Topic	Additional local and regional seismogram examples
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Note: "G" after the depth information means that the given figure (in km) is based on the estimate by a geophysicist, "N" means that the depth was assumed to be "normal" and fixed to 33 km. If the depth is given in km it has been calculated based on (depth) phase data. D – epicentral distance in degree, BAZ – backazimuth in degree, h – source depth in km.

Example 1: Local earthquake south of Limburg/Lahn - Germany

SZGRF-data: 2000-07-26 OT 12:19:23 50.25N 8.04E h = 10G Ml = 3.5

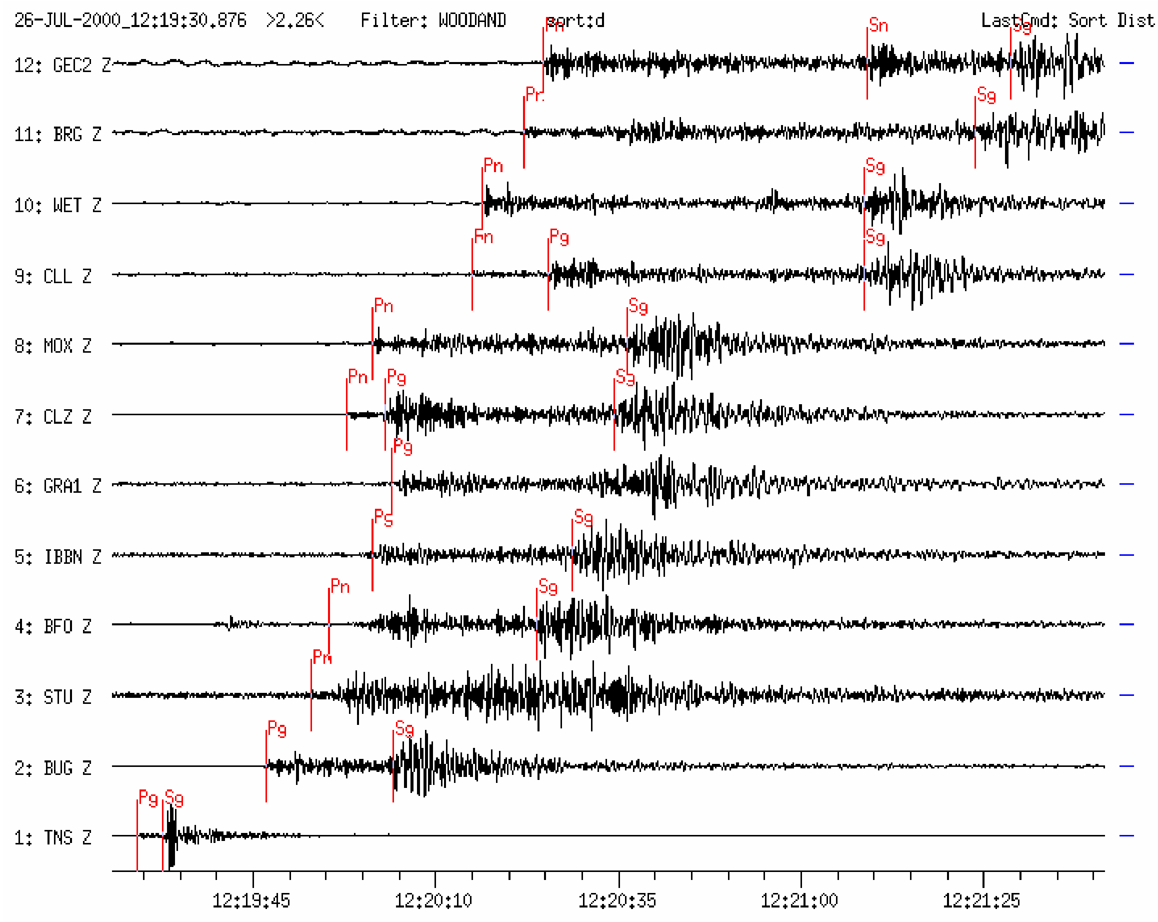

Figure 1a Short-period (Wood-Anderson = WA) filtered Z-component seismograms recorded at 12 GRSN/GRF stations (for network position and outlay see Fig. 11.3). Trace amplitudes are normalized and traces are sorted according to increasing epicentral distance from 29 km (TNS) to 447 km (GEC2).

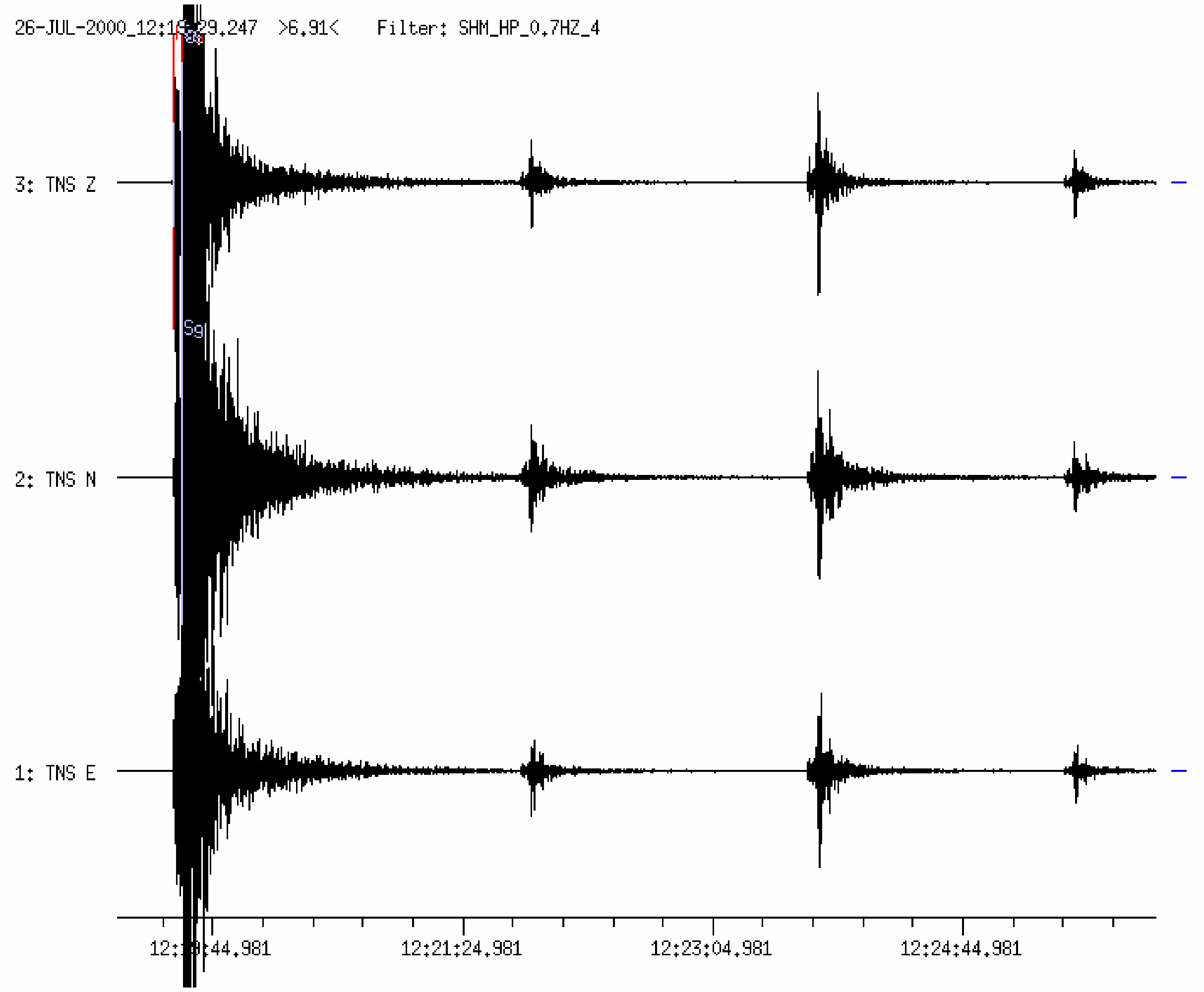

Figure 1b High-pass filtered (0.7 to 4 Hz) 3-component record of the local station TNS (D = 29 km). A few minutes after the main shock 3 smaller aftershocks occur.

