



## **GEO-DESIRE Wide-Angle Reflection / Refraction experiment, Israel and Jordan 2006**

### **Data for IRIS-PASSCAL archives**

James Mechie, Michael Weber, DESIRE Group

Department 2, GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg, 14473 Potsdam, Germany. Tel.: +49 331 288 1237/1250, e-mail: jimmy@gfz-potsdam.de, mhw@gfz-potsdam.de

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## Report

As part of the GEO-DESIRE project a seismic wide-angle reflection / refraction (WRR) experiment was completed in March 2006 across the Dead Sea Transform (DST) in the region of the southern Dead Sea basin. The DST with a total of about 105 km multi-stage left-lateral shear since about 18 Ma ago, accommodates the movement between the Arabian and African plates. It connects the spreading centre in the Red Sea with the Taurus collision zone in Turkey over a length of about 1100 km. With a sedimentary infill of about 10 km in places, the southern Dead Sea basin is the largest pull-apart basin along the DST and one of the largest pull-apart basins on Earth. The WRR experiment comprised 11 shots recorded by 199 three-component and 399 one-component instruments spaced 300 m to 1.2 km apart along the whole length of the E-W trending 240 km long profile. The 199 three-component instruments were Earth Data Logger PR6-24 (EDL) recorders provided by the Geophysical Instrument Pool Potsdam (GIPP). The 399 one-component instruments were Reftek RT 125 recorders (Texans) with 4.5 Hz vertical geophones supplied by IRIS/PASSCAL. A list of shot details including coordinates and origin times is shown in Table 1, while a list of station details including site number, instrument number and coordinates for the 370 Reftek RT 125 instruments which recorded any useful data is shown in Table 2. The locations of the 11 shots and the 370 Reftek RT 125 instruments which recorded any useful data are shown in Figure 1.

By the start of the shot program on the first shot day 397 Reftek RT 125 instruments had actually been deployed. By the start of the shot program on the second shot day two more Reftek RT 125 instruments had been deployed. During the field experiment one Reftek RT 125 and one geophone were stolen. The Reftek RT 125 was recovered about two days later. However, the geophone was never recovered. The other main problem during the field experiment with the PASSCAL instrumentation was that two boxes (30 instruments) did not take the time stamp before being deployed although they seemed to be in order during the programming of the instruments. This resulted in the 27 instruments which were deployed from these two boxes not recording any useful data. A further two Reftek RT 125 instruments (nos. 1037 - batteries stolen - and 1110) did not record any data. Thus there are 368 traces in the segy files for shots 6 and 7 on the first shot day (Table 1). Reftek RT 125 instrument no. 1068 (red light on pick up) died after the shot program on the first shot day and Reftek RT 125 instrument no. 1160 also did not record one shot. Thus there are 369 traces in the segy files for the rest of the shots, except for shot 2 for which there are 368 traces (Table 1).

The data were recorded at 100 samples/sec. For the three shot days (20th-22nd March 2006), 18 windows each 2.75 minutes long were recorded at half hourly intervals beginning at 8.59.45 am (UTC). Thus a total of 54 windows were recorded resulting in a total amount of raw data of about 1.1 Gbytes. These raw data were written to CD in the field HQ in Israel and Jordan by the PASSCAL staff. At GFZ Potsdam the raw data were firstly converted into PASSCAL segy format using the script 125proci.sh.

Then the data were time corrected using clockcor. Here a few more problems were encountered. For Reftek RT 125 instrument nos. 880 and 1068 no clock correction information was produced by 125proci.sh and thus no correction was possible. For Reftek RT 125 instrument nos. 784 and 1269 (red light on pick up) the drift was zero. For Reftek RT 125 instrument no. 752, which was the stolen instrument, the instrument had probably ran too long before it got the time stamp after it was recovered. The drift rate was 0.00000645 which seemed unnaturally large. Also the drift rate for Reftek RT 125 instrument no. 676 seemed unnaturally large, being 0.00170. Thus for Reftek RT 125 instrument nos. 676, 752, 784, 880, 1068 and 1269 no time corrections were made. However, checking of the arrival times

recorded by these instruments indicates that timing errors caused by clock problems are less than 50 msec. The largest reasonable looking timing correction produced by clockcor was 213 msec. Again, examination of all arrival times with timing corrections, the absolute value of which was greater than 50 msec, indicates that timing errors due to clock drifts are less than 50 msec.

