSn	31:24.50		-1.31
RHK5	129.5	71	iPnC	13:31:11.10		0.41
			eSn	31:27.40		-0.40
SMOL	132.4	359	ePn	13:31:11.20		0.16
			eSn	31:27.60		-0.83
KOGS	133.2	223	iPnD	13:31:10.40		-0.75
			eSn	31:28.20		-0.41
PKS7	133.7	103	ePnD	13:31:11.10		-0.11
			eSn	31:28.60		-0.12
VKA	134.5	321	iPnC	13:31:11.60		0.30
			iSn	31:27.30		-1.59
RHK6	141.5	74	ePnC	13:31:12.70		0.52
			eSn	31:31.20		0.75
RHK1	144.8	161	ePn	13:31:12.20		-0.39
ARSA	145.6	267	iPnC	13:31:13.20		0.51
			iSn	31:30.40		-0.95
PENC	147.7	69	ePnC	13:31:13.80		0.84
			eSn	31:31.60		-0.24
PKSM	153.7	143	iPnC	13:31:13.00		-0.70
			eSn	31:31.30		-1.86
KOLL	156.9	27	iPn	13:31:14.20		0.10
			eSn	31:33.20		-0.67
PKS2	163.4	124	ePnD	13:31:14.70		-0.21
			eSn	31:37.30		1.98
VYHS	166.7	39	iPn	13:31:15.60		0.28
			iSn	31:38.40		2.36
RHK3	171.1	159	iPnC	13:31:15.50		-0.37
			eSn	31:38.00		0.98
GROS	176.4	237	iPn	13:31:16.00		-0.53
PKSN	189.9	104	ePnC	13:31:18.20		-0.02
			eSn	31:44.30		3.10
PERS	192.9	247	iPn	13:31:18.60		0.01
PSZ	195.7	70	ePnD	13:31:19.50		0.56
			eSn	31:42.20		-0.29
DOBS	199.5	229	iPnD	13:31:18.90		-0.52
GOLS	201.7	224	iPnD	13:31:19.40		-0.29

```
                 eSn      31:52.20    8.39
LIKS 228.3  33   ePn   13:31:25.20    2.19
VRAC 229.6 344    Pn   13:31:23.70    0.54
PDKS 232.7 234   iPnD  13:31:23.50   -0.05
                 eSn      31:57.50    6.81
OBKA 238.4 248   iPnC  13:31:24.70    0.44
                 iSn      31:50.50   -1.46
MOA  246.1 284   iPnC  13:31:26.40    1.17
                 iSn      31:56.60    2.92
KECS 261.4  60   ePn   13:31:27.50    0.36
MORC 272.9   2    Pn   13:31:31.21    2.64
OKC  284.4  11   ePn   13:31:31.10    1.11
                 eSn      32:01.40   -0.76
KBA  311.8 265   iPnC  13:31:34.40    0.98
                 iSn      32:08.70    0.44
GEC2 326.2 301   ePn   13:31:36.40    1.19
                 eSn      32:24.60   13.16
DPC  346.5 346   ePn   13:31:38.20    0.45
                 eSn      32:15.30   -0.66
CRVS 346.9  60   ePn   13:31:38.70    0.91
KHC  350.6 305   ePn   13:31:39.40    1.15
                 eSn      32:27.10   10.24
PRU  365.5 324   ePn   13:31:40.30    0.19
                 eSn      32:19.10   -1.06
OJC  365.6  28   ePn   13:31:40.90    0.77
UPC  369.3 343   ePn   13:31:42.10    1.51
BZS  372.4 121    Pn   13:31:40.70   -0.27
WET  395.0 301   ePn   13:31:44.70    0.91
                 eSn      32:43.50   16.77
KSP  400.4 348   ePn   13:31:46.10    1.64
                 eSn      32:26.30   -1.61
KOLS 401.6  64   ePn   13:31:46.00    1.39
DRGR 404.5  98    Pn   13:31:43.07   -1.91
WTTA 439.4 269   iPnC  13:31:48.90   -0.42
                 iSn      32:36.80    0.24
SQTA 472.0 269   iPnC  13:31:54.50    1.11
                 iSn      32:42.90   -0.91
GRF  529.9 300   ePn   13:32:01.70    1.09
                 eSn      33:21.20   24.54
GRA1 529.9 300   ePn   13:32:01.70    1.09
                 eSn      33:21.20   24.54
CLL  548.3 324   iPn   13:32:03.80    0.89
MOX  564.4 311   ePn   13:32:05.90    0.99
DAVA 572.0 270   iPnC  13:32:06.80    0.94
                 iSn      33:05.20   -0.81
BURA 586.9  87    Pn   13:32:09.15    1.43
```

41.

```
 2005-05-16  time: 13:39:44.01 UTC  ML= 2.8
   lat: 47.298N  lon: 17.443E  h=  6.7 km
                 erh= 1.2km    erz= 1.3km
   nr= 45        gap= 64       rms=0.65
   Locality: Csót
   Comments: felt 5 EMS

sta   dist azm  phase  hr mn  sec     res
PKSG  72.3  82   ePgC  13:39:56.40   -0.59
                 eSg      40:04.60   -2.51
SOP   79.3 303   ePgC  13:39:58.40    0.17
                 eSg      40:08.60   -0.71
SRO   87.0  49   ePg   13:39:59.30   -0.30
                 eSg      40:11.00   -0.76
PKS9 101.4 141   ePgC  13:40:02.60    0.43
                 eSg      40:16.30   -0.02
ZST  103.1 346   ePg   13:40:02.70    0.23
                 eSg      40:16.10   -0.76
BUD  121.1  80   ePn   13:40:06.40    1.11
                 eSn      40:20.90   -0.98
RHK5 130.6  70   iPnC  13:40:06.50    0.04
                 eSn      40:23.10   -0.88
KOGS 131.1 224   ePn   13:40:06.50   -0.03
                 eSn      40:24.80    0.70
PKS7 133.1 102   ePnD  13:40:06.70   -0.09
                 eSn      40:24.80    0.25
SMOL 135.2 360   ePn   13:40:07.00   -0.05
                 eSn      40:24.20   -0.82
VKA  136.7 322   iPnD  13:40:07.80    0.57
                 iSn      40:25.80    0.47
RHK1 142.1 160   ePnC  13:40:07.50   -0.40
                 eSn      40:26.70    0.16
ARSA 145.4 268   iPnC  13:40:08.40    0.08
                 iSn      40:26.90   -0.37
PKSM 151.5 143   iPnC  13:40:08.50   -0.57
                 eSn      40:27.20   -1.42
RHK3 168.5 158   iPnC  13:40:10.90   -0.29
                 eSn      40:29.90   -2.49
VYHS 168.9  38   ePn   13:40:10.90   -0.35
GROS 174.8 238   ePn   13:40:11.60   -0.38
PKS6 179.1 116   iPnC  13:40:13.30    0.78
                 eSn      40:36.30    1.54
PKSN 189.3 104   iPnC  13:40:15.30    1.51
                 eSn      40:40.20    3.18
PERS 191.8 247   ePn   13:40:14.10    0.00
PSZ  196.8  69   iPnD  13:40:15.80    1.07
                 eSn      40:37.80   -0.88
OBKA 237.3 248   iPnC  13:40:19.50   -0.28
                 iSn      40:46.30   -1.38
MOA  246.8 284   iPnD  13:40:21.90    0.94
                 iSn      40:50.20    0.42
KECS 263.0  60   ePn   13:40:23.00    0.03
MORC 275.8   2   ePn   13:40:24.85    0.28
                 eSn      40:54.22   -1.99
VOY  306.0 243   ePn   13:40:28.30   -0.04
                 eSn      41:20.60   17.69
KBA  311.6 266   iPnC  13:40:28.60   -0.44
                 iSn      41:04.30    0.14
GEC2 327.7 302   ePn   13:40:32.50    1.46
CRVS 348.4  59   ePn   13:40:33.10   -0.53
                 eSn      41:26.50   14.17
DPC  349.3 346   ePn   13:40:34.70    0.96
                 eSn      41:11.00   -1.53
KHC  352.3 305   ePn   13:40:36.50    2.39
                 eSn      41:16.40    3.22
WET  396.5 301   ePn   13:40:40.20    0.57
WTTA 439.4 270   iPnC  13:40:45.50    0.53
                 iSn      41:30.90   -1.62
```



42.

```
 2005-05-17  time:  2:52:23.08 UTC  ML= 3.1
   lat: 46.755N  lon: 22.964E  h= 10.0 km
                 erh= 5.1km    erz= 9.2km
   nr=  9        gap=122       rms=0.64
   Locality: Romania
   Comments:
```

```
sta   dist azm  phase  hr mn  sec     res
BZS  163.8 219   iPnD   2:52:48.80   -0.46
BURA 195.7  61   iPnD   2:52:52.96   -0.29
                 iSn      53:16.87    0.10
VOIR 217.9 132   iPn    2:52:55.70   -0.31
MTUR 235.2 136    Pn    2:52:57.79   -0.38
PSZ  265.6 299   iPnD   2:53:02.80    0.84
                 iSn      53:31.80   -0.47
MLR  269.9 121   iPnD   2:53:04.30    1.80
PKSM 337.3 260    Pn    2:53:12.30    1.40
```

43.

```
 2005-05-25  time:  9:08:19.79 UTC  ML= 1.6
   lat: 47.492N  lon: 18.468E  h=  0.0 km
                 erh= 1.8km    erz= 1.3km
   nr=  5        gap=319       rms=0.76
   Locality: Szárliget
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  12.5 208   ePgC   9:08:22.70    0.04
                 eSg      08:23.30   -1.59
PKS8  69.9 167   ePg    9:08:31.60   -0.81
PKS9 101.6 188   ePgC   9:08:38.90    0.88
                 eSg      08:52.40    0.16
```

44.

```
 2005-05-26  time: 16:36:35.00 UTC  ML= 1.1
   lat: 47.570N  lon: 18.679E  h= 10.0 km
                 erh=10.9km    erz= 5.3km
   nr=  7        gap=243       rms=0.95
   Locality: Szomor
   Comments:

sta   dist azm  phase  hr mn  sec     res
BUD   27.7 110   eSg   16:36:43.70   -0.66
PKSG  29.4 228   iPgC  16:36:40.00   -0.55
                 eSg      36:44.50   -0.38
PKS8  76.9 180   ePgC  16:36:50.70    1.86
                 eSg      36:57.90   -1.74
PKS9 113.5 196   iPnC  16:36:55.10    0.20
                 eSn      37:10.30   -0.12
```

45.

```
 2005-05-30  time: 10:21:56.55 UTC  ML= 1.5
   lat: 45.580N  lon: 17.716E  h=  0.7 km
                 erh= 3.7km    erz= 2.4km
   nr=  8        gap=331       rms=0.57
   Locality: Croatia
   Comments:

sta   dist azm  phase  hr mn  sec     res
RHK3  54.0  51   iPgC  10:22:05.70   -0.50
                 eSg      22:14.10    0.38
RHK1  63.6  26   iPgC  10:22:07.70   -0.21
                 eSg      22:17.10    0.34
PKS9 120.1  21   ePg   10:22:17.80   -0.20
                 eSg      22:34.10   -0.64
PKS8 162.3  27   iPnC  10:22:24.70    0.97
                 eSn      22:46.40    1.46
```

46.

```
 2005-06-12  time: 13:57:53.44 UTC  ML= 0.6
   lat: 47.543N  lon: 18.266E  h=  0.0 km
                 erh= ***km    erz= ***km
   nr=  8        gap=130       rms=1.15
   Locality: Kömlőd
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  19.3 151   ePgC  13:57:57.20    0.31
                 eSg      57:59.80    0.23
PKS8  80.2 157   iPgC  13:58:08.70    0.94
                 eSg      58:18.30   -0.62
PKS9 106.3 179   eSg   13:58:24.70   -2.53
ZST  113.3 310   eSg   13:58:30.30    0.83
VYHS 114.0  22   ePg   13:58:13.70   -0.10
                 eSg      58:27.20   -2.47
```

47.

```
 2005-06-13  time:  9:07:11.01 UTC  ML=
   lat: 45.833N  lon: 18.421E  h=  0.0 km
                 erh= 1.5km    erz= 6.0km
   nr=  6        gap=273       rms=0.10
   Locality: Nagyharsány
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
RHK3  14.5 295   ePgC   9:07:13.50   -0.15
                 eSg      07:15.80    0.09
RHK1  39.7 317   ePg    9:07:18.20    0.08
                 eSg      07:23.60   -0.07
PKSM  45.4  22   iPgD   9:07:19.20    0.06
                 eSg      07:25.30   -0.17
```

48.

```
 2005-06-13  time: 18:38:31.00 UTC  ML= 1.1
   lat: 47.559N  lon: 18.334E  h= 10.0 km
                 erh=10.8km    erz=10.5km
   nr=  7        gap=141       rms=0.84
   Locality: Környe
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKSG  19.1 167   iPgD  18:38:34.70   -0.15
                 eSg      38:37.70   -0.15
PKS8  80.0 161   ePg   18:38:46.70    1.31
                 eSg      38:55.10   -1.52
VYHS 110.5  20   ePn   18:38:50.80    0.27
                 eSn      39:03.10   -2.66
ZST  116.2 308   eSn   18:39:07.20    0.16
```

49.

```
 2005-06-15  time: 22:36:43.12 UTC  ML= 2.0
   lat: 47.656N  lon: 19.624E  h= 10.0 km
                 erh= 3.0km    erz= 1.1km
   nr=  6        gap=265       rms=1.11
   Locality: Kerekharaszt
   Comments:

sta   dist azm  phase  hr mn  sec     res
PENC  29.7 300   iPgC  22:36:49.40    0.69
                 eSg      36:52.90   -0.17
PSZ   35.5  35   ePgD  22:36:50.60    0.90
                 eSg      36:54.50   -0.34
VYHS 110.1 328   ePnC  22:37:01.20   -1.40
                 eSn      37:12.60   -5.20
```

50.

```
 2005-06-16  time: 20:17:15.75 UTC  ML= 1.9
   lat: 45.890N  lon: 17.332E  h= 10.0 km
                 erh=19.5km    erz=12.3km
   nr=  8        gap=313       rms=1.28
   Locality: Croatia
   Comments:

sta   dist azm  phase  hr mn  sec     res
RHK1  61.7  68   ePg   20:17:27.90    0.99
                 eSg      17:34.70   -0.92
RHK3  71.4  90   ePg   20:17:29.30    0.67
                 eSg      17:38.10   -0.58
PKS9 106.5  43   iP*D  20:17:34.50   -0.26
                 eS*      17:46.50   -3.09
PKS8 150.9  43   iPn   20:17:38.70   -1.63
```

```
PKS7 190.5  48   eSn   20:18:11.30    3.02
```

51.

```
 2005-06-23  time:  6:46:18.72 UTC  ML= 2.1
   lat: 46.202N  lon: 19.842E  h= 10.0 km
                 erh=12.5km    erz= 6.6km
   nr=  9        gap=269       rms=1.41
   Locality: Mórahalom
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKS2  58.2 304   ePgC   6:46:31.00    1.73
                 eSg      46:37.70    0.21
PKSN  77.3   1   ePg    6:46:32.70    0.05
                 eSg      46:40.60   -2.91
PKSM  92.7 271   ePgC   6:46:35.30   -0.07
                 eSg      46:46.20   -2.16
PKS8 116.9 310   ePn    6:46:39.30    0.25
                 eSn      46:51.10   -3.81
PKSG 172.6 320   eSn    6:47:08.00    0.73
```

52.

```
 2005-06-23  time: 14:54:53.11 UTC  ML= 1.6
   lat: 46.866N  lon: 19.097E  h= 10.0 km
                 erh= 5.5km    erz=16.5km
   nr=  8        gap=248       rms=0.44
   Locality: Újsolt
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKS8  32.1 272   iPgC  14:54:59.40    0.28
                 eSg     55:03.40   -0.40
PKS9  69.8 244   iPgD  14:55:06.10    0.39
                 eSg     55:15.80    0.26
PKSG  79.3 317   ePgC  14:55:07.30   -0.09
                 eSg     55:16.40   -2.12
PKSM  80.7 206   ePgD  14:55:07.30   -0.33
                 eSg     55:17.80   -1.16
```

53.

```
 2005-06-29  time:  5:30:22.25 UTC  ML= 1.2
   lat: 47.478N  lon: 18.324E  h=  0.0 km
                 erh=10.6km    erz= 967km
   nr=  6        gap=330       rms=0.62
   Locality: Oroszlány
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  10.8 152   iPgC   5:30:23.60   -0.58
                 eSg      30:24.30   -1.38
PKS8  71.8 158   ePg    5:30:35.90    0.83
                 eSg      30:45.60    0.54
PKS9  99.1 182   iPgC   5:30:40.30    0.36
                 eSg      30:53.50   -0.25
```

54.

```
 2005-07-03  time: 13:57:01.93 UTC  ML= 1.9
   lat: 46.332N  lon: 19.712E  h=  6.4 km
                 erh= 5.9km    erz= 3.4km
   nr=  8        gap=287       rms=0.51
   Locality: Pusztamérges
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKS8  99.9 307   ePg   13:57:19.70   -0.10
                 eSg     57:32.20   -1.54
PKS9 113.6 284   iPgC  13:57:22.70    0.45
                 eSg     57:38.40    0.30
RHK3 123.1 246   ePnC  13:57:23.60    0.11
                 eSn     57:39.40   -0.91
PKSG 155.0 319   ePnC  13:57:27.00   -0.46
                 eSn     57:48.10    0.72
```

55.

```
  2005-07-07  time: 19:56:17.87 UTC  ML=

   lat: 48.405N  lon: 22.742E  h= 10.0 km
                 erh=20.4km    erz=    km
   Locality: Ukraine
   Comments:
     Reported by NEIC
```

56.

```
 2005-07-11  time:  7:40:33.68 UTC  ML= 0.7
   lat: 47.472N  lon: 18.360E  h=  0.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=354       rms=0.86
   Locality: Oroszlány
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG   9.3 166   ePgC   7:40:34.70   -0.63
                 eSg      40:35.40   -1.22
PKS8  70.2 160   ePgC   7:40:47.20    0.98
                 eSg      40:56.50    0.49
```

57.

```
 2005-07-11  time:  7:40:58.38 UTC  ML= 1.3
   lat: 47.480N  lon: 18.143E  h=  0.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=329       rms=0.93
   Locality: Császár
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  21.1 118   ePgC   7:41:02.50    0.35
                 eSg      41:03.40   -1.69
PKS8  78.2 149   ePgC   7:41:13.20    0.86
                 eSg      41:22.30   -0.92
```

58.

```
 2005-07-15  time:  6:24:04.20 UTC  ML= 0.7
   lat: 47.471N  lon: 18.392E  h=  0.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=341       rms=0.93
   Locality: Várgesztes
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG   8.8 181   ePgC   6:24:05.10   -0.66
                 eSg      24:05.60   -1.38
PKS8  69.3 162   ePgC   6:24:17.60    1.03
                 eSg      24:26.80    0.59
```