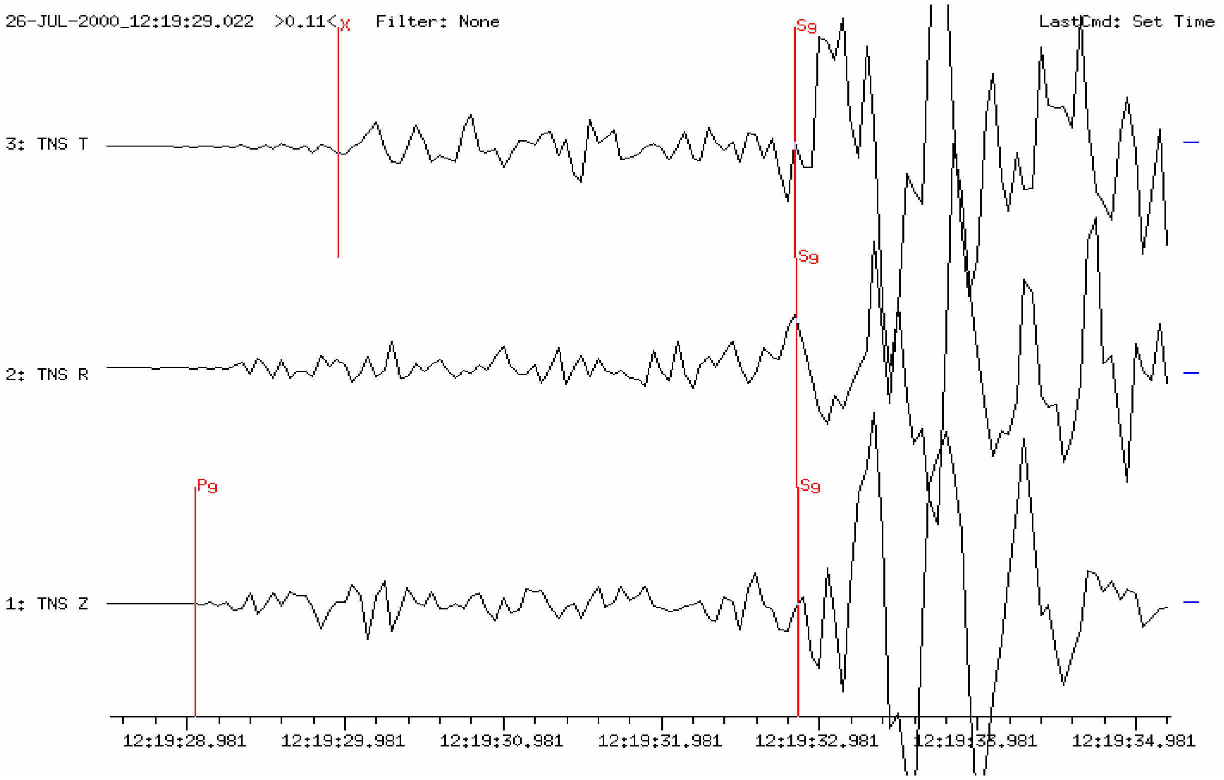

Figure 1c Three-component BB record of station TNS at D = 29 km. Horizontal components are rotated in the R (radial) and T (transverse) directions. One second after Pg a converted P to S wave occurs on the T component (mark X). The sampling rate is 20Hz. Note: “Filter: None” in the uppermost line always means velocity broadband record.

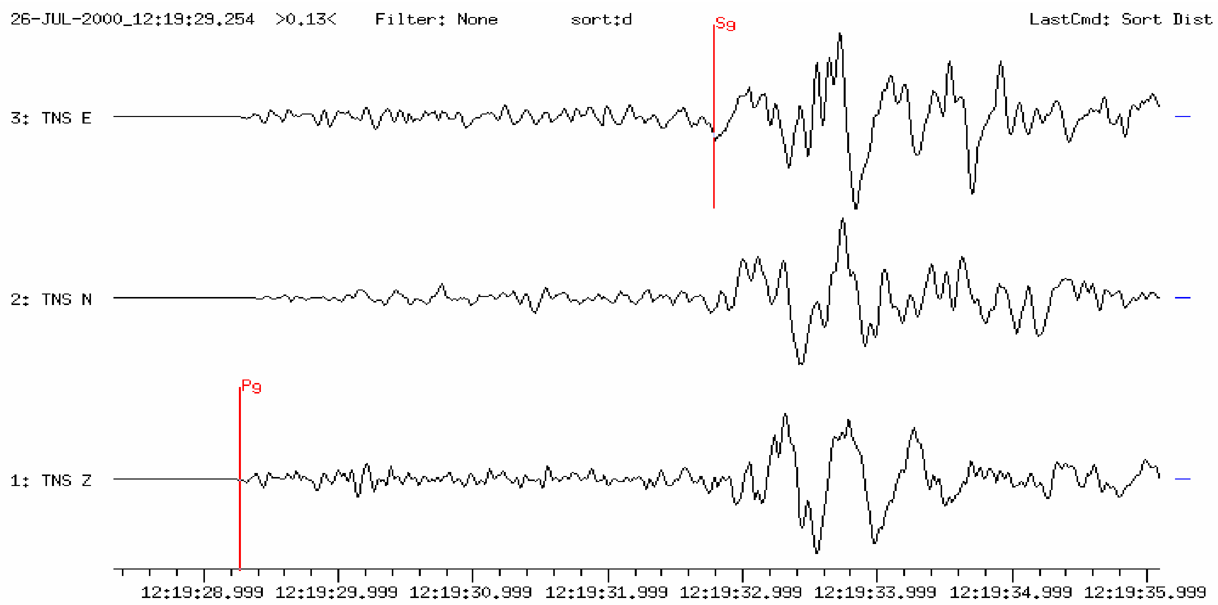

Figure 1d Three-component BB record of station TNS. The sampling rate is 80 Hz.

Example 2: Local earthquake in Northern Germany. Generally, this region is regarded as aseismic.

