

# Seismicity of the Eastern Hellenic Subduction Zone

## Description of the event and phase catalogue of the temporary LIBNET-network

### 1 Summary

During the SFB 526 "Rheology of the Earth" at the Ruhr-University Bochum, Germany, several temporary seismological networks were deployed in the southern Aegean to study the seismotectonic behaviour of the Hellenic Subduction Zone. The amphibian LIBNET network covered the offshore region south of eastern Crete in the area of the so-called Ptolemy, Pliny, and Strabo trenches from July 2003 to June 2004 with various network configurations. The network was supplemented by 5 onshore stations at the south coast of Crete incorporated into the data analysis. The data evaluation was complemented by permanent stations of the NOA, MEDNET and GEOFON networks. The catalogue contains more than 2500 earthquake locations covering the region investigated by the grid search of the probabilistic earthquake localization scheme (roughly 33.35°N-35.625°N and 23.35°E-27.05°E). All phase onsets were manually determined. The reference publication with detailed information about phase determination, velocity model and station corrections is *Becker, D., Meier, T., Bohnhoff, M., & Harjes, H.-P. (2009). Seismicity at the convergent plate boundary offshore Crete, Greece, observed by an amphibian network, J. Seismol., 14 (2), 369-392, doi:10.1007/s10950-009-9170-2*. Waveforms of the offshore OBS stations of LIBNET are stored at the GEOFON project including dataless seed volume of the stations metadata. The network ID for the LIBNET network is ZZ (<http://doi:10.14470/MM7557265463>). The LIBNET network and the data evaluation leading to the creation of the here presented LIBNET catalogue was funded by the German Research Foundation (DFG) within the collaborative research center 526 "Rheology of the Earth: From the Upper Crust to the Subduction Zone".

### 2 Important information

The event and phase catalogue contains the pick times and event parameters of all 2578 events occurring in the time 07/18/2003-06/16/2004 depicted in Fig. 7 of Becker et al. (2009). These events are located with a minimum of 6 manually picked P- and S-onset times and were located within the 3D search volume implemented in the NonLinLoc localization scheme (Becker et al. 2009).

For earthquake localization with the probabilistic NLLoc software the following velocity model derived as minimum 1-D velocity model from a VELEST inversion was used (for details on the creation of the velocity model see *Becker et al., 2009*):

*Table 1: P-wave velocity model used for the event localisation with the amphibian LIBNET experiment. \*The top of the velocity model was set to -0.9 km to include station with positive z coordinates. For the S-wave velocity a constant P/S velocity ratio of 1.78 was set throughout the 1-D velocity model.*

Depth [km]	$v_p$ [km/s]
-0.9*	4.64

3.65	5.25
5.6	5.67
7.6	5.80
9.6	5.89
11.6	6.02
13.6	6.12
18.6	6.14
23.6	6.19
28.6	6.28
33.6	6.48
38.6	6.84
43.6	7.46
48.6	7.75

For the event localisation, a combination of off- and onshore stations was used. P- and S-station corrections (delays) were calculated using the *velast* approach and are provided together with the station coordinates in the following table (see *Becker et al., 2009* for details):

*Table 2: Station coordinates and corresponding P- and S-delays. \*Negative elevation values indicate water depth of the OBS stations.*

Station	Latitude [°]	Longitude [°]	Elevation [km]*	P-delay [s]	S-delay [s]
APEZ	34.9777	24.8858	0.43	0.27	-0.19
GVD	34.8392	24.0873	0.12	0.18	0.17
IDI	35.2880	24.8900	0.75	0.04	-0.35
KARP	35.5500	27.1600	0.53	0.04	-1.04
KRIS	35.1780	25.5030	0.85	-0.02	-0.19
ZKR	35.1147	26.2170	0.27	0.14	-0.04
CCA	35.0039	25.1582	0.35	0.03	-0.24
CCB	35.0306	25.2924	0.35	-0.04	-0.24
CCC	35.0056	25.3891	0.10	-0.10	-0.24
CCD	34.9860	25.2860	0.02	0.00	-0.20
CCE	34.9510	25.1281	0.02	0.07	-0.21
LIB1	33.6996	26.5012	-2.71	2.11	3.82
LIB2	33.9000	25.3998	-2.59	0.14	0.10
LIB3	34.3796	26.7920	-1.76	1.45	3.41
LIB4	34.6497	25.7994	-1.60	0.38	0.66
LIB6	34.4997	25.0987	-1.44	0.19	0.62
LI10	34.2200	26.2497	-2.04	1.95	3.35
LI12	34.7498	25.1200	-1.63	0.68	0.77
LI14	34.8603	25.5407	-0.79	0.45	0.69
LI15	34.6496	25.8003	-1.62	0.41	0.40
LI16	34.4703	26.2305	-3.60	1.32	2.67
LI17	34.3995	25.6405	-2.63	0.67	1.31
LI18	34.1701	25.4704	-3.12	1.31	1.43
LI19	34.0801	25.9007	-2.75	1.14	1.48
LI22	34.4998	25.0989	-2.04	0.73	0.80

### 3 File format

File format modified after the SED file format.

Line Number	Column	Description
<b>line 1</b>	1-2 3-4 6-12 14-18 20-26 27-28 29-34 35-56	<b>Parameters used for localisation</b> velocity model (1, for details see readme-file) station file (1, for details see readme-file) distance (km) where to begin distance weighting (0.00: no explicit a priori distance weighting) distance (km) where to end distance weighting (0.00: no explicit a priori distance weighting) vp/vs ratio a priori P to S pick weighting used Location Programm (NLL: NonLinLoc) INST (default text to describe line)
<b>line 2</b>	1-8 10-18 20-25 27-30 32-33 35-36 38-39 41-42 44-48 50 55-59 61-66 68-71	<b>hypocentre location</b> latitude longitude depth year month day hour minute second 0 TRIAL (text to describe line) localization uncertainty (length of error ellipsoid major semi-axis in km) ml (local magnitude; for details see <i>Becker et al., 2009</i> )
<b>line 3</b>	1-12 55-60	<b>eventID Network</b> eventID network name
<b>line 4</b>	1-16 55-58	<b>Reference time for arrival times, location type</b> reference time from which pick times are offset (YYYY/MM/DD HH:MM) solution type (Loca: local earthquake)
<b>line 5-n</b>	1-4 9 17 18	<b>Phase readings</b> station name phase identifier – either P: P-pick or S: S-pick phase onset characteristic – E: emergent; I: impulsive first motion P-polarity – U: up; D: down; N: not defined pick time in seconds relative to reference time

	20-26 28 54-55 56-59 64-71 73-79 81-87 89	flag whether the pick was used in localization 1 (dummy entry) 0 (dummy entry) Pick (default text to describe line) time of peak amplitude (0.000 if not determined) uncertainty in s before pick (from pick quality factor) uncertainty in s after pick (from pick quality factor) observational weight of pick
<b>line n+1</b>	77-80	<b>SKIP (indicate end of event phase readings)</b> SKIP (default text to indicate end of current event)