Then the data were converted to standard segy using a modified txn2segy. The two modifications which were made are i) a different routine was used to calculate the source-receiver distance and azimuth and ii) the azimuth was written as a two-byte integer in tenths of a degree to the segy header in byte positions 227 and 228. 120 sec of data were cut out beginning at the shot time. Finally, the data were imported to PROMAX where the correct sign for the offset was applied, the source was renumbered between 1 and 11 and a trace DC removal was applied. The exported traces from PROMAX form the archived data set. The file names are wr[1-11]\_ch1\_txn\_rm[dc].sgy. The segy header produced by the modified version of txn2segy described above was preserved during the import to and export from PROMAX.

Individuals interested in the availability of the EDL data set should contact either Dr. J. Mechie or Prof. Dr. M. Weber.

**Table 1.** GEO-DESIRE shot details

shot	lat.	long.	height (m)	depth (m)	date	time (UTC)	size (kg)	no. of traces in segy file
1	31.20240	34.50449	145.9	40	21 3 06	14 00 5.0940	1000	369
2	31.14453	34.61542	197.1	62	21 3 06	12 00 5.7350	250	368
3	31.16504	34.92788	392.9	60	21 3 06	09 00 6.1490	1000	369
4	31.22780	35.17886	579.4	30	22 3 06	09 00 6.6470	250	369
5	31.23129	35.33784	54.1	30	22 3 06	12 00 5.2290	275	368
6	31.25604	35.49238	-363.8	40	20 3 06	10 30 2.2640	1000	368
7	31.30210	35.54788	-263.8	25	20 3 06	13 30 2.3480	250	369
8	31.31029	35.77232	878.8	25	22 3 06	12 30 2.2480	250	369
9	31.31978	35.97675	810.4	40	22 3 06	10 29 59.9760	1000	369
10	31.31376	36.26143	867.6	25	21 3 06	12 30 0.1500	250	369
11	31.30801	36.48701	794.0	40	21 3 06	10 29 58.8090	1000	369

**Table 2.** GEO-DESIRE station details for Reftek RT 125 instruments

site no.	inst.	lat.	long.	height (m)	comments
16	993	31.19976	34.46267	136.5	
18	1148	31.19610	34.47573	139.5	
20	988	31.19610	34.48864	150.6	
22	981	31.20122	34.50108	149.4	
24	980	31.20694	34.51284	140.8	
26	976	31.21179	34.52460	137.8	
28	975	31.20442	34.53844	147.6	
30	967	31.18720	34.55328	157.5	
32	965	31.18021	34.56769	165.6	
34	962	31.17438	34.58006	171.9	
36	961	31.16834	34.59329	206.3	
38	959	31.16200	34.60675	214.9	

40	924	31.15454	34.62030	186.5	
42	957	31.15061	34.63347	213.5	
44	958	31.14856	34.64656	224.8	
46	1214	31.14635	34.65694	224.3	
47	1212	31.14561	34.65966	225.5	
48	1210	31.14506	34.66287	227.6	
50	1209	31.14367	34.66922	244.1	
51	1208	31.14303	34.67281	240.6	
52	1204	31.14622	34.67546	242.0	
54	1199	31.15106	34.68105	259.6	
55	1202	31.15228	34.68409	262.8	
56	1201	31.15434	34.68697	264.8	
58	1198	31.15114	34.69374	267.5	
59	1197	31.15168	34.69654	260.2	
60	1196	31.15247	34.69970	252.3	
62	1195	31.15490	34.70601	253.9	
63	1084	31.15522	34.70884	248.8	
64	1112	31.15711	34.71209	251.7	
66	1085	31.15710	34.71852	255.9	
67	1097	31.15789	34.72134	254.6	
68	1101	31.15921	34.72418	250.8	
70	1108	31.15848	34.73051	247.8	
71	1109	31.15961	34.73390	253.7	
74	1116	31.16261	34.74290	262.1	
75	1114	31.16297	34.74616	267.5	
76	1117	31.16307	34.74949	269.3	
78	1119	31.16355	34.75514	272.0	
79	1120	31.16474	34.75812	274.2	
80	1122	31.16484	34.76162	273.3	
82	1123	31.16774	34.76685	282.3	
83	995	31.16819	34.77074	299.5	
84	1004	31.16948	34.77349	301.3	
86	997	31.17066	34.77968	312.0	
87	998	31.17033	34.78297	325.1	
88	999	31.16899	34.78632	332.8	
90	1000	31.16852	34.79278	344.7	
91	1002	31.16825	34.79605	350.5	
92	1009	31.16828	34.79930	343.4	
94	1006	31.16675	34.80524	349.3	
95	1007	31.16617	34.80873	346.4	
96	1313	31.16612	34.81188	347.7	
97	744	31.16577	34.81513	352.7	
98	880	31.16602	34.81847	363.4	no time correction
99	1008	31.16451	34.82166	358.3	
141	844	31.16722	34.95369	449.2	
142	845	31.17081	34.95634	438.9	
144	846	31.17019	34.96345	410.8	
145	847	31.17028	34.96766	419.1	
146	848	31.17117	34.96990	420.1	
148	849	31.17500	34.97558	390.4	
149	850	31.17793	34.97869	402.1	
150	853	31.17827	34.98133	409.7	
152	852	31.17710	34.98786	410.7	
153	854	31.17565	34.99104	408.7	
154	855	31.17548	34.99449	408.0	
156	856	31.17478	35.00085	415.2	
157	858	31.17492	35.00385	409.4	
158	860	31.17398	35.00738	408.8	
160	861	31.17171	35.01412	407.9	
161	862	31.17070	35.01730	417.7	
162	863	31.17098	35.02034	428.7	
164	864	31.17178	35.02662	445.3	
165	866	31.17189	35.03008	450.9	