SZGRF-Daten: 2000-05-19 OT 19:22:40.8(UTC) 53.47N 11.10E Ml = 3.4

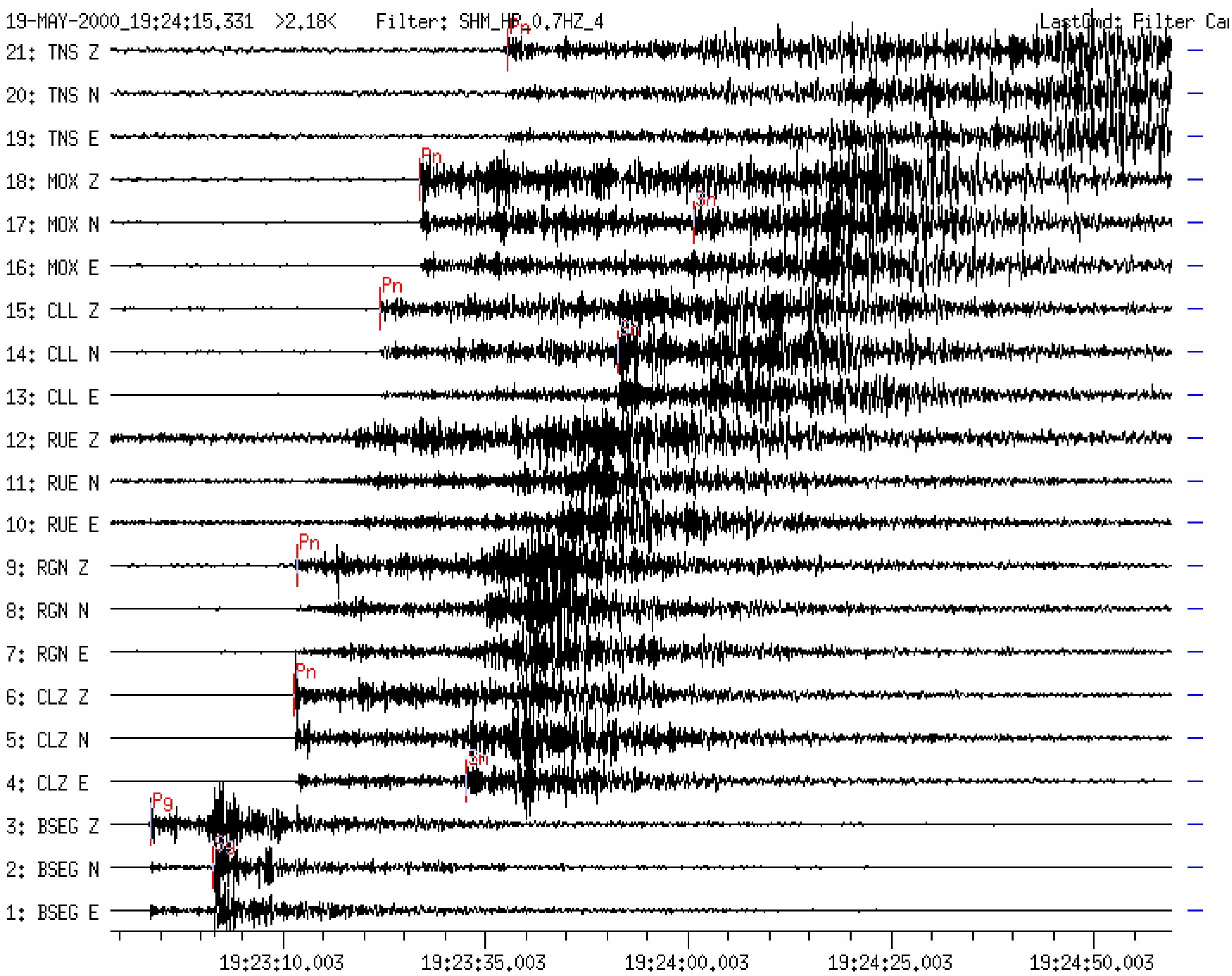

Figure 2a High-pass filtered (0.7 to 4 Hz) 3-component records of 7 GRSN stations. The traces have been sorted according to increasing distance ranging from D = 73 km (BSEG) to 405 km (TNS).

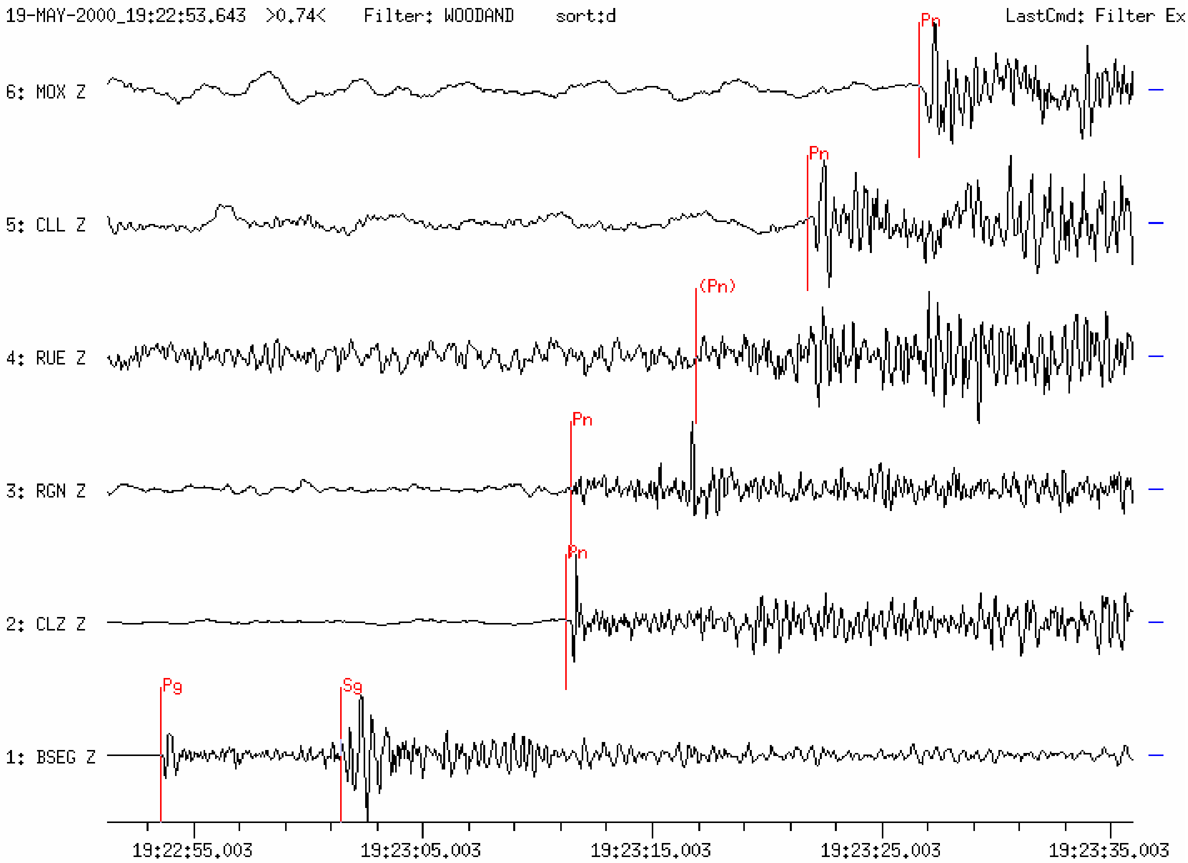

Figure 2b Short-period (WA) filtered Z-component seismograms of the same earthquake as in Figure 2a. First motion polarities can be read from traces 1, 2, 5 and 6, only.

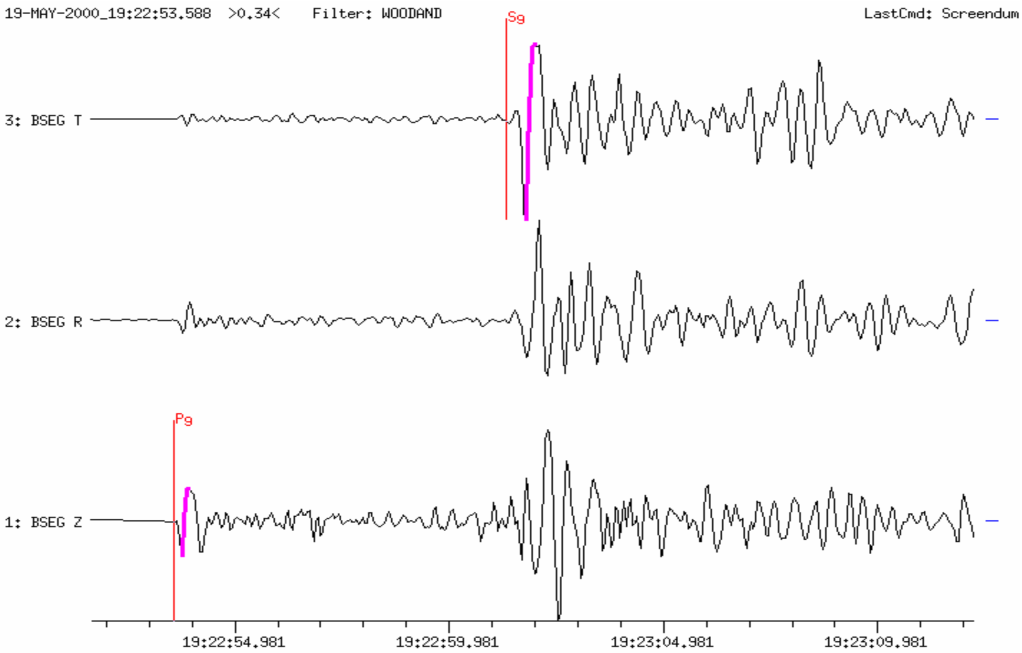

Figure 2c Three-component WA record at station BSEG at D = 73 km and BAZ = 135°. The radial component R shows in the direction of wave propagation, the transversal component T is perpendicular to R.