59.

```
 2005-07-17  time:  7:30:58.60 UTC  ML=
   lat: 45.562N  lon: 21.181E  h=  5.4 km
                 erh=13.2km    erz=11.7km
   nr= 11        gap=210       rms=0.81
   Locality: Romania
   Comments:

sta   dist azm  phase  hr mn  sec     res
BZS   34.6  80   iPg    7:31:04.00   -0.85
DRGR 180.7  41   iPnD   7:31:27.90    0.43
PKSM 209.9 290   ePnD   7:31:31.30    0.19
                 eSn      31:54.90   -1.57
PKS8 242.4 307   ePnD   7:31:35.70    0.54
                 eSn      32:00.70   -2.97
PKS9 251.7 297   ePn    7:31:36.80    0.48
PSZ  279.8 339   ePn    7:31:40.50    0.68
                  Sn      32:11.30   -0.67
```

```
PKSG 295.4 314   ePnC   7:31:42.70    0.93
                 eSn      32:12.90   -2.55

60.
```

```
 2005-07-17  time:  7:39:21.65 UTC  ML=
   lat: 45.515N  lon: 21.174E  h=  2.6 km
                 erh=14.0km    erz= 7.3km
   nr=  9        gap=220       rms=0.33
   Locality: Romania
   Comments:

sta   dist azm  phase  hr mn  sec     res
BZS   36.3  72   iPg    7:39:28.00   -0.15
DRGR 185.0  40   iPn    7:39:51.60    0.18
PKSM 211.4 291   iPn    7:39:54.70   -0.01
PKSM 211.4 291   ePnC   7:39:55.00    0.29
                 eSn      40:18.90   -1.60
PKS8 245.3 308   ePnC   7:39:59.30    0.37
                 eSn      40:24.40   -3.62
PKS9 253.8 298   ePnC   7:40:00.30    0.30
                 eSn      40:29.80   -0.11
PSZ  284.6 340   iPn    7:40:03.20   -0.63
PKSG 298.8 314   ePnD   7:40:05.90    0.29
                 eSn      40:49.60    9.70
MLR  372.9  90   iPn    7:40:22.90    8.06

61.
```

```
 2005-07-25  time:  3:06:58.24 UTC  ML= 4.1
   lat: 47.811N  lon: 16.286E  h= 10.0 km
                 erh= 2.3km    erz= 2.0km
   nr= 26        gap= 77       rms=0.76
   Locality: Austria
   Comments: felt 6 EMS in Austria

sta   dist azm  phase  hr mn  sec     res
SOP   24.9 125   iPgC   3:07:03.50    0.48
                 eSg      07:06.80    0.04
VKA   50.6   3   iPgD   3:07:07.60    0.15
                 iSg      07:14.10   -0.53
ZST   74.5  55   ePg    3:07:11.20   -0.47
                 eSg      07:21.10   -1.04
ARSA  84.7 223   iPgD   3:07:12.40   -1.07
                 iSg      07:23.00   -2.35
SMOL 115.5  47   ePn    3:07:17.90   -0.50
                 eSn      07:32.90   -1.23
MOA  151.3 272   iPnC   3:07:22.90    0.04
                 iSn      07:42.20    0.14
SRO  151.9  90   ePn    3:07:22.50   -0.43
PKSG 165.0 106   ePnC   3:07:24.40   -0.17
KOLL 179.1  62   iPn    3:07:25.90   -0.42
OBKA 195.6 222   iPnC   3:07:29.10    0.71
                 iSn      07:54.80    2.89
PKS9 203.3 132   ePn    3:07:30.10    0.76
VYHS 204.4  68   iPn    3:07:28.60   -0.89
PKS8 208.3 120   ePnC   3:07:30.00    0.04
BUD  208.9 100   ePnC   3:07:34.40    4.36
GEC2 223.5 301   ePn    3:07:32.40    0.54
PKS7 232.9 111   ePnC   3:07:39.30    6.26
KBA  236.3 250   iPnC   3:07:34.80    1.34
                 iSn      08:05.60    4.67
KHC  248.3 306   ePn    3:07:35.30    0.35
                 eSn      08:02.30   -1.29
LIKS 250.1  57   ePn    3:07:37.30    2.12
                 eSn      08:05.70    1.70
PKSM 252.3 135   ePnC   3:07:35.20   -0.26
                 eSn      08:01.10   -3.39
RHK3 261.1 145   ePnC   3:07:36.60    0.06
OKC  263.6  31   ePn    3:07:36.70   -0.17
VOY  268.9 223   ePn    3:07:41.70    4.18
                 eSn      08:16.20    8.04
PSZ  270.3  87   ePn    3:07:40.40    2.70
PRU  273.9 332   ePn    3:07:39.00    0.86
                 eSn      08:08.60   -0.67
DPC  282.5   1   ePn    3:07:38.50   -0.71
                 eSn      08:14.50    3.33
PKS6 282.5 118   ePn    3:07:39.10   -0.12
UPC  300.6 356   ePn    3:07:39.80   -1.67
                 eSn      08:20.30    5.10
KECS 321.4  77   ePn    3:07:43.60   -0.47
KSP  337.3   0   ePn    3:07:45.50   -0.55
WTTA 355.3 260   iPnC   3:07:50.20    1.90
                 iSn      08:40.10   12.76
WATA 358.3 262   iPnC   3:07:50.30    1.64
                 iSn      08:40.00   12.00
OJC  371.2  44   ePn    3:07:49.80   -0.48
FUR  376.0 276   ePn    3:07:52.00    1.12
BRG  380.8 333    Pn    3:07:52.85    1.38
SQTA 388.0 260   iPnC   3:07:53.50    1.13
                 iSn      08:50.20   15.60
NKC  389.1 314   ePn    3:07:53.40    0.89
                 eSn      08:44.70    9.86
MOTA 393.3 262   iPnC   3:07:54.10    1.07
                 iSn      08:51.10   15.33
CRVS 402.3  72   ePn    3:07:54.20    0.04
GRF  427.1 299   ePn    3:07:57.80    0.55
GRA1 427.1 299   ePn    3:07:57.80    0.55
CLL  455.8 329   iPn    3:08:02.20    1.38
                 eSn      08:49.00   -0.64
MOX  463.8 313   ePn    3:08:04.30    2.47
DAVA 485.7 263   iPnD   3:08:05.50    0.95
                 iSn      09:17.70   21.42
KWP  514.1  67   ePn    3:08:08.90    0.80
TOD  585.7 290    Pn    3:08:16.90   -0.13
                  Sn      09:07.90  -10.59
FELD 620.0 271    Pn    3:08:20.60   -0.70
LANF 641.4 282    Pn    3:08:21.60   -2.36
BBS  660.7 267    Pn    3:08:25.40   -0.97
WLS  668.5 276    Pn    3:08:26.70   -0.65
CDF  674.2 276   ePn    3:08:27.50   -0.57
ECH  682.5 274    Pn    3:08:28.10   -0.99
MOF  685.3 270    Pn    3:08:28.70   -0.74
HINF 706.5 270   ePn    3:08:31.00   -1.08
                 eSn      09:38.80   -6.48
HAU  743.3 272   ePn    3:08:36.10   -0.57
                 eSn      09:46.30   -7.15
LPG  773.8 251   ePn    3:08:41.60    1.12
                 eSn      09:53.20   -7.02
LPL  774.4 251   ePn    3:08:41.60    1.05
                 eSn      09:54.00   -6.35
CABF 784.0 260   ePn    3:08:40.00   -1.75
                 eSn      09:54.40   -8.10
RFYF 808.6 276   ePn    3:08:44.90    0.09
                 eSn      10:46.70   38.76
MBDF 809.6 245   ePn    3:08:44.10   -0.84
SFTF 840.4 273   ePn    3:08:47.60   -1.18
                 eSn      10:55.50   40.49
ORIF 862.9 248   ePn    3:08:52.10    0.51
                 eSn      10:12.20   -7.80
GIVF 877.3 287   ePn    3:08:51.10   -2.29
                 eSn      10:14.80   -8.40
FRF  887.1 238   ePn    3:08:52.50   -2.11
BAIF 919.6 286   ePn    3:08:57.60   -1.06

62.
```

```
 2005-07-25  time: 10:14:24.07 UTC  ML= 1.2
   lat: 47.577N  lon: 18.537E  h=  0.0 km
                 erh= ---km    erz= ---km
   nr=  4        gap=324       rms=1.51
   Locality: Tarján
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG  23.3 208   iPgC  10:14:27.90   -0.34
                 eSg      14:28.40   -3.09
PKS8  78.3 172   ePgC  10:14:40.30    2.24
                 eSg      14:48.70   -0.28
```

63.

2005-07-28 time: 17:01:00.20 UTC ML= 1.0
lat: 47.568N lon: 18.434E h= 10.0 km
erh=21.8km erz=14.9km
nr= 7 gap=152 rms=1.05
Locality: Tatabánya
Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	19.8	189	ePgC	17:01:03.20	-0.96
			eSg	01:06.20	-1.05
SRO	28.8	342	eSg	17:01:11.10	1.21
PKS8	78.7	167	ePgC	17:01:15.20	0.82
			eSg	01:26.80	1.37
VYHS	107.3	16	eP*	17:01:19.50	0.16
			eS*	01:32.10	-2.16

64.

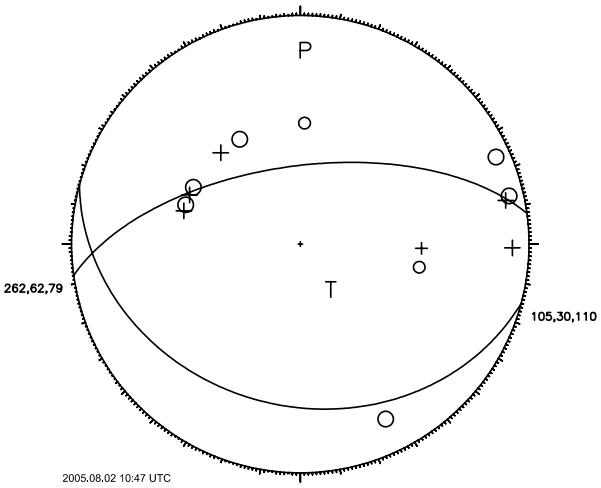
2005-07-29 time: 16:04:27.37 UTC ML=
lat: 48.398N lon: 19.058E h= 0.0 km
erh= 4.3km erz= 5.6km
nr= 7 gap=162 rms=0.74
Locality: Slovak Republic
Comments: explosion

sta	dist	azm	phase	hr mn sec	res
KOLL	52.5	293	ePg	16:04:36.90	0.16
			eSg	04:43.30	-0.75
PSZ	81.9	131	ePgD	16:04:42.10	0.10
			eSg	04:52.60	-0.81
KECS	106.0	85	ePg	16:04:46.60	0.30
			eSg	04:59.80	-1.27
CRVS	185.7	72	eSn	16:05:23.10	1.99

65.

2005-08-02 time: 10:47:34.82 UTC ML= 2.5
lat: 46.140N lon: 16.467E h= 11.1 km
erh= 2.2km erz= 1.6km
nr= 38 gap=132 rms=0.80
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn sec	res
KOGS	38.1	334	iPgD	10:47:42.10	0.20
			iSg	47:47.30	-0.13
GOLS	66.8	258	iPgC	10:47:47.00	0.09
			iSg	47:56.90	0.56
GCIS	73.3	245	iPg	10:47:48.00	-0.05
			iSg	47:58.20	-0.17
DOBS	77.1	271	iPgC	10:47:48.60	-0.14
			iSg	47:58.60	-0.99
CESS	79.9	257	iPg	10:47:49.50	0.27
			iSg	48:01.10	0.64
CRES	85.7	246	iPgD	10:47:50.10	-0.16
			iSg	48:01.30	-1.00
LEGS	91.5	257	iPgD	10:47:51.20	-0.08
			iSg	48:03.70	-0.42
PDKS	113.8	267	iPn	10:47:54.70	0.08
PERS	117.6	298	iPnD	10:47:54.60	-0.49
			eSn	48:10.20	-0.70
BOJS	118.0	233	iPn	10:47:55.50	0.36
			eSn	48:11.60	0.61
RHK1	124.2	92	ePnC	10:47:54.60	-1.31
VISS	131.7	253	iPn	10:47:57.80	0.95
RHK3	141.1	101	ePnD	10:47:56.80	-1.22
			eSn	48:15.20	-0.91
ARSA	143.0	330	iPnD	10:47:58.70	0.44
			iSn	48:14.30	-2.24
LJU	150.4	266	iPn	10:48:00.50	1.32
			iSn	48:17.70	-0.49
OBKA	153.3	286	iPnC	10:48:00.00	0.45
			iSn	48:18.40	-0.43
SOP	171.7	2	ePnD	10:48:03.90	2.07
			eSn	48:19.50	-3.40
VOY	199.4	267	ePn	10:48:07.80	2.50
			eSn	48:35.00	5.93
PKSG	202.3	47	ePn	10:48:07.90	2.24
			eSn	48:32.50	2.79
ZST	233.6	12	ePn	10:48:09.10	-0.45
MOA	253.2	319	iPnC	10:48:12.50	0.49
			iSn	48:39.80	-1.21
KBA	260.9	294	iPnC	10:48:13.90	0.93
			iSn	48:49.30	6.58
KOLL	308.0	28	ePn	10:48:18.10	-0.73
VYHS	317.1	34	ePn	10:48:19.20	-0.77
WTTA	390.0	289	iPnD	10:48:31.30	2.24
			iSn	49:10.70	-0.66
KHC	397.1	327	ePn	10:48:31.50	1.56
			eSn	49:10.80	-2.14
KECS	400.2	49	ePn	10:48:30.00	-0.33
MORC	412.2	11	ePn	10:48:31.69	-0.14
			eSn	49:13.98	-2.32
PRU	451.3	341	ePn	10:48:37.40	0.70
NKC	544.4	327	ePn	10:48:48.80	0.48
			eSn	49:42.80	-2.84
MOX	616.5	324	ePn	10:48:58.40	1.10
			eSn	50:31.90	30.26
CLL	628.6	336	iPn	10:48:59.50	0.69
			eSn	50:38.00	33.68



66.

2005-08-02 time: 13:37:41.55 UTC ML=
lat: 46.134N lon: 16.536E h= 8.1 km
erh= 2.1km erz= 1.7km
nr= 17 gap=155 rms=0.49
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn sec	res
KOGS	41.3	328	iPgD	13:37:49.60	0.53
			iSg	37:54.70	-0.23
GOLS	71.9	259	iPg	13:37:54.60	0.13
			iSg	38:04.70	0.15
GCIS	77.9	247	iPg	13:37:55.40	-0.13
DOBS	82.5	271	iPg	13:37:56.00	-0.35
CESS	84.9	258	iSg	13:38:08.60	-0.07
CRES	90.3	248	iPg	13:37:58.10	0.36
LEGS	96.5	258	iPg	13:37:58.60	-0.25
			iSg	38:11.60	-0.75
RHK1	118.8	92	ePnD	13:38:01.70	-0.67
			eSn	38:17.60	-1.01
PDKS	119.1	267	iPn	13:38:03.00	0.59
ARSA	146.3	328	iPnC	13:38:06.00	0.20
			iSn	38:23.80	-0.91
OBKA	158.6	285	iPnC	13:38:08.90	1.56
			iSn	38:27.80	0.35

67.

2005-08-07 time: 22:13:11.57 UTC ML= 1.0
lat: 47.312N lon: 18.250E h= 10.0 km
erh= 7.9km erz= 4.2km
nr= 8 gap=224 rms=0.57
Locality: Fehérvárcsurgó
Comments:

sta	dist	azm	phase	hr mn	sec	res
PKSG	13.9	50	iPgD	22:13:14.50		-0.12
			eSg	13:17.60		0.60
PKS8	58.0	146	iPgD	22:13:21.40		-0.68
			eSg	13:33.10		2.82
PKS9	80.6	178	ePgC	22:13:26.80		0.73
			eSg	13:37.10		-0.28
RHK1	135.9	186	ePnC	22:13:34.60		0.32
			eSn	13:51.40		-0.59

68.

2005-08-15 time: 13:12:08.01 UTC ML= 0.4
lat: 47.481N lon: 18.708E h= 0.0 km
erh= ***km erz= ***km
nr= 5 gap=295 rms=0.92
Locality: Herceghalom
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
PKSG	25.9	247	ePgC	13:12:12.90		0.26
			eSg	12:14.60		-1.65
PKS8	67.1	182	ePg	13:12:19.10		-0.89
			eSg	12:30.10		0.77
PKS9	104.7	198	ePgC	13:12:27.70		1.00

69.

2005-08-19 time: 10:54:47.35 UTC ML= 1.8
lat: 45.504N lon: 18.084E h= 6.2 km
erh= 5.8km erz= 2.8km
nr= 9 gap=330 rms=0.48
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
RHK3	44.7	17	ePgD	10:54:55.60		0.19
			eSg	55:01.10		-0.59
RHK1	65.7	359	ePgD	10:54:58.90		-0.23
			eSg	55:08.40		0.08
PKSM	89.8	29	ePgC	10:55:03.30		-0.12
			eSg	55:16.50		0.54
PKS9	121.3	7	ePnC	10:55:09.10		0.39
			eSn	55:26.40		1.02
PKS8	159.5	17	ePn	10:55:12.50		-0.97

70.

2005-08-19 time: 13:06:34.40 UTC ML=
lat: 46.173N lon: 16.008E h= 0.9 km
erh= 4.1km erz= 4.2km
nr= 10 gap=239 rms=0.32
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
GOLS	34.7	239	ePg	13:06:40.80		0.20
			eSg	06:46.70		1.26
KOGS	35.8	31	iSg	13:06:46.60		0.81
DOBS	41.7	266	ePg	13:06:41.60		-0.24
			eSg	06:47.80		0.15
GCIS	46.3	222	ePg	13:06:42.30		-0.36
			eSg	06:49.00		-0.10
CRES	57.5	228	ePg	13:06:44.60		-0.06
			iSg	06:52.70		0.03
LEGS	58.9	245	iPg	13:06:44.90		-0.02
			eSg	06:53.00		-0.13
PDKS	78.8	262	ePg	13:06:48.00		-0.46
			eSg	06:59.70		0.26
JAVS	79.4	247	eSg	13:07:20.10		20.46
VISS	99.5	246	ePg	13:06:53.00		0.83
OBKA	118.4	288	iPgC	13:06:55.40		-0.14
			iSg	07:09.20		-2.82
ARSA	125.4	343	iPgC	13:06:56.90		0.12
			iSg	07:12.10		-2.15
KNDS	145.6	240	ePn	13:06:59.70		0.23
RHK1	159.7	93	ePn	13:07:06.50		5.26

71.

2005-08-19 time: 15:50:24.23 UTC ML= 1.2
lat: 47.575N lon: 18.405E h= 0.0 km
erh= ***km erz= ***km
nr= 7 gap=148 rms=1.11
Locality: Tatabánya
Comments: explosion

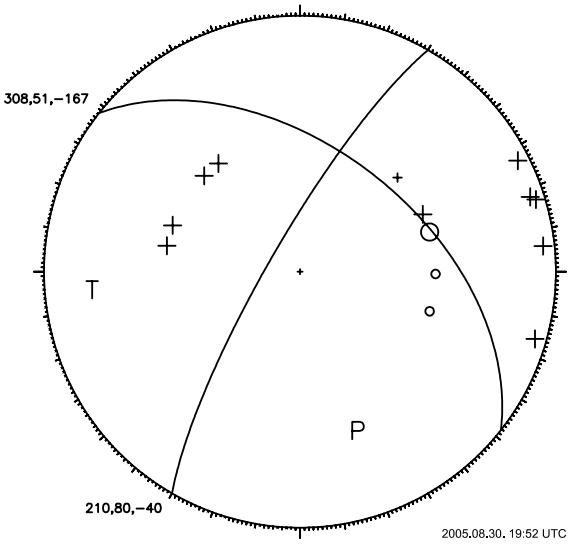
sta	dist	azm	phase	hr mn	sec	res
PKSG	20.4	183	ePgC	15:50:27.50		-0.36
			eSg	50:30.50		-0.20
PKS8	80.1	165	ePg	15:50:40.60		2.07
			eSg	50:47.50		-2.18
VYHS	107.2	17	ePg	15:50:43.80		0.43
			eSg	50:56.90		-1.40
ZST	119.4	305	eSg	15:51:02.20		0.01

72.

2005-08-30 time: 19:52:21.30 UTC ML= 2.3
lat: 46.234N lon: 16.640E h= 8.0 km
erh= 3.4km erz= 3.8km
nr= 19 gap=102 rms=0.55
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
PTJ	64.6	235	iPg	19:52:32.62		-0.30
			iSg	52:40.69		-1.29
ZAG	67.3	228	iPg	19:52:33.65		0.24
			iSg	52:42.07		-0.78
GOLS	82.4	252	iPgC	19:52:36.00		-0.08
			iSg	52:48.50		0.90
SISC	87.4	194	iPg	19:52:38.30		1.33
			iSg	52:48.59		-0.59
GCIS	89.8	243	iPgC	19:52:36.90		-0.51
			iSg	52:49.20		-0.77
DOBS	90.9	264	iPgC	19:52:37.40		-0.20
			iSg	52:50.10		-0.21
GROS	91.2	286	iPgC	19:52:37.60		-0.05
CRES	102.3	244	iPg	19:52:39.30		-0.32
			iSg	52:52.70		-1.20
LEGS	107.1	253	iPgC	19:52:39.80		-0.68
RHK1	111.7	98	ePn	19:52:41.20		-0.04
			eSn	52:55.00		-1.78
PDKS	128.1	262	iPn	19:52:43.30		0.02
RHK3	130.5	107	ePnD	19:52:43.40		-0.19
			eSn	53:00.20		-0.77
PKS9	131.9	73	iPnD	19:52:43.70		-0.07
			eSn	53:03.30		2.01
ARSA	141.6	323	iPnC	19:52:45.90		0.93
			iSn	53:03.10		-0.33
PKSM	154.4	91	ePnD	19:52:46.30		-0.27
			eSn	53:08.00		1.73
OBKA	163.8	281	iPnC	19:52:48.00		0.26
			iSn	53:08.40		0.04
PKS8	171.8	65	iPnC	19:52:48.10		-0.63
			eSn	53:13.10		2.97
PKSG	185.5	46	ePnC	19:52:54.30		3.86
			eSn	53:18.70		5.53
PKS7	213.1	65	eSn	19:53:25.30		6.00
VOY	213.5	264	ePn	19:52:57.80		3.87
			eSn	53:19.10		-0.28
ZST	220.9	9	eSn	19:53:26.70		5.67

PKS6	228.5	80	eSn	19:53:30.60	7.89
MOA	254.6	315	iPnC	19:53:00.90	1.84
			iSn	53:29.90	1.40
KBA	269.2	290	iPnC	19:53:00.70	-0.17
			iSn	53:40.80	9.06
HVAR	340.0	183	iPn	19:53:10.00	0.30
			Sn	53:40.69	-6.77
KHC	395.7	324	ePn	19:53:18.80	2.14



73.

2005-09-20 time: 10:53:28.71 UTC ML= 1.9
lat: 47.871N lon: 19.385E h= 0.0 km
erh= 9.4km erz=21.8km
nr= 6 gap=138 rms=0.76
Locality: Nógrádkövesd
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
PENC	11.9	221	ePgC	10:53:31.30		-0.18
			eSg	53:34.60		0.96
PSZ	38.5	82	iPgD	10:53:35.50		-0.31
			eSg	53:41.00		-0.35
VYHS	80.3	329	ePg	10:53:44.60		1.43
			eSg	53:53.00		-1.45

74.

2005-09-20 time: 13:27:10.77 UTC ML= 1.0
lat: 47.734N lon: 18.707E h= 10.0 km
erh=11.6km erz=42.9km
nr= 6 gap=175 rms=0.61
Locality: Dorog
Comments:

sta	dist	azm	phase	hr mn	sec	res
PKSG	44.9	212	iPgD	13:27:19.00		0.02
			eSg	27:25.10		-0.28
VYHS	85.1	6	ePg	13:27:27.10		1.04
			eSg	27:36.50		-1.49
PKS8	95.1	181	ePgC	13:27:27.80		-0.05
			eSg	27:40.60		-0.57

75.