166	867	31.17206	35.03285	452.1	
168	868	31.17270	35.03933	451.2	
169	871	31.17230	35.04182	451.3	
170	873	31.17324	35.04539	457.9	
172	874	31.17529	35.05193	459.4	
173	875	31.17660	35.05437	466.1	
174	876	31.17777	35.05787	464.4	
176	877	31.17978	35.06367	473.1	
177	762	31.18077	35.06662	478.5	
178	763	31.18184	35.06966	478.5	
180	765	31.18307	35.07573	477.1	
181	766	31.18142	35.07919	478.7	
182	767	31.18324	35.08227	483.6	
184	768	31.18597	35.08861	488.5	
185	769	31.18735	35.09132	489.2	
186	770	31.18885	35.09439	483.9	
188	771	31.18973	35.10032	483.2	
189	773	31.19447	35.10316	508.1	
190	774	31.19559	35.10590	526.0	
192	775	31.20035	35.11206	514.7	
193	776	31.20586	35.11427	489.4	
194	781	31.20802	35.11648	494.9	
196	1150	31.20860	35.12363	506.4	
197	745	31.20825	35.12751	513.9	
198	746	31.21114	35.12949	517.0	
200	750	31.21502	35.13467	543.6	
201	749	31.21609	35.13829	536.9	
202	752	31.21709	35.14161	536.0	stolen, no time correction
204	753	31.21867	35.14761	535.5	
205	754	31.21948	35.15076	537.6	
206	755	31.22049	35.15340	543.6	
208	756	31.22319	35.15982	554.1	
209	747	31.22525	35.16212	550.4	not deployed on 20th March 2006
210	757	31.22994	35.16668	549.3	
212	758	31.22915	35.17145	562.6	
213	664	31.22939	35.17471	571.9	
214	814	31.22860	35.17814	579.3	
216	817	31.22827	35.18441	587.8	
217	813	31.22863	35.18732	592.5	
218	812	31.22907	35.19059	593.0	
220	811	31.23024	35.19692	601.5	
221	808	31.22956	35.19993	608.8	
222	809	31.22838	35.20343	609.2	
224	810	31.22479	35.21017	635.4	
225	804	31.22575	35.21319	639.1	
226	806	31.22756	35.21643	637.9	
228	807	31.22668	35.22254	628.5	
229	801	31.22743	35.22572	629.6	
230	802	31.22998	35.22846	611.3	
232	803	31.23172	35.23468	577.4	
233	662	31.23094	35.23798	552.0	
234	688	31.23197	35.24080	517.4	
236	686	31.22838	35.24749	366.7	
237	681	31.22884	35.25090	345.2	
238	683	31.22945	35.25392	326.3	
240	685	31.23515	35.25972	311.7	
241	671	31.23605	35.26273	305.3	
242	676	31.23716	35.26566	297.1	drift rate too big, no time correction
244	679	31.23495	35.27223	284.4	
245	666	31.23429	35.27555	285.2	
246	667	31.23169	35.27912	264.4	
248	668	31.22878	35.28588	235.8	