Example 3: Regional earthquake south of Wien

SZGRF-data: 2000-07-11 OT 02:49:51(UTC) 48.10N 16.40E Ml = 5.2

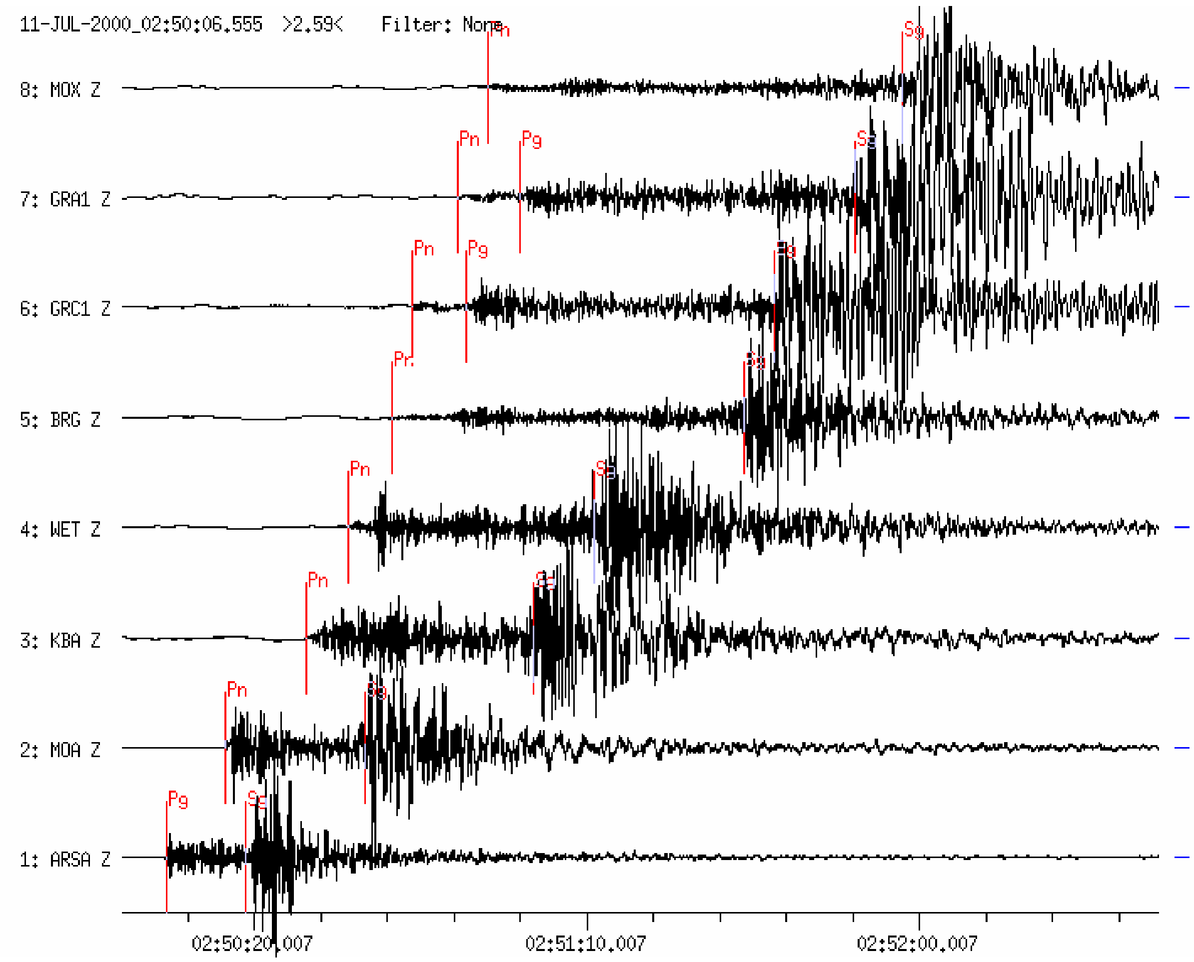

Figure 3a Vertical-component BB records of 5 GRSN/GRF stations and 3 Austrian stations (ARSA, MOA, KBA). Seismogram trace amplitudes have been normalized and the traces sorted according to increasing distance (D = 100 km to ARSA is 100 km and 490 km to MOX).

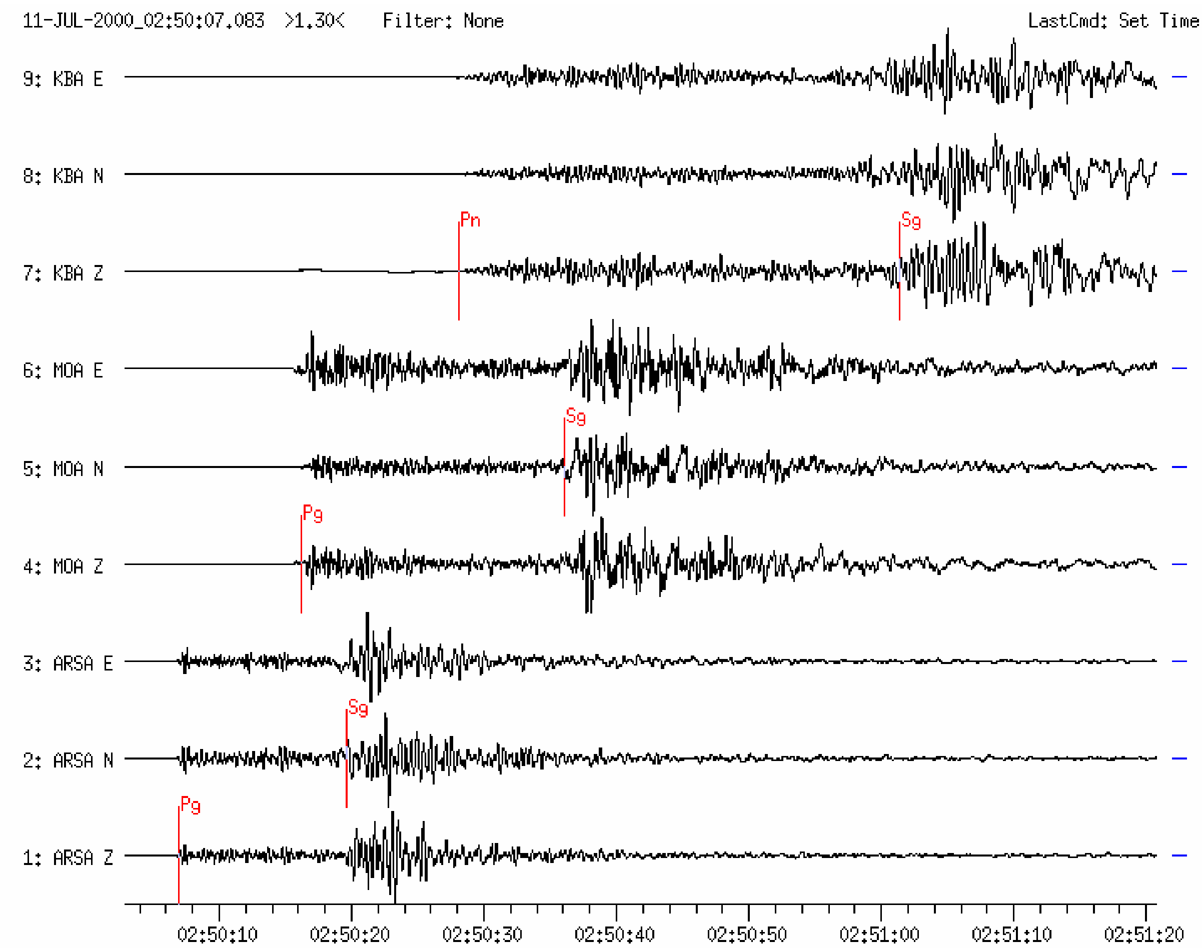

Figure 3b Three-component BB records of the stations ARSA (D = 100 km), MOA (D = 160 km) and KBA (D = 250 km) of the Austrian network (ZAMG Wien).