2005-09-22 time: 13:05:09.38 UTC ML= 0.9
lat: 47.570N lon: 18.572E h= 0.0 km
erh= 3.2km erz= 1.5km
nr= 5 gap=320 rms=0.70
Locality: Gyermely
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
PKSG	24.1	215	ePgC	13:05:14.40		0.35
			eSg	05:16.10		-1.58
PKS8	77.3	174	eSg	13:05:34.50		0.34
PKS9	111.6	192	iPnC	13:05:29.10		0.05
			eSn	05:41.50		-2.89

76.

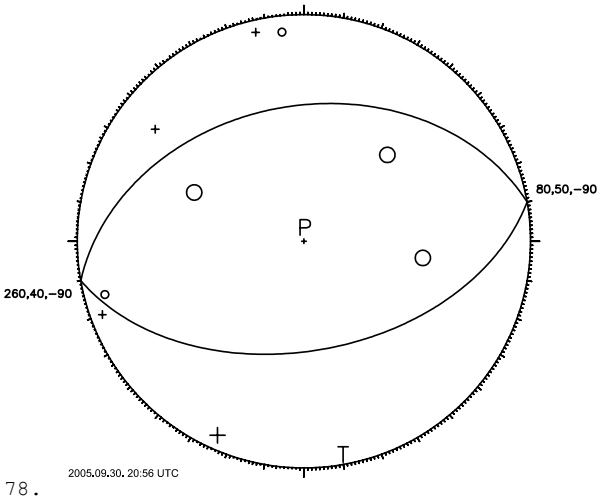
2005-09-23 time: 7:45:27.98 UTC ML= 1.5
lat: 47.467N lon: 18.347E h= 0.0 km
erh= 7.7km erz=22.6km
nr= 5 gap=335 rms=0.77
Locality: Oroszlány
Comments: explosion

sta	dist	azm	phase	hr mn	sec	res
PKSG	9.0	158	ePgC	7:45:28.90		-0.69
			eSg	45:29.80		-1.05
PKS8	70.0	159	ePgC	7:45:41.60		1.12
PKS9	98.0	183	ePgC	7:45:45.80		0.33
			eSg	45:58.70		-0.42

77.

2005-09-30 time: 20:56:38.44 UTC ML= 2.3
lat: 46.748N lon: 17.972E h= 10.0 km
erh= 1.6km erz= 1.8km
nr= 28 gap= 82 rms=0.70
Locality: Szólád
Comments: felt 4 EMS

sta	dist	azm	phase	hr mn	sec	res
PKS9	29.5	127	ePgC	20:56:44.90		0.89
			eSg	56:48.70		0.35
PKS8	55.7	75	ePgD	20:56:48.90		0.36
			eSg	56:56.60		0.18
RHK1	73.0	174	ePgD	20:56:51.90		0.30
			eSg	57:01.10		-0.77
PKSG	78.3	24	iPgC	20:56:52.00		-0.53
			eSg	57:01.90		-1.63
PKSM	78.7	139	iPg	20:56:52.51		-0.10
			iSg	57:02.90		-0.76
PKS7	96.5	70	ePgC	20:56:56.10		0.34
			eSg	57:09.50		0.23
BEH	96.7	251	iPg	20:56:56.68		0.88
			iSg	57:08.50		-0.85
RHK3	98.0	167	ePgC	20:56:56.40		0.37
			eSg	57:08.60		-1.14
BUD	114.3	44	iPnD	20:56:58.74		0.30
			iSn	57:13.10		-0.94
SRO	121.2	12	ePn	20:57:00.50		1.20
			eSn	57:16.00		0.42
PKS6	123.0	98	iPnD	20:56:59.40		-0.13
			eSn	57:16.40		0.43
ARSA	194.5	287	ePn	20:57:08.51		0.07
PSZ	195.0	48	ePn	20:57:10.30		1.79
			iSn	57:35.70		3.73
VYHS	204.7	19	ePn	20:57:10.36		0.65
			iSn	57:32.00		-2.11
KOLL	206.1	9	eSn	20:57:33.20		-1.22
CRES	219.3	242	ePn	20:57:11.63		0.09
MOA	305.9	294	iPnD	20:57:23.50		1.17
			iSn	57:57.00		0.43
KHC	421.9	309	ePn	20:57:37.90		1.10
			eSn	58:34.50		12.19



78.

2005-10-04 time: 9:16:44.95 UTC ML= 1.3
lat: 47.852N lon: 18.384E h= 0.3 km
erh= ***km erz= ***km
nr= 5 gap=289 rms=1.54
Locality: Slovak Republic
Comments:

sta	dist	azm	phase	hr mn sec	res
PKSG	51.2	179	ePgC	9:16:54.40	0.30
			eSg	16:58.80	-2.43
RHK5	54.3	108	ePgC	9:16:54.70	0.05
			eSg	16:59.80	-2.42
BUD	63.1	130	eSg	9:17:07.00	1.97

79.

2005-10-05 time: 16:24:30.58 UTC ML=
lat: 46.199N lon: 16.000E h= 12.6 km
erh= 4.6km erz= 3.9km
nr= 12 gap=243 rms=0.51
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn sec	res
GOLS	35.8	234	iPgD	16:24:37.30	-0.06
			iSg	24:43.00	0.36
DOBS	41.4	262	iPg	16:24:38.20	-0.10
			iSg	24:44.70	0.38
CRES	59.0	225	iPg	16:24:41.30	-0.05
			iSg	24:49.10	-0.66
LEGS	59.7	242	iPg	16:24:41.20	-0.27
			iSg	24:49.20	-0.76
PDKS	78.6	260	iPg	16:24:44.70	-0.09
VISS	100.2	244	iP*	16:24:49.60	1.21
ARSA	122.4	343	Pn	16:24:51.40	0.14
			Sn	25:06.90	-0.49
RHK1	160.5	94	ePnC	16:25:04.20	8.19

80.

2005-10-11 time: 11:47:17.97 UTC ML=
lat: 48.374N lon: 19.840E h= 4.5 km
erh= 1.1km erz= 1.5km
nr= 8 gap=144 rms=0.20
Locality: Slovak Republic
Comments:

sta	dist	azm	phase	hr mn sec	res
KECS	49.3	76	ePg	11:47:26.80	-0.01
			eSg	47:33.40	-0.31
PSZ	50.8	175	iPgC	11:47:27.10	0.02
			eSg	47:34.20	0.01
VYHS	75.4	280	ePg	11:47:31.80	0.33
			eSg	47:41.40	-0.59
CRVS	133.2	64	ePn	11:47:40.90	-0.13
			eSn	47:59.20	0.18

81.

2005-10-14 time: 9:51:25.86 UTC ML=
lat: 47.970N lon: 20.000E h= 10.0 km
erh=12.0km erz= 7.7km
nr= 5 gap=202 rms=0.35
Locality: Mátraballa
Comments:

sta	dist	azm	phase	hr mn sec	res
PSZ	9.7	234	ePgC	9:51:27.90	-0.45
			eSg	51:30.80	0.50
KECS	67.5	32	eSg	9:51:47.70	0.13
VYHS	104.3	304	eP*	9:51:44.80	0.26
			eS*	51:58.70	-0.40

82.

2005-10-16 time: 16:09:55.90 UTC ML= 1.5
lat: 47.446N lon: 19.503E h= 17.9 km
erh= 2.1km erz= 2.0km
nr= 16 gap=126 rms=0.61
Locality: Sülysáp
Comments:

sta	dist	azm	phase	hr mn sec	res
BUD	36.4	277	ePgC	16:10:03.60	0.45
			eSg	10:08.00	-0.79
RHK5	42.9	311	ePgC	16:10:04.90	0.69
			eSg	10:11.20	0.52
PKS7	51.3	210	iPgC	16:10:05.60	-0.01
			eSg	10:12.00	-1.18
PSZ	60.2	29	iPgD	16:10:07.00	-0.12
			eSg	10:15.00	-0.86
PKSN	66.9	156	eP*D	16:10:08.50	0.34
			eS*	10:18.10	0.38
PKSG	84.2	266	eP*C	16:10:09.00	-1.78
			eS*	10:22.20	-0.18
PKS8	88.9	225	eP*C	16:10:12.40	0.90
			eS*	10:23.70	0.03
PKSM	152.1	206	ePnC	16:10:19.60	-0.02
			eSn	10:37.60	-0.52

83.

2005-10-28 time: 10:41:07.42 UTC ML= 1.6
lat: 45.533N lon: 17.714E h= 1.3 km
erh= 6.6km erz= 199km
nr= 5 gap=334 rms=0.14
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn sec	res
RHK3	57.6	47	iPgC	10:41:17.60	-0.10
			eSg	41:26.00	0.27
RHK1	68.4	24	iPgC	10:41:19.60	-0.03
			eSg	41:28.80	-0.35
PKS9	125.0	20	iPgC	10:41:29.90	0.15

84.

2005-11-07 time: 15:25:17.22 UTC ML= 2.5
lat: 45.605N lon: 16.647E h= 5.6 km
erh= 5.2km erz= 4.3km
nr= 14 gap=209 rms=0.67
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn sec	res
GCIS	85.7	290	iPg	15:25:32.30	-0.25
			iSg	25:43.90	-0.61
GOLS	91.4	300	iPg	15:25:34.70	1.12

```
                 eSg      25:47.30    0.97
CRES  95.8 285   iPg   15:25:34.20   -0.15
                 iSg      25:46.70   -1.01
KOGS  98.6 342   iPg   15:25:34.90    0.05
DOBS 109.6 303   iPg   15:25:36.90    0.08
                 iSg      25:51.90   -0.21
RHK1 123.4  64   ePnD  15:25:38.90   -0.02
RHK3 128.8  76   ePnD  15:25:39.90    0.30
                 eSn      25:55.50   -1.56
OBKA 190.9 302    Pn   15:25:51.20    3.86
                  Sn      26:12.40    1.56
```

85.

```
 2005-11-07  time: 15:38:02.04 UTC  ML= 1.1
   lat: 47.551N  lon: 18.370E  h= 11.1 km
                 erh= 2.1km    erz= 1.3km
   nr=  8        gap=132       rms=0.31
   Locality: Környe
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKSG  17.8 175   iPgD  15:38:05.70   -0.09
                 eSg      38:08.60   -0.11
SRO2  23.6   4   eSg   15:38:09.90   -0.42
SRO   29.4 352   eSg   15:38:12.70    0.66
BUD   49.8  99   ePgC  15:38:11.20    0.05
VYHS 110.4  18   ePn   15:38:21.50    0.07
                 eSn      38:34.60   -1.95
ZST  118.9 307   eSn   15:38:38.40   -0.03
```

86.

```
 2005-11-09  time: 13:13:31.11 UTC  ML=
   lat: 48.271N  lon: 19.837E  h=  0.0 km
                 erh= 5.7km    erz= 9.5km
   nr=  6        gap=131       rms=0.36
   Locality: Slovak Republic
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PSZ   39.4 174   iPgC  13:13:38.10   -0.05
                 eSg      13:43.60   -0.04
VYHS  78.1 289   ePg   13:13:45.30    0.24
                 eSg      13:55.30   -0.65
CRVS 138.9  60   ePn   13:13:56.00    0.54
                 eSn      14:13.70   -0.76
```

87.

```
 2005-11-22  time: 11:49:40.14 UTC  ML= 1.2
   lat: 47.396N  lon: 18.520E  h=  0.0 km
                 erh= 2.5km    erz= 5.7km
   nr=  8        gap=157       rms=0.63
   Locality: Csákvár
   Comments: explosion

sta   dist azm  phase  hr mn  sec     res
PKSG   9.7 268   iPgC  11:49:41.90    0.02
                 eSg      49:43.50    0.26
PKS8  58.7 168   ePgC  11:49:50.70    0.08
                 eSg      49:58.70   -0.09
VYHS 124.4  11   ePg   11:50:03.50    1.14
                 eSg      50:18.80   -0.89
RHK1 148.6 193   ePnC  11:50:04.80   -0.90
                 eSn      50:21.90   -3.74
```

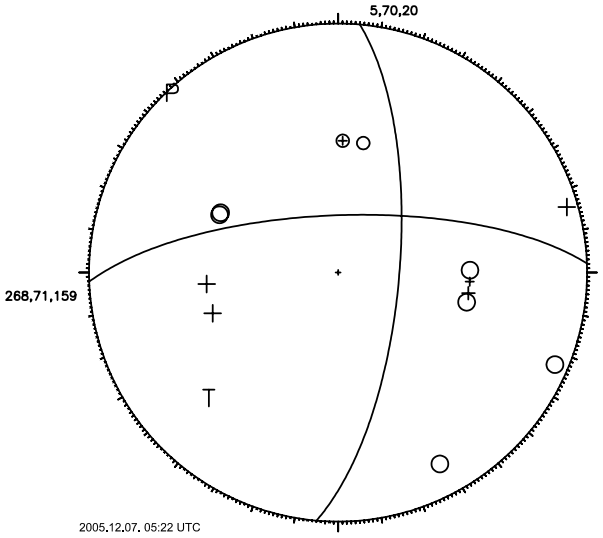
88.

```
 2005-11-27  time:  0:59:00.50 UTC  ML= 1.9
   lat: 46.335N  lon: 19.843E  h=  5.4 km
                 erh= ---km    erz= ---km
   nr=  4        gap=304       rms=0.52
   Locality: Üllés
   Comments:

sta   dist azm  phase  hr mn  sec     res
PKS8 107.8 304   ePgC   0:59:20.00    0.22
RHK3 132.6 248   ePn    0:59:23.80    0.42
RHK1 139.2 259   ePn    0:59:23.30   -0.90
                 eSn      59:42.90    0.21
```

89.

```
 2005-12-07  time:  5:22:02.93 UTC  ML= 2.8
   lat: 46.174N  lon: 16.463E  h=  8.6 km
                 erh= 1.9km    erz= 1.6km
   nr= 52        gap=141       rms=0.87
   Locality: Croatia
   Comments:

sta   dist azm  phase  hr mn  sec     res
KOGS  34.6 332   iPgD   5:22:09.60    0.30
                 iSg      22:14.40    0.14
GOLS  67.4 254   iPg    5:22:15.00   -0.07
DOBS  76.8 268   iPg    5:22:16.30   -0.44
GROS  80.6 293   iPgD   5:22:16.90   -0.51
                 iSg      22:29.40    0.69
CRES  87.1 244   ePg    5:22:18.10   -0.46
                 iSg      22:31.30    0.56
LEGS  92.1 254   iPgC   5:22:19.00   -0.46
PDKS 113.8 265   iPnC   5:22:22.50   -0.55
BISS 115.4 297   iPnD   5:22:22.10   -1.16
                 eSn      22:38.10   -1.01
PERS 115.6 296   iPnD   5:22:22.20   -1.07
RHK1 124.6  94   ePnC   5:22:24.20   -0.20
                 eSn      22:38.90   -2.25
VISS 132.5 252   iPnC   5:22:25.30   -0.09
ARSA 139.6 329    Pn    5:22:26.30    0.04
                  Sn      22:43.20   -1.26
RHK3 142.1 103   iPnD   5:22:26.30   -0.28
                 eSn      22:45.10    0.07
LJU  150.4 264   iPn    5:22:28.00    0.38
OBKA 152.0 284    Pn    5:22:28.10    0.28
                  Sn      22:46.50   -0.73
CEY  165.2 253   ePn    5:22:29.70    0.24
                 iSn      22:52.70    2.55
SOP  167.9   2   ePnC   5:22:31.70    1.90
PKSM 168.2  89   iPnD   5:22:29.40   -0.43
                 eSn      22:53.00    2.18
KNDS 177.3 246   ePn    5:22:32.70    1.73
                 eSn      22:55.10    2.27
GORS 190.6 275   iPn    5:22:32.80    0.17
VOJS 199.8 265   ePn    5:22:33.60   -0.18
PKSG 199.9  47   ePn    5:22:36.90    3.11
CADS 210.8 272   iPn    5:22:35.00   -0.15
ROBS 228.1 272   ePn    5:22:37.20   -0.11
ZST  229.9  12   ePn    5:22:37.00   -0.53
                 eSn      23:09.80    5.28
MOA  250.2 318    Pn    5:22:41.20    1.14
                  Sn      23:08.50   -0.52
KBA  259.1 293    Pn    5:22:40.90   -0.27
                  Sn      23:12.40    1.40
VYHS 314.1  35   ePn    5:22:47.60   -0.43
PSZ  324.9  53   ePn    5:22:45.70   -3.68
VRAC 348.6   2    PnD   5:22:52.44    0.11
GEC2 362.6 325   ePn    5:22:55.40    1.33
                 eSn      23:32.10   -1.86
KHC  393.7 327   ePn    5:22:59.60    1.64
                 eSn      23:39.50   -1.38
BZS  404.7  99    PnC   5:22:59.24   -0.09
MORC 408.6  11    PnD   5:23:00.49    0.68
WET  426.1 321   ePn    5:23:02.40    0.41
                 eSn      23:46.00   -2.05
DPC  464.4 359   ePn    5:23:08.70    1.93
PVCC 504.1 344   ePn    5:23:12.30    0.58
NKC  541.1 327   ePn    5:23:17.00    0.67
                 eSn      24:10.80   -2.78
BRG  554.7 340   ePn    5:23:20.25    2.22
                  Sn      24:39.05   22.45
MOX  613.2 324   ePn    5:23:26.00    0.68
                 eSn      24:58.30   28.71
```

CLL	625.0	336	iPn	5:23:27.30	0.50
			iSn	25:06.30	34.09
PGF	718.6	236	ePn	5:23:36.20	-2.27
CDF	738.1	290	ePn	5:23:40.50	-0.40
HINF	753.5	284	ePn	5:23:42.10	-0.71
			eSn	24:53.10	-7.62
SBF	756.6	250	ePn	5:23:41.10	-2.10
			eSn	24:53.70	-7.71
LPG	758.3	264	ePn	5:23:42.40	-1.02
LPL	759.5	264	ePn	5:23:42.50	-1.06
MBDF	775.1	258	ePn	5:23:43.30	-2.21
CABF	799.6	273	ePn	5:23:47.50	-1.06
FRF	828.4	249	ePn	5:23:50.20	-1.96
ORIF	838.2	260	ePn	5:23:52.90	-0.48
LMR	849.1	248	ePn	5:23:52.70	-2.04
			eSn	25:13.60	-8.34
VIVF	932.9	261	ePn	5:24:03.30	-1.88
SMF	972.0	273	ePn	5:24:08.30	-1.76
AVF	9.1	274	ePn	5:24:13.40	-1.29
LASF	18.9	257	ePn	5:24:13.70	-2.21
BGF	48.8	272	ePn	5:24:17.10	-2.53



90.

2005-12-07 time: 6:08:03.43 UTC ML= 2.3
lat: 46.173N lon: 16.462E h= 7.0 km
erh= 3.2km erz= 2.1km
nr= 13 gap=150 rms=0.53
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	34.7	332	iPg	6:08:09.90		0.14
			iSg	08:14.70		0.01
GOLS	67.3	255	iPg	6:08:15.60		0.09
DOBS	76.7	268	iPg	6:08:16.70		-0.49
GROS	80.6	293	iPg	6:08:17.30		-0.58
CRES	86.8	244	iPg	6:08:19.10		0.12
			eSg	08:31.70		0.59
PERS	115.6	296	iPn	6:08:24.10		0.11
RHK1	124.7	94	ePnC	6:08:24.60		-0.52
			eSn	08:38.10		-3.95
ARSA	139.7	329	Pn	6:08:28.30		1.31
			Sn	08:44.70		-0.67
OBKA	152.0	284	Pn	6:08:29.50		0.98
			Sn	08:47.40		-0.70

91.

2005-12-08 time: 6:27:39.47 UTC ML= 1.8
lat: 46.184N lon: 16.395E h= 8.0 km
erh= 3.7km erz= 3.2km
nr= 7 gap=158 rms=0.30
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	31.4	339	iPg	6:27:45.50		0.24
			iSg	27:50.00		0.22
GOLS	62.6	252	iPg	6:27:50.90		0.16
DOBS	71.6	267	iPg	6:27:52.20		-0.13
GROS	75.3	294	iPg	6:27:52.60		-0.40
RHK1	130.0	94	ePnC	6:28:01.50		-0.19
			eSn	28:15.70		-3.32
ARSA	136.0	331	Pn	6:28:02.30		-0.14
			Sn	28:18.40		-1.95
OBKA	146.6	284	Pn	6:28:04.50		0.74
			Sn	28:23.00		0.29

92.

