Earthquake-parameters and stress-field determinations from events near the KTB-drill site

Dahlheim, H.-A. Institut für Allgemeine und Angewandte
Geophysik, Universität München

Over 70 earthquakes located within 20 km of the KTB drillsite have been recorded by the KTB Seismological Network (KTB-NET). The strongest events have been also recorded by other stations of the University of Munich, the Vogtland network/University of Jena, the Graefenberg Array, the Vogtland Network/Masaryk University Brno,CFR, the Geophysical Institute and the Institute of Geotechnics, both Academy of Science, Praha, CFR. A total of 5 small events (ML 0.2 to 0.5) are located within or close to the KTB-NET (see Tab.1). The other earthquakes are located 20 km north of the drillsite appr. 5 to 10 km east of the town of Marktredwitz. These events are occurring mainly in form of swarms with the highest magnitude of ML=2.8 recorded so far. Besides several single events we recorded from 1990 to present a total of 3 swarms. The major events are listed in Tab. 2. All epicenters are within an area of 6 km in the EW- and 3 km in the NS-direction. They coincide with the main basalts of this area, which probably extruded at intersecting fault zones. All the events of one swarm are very close to each other and within the errors of the hypocenter determinations. The depth ranges between 9 and 11 km. The major events have been felt by the population and macroseismic surveys have been conducted.

Limited by the number of stations, we estimated possible fault plane solutions using two different routines. The first one uses only polarity-readings (Reasenberg and Oppenheimer, 1985), the second includes amplitude ratios of SV/P, SV/SH and SH/P (Snoke et. al,1984). The different solutions will be presented and discussed. We limited the readings to the closest stations of high quality recording, the KTB-NET, Uni Munich and Geotechnics, but all emergence angles are above critical. In general, the main stress directions coincide with the known tectonic stress field.

For the small shallow events within the KTB-NET estimates indicate a different local stress field, but the amplitudes of such small events could be influenced by station effects.

Tab.1: Seismic events within or close of the KTB Seismological Network

location	distance from KTB	date	time [UTC]	lat	long	depth	ML
Escheldorf	7 km N	910416	23:40:18.68	49-52.54N	12-07.92E	6.77	0.3
	basaltic intrusion / Fichtelnaab faultzone						
NW-Tir-schenreuth	16 km NE	910613	01:47:23.85	49-54.59N	12-17.47E	12.00*	0.3
	*event outside net poor depth resolution						
Windisch-eschenbach	2.4 km E	910828	19:34:58.21	49-48.57N	12-09.17E	1.54	<0.3
	border of ZEV to Falkenberg granite						
Püchers-reuth	12 km SE	920725	13:46:28.29	49-45.27N	12-14.73E	11.24	<0.3
	NW-SE striking intrusions						
Windisch-eschenbach	2.4 km E	930206	23:19:18.36	49-48.48N	12-09.18E	1.52	<0.3
	border of ZEV to Falkenberg granite						

Tab. 2.: Swarm activity east of Marktredwitz from 1990-present

location	date	time [UTC]	lat	long	depth	ML
Swarm 1	Aug/Sep 91	12 events recorded				
Haingruen	910906	23:17:52.04	50-00.03N	12-08.18E	10.50	1.9
Haingruen	910907	00:50:28.89	50-00.01N	12-08.26E	10.00	1.3
Swarm 2	June 24, 1992	39 events recorded				
Haingruen	920624	02:32:56.54	50-00.63N	12-13.12E	9.80	2.8
Haingruen	920624	04:02:24.29	50.00.52N	12-12.90E	9.80	2.6
Swarm 3	Sep 22, 1992	6 events recorded	max ML 1.7			