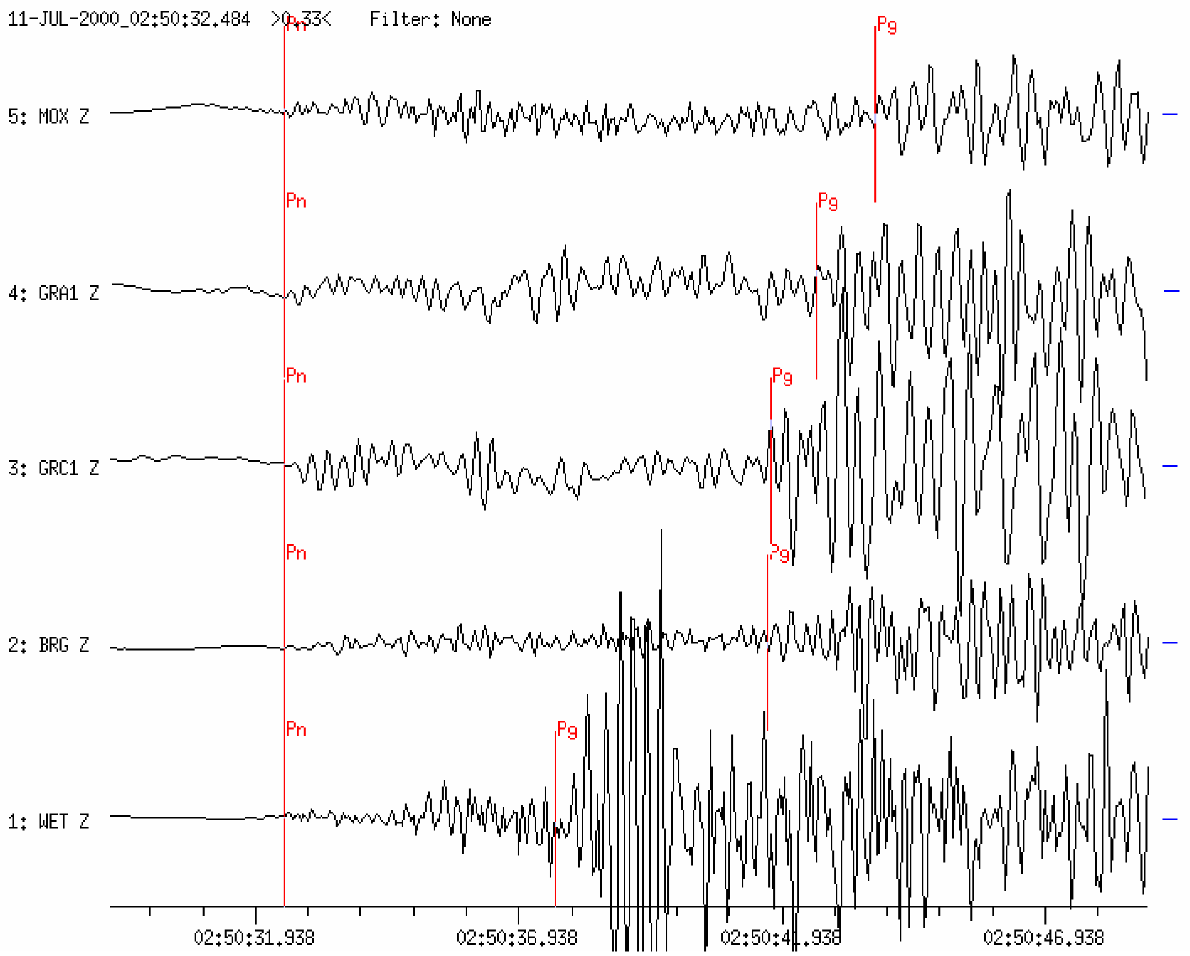

Figure 3c Vertical-component BB records of 5 GRSN stations with phases Pn and Pg. Traces are shifted and aligned for Pn according to a reference station (WET) at D = 284 km. Recorded Pn-onsets are weak and polarity readings are impossible