2005-12-09 time: 5:16:20.70 UTC ML= 1.9
lat: 46.175N lon: 16.396E h= 8.3 km
erh= 2.5km erz= 1.8km
nr= 17 gap=136 rms=0.50
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	32.4	340	iPg	5:16:26.80		0.13
			iSg	16:31.50		0.17
GOLS	62.4	253	iPg	5:16:32.50		0.56
GCIS	70.1	240	iPg	5:16:33.00		-0.30
DOBS	71.7	268	iPg	5:16:33.60		0.02
GROS	75.9	295	iPg	5:16:34.10		-0.23
CRES	82.4	242	iPg	5:16:35.80		0.32
			iSg	16:46.70		-0.31
LEGS	87.1	253	iPg	5:16:36.30		-0.03
			iSg	16:47.70		-0.82
BOJS	116.0	230	iPn	5:16:41.70		0.56
VISS	127.6	251	ePn	5:16:42.60		0.02
RHK1	129.8	94	ePnC	5:16:41.40		-1.46
			eSn	16:55.00		-5.15
ARSA	137.0	331	Pn	5:16:43.70		-0.05
			Sn	17:00.70		-1.03
OBKA	147.0	285	Pn	5:16:45.80		0.80
			Sn	17:04.60		0.64

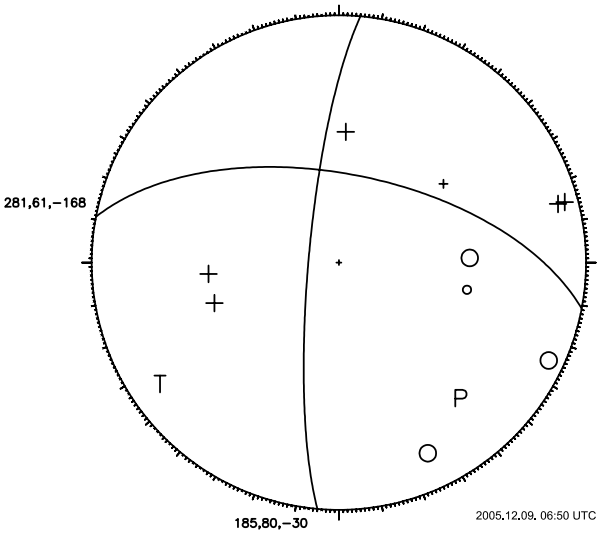
93.

2005-12-09 time: 6:50:13.43 UTC ML= 2.9
lat: 46.163N lon: 16.444E h= 10.0 km
erh= 1.5km erz= 1.2km
nr= 41 gap=129 rms=0.59
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	35.0	335	iPgD	6:50:20.20		0.27
			iSg	50:25.00		0.00
GOLS	65.6	255	iPgC	6:50:25.60		0.32
			eSg	50:34.30		-0.23
GCIS	72.7	243	iPg	6:50:26.50		-0.04
DOBS	75.3	269	iPg	6:50:27.00		0.00
			iSg	50:36.90		-0.68
GROS	79.8	295	iPgD	6:50:27.60		-0.18
CRES	85.2	244	ePg	6:50:28.70		-0.04
LEGS	90.4	255	iPgC	6:50:29.50		-0.17
			eSg	50:41.30		-1.03
PDKS	112.2	265	iPnC	6:50:33.10		-0.07
			eSn	50:47.40		-1.17
BISS	114.7	298	iPn	6:50:32.90		-0.59
PERS	114.8	297	iPn	6:50:33.00		-0.50

Földrengés paraméterek **Hypocenter Parameters**

BOJS	118.1	232	ePn	6:50:34.30	0.39
			eSn	50:48.30	-1.58
RHK1	126.1	93	ePn	6:50:34.90	0.00
			eSn	50:49.60	-2.05
VISS	130.7	252	iPnC	6:50:36.00	0.52
			eSn	50:52.40	-0.29
ARSA	139.9	330	Pn	6:50:36.80	0.18
			Sn	50:53.60	-1.12
RHK3	143.3	102	ePnD	6:50:37.30	0.25
			eSn	50:55.80	0.32
LJU	148.8	265	iPn	6:50:38.90	1.16
OBKA	150.9	285	Pn	6:50:38.40	0.40
			Sn	50:57.10	-0.06
CEY	163.4	253	ePn	6:50:40.40	0.84
SOP	169.2	3	iPnC	6:50:40.50	0.22
PKSM	169.7	88	iPnD	6:50:39.90	-0.45
			eSn	50:59.00	-2.34
GORS	189.3	275	ePn	6:50:43.30	0.51
VOY	197.8	266	ePn	6:50:44.50	0.66
PKSG	201.9	47	ePn	6:50:46.20	1.84
			eSn	51:14.00	5.52
CADS	209.4	272	iPn	6:50:45.60	0.31
ZST	231.4	12	ePn	6:50:48.20	0.16
			eSn	51:22.60	7.56
SRO	232.1	38	ePn	6:50:48.70	0.58
MOA	250.1	319	Pn	6:50:51.90	1.53
			Sn	51:19.20	0.01
KBA	258.3	293	Pn	6:50:51.60	0.21
			Sn	51:29.90	8.91
VYHS	316.0	35	ePn	6:50:58.20	-0.38
PSZ	326.9	53	ePnC	6:50:58.80	-1.14
			eSn	51:34.70	-1.52
GEC2	362.8	325	ePn	6:51:06.10	1.68
			eSn	51:43.40	-0.79
KHC	394.0	327	ePn	6:51:10.20	1.89
			eSn	51:50.10	-1.02
KECS	399.8	50	ePn	6:51:09.10	0.06
MORC	410.1	12	ePn	6:51:10.86	0.54
			eSn	51:52.45	-2.24
PRU	448.3	342	ePn	6:51:16.70	1.62
NKC	541.3	327	ePn	6:51:27.70	1.02
CLL	625.6	336	iPn	6:51:38.60	1.41
			eSn	53:16.00	33.48



94.

2005-12-13 time: 16:21:32.18 UTC ML= 2.0
lat: 46.177N lon: 16.386E h= 8.3 km
erh= 1.2km erz= 0.9km
nr= 17 gap=146 rms=0.28
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	31.9	341	iPgD	16:21:38.20		0.14
			iSg	21:42.60		-0.06
GOLS	61.8	253	iPgD	16:21:43.70		0.39
			iSg	21:52.20		0.21
GCIS	69.5	240	iPgC	16:21:44.40		-0.28
DOBS	70.9	268	iPgC	16:21:44.80		-0.12
			iSg	21:54.80		-0.06
GROS	75.1	295	iPg	16:21:45.30		-0.36
CRES	81.8	242	iPg	16:21:46.70		-0.16
PERS	110.1	298	iPnD	16:21:52.10		0.22
RHK1	130.6	94	iPnC	16:21:54.40		-0.03
			eSn	22:10.00		-1.80
ARSA	136.4	331	Pn	16:21:55.20		0.05
			Sn	22:12.30		-0.78
OBKA	146.2	285	Pn	16:21:57.10		0.72
			Sn	22:15.30		0.04
MOA	246.1	319	Pn	16:22:09.10		0.26
			Sn	22:37.30		-0.13

95.

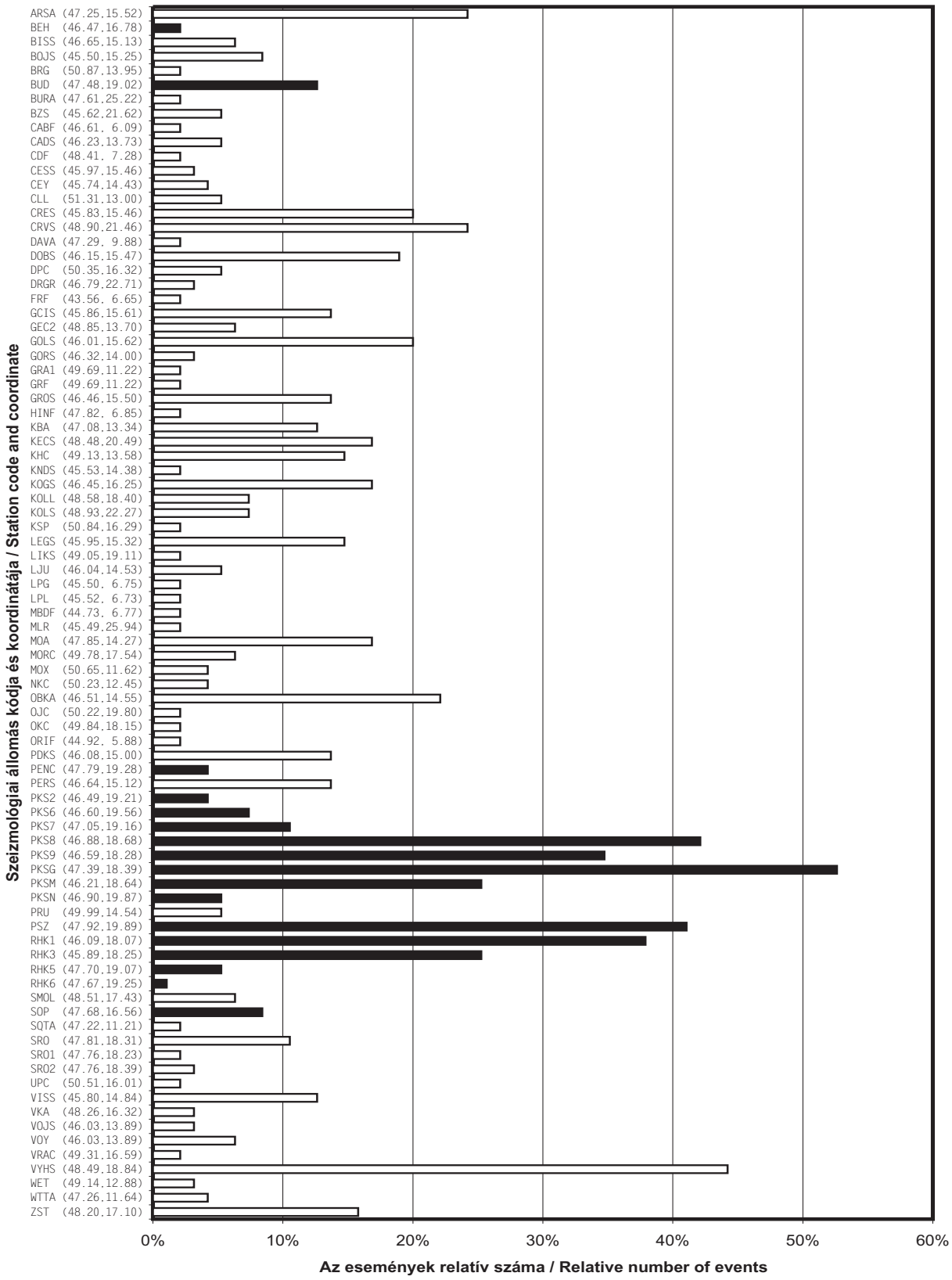
2005-12-26 time: 7:11:06.42 UTC ML= 1.8
lat: 46.106N lon: 17.164E h= 10.0 km
erh=10.4km erz= 9.5km
nr= 7 gap=279 rms=0.48
Locality: Bélavár
Comments:

sta	dist	azm	phase	hr mn	sec	res
RHK1	70.2	91	ePg	7:11:19.70		0.61
			eSg	11:28.80		-0.17
RHK3	87.7	106	ePgC	7:11:22.20		0.01
			eSg	11:34.10		-0.39
PKSG	170.9	33	iPnD	7:11:33.10		-0.39
			eSn	11:56.70		2.10
VYHS	294.0	25	ePn	7:11:48.80		-0.04
			eSn	12:18.70		-3.22

96.

2005-12-26 time: 22:11:14.89 UTC ML= 1.8
lat: 46.124N lon: 16.431E h= 10.8 km
erh= 1.5km erz= 0.9km
nr= 20 gap=142 rms=0.35
Locality: Croatia
Comments:

sta	dist	azm	phase	hr mn	sec	res
KOGS	38.6	339	iPg	22:11:22.40		0.34
			iSg	11:27.80		0.15
GOLS	63.7	259	iPg	22:11:26.70		0.27
GCIS	70.0	246	iPg	22:11:27.40		-0.13
DOBS	74.4	272	iPg	22:11:28.10		-0.22
GROS	80.8	298	iPg	22:11:29.00		-0.45
CRES	82.4	246	iPg	22:11:29.80		0.07
LEGS	88.4	257	iPg	22:11:30.50		-0.29
BOJS	114.6	233	iPn	22:11:35.30		0.46
			eSn	11:49.60		-0.80
PERS	116.0	299	iPn	22:11:34.50		-0.51
			eSn	11:50.40		-0.31
RHK1	126.9	91	iPnC	22:11:36.20		-0.17
			eSn	11:51.10		-2.02
VISS	128.5	254	iPn	22:11:37.00		0.43
ARSA	143.2	331	Pn	22:11:38.70		0.30
			Sn	11:56.20		-0.54
OBKA	151.2	286	Pn	22:11:40.00		0.60
			Sn	11:58.80		0.29
MOA	252.8	319	Pn	22:11:52.00		-0.07
			Sn	12:20.90		-0.17



3.4. ábra Az egyes állomások részvétele a hipocentrum meghatározásban

Figure 3.4. Contribution of individual stations to the hypocenter determination

4.

JELENTŐS FÖLDRENGÉSEK 2005-BEN
(Magyarországon érezhető földrengések)

2005. május 15. - Pápa
2005. május 16. - Csót
2005. szeptember 30. - Szólád

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 2005

(Earthquakes that were felt in Hungary)

15 May 2005 - Pápa

16 May 2005 - Csót

30 September 2005 - Szólád

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)

2005. május 15. - Pápa / 15 May 2005 - Pápa

FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS

Dátum / Date:	2005/05/15
Kipattanási idő / Origin Time:	13:30:48.8 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.323 N 17.444 E (S.D. 1.3 km)
Mélység / Depth:	9.8 km (S.D. 1.4 km)
Magnitúdó / Magnitude:	3.5 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

LEÍRÁS

Az év legerősebb magyarországi rengése május 15-én pattant ki Pápa környékén. A 3.5 M_L magnitúdójú rengés érezhető volt mintegy 1000 km^2 területen. A legnagyobb megrázottságot (5 EMS) Pápa és Nagygyimód településekről jelentették. A rengés az epicentrum környékén jelentéktelen épület károkat (hajszálrepedések a falakban) is okozott. A rengést másnap 2.8 M_L magnitúdójú utórengés követte, mely szintén érezhető volt. Egy évvel korábban (2004/05/25 07:30) 3.8 M_L rengés keletkezett a mostani rengés epicentrumától kb. 30 km-re ÉNy-ra.

Az esemény szeizmogramja a 4.1. ábrán látható.

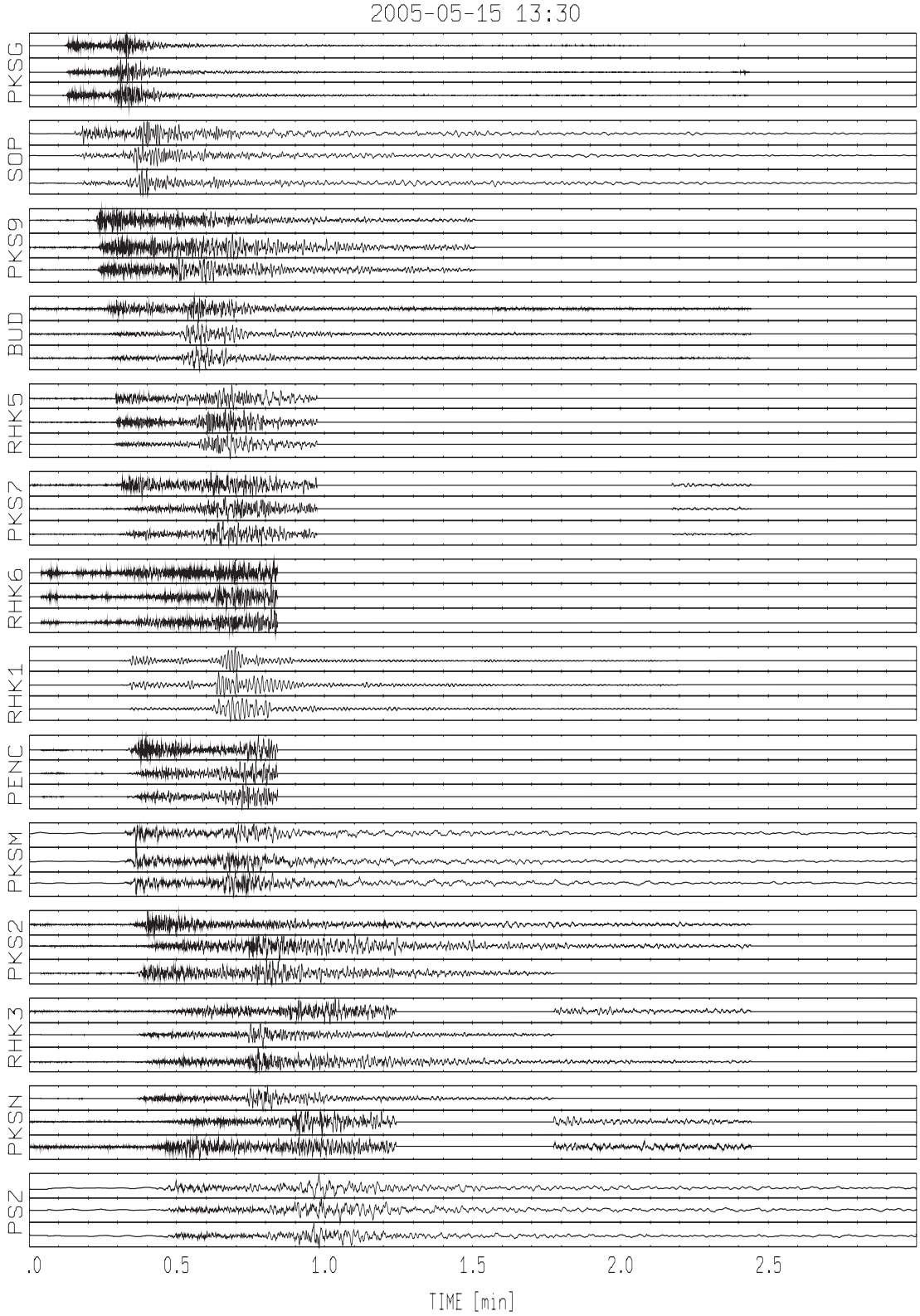
A rengés intenzitás eloszlását a 4.1. táblázat tartalmazza és a 4.2. ábra mutatja.

DISCUSSION

The highest magnitude (3.5 M_L) earthquake of the year was the Pápa event on May 15th. The earthquake was felt in an area of about 1000 km^2 in NW Hungary. The highest intensity values (5 EMS) were reported from Pápa and Nagygyimód. Minor damage (small cracks in walls) was reported from the epicenter area. On the next day a magnitude 2.8 M_L aftershock followed the main shock which was also felt in a small area. Just 30 km NW from the recent epicenter, a magnitude 3.8 M_L event was located one year earlier (2004/05/25 07:30).

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 2005. május 15-i, pápai földrengés (13:30:48.8 UTC) szeizmogramja

Figure 4.1. Seismograms of the Pápa earthquake 15th May 2005 (13:30:48.8 UTC)

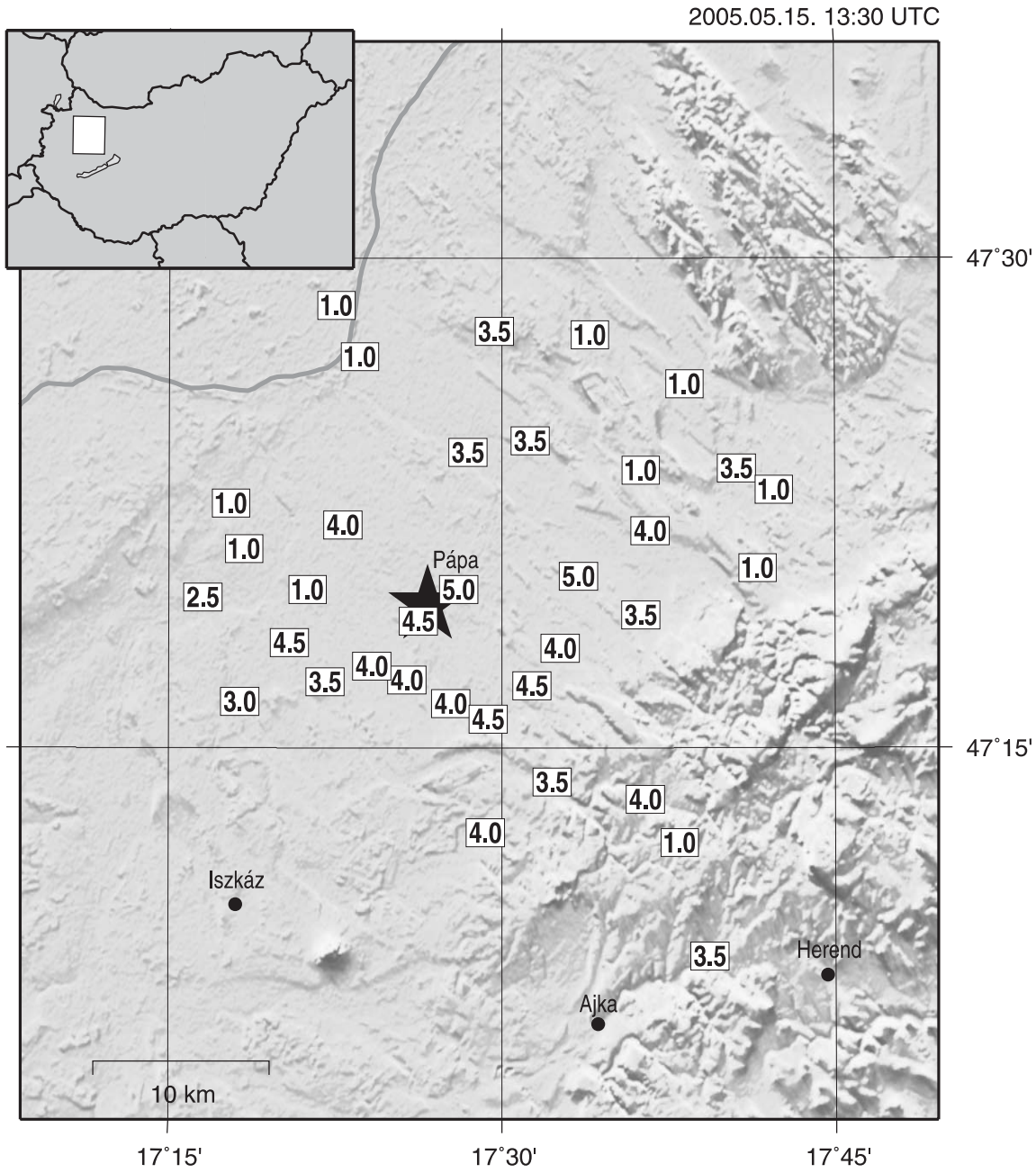
4.1. Táblázat

A 2005. május 15-i, pápai földrengés (13:30:48.8 UTC) intenzitás eloszlása

Table 4.1.