Aftershock: 2000-07-11 OT 10:56:04.5 (UTC) 48.01N 16.48E Ml = 4.7

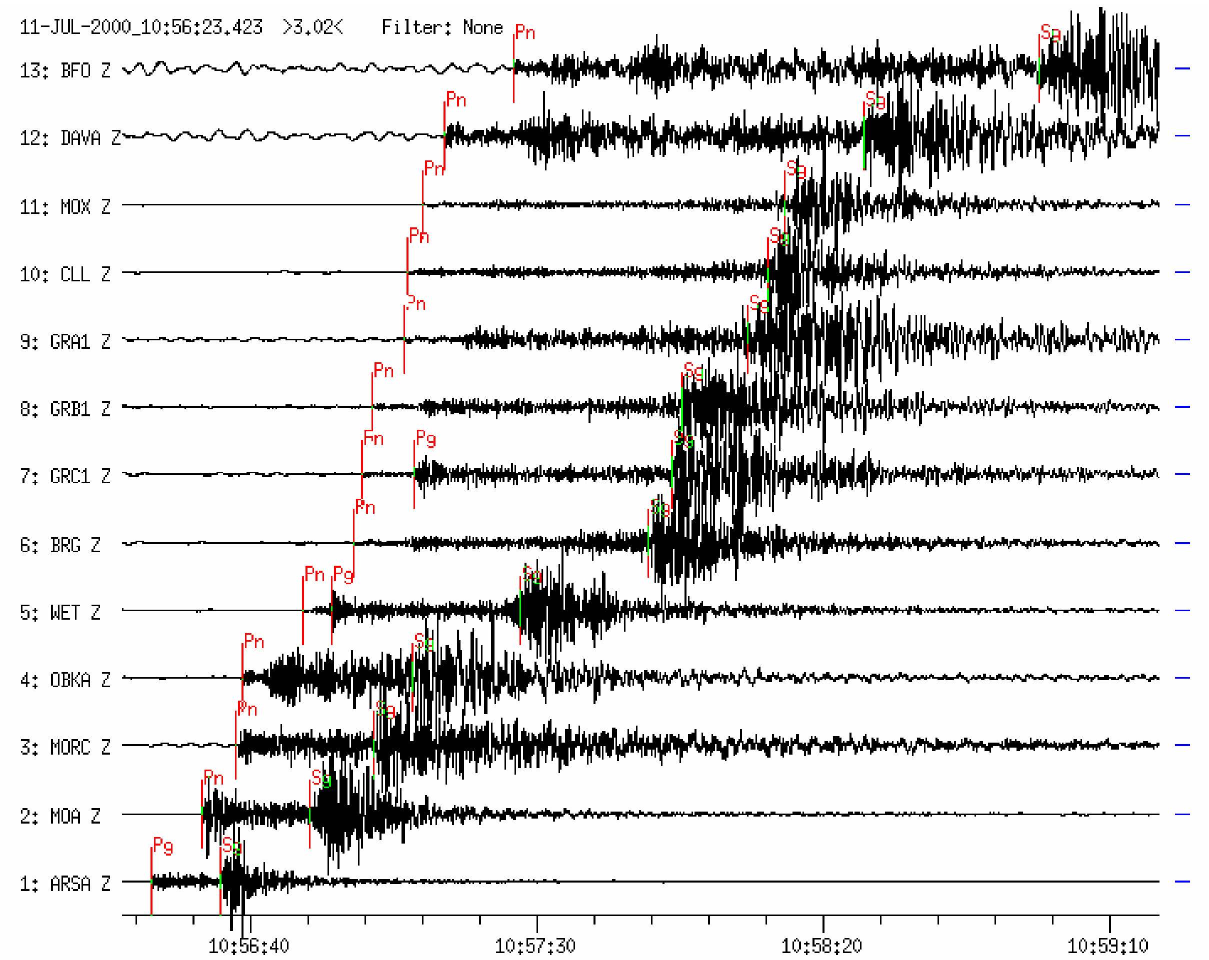

Figure 3d Vertical-component BB records of 8 German GRSN/GRF-stations (WET, BRG, GRC1, GRB1, GRA1, CLL, MOX, BFO), 4 Austrian ZAMG-stations (ARSA, MOA, OBKA, DAVA) and 1 Czech GEOFON-station (MORC). Trace amplitudes have been normalized and the stations sorted according to increasing distance (D = 96 km to ARSA and 920 km to BFO).

Example 4: Earthquake in Yugoslavia

NEIC-data: 1998-09-29 OT 22:14:50 44.11N 20.04E h = 10km mb = 5.2
(D = 8.2° and BAZ = 130° from GRA1)

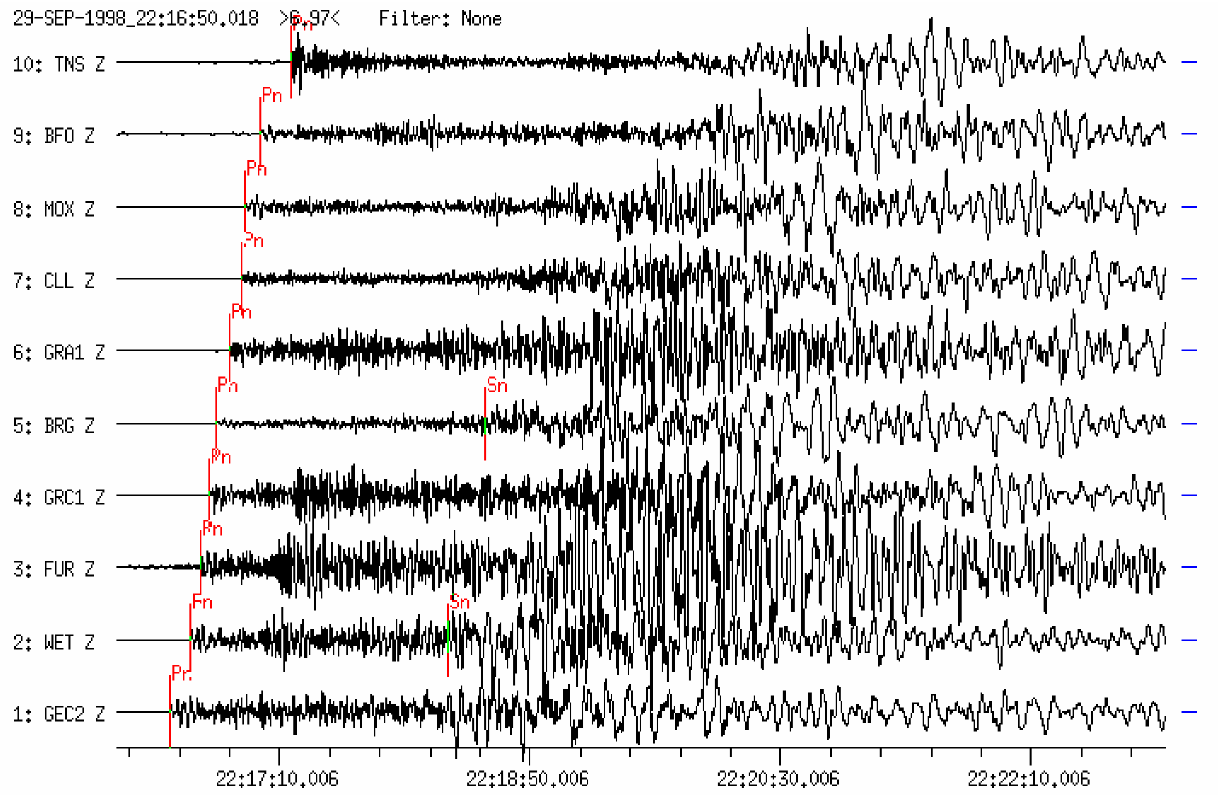

Figure 4a Vertical-component BB records of 10 GRSN/GRF-stations sorted according to increasing distance (D = 6.45° to GEC2 and 10.0° to TNS).

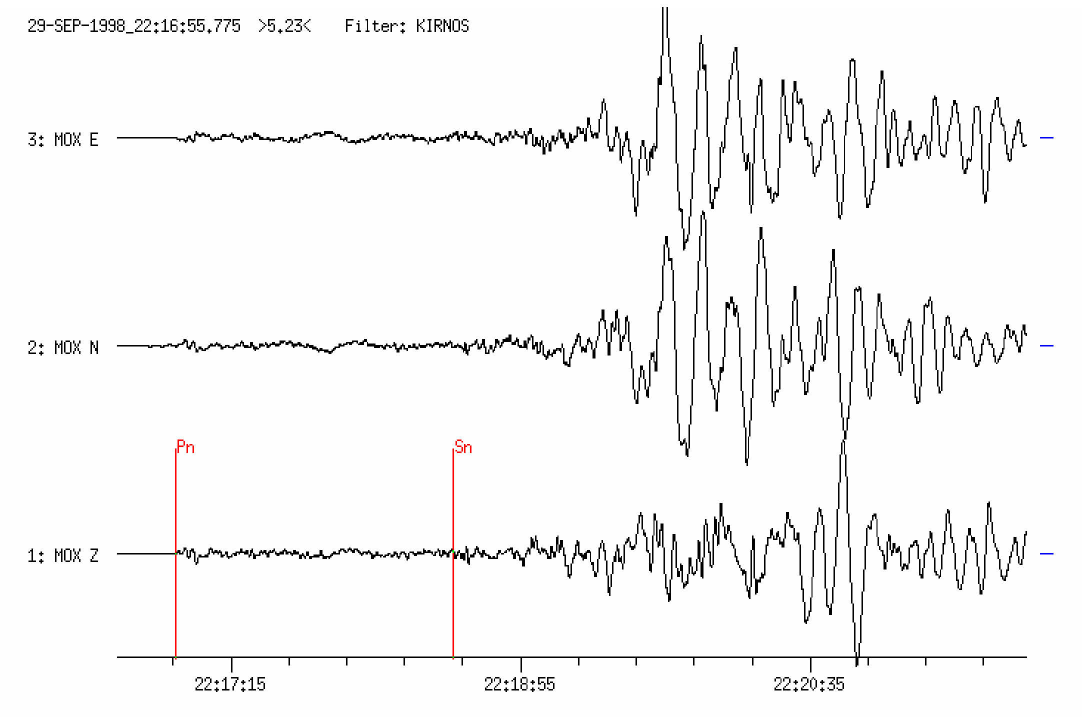

Figure 4b Three-component BB-displacement (Kirnos filtered) record of station MOX (D = 8.7°, BAZ = 136°) with phases Pn, weak Sn and strong dispersed surface waves (LQ onset in N-E around 22:19:10 and LR_{max} in Z at 22:20:45; note onset-like Lg phases arriving between Sn and LQ).

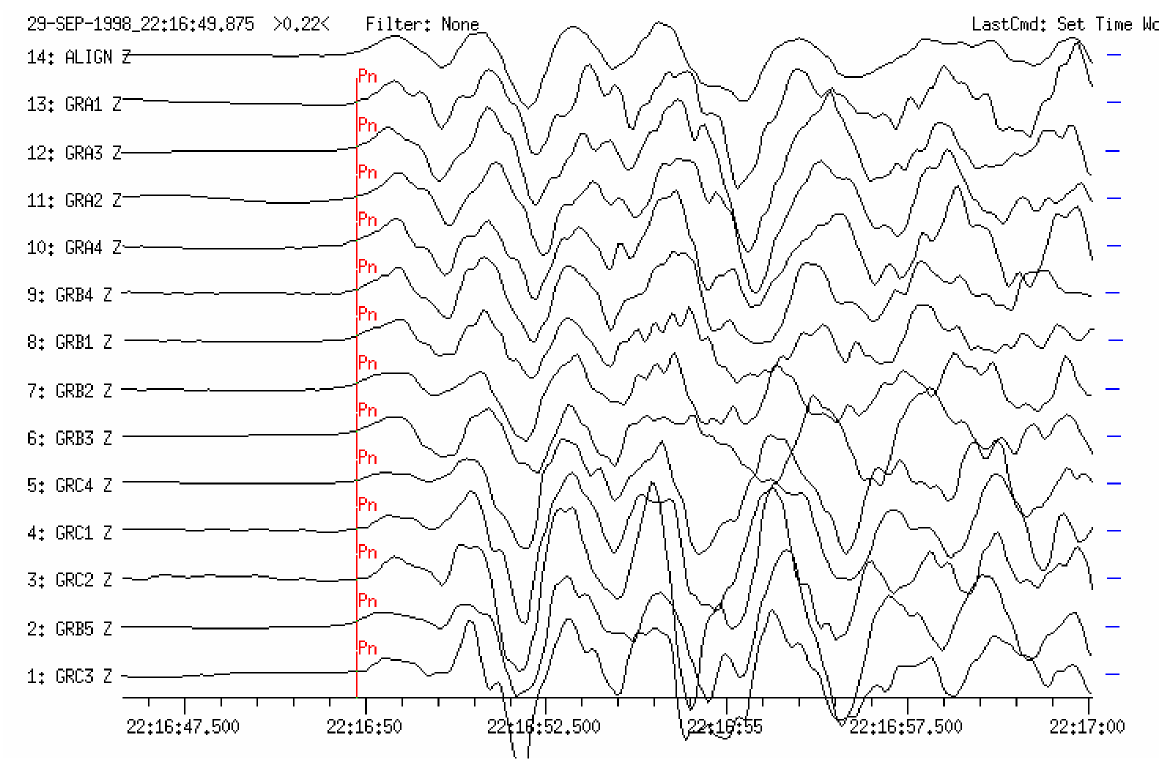

Figure 4c Time-shifted and aligned vertical components BB records of the 13 GRF-array stations (see Fig. 11.3a for array position and outline). Traces are sorted according to increasing distance.

Example 5: Earthquake in Albania

NEIC-data: 1998-09-30 OT 23:42:54 41.95N 20.39E h = 10km Ms = 5.1 (D = 10.0° and BAZ = 137° from GRA1).

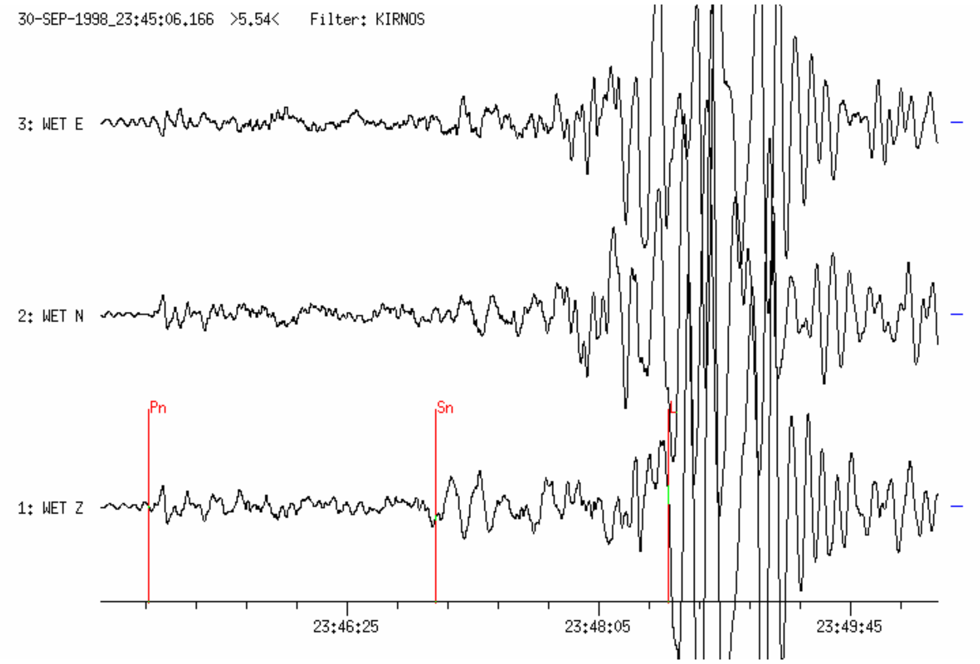

Figure 5 Three-component BB-displacement (Kirnos filtered) record at the GRSN station WET at D = 8.9° (BAZ = 136°). Note the clear onset of Pn, a very pronounced long-period Sn (as compared to the very weak Sn in the record of the Yugoslavia earthquake in Figure 4b above) and well dispersed surface waves of dominatingly Rayleigh (LR) type (because of the strong vertical component).

Example 6: Earthquake in SOUTHERN ITALY

USGS NEIC-data: 1998-09-09 OT 11:27:58.6 39.964N 15.948E h = 10km
mb = 5.3 Ms = 5.2
SZGRF-data: 1998-09-09 OT 11:28:01.8 40.1N 16.4E Ms = 5.2
Distance (GRA1) D = 10.3 deg, BAZ = 157 deg