Intensity distribution of the Pápa earthquake 15th May 2005 (13:30:48.8 UTC)

	Helység / Location	Koordináta Coordinates		I	R	N
		Szélesség Latitude (N)	Hosszúság Longitude (E)	Intenzitás Intensity	Rel. megbízhatóság Rel. reliability	Jelentések száma No. of reports
1	Adásztevel	47.301	17.543	4.0	32%	3
2	Bakonyjákó	47.224	17.607	4.0	37%	1
3	Bakonypölöske	47.207	17.487	4.0	23%	1
4	Bakonyszentiván	47.393	17.676	3.5	35%	1
5	Bakonyszűcs	47.342	17.691	1.0	0%	1
6	Békás	47.331	17.353	1.0	0%	1
7	Borsosgyőr	47.315	17.437	4.5	37%	1
8	Csót	47.361	17.611	4.0	30%	2
9	Dáka	47.285	17.428	4.0	34%	1
10	Farkasgyepü	47.202	17.632	1.0	0%	1
11	Ganna	47.233	17.537	3.5	38%	1
12	Gyarmat	47.463	17.494	3.5	42%	2
13	Kemeneshőgyész	47.352	17.305	1.0	0%	1
14	Lovászpatona	47.436	17.636	1.0	0%	2
15	Magyargencs	47.375	17.295	1.0	0%	1
16	Malomsok	47.450	17.392	1.0	0%	2
17	Mihályháza	47.304	17.340	4.5	33%	1
18	Nagyacsád	47.364	17.380	4.0	56%	2
19	Nagygyimót	47.338	17.557	5.0	24%	1
20	Nemesszalók	47.274	17.303	3.0	50%	1
21	Nóráp	47.273	17.461	4.0	36%	1
22	Nyárád	47.284	17.367	3.5	34%	2
23	Pápa	47.331	17.467	5.0	25%	7
24	Pápaderecske	47.292	17.402	4.0	39%	2
25	Pápakovácsi	47.265	17.489	4.5	34%	2
26	Pápateszér	47.382	17.703	1.0	0%	1
27	Sobor	47.476	17.374	1.0	0%	1
28	Szerecseny	47.461	17.565	1.0	0%	1
29	Szergény	47.327	17.275	2.5	43%	1
30	Takácsi	47.401	17.474	3.5	38%	2
31	Tapolcafő	47.282	17.522	4.5	33%	2
32	Ugod	47.318	17.604	3.5	21%	1
33	Vanyola	47.392	17.603	1.0	0%	1
34	Vaszar	47.407	17.521	3.5	41%	1
35	Városlőd	47.144	17.655	3.5	44%	1



4.2. ábra A 2005. május 15-i, pápai földrengés (13:30:48.8 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.2. Intensity distribution of the Pápa earthquake 15th May 2005 (13:30:48.8 UTC) (star - instrumental epicentre)

2005. május 16. - Csót / 16 May 2005 - Csót

FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS

Dátum / Date:	2005/05/16
Kipattanási idő / Origin Time:	13:39:44.0 UTC
Szélesség és hosszúság / Latitude and Longitude:	47.298 N 17.443 E (S.D. 1.2 km)
Mélység / Depth:	6.7 km (S.D. 1.3 km)
Magnitúdó / Magnitude:	2.8 ML
Maximális intenzitás / Maximum Intensity:	5 EMS

LEÍRÁS

Május 16-án 2.8 M_L magnitúdójú utórengés követte az előző napi 3.5 M_L magnitúdójú földrengést, mely néhány településen szintén érezhető volt. A rengés intenzitása 5 EMS fokra becsülhető (Csót – Vanyola).

Az esemény szeizmogramja a 4.3. ábrán látható.

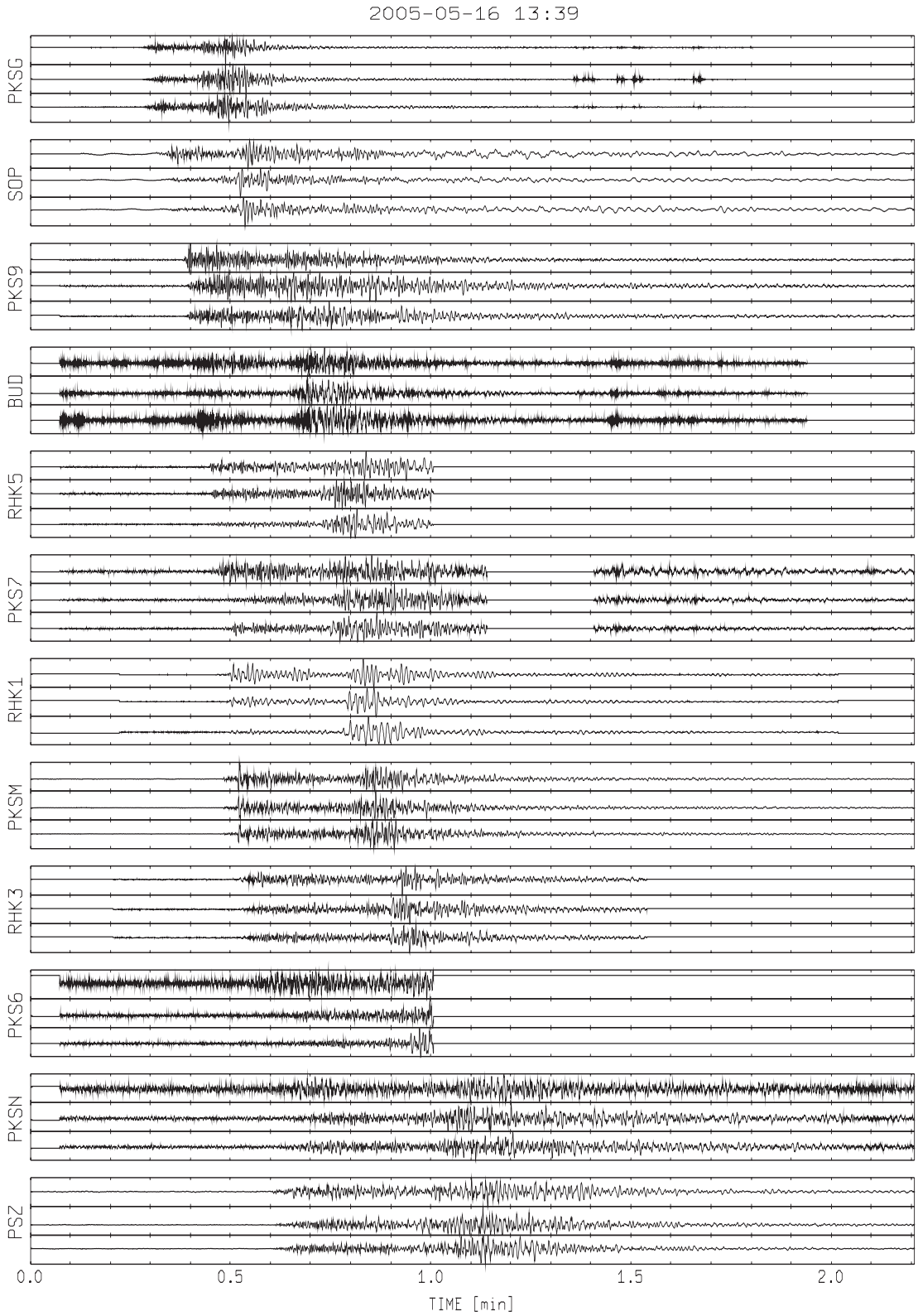
A rengés intenzitás eloszlását a 4.2. táblázat tartalmazza és a 4.4. ábra mutatja.

DISCUSSION

On May 16th, a 2.8 M_L magnitude aftershock followed the 3.5 M_L magnitude Pápa earthquake on the day before, and produced reports of 5 EMS from Csót – Vanyola.

Seismograms of the event are shown in Figure 4.3.

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



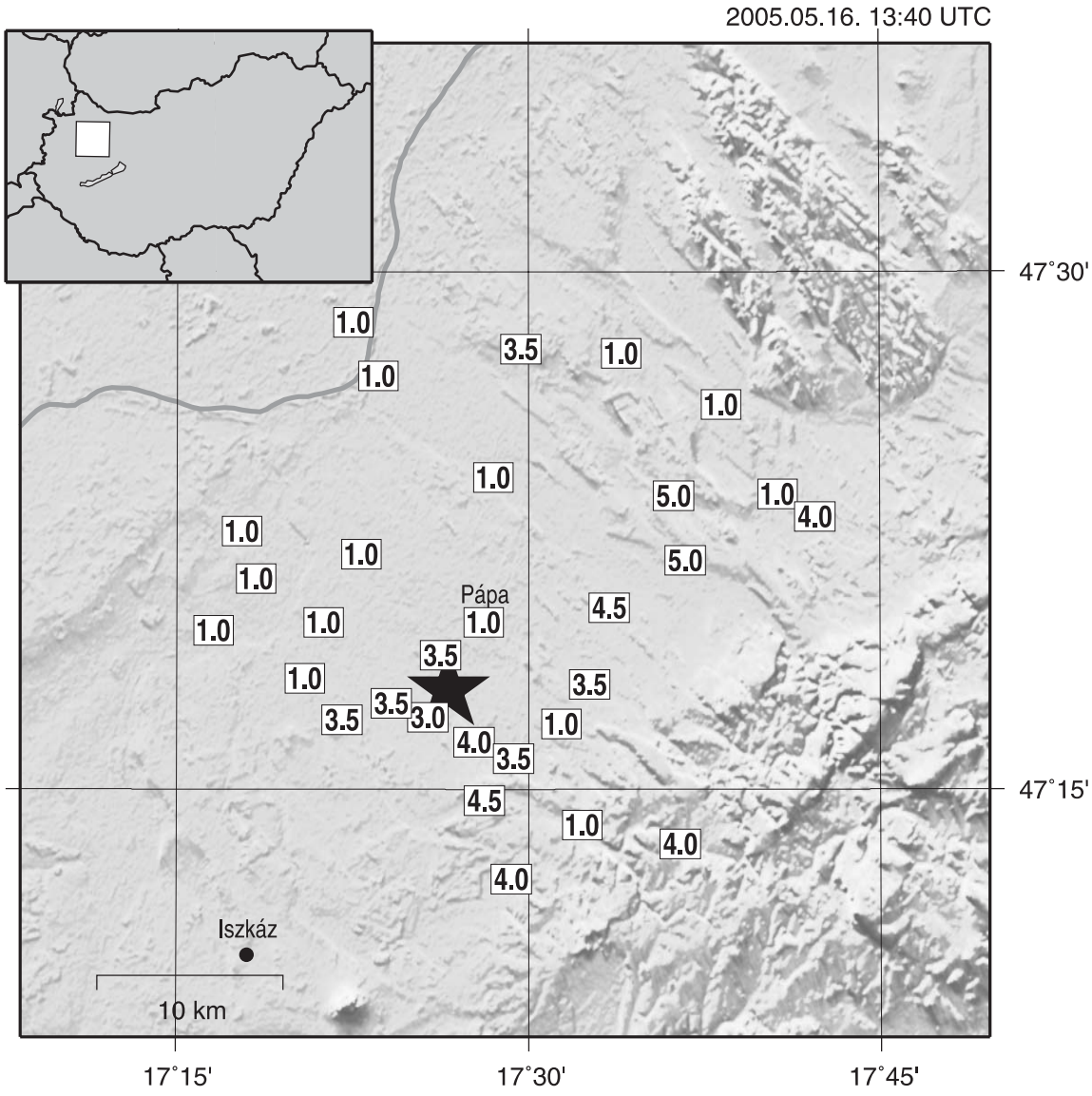
4.3. ábra A 2005. május 16-i, csóti földrengés (13:39:44.0 UTC) szeizmogramja

Figure 4.3. Seismograms of the Csót earthquake 16th May 2005 (13:39:44.0 UTC)

4.2. Táblázat
A 2005. május 16-i, csóti földrengés (13:39:44.0 UTC) intenzitás eloszlása

Table 4.2.
Intensity distribution of the Csót earthquake 16th May 2005 (13:39:44.0 UTC)

	Helység / Location	Koordináta Coordinates		I	R	N
		Szélesség Latitude (N)	Hosszúság Longitude (E)	Intenzitás Intensity	Rel. megbízhatóság Rel. reliability	Jelentések száma No. of reports
1	Adásztevel	47.301	17.543	3.5	38%	3
2	Bakonyjákó	47.224	17.607	4.0	24%	1
3	Bakonypölöske	47.207	17.487	4.0	55%	1
4	Bakonyszentiván	47.393	17.676	1.0	0%	1
5	Békás	47.331	17.353	1.0	0%	1
6	Borsosgyőr	47.315	17.437	3.5	35%	1
7	Csót	47.361	17.611	5.0	35%	2
8	Dáka	47.285	17.428	3.0	33%	1
9	Ganna	47.233	17.537	1.0	0%	1
10	Gyarmat	47.463	17.494	3.5	43%	1
11	Kemeneshőgyész	47.352	17.305	1.0	0%	1
12	Kup	47.245	17.468	4.5	31%	2
13	Lovászpatona	47.436	17.636	1.0	0%	2
14	Magyargencs	47.375	17.295	1.0	0%	1
15	Malomsok	47.450	17.392	1.0	0%	1
16	Mihályháza	47.304	17.340	1.0	0%	1
17	Nagyacsád	47.364	17.380	1.0	0%	2
18	Nagygyimót	47.338	17.557	4.5	25%	1
19	Nóráp	47.273	17.461	4.0	28%	1
20	Nyárád	47.284	17.367	3.5	43%	3
21	Pápa	47.331	17.467	1.0	0%	7
22	Pápaderecske	47.292	17.402	3.5	32%	1
23	Pápakovácsi	47.265	17.489	3.5	44%	3
24	Pápateszér	47.382	17.703	4.0	30%	1
25	Sobor	47.476	17.374	1.0	0%	1
26	Szerecseny	47.461	17.565	1.0	0%	1
27	Szergény	47.327	17.275	1.0	0%	1
28	Takácsi	47.401	17.474	1.0	0%	2
29	Tapolcafő	47.282	17.522	1.0	0%	1
30	Vanyola	47.392	17.603	5.0	37%	1



4.4. ábra A 2005. május 16-i, csóti földrengés (13:39:44.0 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.4. Intensity distribution of the Csót earthquake 16th July 2005 (13:39:44.0 UTC) (star - instrumental epicentre)

2005. szeptember 30. - Szólád / 30 September 2005 - Szólád

FÉSZEKPARAMÉTEREK / HYPOCENTER PARAMETERS

Dátum / Date:	2005/09/30
Kipattanási idő / Origin Time:	20:56:38.44 UTC
Szélesség és hosszúság / Latitude and Longitude:	46.748 N 17.972 E (S.D. 1.6 km)
Mélység / Depth:	10 km (S.D. 1.8 km)
Magnitúdó / Magnitude:	2.3 ML
Maximális intenzitás / Maximum Intensity:	4 EMS

LEÍRÁS

Szeptember 30-án este 2.3 M_L magnitúdójú földrengés keltett riadalmat Somogy-megyében. A rengés intenzitása 4 EMS fokra becsülhető (Szólád – Pusztaszemes). A rengés csak viszonylag kis területen (300-400 km^2) volt érezhető.

Az esemény szeizmogramja a 4.5. ábrán látható.

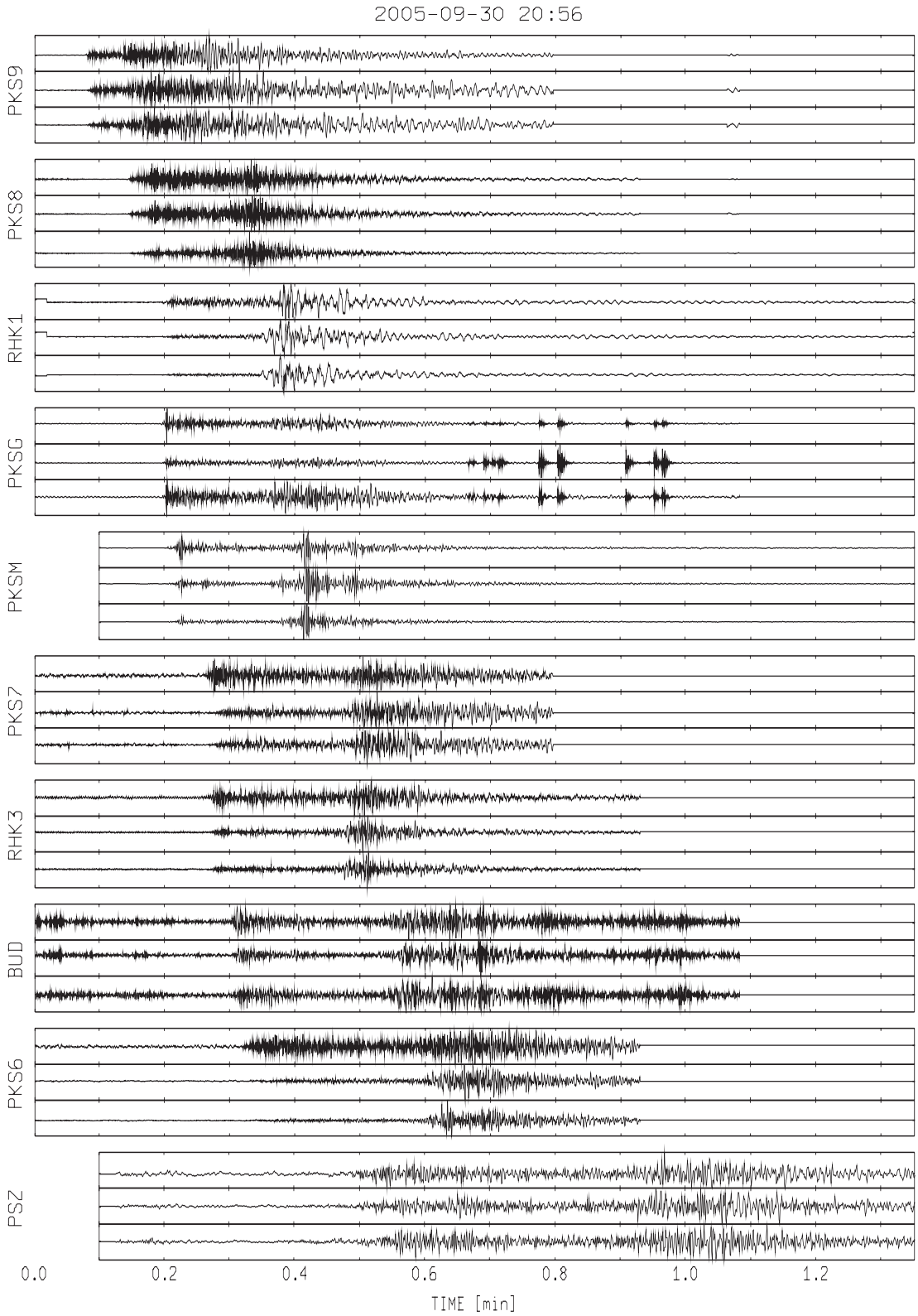
A rengés intenzitás eloszlását a 4.3. táblázat tartalmazza és a 4.6. ábra mutatja.

DISCUSSION

On September 30th late afternoon, a 2.3 M_L magnitude earthquake alarmed people in Somogy County. The shock was felt in a relatively small area of 300-400 km^2 and produced reports of 4 EMS from Szólád – Pusztaszemes.

Seismograms of the event are shown in Figure 4.5.

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



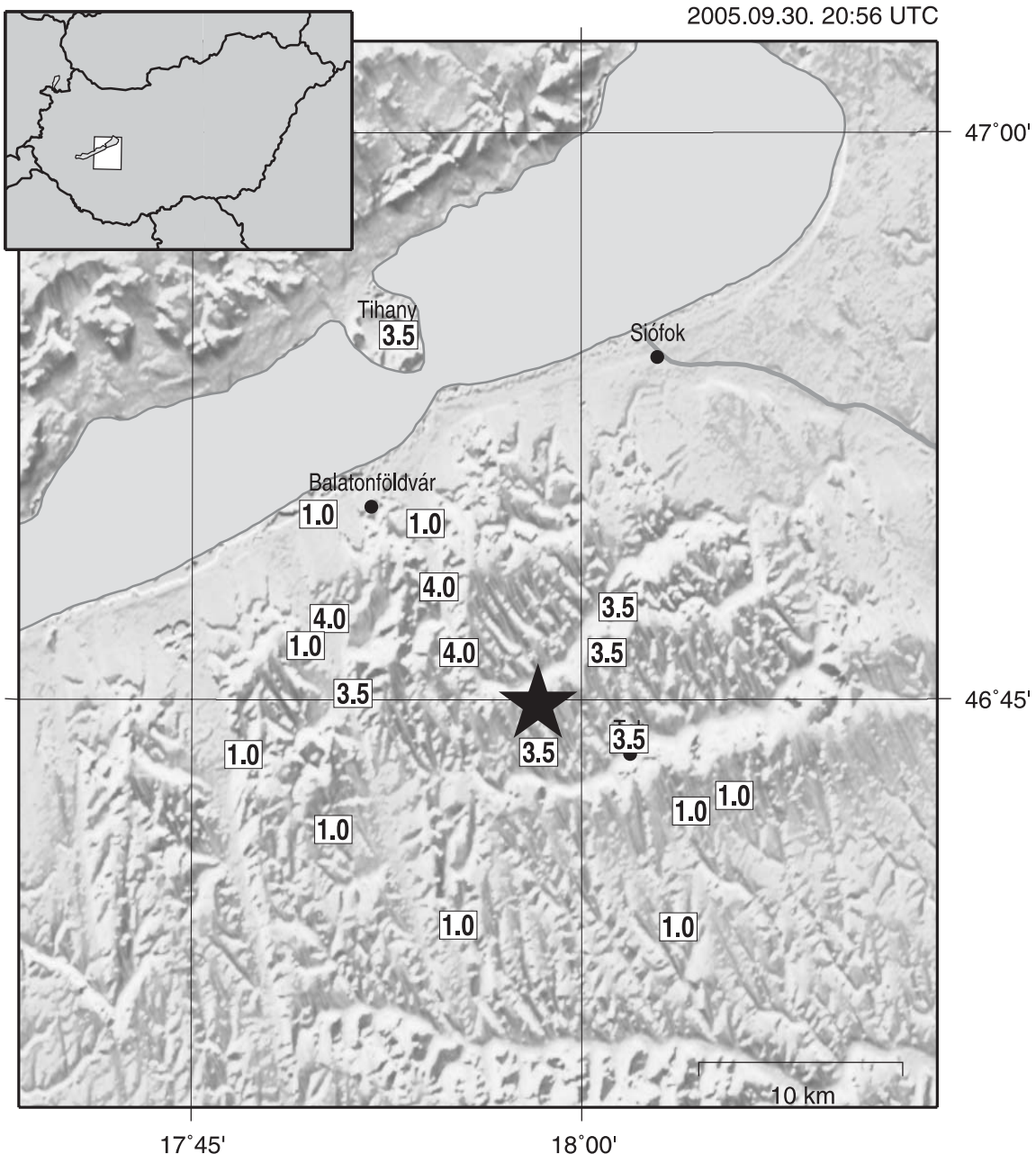
4.5. ábra A 2005. szeptember 30-i, szóládi földrengés (20:56:38.44 UTC) szeizmogramja

Figure 4.5. Seismograms of the Szólád earthquake 30th September 2005 (20:56:38.44 UTC)

4.3. Táblázat
A 2005. szeptember 30-i, szóládi földrengés (20:56:38.44 UTC) intenzitás eloszlása

Table 4.3.
Intensity distribution of the Szólád earthquake 30th September 2005 (20:56:38.44 UTC)

Helység / Location		Koordináta Coordinates		I	R	N
		Szélesség Latitude (N)	Hosszúság Longitude (E)	Intenzitás Intensity	Rel. megbízhatóság Rel. reliability	Jelentések száma No. of reports
1	Andocs	46.651	17.920	1.0	0%	2
2	Balatonszárszó	46.832	17.830	1.0	0%	1
3	Bedegkér	46.650	18.061	1.0	0%	1
4	Kapoly	46.727	17.972	3.5	38%	2
5	Karád	46.693	17.840	1.0	0%	2
6	Kánya	46.701	18.069	1.0	0%	3
7	Kereki	46.800	17.908	4.0	25%	1
8	Kötcse	46.753	17.853	3.5	35%	1
9	Kőröshegy	46.828	17.899	1.0	0%	1
10	Lulla	46.791	18.023	3.5	38%	1
11	Pusztaszemes	46.771	17.921	4.0	39%	1
12	Sérsekszőlős	46.771	18.016	3.5	35%	1
13	Szólád	46.786	17.838	4.0	44%	1
14	Tab	46.733	18.030	3.5	33%	2
15	Teleki	46.774	17.822	1.0	0%	1
16	Tengőd	46.708	18.097	1.0	0%	1
17	Tihany	46.911	17.882	3.5	35%	2
18	Visz	46.726	17.782	1.0	0%	1



4.6. ábra A 2005. szeptember 30-i, szóládi földrengés (20:56:38.44 UTC) intenzitás eloszlása (a csillag a műszeresen meghatározott epicentrumot jelöli)

Figure 4.6. Intensity distribution of the Szólád earthquake 30th September 2005 (20:56:38.44 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 rengést 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 rengést 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 kinyílanak 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 ☞ **Elsöprő**

A legtöbb épület összedől.

12 ☞ **Teljesen elsöprő**

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

2005

Forrás:

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

APPENDIX B

SIGNIFICANT EARTHQUAKES OF THE WORLD

2005

Source:

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

Halálos áldozatot követelő földrengések a világon 2005-ben

Deaths from Earthquakes in 2005

Dátum Date	Ország, terület Region	Magnitúdó Magnitude	Áldozatok száma Number killed
2005/01/23	Sulawesi, Indonesia	6.3	1
2005/01/25	Turkey-Iraq Border Region	5.9	2
2005/02/02	Java, Indonesia	4.8	1
2005/02/05	Celebes Sea	7.1	2
2005/02/22	Central Iran	6.4	612
2005/03/09	South Africa	5.0	2
2005/03/20	Kyushu, Japan	6.6	1
2005/03/28	Northern Sumatra, Indonesia	8.7	1 313
2005/05/03	Western Iran	4.9	4
2005/06/04	Eastern New Guinea Region	6.1	1
2005/06/13	Tarapaca, Chile	7.8	11
2005/07/05	South Africa	2.7	1
2005/07/25	Heilongjiang, China	5.0	1
2005/09/26	Northern Peru	7.5	5
2005/10/08	Pakistan	7.6	87 351
2005/10/15	Pakistan	5.1	2
2005/10/27	Guangxi, China	4.2	1
2005/10/20	Near the Coast of Western Turkey	5.9	1
2005/11/08	South China Sea	5.2	1
2005/11/26	Hubei-Jiangxi Region, China	5.2	16
2005/11/27	Southern Iran	6.0	13
2005/12/05	Lake Tanganyika, Congo-Tanzania	6.8	6
2005/12/12	Hindu Kush Region, Afghanistan	6.5	5
2005/12/14	Uttaranchal, India	5.3	1
2005/01/23	Sulawesi, Indonesia	6.3	1
2005/01/25	Turkey-Iraq Border Region	5.9	2
2005/02/02	Java, Indonesia	4.8	1
2005/02/05	Celebes Sea	7.1	2
	Összesen / Total		**89 354**

A 7.0 vagy annál nagyobb magnitúdójú földrengések a világon 2005-ben

Earthquakes of magnitude 7.0 and greater in 2005

	Év Year	Hónap Month	Nap Day	Idő Time (UTC)	Szélesség Latitude	Hosszúság Longitude	Mélység Depth (km)	Magnitúdó Magnitude	Ország, terület Region
1	2005	02	05	12:23:18.9	5.293	123.337	525	7.1	Celebes Sea
2	2005	03	02	10:42:12.2	-6.527	129.933	202	7.1	Banda Sea
3	2005	03	28	16:09:36.3	2.074	97.013	30	8.7	Northern Sumatra, Indonesia
4	2005	06	13	22:44:33.9	-19.987	-69.197	116	7.8	Tarapaca, Chile
5	2005	06	15	02:50:53.1	41.301	-125.970	10	7.2	Off the Coast of Northern California
6	2005	07	24	15:42:06.2	7.920	92.190	16	7.3	Nicobar Islands, India Region
7	2005	08	16	02:46:28.4	38.276	142.039	36	7.2	Near the East Coast of Honshu, Japan
8	2005	09	09	07:26:43.7	-4.539	153.474	90	7.7	New Ireland Region, P.N.G.
9	2005	09	26	01:55:37.6	-5.678	-76.398	115	7.5	Northern Peru
10	2005	10	08	03:50:40.8	34.539	73.588	26	7.6	Pakistan
11	2005	11	14	21:38:51.4	38.106	144.891	11	7.0	Off the East Coast of Honshu, Japan

A 6.5 vagy annál nagyobb magnitúdójú, és a jelentősebb károkat okozó földrengések a világon 2005-ben

Earthquakes of magnitude 6.5 or greater or ones that caused fatalities, injuries or substantial damage in 2005

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 01	06 25 44.8	5.099 N	92.304 E	12 D	6.7	1.0	364	OFF THE WEST COAST OF NORTHERN SUMATRA. MW 6.7 (HRV), 6.5 (GS). mb 6.0 (GS). MS 6.7 (GS). ME 7.2 (GS). Mo 6.7*10**18 Nm (GS), 1.2*10**19 Nm (HRV), 6.3*10**18 Nm (PPT). Es 1.4*10**15 Nm (GS).
JAN 10	18 47 30.1	37.103 N	54.574 E	32 D	5.4	0.9	408	NORTHERN IRAN. MW 5.4 (HRV), 5.3 (GS). mb 5.3 (GS). MS 5.1 (GS). Mo 1.3*10**17 Nm (HRV), 1.1*10**17 Nm (GS). Atl least 110 people injured in the Gorgan area.
JAN 10	23 48 50.0&	37.017 N	27.804 E	16	5.5		344	WESTERN TURKEY. <ISK>. MW 5.5 (HRV), 5.3 (GS). mb 4.9 (GS). MS 4.8 (GS). ML 5.1 (ISK), 4.9 (THE), 4.8 (ATH). Mo 1.8*10**17 Nm (HRV), 1.1*10**17 Nm (GS). One person injured at Marmaris. Felt in Aydin and at Bodrum. Also felt on Rhodes, Greece.
JAN 12	08 40 03.6	0.878 S	21.194 W	10 G	6.8	1.0	462	CENTRAL MID-ATLANTIC RIDGE. MW 6.8 (GS), 6.8 (HRV). mb 5.7 (GS). MS 6.0 (GS). ME 6.6 (GS). Mo 1.9*10**19 Nm (HRV), 1.8*10**19 Nm (GS). Es 1.9*10**14 Nm (GS).
JAN 16	20 17 52.7	10.934 N	140.842 E	25	6.6	0.9	395	STATE OF YAP, FED. STATES OF MICRONESIA. MW 6.6 (GS), 6.6 (HRV). mb 6.3 (GS). MS 6.7 (GS). ME 6.9 (GS). Mo 9.6*10**18 Nm (HRV), 7.6*10**18 Nm (GS), 4.6*10**18 Nm (PPT). Es 5.4*10**14 Nm (GS). Felt on Ulithi.
JAN 19	06 11 36.4	34.064 N	141.491 E	28 D	6.6	1.2	225	OFF THE EAST COAST OF HONSHU, JAPAN. MW 6.6 (HRV), 6.4 (GS), 6.5 (NIED). mb 5.8 (GS). MS 6.4 (GS). ME 5.9 (GS). Mo 8.1*10**18 Nm (HRV), 4.8*10**18 Nm (GS), 5.6*10**18 Nm (NIED), 1.4*10**19 Nm (OBN), 1.1*10**19 Nm (PPT). Es 1.4*10**13 Nm (GS). Felt lightly in the Tokyo area. A tsunami with a wave height of 30 cm was recorded on Miyake-jima. Recorded (1 JMA) in Aomori, Chiba, Fukushima, Ibaraki, Kanagawa, Miyagi, Nagano, Niigata, Saitama, Shizuoka, Tochigi and Tokyo Prefectures. Also recorded (1 JMA) on Miyake-jima, Mikura-jima and Hachijo-jima.
JAN 23	20 10 12.1	1.198 S	119.933 E	11 G	6.3	1.2	139	SULAWESI, INDONESIA. MW 6.3 (HRV), 6.1 (GS). mb 5.8 (GS). MS 5.9 (GS). ME 6.0 (GS). Mo 2.8*10**18 Nm (HRV), 1.5*10**18 Nm (GS). Es 2.5*10**13 Nm (GS). One person killed, four injured and at least 136 buildings damaged (V) in the Palu area. Felt (III) at Parigi. New hot springs formed in the Bobo area.
JAN 25	16 30 38.9	22.526 N	100.709 E	12 *	4.8	1.0	42	YUNNAN, CHINA. mb 4.8 (GS). At least three people injured and some houses damaged at Simao.
JAN 25	16 44 16.1	37.622 N	43.703 E	41	5.9	1.1	333	TURKEY-IRAQ BORDER REGION. MW 5.9 (HRV), 5.8 (GS). mb 5.3 (GS). MS 5.6 (GS). Mo 7.5*10**17 Nm (HRV), 5.7*10**17 Nm (GS). At least two people killed, 22 injured and 80 buildings damaged in the Hakkari area, Turkey. Felt in Batman, Siirt, Sirnak and Van, Turkey. Also felt at Baghdad, Iraq.
FEB 02	05 55 18.2	7.037 S	107.819 E	15 A	4.8	1.2	29	JAVA, INDONESIA. mb 4.8 (GS). One person killed and several injured; many buildings damaged or destroyed; power outages occurred in Garut. Felt (IV) at Garut and (III) at Pangalengan, Pelabuhan and Soreang.
FEB 05	03 34 25.7	16.011 N	145.867 E	143 D	6.6	1.1	322	ANATAHAN REG., NORTHERN MARIANA ISLANDS. MW 6.6 (HRV), 6.5 (GS). mb 6.3 (GS). ME 6.2 (GS). Mo 9.4*10**18 Nm (HRV), 7.1*10**18 Nm (GS), 6.8*10**18 Nm (PPT). Es 5.1*10**13 Nm (GS). Felt (VI) on Tinian and (V) on Saipan. Felt (IV) at Barrigada, Hagatna, Tamuning and Yigo and (III) at Santa Rita, Guam.
FEB 05	12 23 18.9	5.293 N	123.337 E	525 D	7.1	1.1	640	CELEBES SEA. MW 7.1 (HRV), 7.0 (GS). mb 6.4 (GS). ME 6.6 (GS). Mo 5.2*10**19 Nm (HRV), 4.7*10**19 Nm (GS), 2.8*10**19 Nm (PPT). Es

1.7*10**14 Nm (GS). Two people killed in Sabah, Malaysia. Felt at Kota Kinabalu and Tawau, Malaysia. Felt (III PIVS) at Davao and General Santos, Mindanao, Philippines.

FEB 08 14 48 21.9 14.252 S 167.259 E 206 D 6.7 1.2 457 VANUATU. MW 6.7 (GS), 6.7 (HRV). mb 6.1 (GS). ME 6.1 (GS). Mo 1.5*10**19 Nm (GS), 1.3*10**19 Nm (HRV), 2.2*10**19 Nm (PPT). Es 3.6*10**13 Nm (GS).

FEB 14 23 38 08.6 41.728 N 79.440 E 22 G 6.1 0.9 623 SOUTHERN XINJIANG, CHINA. MW 6.1 (HRV), 6.0 (GS), 6.2 (OBN). mb 6.1 (GS). MS 6.2 (GS). ME 5.7 (GS). Mo 1.7*10**18 Nm (HRV), 1.1*10**18 Nm (GS), 2.2*10**18 Nm (OBN). Es 8.5*10**12 Nm (GS). At least 6,000 homes destroyed or damaged in the Wushi area. Felt (V) at Almaty, Kazakhstan.

FEB 15 14 42 25.8 4.756 N 126.421 E 40 D 6.5 1.0 286 KEPULAUAN TALAUD, INDONESIA. MW 6.5 (HRV), 6.4 (GS). mb 6.1 (GS). MS 6.0 (GS). ME 6.1 (GS). Mo 7.0*10**18 Nm (HRV), 5.0*10**18 Nm (GS), 1.1*10**19 Nm (PPT). Es 3.2*10**13 Nm (GS). Felt (IV PIVS) at General Santos; (III PIVS) at Davao and Zamboanga; (II PIVS) at Kidapawan, Mindanao, Philippines.

FEB 15 19 46 35.8 35.982 N 139.686 E 46 D 5.5 0.8 215 NEAR THE SOUTH COAST OF HONSHU, JAPAN. MW 5.5 (GS), 5.4 (HRV), 5.3 (NIED). mb 5.2 (GS). Mo 1.9*10**17 Nm (GS), 1.6*10**17 Nm (HRV), 1.3*10**17 Nm (NIED). At least 7 people injured in Ibaraki; 7 in Chiba; 6 in Tokyo; 6 in Saitama; and 1 in Kanagawa Prefectures. Recorded (5L JMA) in Chiba, Ibaraki and Saitama; (4 JMA) in Kanagawa, Tochigi and Tokyo; (3 JMA) in Fukushima and Gumma; (2 JMA) in Miyagi, Nagano, Shizuoka and Yamanashi Prefectures. Also recorded (2 JMA) on O-shima and (1 JMA) on Hachijo-jima, Kozu-shima, Mikura-jima, Miyake-jima and Nii-jima.

FEB 16 20 27 52.4 36.320 S 16.558 W 10 G 6.6 1.4 329 SOUTHERN MID-ATLANTIC RIDGE. MW 6.6 (HRV), 6.5 (GS). mb 6.0 (GS). MS 6.1 (GS). ME 6.7 (GS). Mo 6.0*10**18 Nm (GS), 1.0*10**19 Nm (HRV). Es 2.2*10**14 Nm (GS).

FEB 19 00 04 43.5 5.562 S 122.129 E 10 G 6.5 0.9 371 SULAWESI, INDONESIA. MW 6.5 (GS), 6.4 (HRV). mb 6.3 (GS). MS 6.3 (GS). ME 6.3 (GS). Mo 7.0*10**18 Nm (GS), 5.6*10**18 Nm (HRV), 2.2*10**19 Nm (PPT). Es 7.1*10**13 Nm (GS). Felt (V) on Pulau Buton and (IV) at Makassar.

FEB 22 02 25 22.9 30.754 N 56.816 E 14 G 6.4 1.3 652 CENTRAL IRAN. MW 6.4 (HRV), 6.3 (GS). mb 6.0 (GS). MS 6.5 (GS). ME 6.2 (GS). mbLg 6.2 (TEH). Mo 5.2*10**18 Nm (HRV), 3.0*10**18 Nm (GS). Es 4.2*10**13 Nm (GS). At least 612 people killed and 1,411 injured in Kerman Province. An estimated 8,000 homes damaged or destroyed in the Zarand area.

FEB 26 12 56 52.6 2.908 N 95.592 E 36 6.8 0.9 444 SIMEULUE, INDONESIA. MW 6.8 (GS), 6.7 (HRV). mb 6.0 (GS). MS 6.7 (GS). ME 6.2 (GS). Mo 1.7*10**19 Nm (GS), 1.4*10**19 Nm (HRV). Es 5.2*10**13 Nm (GS). Felt on Simeulue and at Banda Aceh and Meulaboh, Sumatra.

MAR 02 10 42 12.2 6.527 S 129.933 E 202 D 7.1 1.2 569 BANDA SEA. MW 7.1 (GS), 7.1 (HRV). mb 7.0 (GS). ME 7.0 (GS). Mo 5.6*10**19 Nm (HRV), 5.0*10**19 Nm (GS), 9.3*10**19 Nm (PPT). Es 7.9*10**14 Nm (GS). Felt (V) on Ambon and at Waingapu, Sumba; (III) at Jayapura and Merauke, Irian Jaya. Felt at Manakwari and Sorong, Irian Jaya. Felt at Amlapura, Karangasem and Klungkung, Bali. Also felt at Brisbane, Darwin, Howard Springs, Jabiru, Katherine and Kununurra, Australia.

MAR 02 11 12 14.9* 30.378 N 68.038 E 52 * 4.9 1.1 29 PAKISTAN. mb 4.9 (GS). One person injured and some buildings damaged at Quetta.

MAR 05 19 06 51.4 24.637 N 121.935 E 4 5.8 1.0 311 TAIWAN. MW 5.8 (HRV), 5.7 (GS). mb 5.7 (GS). MS 5.6 (GS). ML 5.9 (TAP). Mo 5.2*10**17 Nm (HRV), 3.8*10**17 Nm (GS). At least two people injured in I-lan and items knocked from shelves in I-lan and T'ai-pei Counties. Recorded (5 TAP) in I-lan; (4 TAP) in Hua-lien and T'ai-pei; (3 TAP) in T'ao-yuan; (2 TAP) in Nan-t'ou Counties. Also recorded (2 JMA) on Yonaguni-jima and (1 JMA) on Iriomote-jima and Ishigaki-jima, Ryukyu Islands.

MAR 09 10 15 31.8 26.913 S 26.789 E 5 G 5.0 0.8 93 SOUTH AFRICA. mb 5.0 (GS). MS 4.3 (GS). Two people killed, 58 injured and many buildings damaged in the Klerksdorp-Stilfontein area. Felt (V) at Klerksdorp and (III) at Johannesburg. Also felt at Pretoria and Westonaria.

MAR 12 07 36 12.1 39.440 N 40.978 E 11 5.7 1.1 458 EASTERN TURKEY. MW 5.7 (GS), 5.6 (HRV). mb 5.4 (GS). MS 5.0 (GS). ML 5.7 (ISK). Mo 3.7*10**17 Nm (GS), 3.3*10**17 Nm (HRV). At

least 16 people injured and 214 buildings damaged in the Cat-Karliova area. A landslide blocked a road between Cat and Erzurum. Several livestock killed at Cat. Felt at Diyarbakir, Erzincan, Mus and Tunceli.

MAR 14 01 55 55.6& 39.354 N 40.890 E 5 5.8 578 EASTERN TURKEY. <ISK>. MW 5.8 (HRV), 5.7 (GS). mb 5.5 (GS). MS 5.7 (GS). ML 5.9 (ISK). Mo 6.1*10**17 Nm (HRV), 4.5*10**17 Nm (GS). At least 18 people injured, some buildings destroyed which were damaged by the earthquake of 07:36 UTC on March 12, at least 450 additional buildings damaged and some livestock killed in Bingol Province.