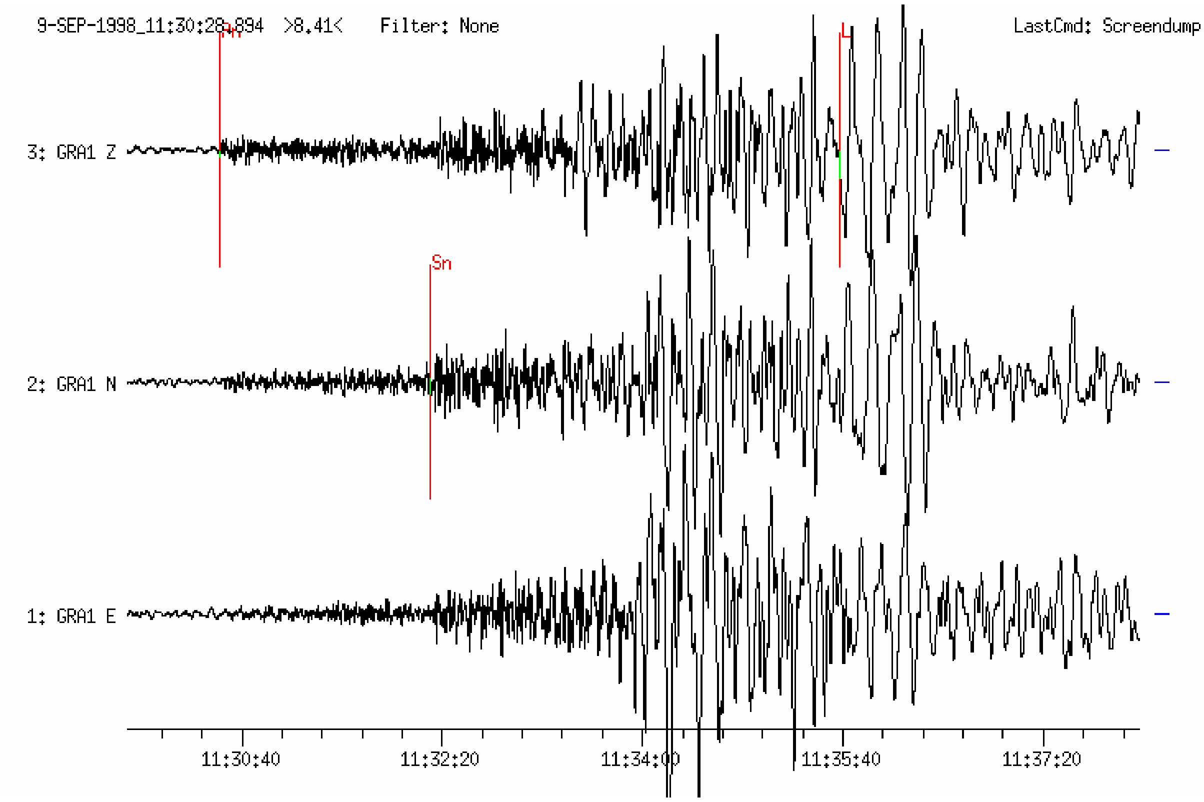

Figure 6a Three-component BB record at the GRF-station GRA1 (D = 10.3°, BAZ = 159°) with clear phases Pn, Sn and surface waves (Lg arriving around 11:34:00 and Rg around 11:35.40).

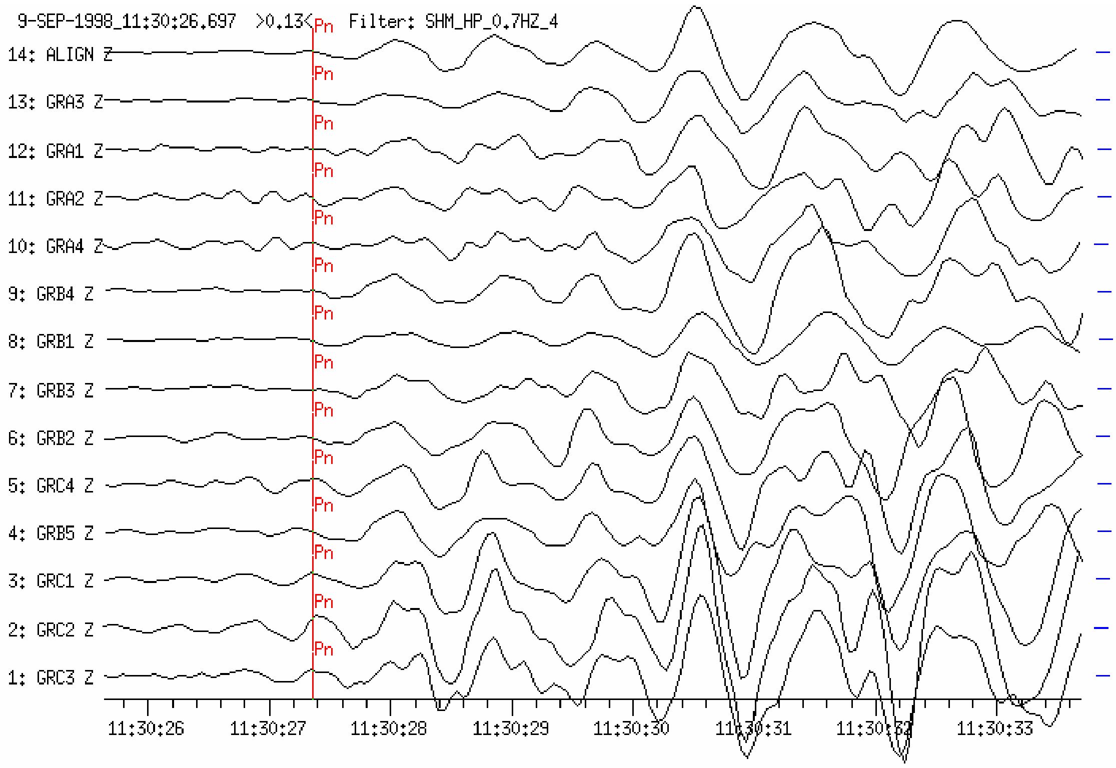

Figure 6b Highpass-filtered (0.7 to 4 Hz) Z-component records with Pn onsets at 13 GRF-array stations. Traces are aligned and sorted according to increasing distance (D = 9.45° to GRC3 and D = 10.33° to GRA3). The coherency of Pn is poor at this distance range.

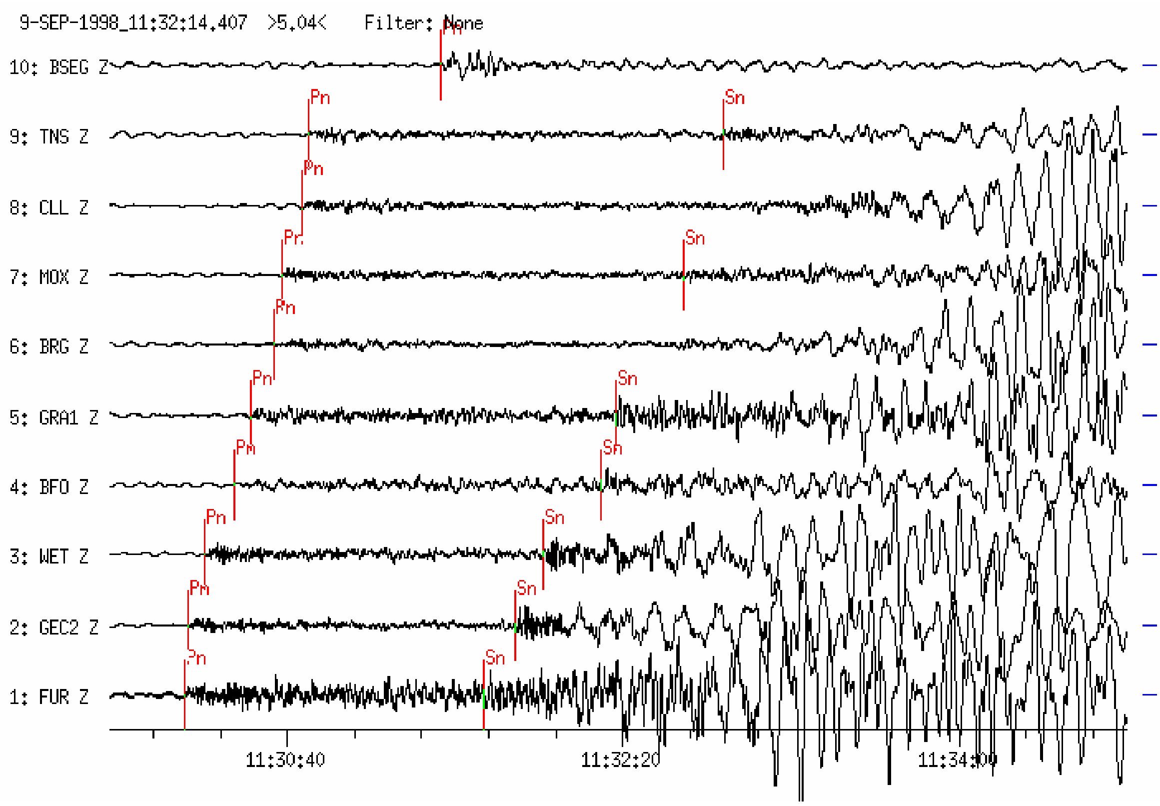

Figure 6c Vertical-component BB records with Pn and Sn waves from 10 GRSN-stations. The traces have been sorted according to increasing distance between D = 8.86° (FUR) and 14.5° (BSEG). Except for stations CLL, BRG and BSEG clear Sn arrivals are visible.