MAR 14 09 43 49.1 17.145 N 73.730 E 10 G 4.9 1.0 98 MAHARASHTRA, INDIA. mb 4.9 (GS). MS 4.1 (GS). At least 45 people injured in Kolhapur, Ratnagiri and Satara, Maharashtra and in Belgaum, Karnataka. Buildings damaged (VII) in the Dhebewadi-Kasani area and (VI) at Devgad, Koynanagar, Patan and Sangammeshwar. Minor damage (V) to some buildings at Pune. Felt (V) at Chiplun, Karad, Kolhapur and Satara; (IV) at Belgaum, Hubli and Bombay; (III) at Madgaon, Karwar, Latur, Nashik, Panaji and Solapur. Felt throughout Goa, Karnataka and western Maharashtra. Rail services interrupted in Ratnagiri and Sindudurg.

MAR 20 01 53 41.8 33.807 N 130.131 E 10 G 6.6 1.3 401 KYUSHU, JAPAN. MW 6.6 (HRV), 6.5 (GS), 6.6 (NIED). mb 5.9 (GS). MS 6.7 (GS). ME 7.2 (GS). Mo 8.6*10**18 Nm (HRV), 5.8*10**18 Nm (GS), 8.5*10**18 Nm (PPT), 7.9*10**18 Nm (NIED). Es 1.2*10**15 Nm (GS). One person killed at Fukuoka; at least 500 injured on Genkai and in the Fukuoka area. Sixty five houses destroyed by a landslide on Genkai and buildings damaged (VII) at Fukuoka. Felt (V) at Isaya and Sasebo; (IV) at Hiroshima, Iwakuni and Kumamoto; (III) at Miyazaki. Also felt (IV) at Keoje, Kyeongju and Pusan; (III) at Kunsan, Kwangju, Taegu and Ulsan, South Korea. Recorded (6L JMA) in Fukuoka and Saga; (5L JMA) in Nagasaki; (4 JMA) in Kumamoto and Oita and in the Tsushima Islands; (3 JMA) in Kagoshima and Miyazaki Prefectures. Recorded (4 JMA) in Shimane and Yamaguchi; (3 JMA) in Hiroshima, Hyogo, Kyoto, Okayama and Tottori Prefectures, Honshu. Recorded (2 JMA) in much of southern Honshu and (1 JMA) as far north as Tochigi Prefecture, Honshu. Also recorded (3 JMA) in Ehime and Kochi; (2 JMA) in Kagawa and Tokushima Prefectures, Shikoku.

MAR 21 12 23 54.0 24.983 S 63.470 W 579 D 6.9 0.8 650 SALTA, ARGENTINA. MW 6.9 (GS), 6.9 (HRV). mb 6.1 (GS). ME 6.4 (GS). MD 6.5 (SJA). Mo 2.7*10**19 Nm (GS), 2.3*10**19 Nm (HRV), 1.6*10**19 Nm (PPT). Es 8.8*10**13 Nm (GS). Felt (III) in the capital cities of Catamarca, Salta, Santiago del Estero and Tucuman. Felt (IV) at Maria Elena and Tocopilla; (III) at Antofagasta, Mejillones and Sierra Gorda; (II) at Iquique, Chile.

MAR 28 16 09 36.5 2.085 N 97.108 E 30 G 8.7 0.9 510 NORTHERN SUMATRA, INDONESIA. MW 8.7 (HRV), 8.1 (GS). mb 7.2 (GS). MS 8.4 (GS). ME 8.1 (GS). Mo 1.5*10**21 Nm (GS), 1.1*10**22 Nm (HRV), 2.8*10**21 Nm (PPT). Es 3.7*10**16 Nm (GS). At least 1,000 people killed, 300 injured and 300 buildings destroyed on Nias; 100 people killed, many injured and several buildings damaged on Simeulue; 200 people killed in Kepulauan Banyak; 3 people killed, 40 injured and some damage in the Meulaboh area, Sumatra. A 3 meter tsunami damaged the port and airport on Simeulue. Tsunami runup heights as high as 2 meters were observed on the west coast of Nias and 1 meter at Singkil and Meulaboh, Sumatra. Felt (VI) at Banda Aceh and (V) at Medan. At least 10 people were killed during evacuation of the coast of Sri Lanka. Felt (IV) along the west coast of Malaysia; (IV) at Bangkok and (III) at Phuket, Thailand; (III) on Singapore; (III) at Male, Maldives. The quake was also felt in the Andaman and Nicobar Islands, India and in Sri Lanka. Tsunami wave heights (peak-to-trough) recorded from selected tide stations: about 40 cm on Panjang, Indonesia; about 25 cm at Colombo, Sri Lanka; 40 cm on Hanimadu, 18 cm at Male and 10 cm at Gan, Maldives. Initial observations indicate about 1 meter of subsidence on the coast of Kepulauan Banyak as well as 1 meter of uplift on the coast of Simeulue. Seiches were observed on ponds in West Bengal, India.

APR 10 10 29 11.2 1.644 S 99.607 E 19 G 6.7 1.0 656 KEPULAUAN MENTAWAI REGION, INDONESIA. MW 6.7 (HRV), 6.6 (GS). mb 6.4 (GS). MS 6.7 (GS). ME 6.6 (GS). Mo 8.3*10**18 Nm (GS), 1.3*10**19 Nm (HRV), 1.5*10**19 Nm (PPT). Es 1.7*10**14 Nm (GS). Felt (V) at Padang, (IV) at Padangsidempuan and (II) at Pekanbaru, Sumatra. Felt (III) at Kuala Lumpur, Malaysia and on

Singapore. Also felt (II) on Nias. A tsunami with a wave height of 40 cm was observed at Padang, Sumatra.

APR 10 11 14 19.6 1.714 S 99.779 E 30 G 6.5 0.9 478 KEPULAUAN MENTAWAI REGION, INDONESIA. MW 6.5 (HRV). mb 6.2 (GS). MS 6.3 (GS). Mo 6.3*10**18 Nm (HRV). Felt (III) at Padang, Sumatra and on Singapore. Felt (II) at Kuala Lumpur, Malaysia.

APR 11 12 20 05.9 3.484 S 145.909 E 11 D 6.7 1.1 211 NEAR NORTH COAST OF NEW GUINEA, P.N.G. MW 6.7 (HRV), 6.5 (GS). mb 5.9 (GS). MS 6.7 (GS). Mo 5.7*10**18 Nm (GS), 1.1*10**19 Nm (HRV), 1.9*10**19 Nm (PPT).

APR 11 17 08 53.9 21.975 S 170.612 E 68 G 6.8 1.0 414 SOUTHEAST OF THE LOYALTY ISLANDS. MW 6.8 (GS), 6.8 (HRV). mb 6.0 (GS). ME 6.4 (GS). Mo 1.5*10**19 Nm (GS), 1.5*10**19 Nm (HRV), 2.9*10**19 Nm (PPT). Es 9.2*10**13 Nm (GS). Felt on New Caledonia and the Loyalty Islands.

APR 19 21 11 28.4 33.637 N 130.179 E 19 D 5.5 0.9 242 KYUSHU, JAPAN. MW 5.5 (GS), 5.5 (HRV), 5.4 (NIED). mb 5.3 (GS). MS 5.0 (GS). Mo 2.1*10**17 Nm (GS), 1.9*10**17 Nm (HRV), 1.4*10**17 Nm (NIED). At least 58 people injured and 279 buildings damaged in Fukuoka Prefecture. Several homes destroyed on Genkai-jima. Felt (IV) at Sasebo. Felt (III) at Pusan, South Korea. Felt at Beppu, Hiroshima, Isahaya, Iwakuni, Nagasaki, Sasebo, Shimonoseki and Takeo. Also felt at Inch'on, Kwangju, Seoul and Ulsan, South Korea. Several landslides occured in the epicentral area. Recorded (5U JMA) in Fukuoka and Saga; (4 JMA) in Nagasaki; (3 JMA) in Kumamoto and Oita; (2 JMA) in Kagoshima and Miyazaki Prefectures. Recorded (3 JMA) in the Tsushima Islands and (2 JMA) on Uku-jima. Recorded (4 JMA) in Yamaguchi; (3 JMA) in Shimane; (2 JMA) in Hiroshima and Hyogo; (1 JMA) in Hyogo, Okayama and Tottori Prefectures, Honshu. Also recorded (3 JMA) in Ehime and (1 JMA) in Kagawa and Kochi Prefectures, Shikoku.

MAY 01 16 23 57.9 33.611 N 130.244 E 10 G 4.5 1.0 43 KYUSHU, JAPAN. mb 4.5 (GS). One person injured in Fukuoka Prefecture. Felt strongly in the Fukuoka area. Felt in many parts of southwestern Japan. Recorded (4 JMA) in Fukuoka and Saga; (3 JMA) in Nagasaki; (2 JMA) in Kumamoto and Oita; (1 JMA) in Miyazaki Prefectures. Recorded (2 JMA) on Mi-shima, Uku-jima and in the Tsushima Islands. Also recorded (3 JMA) in Yamaguchi, (2 JMA) in Shimane and (1 JMA) in Hiroshima Prefectures, Honshu.

MAY 03 07 21 10.4 33.711 N 48.685 E 12 4.9 1.3 186 WESTERN IRAN. mb 4.9 (GS). ML 4.9 (THR). mbLg 4.9 (TEH). At least 4 people killed, 26 injured and extensive damage in the Borujerd area.

MAY 05 19 12 20.2 5.723 N 82.837 W 10 G 6.5 1.2 187 SOUTH OF PANAMA. MW 6.5 (HRV), 6.4 (GS). mb 5.9 (GS). MS 5.8 (GS). ME 6.7 (GS). Mo 6.4*10**18 Nm (HRV), 4.2*10**18 Nm (GS), 1.1*10**19 Nm (PPT). Es 2.8*10**14 Nm (GS).

MAY 12 11 15 35.2 57.400 S 139.231 W 10 G 6.5 1.2 221 PACIFIC-ANTARCTIC RIDGE. MW 6.5 (HRV), 6.4 (GS). mb 6.0 (GS). MS 6.2 (GS). Mo 6.0*10**18 Nm (HRV), 4.1*10**18 Nm (GS), 1.3*10**19 Nm (PPT).

MAY 14 05 05 18.4 0.587 N 98.459 E 34 G 6.8 1.0 695 NIAS REGION, INDONESIA. MW 6.8 (GS), 6.8 (HRV). mb 6.4 (GS). MS 6.8 (GS). ME 6.5 (GS). Mo 1.6*10**19 Nm (GS), 1.6*10**19 Nm (HRV), 1.3*10**19 Nm (PPT). Es 1.4*10**14 Nm (GS). Felt (V) at Padang and Sibolga; (III) at Palembang and Pekanbaru, Sumatra. Felt (III) in Malaysia. Felt on Nias and in Singapore.

MAY 16 03 54 14.6 32.589 S 179.353 W 34 G 6.6 1.0 660 SOUTH OF THE KERMADEC ISLANDS. MW 6.6 (GS), 6.6 (HRV). mb 6.2 (GS). MS 6.4 (GS). ME 6.4 (GS). Mo 9.0*10**18 Nm (GS), 7.8*10**18 Nm (HRV), 7.9*10**18 Nm (PPT). Es 8.0*10**13 Nm (GS).

MAY 19 01 54 52.8 1.989 N 97.041 E 30 G 6.9 0.9 635 NIAS REGION, INDONESIA. MW 6.9 (HRV), 6.7 (GS). mb 6.2 (GS). MS 6.9 (GS). Mo 2.5*10**19 Nm (HRV), 1.2*10**19 Nm (GS). Felt (IV) at Meulaboh and Sibolga; (III) at Banda Aceh, Sumatra. Felt at Medan, Sumatra. Felt (II) at Gelugor, Malaysia. Also felt at Bukit Mertajam, George Town, Kuala Lumpur, Sungai Ara and Tanjong Tokong, Malaysia.

MAY 23 06 09 13.1 26.348 S 27.436 E 5 G 4.3 0.8 18 SOUTH AFRICA. mb 4.3 (GS). Fifteen miners injured in a mine collapse at Carletonville. Felt at Johannesburg.

JUN 04 14 50 48.8 6.341 S 146.812 E 43 6.1 0.9 342 EASTERN NEW GUINEA REG, PAPUA NEW GUINEA. MW 6.1 (GS), 6.1 (HRV). mb 6.0 (GS). MS 6.0 (GS). Mo 1.7*10**18 Nm (GS), 1.7*10**18 Nm (HRV). One person killed, several injured and many houses

damaged or destroyed in the Lae area.

JUN 06 07 41 28.7& 39.220 N 41.080 E 10 5.7 290 EASTERN TURKEY. <CSEM>. MW 5.7 (HRV), 5.6 (GS), 5.6 (CSEM). mb 5.0 (GS). MS 5.4 (GS). ML 5.7 (ISK). Mo 3.4*10**17 Nm (HRV), 2.4*10**17 Nm (GS). Five people seriously injured, at least 49 slightly injured, several buildings collapsed and at least 60 damaged in the Karliova area. Felt in Bingol, Erzurum, Mus and Tunceli.

JUN 13 22 44 33.9 19.987 S 69.197 W 116 D 7.8 1.0 714 TARAPACA, CHILE. MW 7.8 (GS), 7.8 (HRV). mb 6.8 (GS). Mo 6.5*10**20 Nm (GS), 5.1*10**20 Nm (HRV), 4.5*10**20 Nm (PPT). Five people killed by collapsed buildings and 6 people killed when their vehicle was struck by a boulder near Iquique. At least 200 people injured, 544 houses destroyed and 8,691 damaged (VII), power and telephone services interrupted, roads damaged and landslides occurred in the Iquique area. A rock fell from El Morro near Arica. Felt (VI) at Calama and Tocopilla; (V) at Arica, Chanaral and El Salvador; (IV) at Antofagasta, Caldera and Copiapo. Felt throughout northern Chile. Also felt (V) at Arequipa, Ilo, Moquega, Punta de Bombon and Tacna, Peru. Felt (III) at La Paz, Bolivia. Felt as far away as Santiago, Chile and in Brasilia, Goias, Mato Grosso, Minas Gerais, Parana, Rio Grande do Sul, Santa Catarina and Sao Paulo, Brazil.

JUN 14 17 10 16.6 51.232 N 179.406 E 51 D 6.8 0.9 763 RAT ISLANDS, ALEUTIAN ISLANDS, ALASKA. MW 6.8 (HRV), 6.6 (GS). mb 6.0 (GS). ML 6.7 (AEIC). Mo 8.7*10**18 Nm (GS), 1.8*10**19 Nm (HRV), 1.7*10**19 Nm (PPT). Felt (V) on Adak.

JUN 15 02 50 53.1 41.301 N 125.970 W 10 G 7.2 1.1 368 OFF THE COAST OF NORTHERN CALIFORNIA. MW 7.2 (HRV), 7.1 (GS), 7.0 (BRK). mb 6.2 (GS). MS 7.1 (GS). ME 7.4 (GS). Mo 8.2*10**19 Nm (HRV), 5.9*10**19 Nm (GS), 3.8*10**19 Nm (BRK). Es 3.0*10**15 Nm (GS). Felt (IV) at Crescent City, Ferndale, Kneeland, Loleta and Petrolia; (III) at Arcata, Bayside, Blue Lake, Carlotta, Eureka, Fortuna, Garberville, Gasquet, Hoopa, Hydesville, Klamath, McKinleyville, Orick, Orleans, Redway, Rio Dell, Scotia, Smith River, Trinidad and Whitethorn. Also felt (III) at Brookings and Grants Pass, Oregon. Felt from southwestern Oregon south as far as the San Francisco Bay area. A tsunami was generated with maximum recorded wave heights (peak-to-trough) of 26 cm at Crescent City, 6.5 cm at Arena Cove and 5 cm at North Spit, California; 3.5 cm at Tofino and 2 cm at Bamfield, Vancouver Island, Canada.

JUN 15 19 52 24.8 44.865 S 80.562 W 10 G 6.5 1.3 132 OFF THE COAST OF AISEN, CHILE. MW 6.5 (HRV), 6.4 (GS). mb 5.5 (GS). MS 5.9 (GS). Mo 5.7*10**18 Nm (HRV), 5.2*10**18 Nm (GS).

JUN 16 20 53 26.0& 34.058 N 117.010 W 12 4.9 183 GREATER LOS ANGELES AREA, CALIFORNIA. <PAS>. MW 4.9 (HRV), 4.9 (PAS). mb 4.8 (GS). MS 4.7 (GS). Mo 2.3*10**16 Nm (HRV), 2.6*10**16 Nm (PAS). Two people injured at San Bernardino and one person at Lake Arrowhead. Felt (VI) at Angelus Oaks and (V) at Anza, Banning, Beaumont, Colton, Corona, Forest Falls, Highland, Loma Linda, Mentone, Moreno Valley, Perris, Redlands, Riverside, San Bernardino, San Jacinto, Sun City and Yucaipa. Felt (III-IV) in much of southern California. Also felt in Arizona and Nevada.

JUN 17 06 21 42.2 40.768 N 126.574 W 10 G 6.7 1.0 611 OFF THE COAST OF NORTHERN CALIFORNIA. MW 6.7 (HRV), 6.6 (GS), 6.7 (BRK). mb 6.2 (GS). MS 6.5 (GS). ME 6.9 (GS). Mo 9.9*10**18 Nm (GS), 1.1*10**19 Nm (HRV), 1.1*10**19 Nm (BRK). Es 5.3*10**14 Nm (GS). Felt (III) at Arcata, Bayside, Burlingame, Crescent City, Daly City, Eureka, Felton, Ferndale, Fortuna, Los Gatos, Redwood City, San Bruno, San Francisco, San Mateo, Santa Cruz, South San Francisco and Trinidad. Also felt (III) at Brookings and Grants Pass, Oregon. Felt from southern Oregon south as far as the San Francisco Bay area.

JUN 20 04 03 13.4 37.206 N 138.420 E 16 4.7 0.6 224 NEAR THE WEST COAST OF HONSHU, JAPAN. MW 4.7 (NIED). mb 5.2 (GS). Mo 1.1*10**16 Nm (NIED). One person injured at Kashiwazaki-shi. Felt strongly in Niigata Prefecture. Recorded (4 JMA) in Niigata; (2 JMA) in Fukushima, Gumma, Nagano and Yamagata; (1 JMA) in Ishikawa, Miyagi, Saitama and Toyama Prefectures. Recorded (3 JMA) on Sado-shima.

JUL 02 02 16 43.7 11.245 N 86.172 W 27 G 6.6 1.1 446 NEAR THE COAST OF NICARAGUA. MW 6.6 (GS), 6.6 (HRV). mb 5.6 (GS). MS 6.4 (GS). ME 6.0 (GS). Mo 7.8*10**18 Nm (GS), 1.0*10**19 Nm (HRV). Es 2.1*10**13 Nm (GS). Felt (IV) at Managua and San Juan del Sur. Also felt (IV) at Curridabat and San Pedro; (III) at

Escazu, Costa Rica. Felt (II) at San Salvador, El Salvador. Felt in much of Costa Rica and Nicaragua.

JUL 05 01 52 02.9 1.819 N 97.082 E 21 G 6.7 1.0 398 NIAS REGION, INDONESIA. MW 6.7 (HRV), 6.6 (GS). mb 6.2 (GS). MS 6.8 (GS). ME 6.5 (GS). Mo 7.9*10**18 Nm (GS), 1.1*10**19 Nm (HRV), 1.5*10**18 Nm (PPT). Es 1.1*10**14 Nm (GS). Buildings and roads damaged in the Gunungsitoli area. Felt (II) at Sibolga, Sumatra. Felt at Medan and Pematangsiantar, Sumatra. Also felt at Kelang, Kuala Lumpur, Petaling Jaya, Shah Alam and Sungai Ara, Malaysia.

JUL 05 16 53 26.3? 26.47 S 27.43 E 5 G 2.7 0.7 5 SOUTH AFRICA. ML 2.7 (PRE). One person killed and one injured in a mine near Carletonville.

JUL 23 07 34 56.7 35.498 N 139.982 E 61 G 6.0 0.7 457 NEAR THE SOUTH COAST OF HONSHU, JAPAN. MW 6.0 (GS), 6.0 (HRV). mb 6.1 (GS). ME 5.8 (GS). Mo 9.5*10**17 Nm (GS), 1.1*10**18 Nm (HRV). Es 1.1*10**13 Nm (GS). Twenty-seven people injured and one building damaged in the Tokyo area. Felt (V) at Togane, Tokyo, Yokohama, Yokosuka, Zama and Zushi; (IV) at Chigasaki. Recorded (5U JMA) in Saitama and Tokyo; (5L JMA) in Chiba and Kanagawa; (4 JMA) in Ibaraki, Shizuoka and Tochigi; (3 JMA) in Fukushima, Gumma, Miyagi, Nagano, Niigata and Yamanashi; (2 JMA) in Iwate and Yamagata; (1 JMA) in Aichi, Akita, Aomori and Gifu Prefectures. Also recorded (3 JMA) on O-shima; (2 JMA) on Kozu-jima, Mikura-jima, Miyake-jima and Nii-jima; (1 JMA) on Aoga-shima and Hachijo-jima.

JUL 24 15 42 06.2 7.920 N 92.190 E 16 G 7.3 0.9 636 NICOBAR ISLANDS, INDIA REGION. MW 7.3 (HRV), 7.2 (GS). mb 6.6 (GS). MS 7.5 (GS). ME 7.8 (GS). Mo 8.8*10**19 Nm (HRV), 6.5*10**19 Nm (GS), 1.1*10**20 Nm (PPT). Es 1.2*10**16 Nm (GS). Some buildings damaged in the Andaman and Nicobar Islands. Felt (V) on Car Nicobar, Katchal and Nancowry. Also felt (V) at Campbell Bay, Great Nicobar and Port Blair, South Andaman Island; (IV) at Rangat, Middle Andaman Island. Felt throughout the Andaman and Nicobar Islands. Felt (IV) at Chennai and at Machilipatnam, Srikakulam, Visakhapatnam, Vizianagaram and other coastal areas of Andhra Pradesh; (III) at Dum Dum and Garia, West Bengal and at Ramanniguda, Orissa; (II) by people in high-rise buildings at Bangalore, Karnataka, India. Felt at Mamallapuram, India. Felt (III) at Banda Aceh, Indonesia. Felt (III) at Colombo, Matale and Kandy, Sri Lanka. Felt at Peraliya and Sri Jayawardenepura Kotte, Sri Lanka. Also felt at Male, Maldives and on Phuket, Thailand.

JUL 25 15 43 41.1 46.827 N 125.058 E 48 D 5.0 0.7 157 HEILONGJIANG, CHINA. mb 5.0 (GS). MS 4.7 (GS). At least one person killed and 12 injured at Daqing. Felt at Changchun and Harbin.

AUG 05 14 14 48.0 26.569 N 103.036 E 42 5.2 1.0 200 YUNNAN, CHINA. mb 5.2 (GS). MS 4.8 (GS). At least nine people injured and 3,700 buildings damaged in Huize County. Felt at Chengdu, Panzhihua and Qujing.

AUG 13 04 58 44.8 23.627 N 104.103 E 10 G 4.8 0.7 127 YUNNAN, CHINA. mb 4.8 (GS). MS 4.5 (GS). At least 26 people injured, several houses destroyed and roads and reservoirs damaged in Wenshan County.

AUG 16 02 46 28.4 38.276 N 142.039 E 36 G 7.2 0.9 698 NEAR THE EAST COAST OF HONSHU, JAPAN. MW 7.2 (HRV), 7.1 (GS), 7.1 (NIED). mb 6.5 (GS). MS 6.8 (GS). ME 6.8 (GS). Mo 7.4*10**19 Nm (HRV), 4.7*10**19 Nm (GS), 5.4*10**19 Nm (NIED). Es 3.8*10**14 Nm (GS). At least 39 people injured in Miyagi, 9 in Iwate, 5 in Fukushima and 3 in Saitama Prefectures. One building destroyed at Kazo and one damaged at Sendai. Power outages and landslides occurred in northern Japan. A local tsunami was generated with a wave height of 10 cm on the coast of northern Japan. Felt (VI) at Sendai, (V) at Misawa and (IV) at Tokyo. Recorded (6L JMA) in Miyagi and Yamagata; (5U JMA) in Fukushima and Iwate; (5L JMA) in Akita, Aomori, Ibaraki and Tochigi; (4 JMA) in Chiba, Gumma, Kanagawa, Nagano, Niigata, Saitama, Shizuoka, Tokyo and Yamanashi; (3 JMA) in Aichi, Gifu and Mie; (2 JMA) in Fukui, Ishikawa, Shiga and Toyama Prefectures. Recorded (2 JMA) on Kozu-shima, Miyake-jima, Nii-jima, O-shima and Sado-shima; (1 JMA) on Aoga-shima, Hachijo-jima and Mikura-jima. Also recorded (3 JMA) in southwestern Hokkaido and in the Chitose-Ebetsu-Shizunai and Obihiro areas, Hokkaido; (2 JMA) in much of central, south-central and eastern Hokkaido.

AUG 21 02 29 29.9 37.276 N 138.588 E 13 D 5.1 0.7 184 NEAR THE WEST COAST OF HONSHU, JAPAN. mb 5.1 (GS). MS 4.5 (GS). Two people injured at Kashiwazaki. Felt strongly in Niigata. Train service interrupted between Tokyo and Niigata. Recorded (5L JMA) in Niigata; (4 JMA) in Nagano; (3 JMA) in Gumma; (2 JMA) in Fukushima, Ibaraki, Ishikawa, Saitama, Tochigi, Tokyo, Toyama and Yamagata; (1 JMA) in Aichi, Chiba and Kanagawa Prefectures. Also recorded (2 JMA) on Sadoga-shima.

SEP 09 07 26 43.7 4.539 S 153.474 E 90 G 7.7 1.0 502 NEW IRELAND REGION, PAPUA NEW GUINEA. MW 7.7 (HRV), 7.5 (GS). mb 6.3 (GS). ME 6.4 (GS). Mo 3.6*10**20 Nm (HRV), 1.8*10**20 Nm (GS), 3.2*10**20 Nm (PPT). Es 8.6*10**13 Nm (GS). Felt at Rabaul and Sohano and on Lihir. Also felt at Gizo and Honiara, Solomon Islands.

SEP 24 19 24 02.6 12.471 N 40.634 E 12 D 5.6 1.0 207 ETHIOPIA. MW 5.6 (HRV), 5.5 (GS). mb 5.1 (GS). MS 5.0 (GS). ML 5.5 (DHMR). Mo 2.7*10**17 Nm (HRV), 2.1*10**17 Nm (GS). Surface faulting observed. Dabbahu Volcano began erupting, with the largest eruption occurring on September 26. An estimated 6,500 people were displaced, about 1000 livestock were killed and roads and water facilities were damaged by the eruption.

SEP 26 01 55 37.6 5.678 S 76.398 W 115 G 7.5 0.9 696 NORTHERN PERU. MW 7.5 (GS), 7.5 (HRV). mb 6.7 (GS). ME 7.0 (GS). MD 7.5 (QUI). Mo 2.1*10**20 Nm (HRV), 2.0*10**20 Nm (GS), 1.2*10**20 Nm (PPT). Es 8.1*10**14 Nm (GS). Five people killed, at least 60 injured, about 70 percent of the houses destroyed and at least 200 buildings damaged at Lamas. Damage to buildings at Chachapoyas, Moyobamba and Tarapota. Felt (IV) at Cajamarca, Lima and Trujillo; (III) at Manta. Felt (VI) at Cuenca and Loja and (III) at Quito, Ecuador. Felt (II) at Bogota, Colombia. Felt throughout Peru and Ecuador. Also felt in Amazonas and Rondonia, Brazil.

SEP 29 15 50 24.0 5.437 S 151.840 E 25 G 6.7 0.9 402 NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.7 (HRV), 6.5 (GS). mb 5.9 (GS). MS 6.6 (GS). ME 6.0 (GS). Mo 7.4*10**18 Nm (GS), 1.2*10**19 Nm (HRV), 1.2*10**19 Nm (PPT). Es 2.3*10**13 Nm (GS). Felt in parts of eastern New Britain.

OCT 01 22 19 51.3 16.635 S 70.794 W 20 A 5.3 1.0 72 SOUTHERN PERU. mb 5.3 (GS). ML 5.4 (LIM). At least 10 people injured and 300 houses destroyed in Moquegua. Felt (V) at Carumas, (IV) at Omate and (II) at Arequipa.

OCT 08 03 50 40.8 34.539 N 73.588 E 26 G 7.6 0.9 724 PAKISTAN. MW 7.6 (HRV), 7.3 (GS). mb 6.9 (GS). MS 7.7 (GS). ME 7.4 (GS). Mo 2.9*10**20 Nm (HRV), 1.0*10**20 Nm (GS), 4.6*10**20 Nm (PPT). Es 3.1*10**15 Nm (GS). At least 86,000 people killed, more than 69,000 injured and extensive damage in northern Pakistan. The heaviest damage occurred in the Muzaffarabad area, Kashmir where entire villages were destroyed and at Uri where 80 percent of the town was destroyed. At least 32,335 buildings collapsed in Anantnag, Baramula, Jammu and Srinagar, Kashmir. Buildings collapsed in Abbottabad, Gujranwala, Gujrat, Islamabad, Lahore and Rawalpindi, Pakistan. Maximum intensity VIII. Felt (VII) at Topi; (VI) at Islamabad, Peshawar and Rawalpindi; (V) at Faisalabad and Lahore. Felt at Chakwal, Jhang, Sargodha and as far as Quetta. At least 1,350 people killed and 6,266 injured in India. Felt (V) at Chandigarh and New Delhi; (IV) at Delhi and Gurgaon, India. Felt in Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Punjab, Rajasthan, Uttaranchal and Uttar Pradesh, India. At least one person killed and some buildings collapsed in Afghanistan. Felt (IV) at Kabul and (III) at Bagrami, Afghanistan. An estimated 4 million people in the area left homeless. Landslides and rockfalls damaged or destroyed several mountain roads and highways cutting off access to the region for several days. Landslides occurred farther north near the towns of Gilgit and Skardu, Kashmir. Liquefaction and sandblows occurred in the western part of Vale of Kashmir and near Jammu. Landslides and rockfalls also occurred in parts of Himachal Pradesh, India. Seiches were observed in Haryana, Uttar Pradesh and West Bengal, India and many places in Bangladesh.

OCT 15 04 24 06.2 34.014 N 74.003 E 10 G 5.2 0.8 222 SOUTHWESTERN KASHMIR. mb 5.2 (GS). Two people killed in the Uri area.

OCT 15 15 51 07.2 25.321 N 123.356 E 183 6.5 0.8 705 NORTHEAST OF TAIWAN. MW 6.5 (GS), 6.5 (HRV). mb 6.2 (GS). Mo 5.7*10**18 Nm (GS), 5.4*10**18 Nm (HRV), 4.7*10**18 Nm (PPT). Felt (III) at Okinawa and (II) at Chatan, Okinawa-jima, Ryukyu Islands. Recorded (3 TAP) in Hua-lien, I-lan, Miao-li and T'ai-

tung; (2 TAP) in Chang-hua, Chia-i, Hsin-chu, Nan-t'ou, T'ai-pei, T'ao-yuan and Yun-lin; (1 TAP) in Kao-hsiung, P'eng-hu, P'ing-tung and T'ai-nan Counties. Recorded (3 JMA) on Ishigaki-jima and Tarama-jima; (2 JMA) on Yonaguni-jima; (1 JMA) on Kume-jima and Okinawa-jima, Ryukyu Islands.

OCT 16 07 05 41.6 36.014 N 139.773 E 40 D 5.1 0.7 221 EASTERN HONSHU, JAPAN. mb 5.1 (GS). Two people injured in the Tokyo area. Felt (V) at Urawa; (IV) at Tokyo, Tsukuba and Yokohama; (III) at Narita and Yokosuka. Recorded (4 JMA) in Ibaraki, Kanagawa, Saitama, Tochigi and Tokyo; (3 JMA) in Chiba; (2 JMA) in Fukushima, Gumma, Nagano, Shizuoka and Yamanashi; (1 JMA) in Miyagi Prefectures. Also recorded (2 JMA) on O-shima and (1 JMA) on Kozu-shima, Miyake-jima and Nii-jima.

OCT 20 21 40 04.0 38.152 N 26.751 E 10 G 5.9 0.9 494 NEAR THE COAST OF WESTERN TURKEY. MW 5.9 (GS), 5.9 (HRV). mb 5.5 (GS). MS 5.7 (GS). ML 5.9 (ISK), 5.6 (ATH), 5.5 (THE). Mo 8.4*10**17 Nm (GS), 7.3*10**17 Nm (HRV). One person died of a heart attack and fifteen others injured at Izmir. Minor damage to several buildings at Urla. Felt (VI) at Izmir and (III) at Istanbul. Felt at Balikesir, Bursa, Buyukcekmece, Canakkale, Eskisehir, Gebze, Golcuk, Kusadasi, Manisa, Odemis, Polatli and Tekirdag. Also felt at Chios, Kalamakion, Kos, Mytilini, Neon Karlovasion, Psikhikon and Zakinthos, Greece.

OCT 27 11 18 57.3 23.604 N 107.798 E 10 G 4.2 1.1 17 GUANGXI, CHINA. mb 4.2 (GS). One person killed and one person injured at Bose; several houses damaged at Taiping. Also felt at Nanning.

OCT 29 04 05 56.0 45.214 S 96.898 E 8 G 6.5 0.8 416 SOUTHEAST INDIAN RIDGE. MW 6.5 (HRV), 6.4 (GS). mb 6.1 (GS). MS 6.2 (GS). ME 6.2 (GS). Mo 6.6*10**18 Nm (HRV), 4.4*10**18 Nm (GS), 4.2*10**18 Nm (PPT). Es 4.2*10**13 Nm (GS).

NOV 06 02 11 52.9 34.520 N 73.385 E 10 G 5.2 0.8 295 PAKISTAN. mb 5.2 (GS). MS 4.5 (GS). Seven people injured at Batgram. Felt at Balakot, Islamabad, Malakand, Mansehra, Peshawar and Swat. Also felt at Muzaffarabad and Rawala Kot, Kashmir.

NOV 08 07 54 38.9 9.973 N 108.287 E 10 G 5.1 0.9 88 SOUTH CHINA SEA. mb 5.1 (GS). MS 4.9 (GS). One person killed at Ho Chi Minh City, Vietnam.

NOV 14 21 38 51.4 38.107 N 144.896 E 11 G 7.0 0.9 699 OFF THE EAST COAST OF HONSHU, JAPAN. MW 7.0 (HRV), 6.9 (GS), 7.0 (NIED). mb 6.7 (GS). MS 6.8 (GS). ME 6.9 (GS). Mo 3.3*10**19 Nm (HRV), 2.2*10**19 Nm (GS), 6.7*10**19 Nm (PPT), 4.1*10**19 Nm (NIED). Es 4.5*10**14 Nm (GS). Felt (IV) at Misawa and (II) at Tokyo and Yokosuka. Felt widely in northern and eastern Honshu. Also felt on Hokkaido. A tsunami with a wave height of 32 cm (peak-to-trough) was recorded at Ofunato. Recorded (3 JMA) in northeastern Honshu and (2 JMA) in northwestern and central Honshu. Recorded (3 JMA) in eastern and south-central Hokkaido; (2 JMA) in much of central and southwestern Hokkaido. Also recorded (2 JMA) on Hachijo-jima, Miyake-jima and O-shima; (1 JMA) on Aoga-shima, Kozu-shima and Nii-jima.

NOV 17 19 26 56.4 22.319 S 67.887 W 163 D 6.9 0.9 503 POTOSI, BOLIVIA. MW 6.9 (GS), 6.8 (HRV). mb 6.0 (GS). Mo 2.2*10**19 Nm (GS), 2.1*10**19 Nm (HRV), 2.5*10**19 Nm (PPT). Power outages occurred in Tocopilla, Chile. Felt (VI) at Mejillones and Tocopilla; (V) at Antofagasta, Calama, Caldera, Camina, Chanaral, Copiapo, Huara, Sierra Gorda and Taltal; (IV) at Diego de Almagro, El Salvador, Iquique, Maria Elena, San Pedro de Atacama, Tierra Amarilla and Vallenar; (III) at Arica and Camarones, Chile. Also felt (II) at Calana and Tacna, Peru.

NOV 19 14 10 13.0 2.164 N 96.786 E 21 G 6.5 1.0 358 SIMEULUE, INDONESIA. MW 6.5 (GS), 6.5 (HRV). mb 6.0 (GS). MS 6.1 (GS). ME 5.9 (GS). Mo 6.2*10**18 Nm (GS), 5.4*10**18 Nm (HRV). Es 1.8*10**13 Nm (GS). Felt at Sinabang. Felt at Medan, Sibolga and on Samosir, Sumatra. Also felt on Nias.

NOV 26 00 49 37.6 29.695 N 115.689 E 10 G 5.2 0.8 230 HUBEI-JIANGXI BORDER REGION, CHINA. MW 5.2 (GS), 5.2 (HRV). mb 5.4 (GS). MS 4.9 (GS). Mo 8.1*10**16 Nm (GS), 7.0*10**16 Nm (HRV). At least 16 people killed, 8,000 injured and 150,000 houses destroyed in the Jiujiang-Ruichang area. Minor damage at Wuhan. Felt in Anhui, Hubei, Hunan and Zhejiang Provinces.

NOV 27 10 22 19.1 26.774 N 55.858 E 10 G 6.0 1.1 637 SOUTHERN IRAN. MW 6.0 (HRV), 5.9 (GS). mb 6.1 (GS). MS 5.8 (GS). ME 5.8 (GS). Mo 7.3*10**17 Nm (GS), 1.1*10**18 Nm (HRV). Es 1.1*10**13 Nm (GS). Thirteen people killed and about 100 injured

										on Qeshm. More than 80 percent of buildings destroyed at Zirang; at least seven villages severely damaged on Qeshm. Felt (III) at Bandar-e Abbas. Felt (IV) at ash-Shariqah, (III) at Abu Zabi, Ajman, Dubayy, al-Fujayrah and Ras al Khaymah, United Arab Emirates. Felt in Oman.
DEC	02	13 13 09.5	38.089 N	142.122 E	29 G	6.5	0.8	464	NEAR THE EAST COAST OF HONSHU, JAPAN. MW 6.5 (HRV), 6.4 (GS). mb 6.1 (GS). MS 6.3 (GS). ME 6.3 (GS). Mo 6.3*10**18 Nm (HRV), 5.3*10**18 Nm (GS), 6.5*10**18 Nm (PPT). Es 5.7*10**13 Nm (GS). Felt (III) at Kamaishi, Misawa, Sendai, Tokyo and Yokosuka. Recorded (3 JMA) in northeastern Honshu and (2 JMA) in much of northern and central Honshu. Also recorded (1 JMA) in the Abashiri area, Hokkaido and in southwestern and south-central Hokkaido.
DEC	05	12 19 56.6	6.224 S	29.830 E	22 G	6.8	1.0	561	LAKE TANGANYIKA REGION, CONGO-TANZANIA. MW 6.8 (HRV), 6.7 (GS). mb 6.4 (GS). MS 7.2 (GS). ME 6.2 (GS). Mo 1.8*10**19 Nm (HRV), 1.2*10**19 Nm (GS). Es 4.7*10**13 Nm (GS). At least six people killed, 300 houses destroyed and a church collapsed at Kalemie, Congo. Felt (IV) at Arusha, Tanzania and Kigali, Rwanda. Felt (III) at Kampala, Uganda and Nairobi, Kenya. Also felt at Bujumbura, Burundi.
DEC	11	14 20 43.7	6.568 S	152.195 E	10 G	6.6	0.8	454	NEW BRITAIN REGION, PAPUA NEW GUINEA. MW 6.6 (HRV), 6.5 (GS). mb 6.2 (GS). MS 6.2 (GS). ME 6.2 (GS). Mo 9.5*10**18 Nm (HRV), 7.5*10**18 Nm (GS), 1.5*10**19 Nm (PPT). Es 4.4*10**13 Nm (GS).
DEC	12	21 47 46.0	36.357 N	71.093 E	225 D	6.5	0.8	529	HINDU KUSH REGION, AFGHANISTAN. MW 6.5 (GS), 6.5 (HRV). mb 6.0 (GS). ME 6.2 (GS). Mo 7.5*10**18 Nm (GS), 7.0*10**18 Nm (HRV). Es 4.0*10**13 Nm (GS). Five people killed at Tili. At least one person injured in Jalalabad. At least 300 livestock killed and 100 houses damaged in Badakhshan. Several houses damaged at Baramulla, Fariabad and Uri, India. Landslides blocked several roads near Bagh, Kashmir. Felt (V) at Lahore and (IV) at Islamabad, Pakistan. Felt (IV) at Kabul and (III) at Bagrami, Afghanistan. Felt (IV) at Tashkent, Uzbekistan and Chandigarh, India. Felt at Gilgit and Muzaffarabad, Kashmir. Also felt at Balakot, Mansehra, Peshawar and Rawalpindi, Pakistan. Also felt at Amritsar and New Delhi, India.
DEC	13	03 16 06.3	15.265 S	178.571 W	10 G	6.7	1.2	322	FIJI REGION. MW 6.7 (GS), 6.7 (HRV). mb 6.1 (GS). MS 6.8 (GS). Mo 1.3*10**19 Nm (GS), 1.2*10**19 Nm (HRV), 1.2*10**19 Nm (PPT).
DEC	14	07 09 54.1	30.476 N	79.255 E	44	5.3	0.7	194	UTTARANCHAL, INDIA. mb 5.3 (GS). One person killed at Jausari. Three people injured at Chamoli and one at Nandprayag. One building destroyed at Phata and several damaged at Chamoli, Daida, Dasholi, Devaal, Ghat, Gopeshwar, Joshimath, Ravigram and Tharali; a wall collapsed at Bageshwar; minor damage occurred at Devprayag, Gairsain, Gochar, Pauri, Pokhri and Srinagar. Felt (IV) at Dehra Dun. Felt strongly at Badrinath. Felt at Almora, Bageshwar, Budhkedar, Chamba, Chamiyala, Chamoli, Champawat, Dhansali, Khatima, Lambgaon, Lohaghat, Mussourie, Nainbagh, Naini Tal, Pitoragarh and Uttarkashi. Felt by people in high-rise buildings at Chandigarh, Lajpatnagar, Noida and Greater Kailash. A landslide occurred at Jausari and Rudraprayag.
DEC	24	02 01 55.0&	35.231 N	136.840 E	43	4.5		63	WESTERN HONSHU, JAPAN. <JMA>. mb 4.5 (GS). One person injured at Yokkaichi. Felt in the Nagoya-Osaka-Kyoto area. Recorded (4 JMA) in Aichi and Mie; (3 JMA) in Gifu, Nara and Shiga; (1 JMA) in Fukui, Hyogo, Kyoto, Osaka and Wakayama Prefectures.

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