249	797	31.22754	35.28902	227.5	
250	795	31.22597	35.29230	214.3	
252	793	31.22206	35.29913	204.6	
253	792	31.22300	35.30215	196.9	
254	791	31.22348	35.30508	188.0	
256	790	31.22037	35.31208	114.6	
257	789	31.22100	35.31517	106.2	
258	788	31.22110	35.31818	99.1	
260	787	31.22230	35.32447	83.0	
261	785	31.22333	35.32755	75.9	
262	784	31.22666	35.33016	63.0	no time correction
264	783	31.22956	35.33628	48.2	
265	782	31.22917	35.33940	56.0	
266	692	31.22960	35.34248	55.5	
268	698	31.23177	35.34827	-75.9	
269	707	31.22105	35.35316	-237.1	
270	701	31.21794	35.35670	-307.3	
272	695	31.23810	35.36057	-361.3	
273	699	31.23448	35.36419	-372.5	
274	702	31.23493	35.36686	-376.4	
276	708	31.23560	35.37371	-379.7	
277	709	31.23556	35.37697	-380.4	
278	703	31.23559	35.38012	-381.6	
280	700	31.23559	35.38636	-381.1	
281	697	31.23504	35.38978	-380.0	
282	690	31.23396	35.39335	-379.1	
284	1149	31.22652	35.40041	-380.3	
285	682	31.23484	35.40288	-429.9	
286	693	31.24726	35.40366	-427.1	
288	672	31.24848	35.40983	-416.9	
289	759	31.24848	35.41316	-396.0	
290	715	31.24868	35.41642	-393.1	
292	706	31.25106	35.42223	-388.7	
293	821	31.25162	35.42535	-386.9	
294	779	31.25240	35.42831	-385.3	
296	777	31.25542	35.43456	-363.0	
297	851	31.25768	35.43739	-358.8	
298	838	31.25999	35.44012	-355.8	
300	834	31.26086	35.44665	-307.2	
301	964	31.26121	35.44961	-315.4	
302	956	31.26161	35.45292	-318.6	
304	882	31.26135	35.45903	-324.4	
305	1153	31.26142	35.46228	-324.2	
306	1152	31.26086	35.46537	-325.7	
308	1151	31.26448	35.47145	-319.3	
309	1157	31.26677	35.47446	-321.5	
310	1161	31.26834	35.47748	-322.2	
312	1156	31.26832	35.48380	-336.0	
313	1160	31.26784	35.48699	-340.9	no recording for shot-point 2
314	1154	31.26832	35.49012	-360.4	
316	1270	31.27023	35.49604	-370.1	
317	1271	31.27192	35.49894	-374.1	
318	1145	31.27351	35.50194	-375.3	
320	1267	31.27681	35.50793	-375.5	
321	1146	31.27846	35.51085	-375.2	
322	1144	31.27993	35.51398	-378.4	
324	1143	31.29351	35.51879	-396.4	
325	1142	31.29399	35.52184	-394.6	
326	1298	31.29436	35.52487	-392.1	
328	1300	31.29480	35.53117	-379.1	
329	1273	31.30026	35.53384	-358.7	
330	1301	31.30260	35.53679	-350.9	
332	1302	31.30149	35.54325	-299.0	

333	1303	31.30212	35.54624	-274.4	
334	1306	31.30148	35.54945	-249.1	
336	1305	31.30376	35.55562	-180.2	
337	1304	31.30507	35.55844	-161.9	
338	1309	31.30947	35.56131	-155.4	
340	1308	31.31518	35.56694	-128.0	
341	1307	31.32017	35.56954	-62.1	
342	1312	31.32189	35.57249	-4.6	
344	1310	31.32873	35.57817	67.3	
346	1062	31.33281	35.58406	98.0	
348	1060	31.33297	35.59022	147.9	
349	2323	31.33230	35.59352	173.5	
350	2334	31.33297	35.59674	180.8	
352	2331	31.33396	35.60295	225.2	
353	2366	31.33473	35.60600	240.2	
354	2369	31.33859	35.60846	300.4	
356	1968	31.34188	35.61477	332.0	
357	2354	31.34467	35.61766	366.5	
358	2090	31.34460	35.62085	427.9	
360	1946	31.34470	35.62707	512.2	
361	2343	31.34241	35.63044	589.4	
362	2311	31.33957	35.63382	691.7	
364	1962	31.34454	35.63972	839.3	
365	2299	31.34203	35.64319	843.1	
366	1958	31.33829	35.64663	863.8	
368	1955	31.33722	35.65314	883.3	
369	1978	31.33776	35.65631	914.7	
370	1949	31.33732	35.65948	918.5	
372	1944	31.33962	35.66555	939.0	
373	1985	31.34176	35.66848	928.2	
374	2344	31.34225	35.67167	940.7	
376	1026	31.34025	35.67799	943.5	
377	1027	31.34005	35.68110	948.6	
378	1029	31.34025	35.68464	947.9	
380	1028	31.34080	35.69076	946.4	
381	1032	31.34089	35.69389	949.5	
382	1033	31.34086	35.69677	947.6	
384	1036	31.33877	35.70369	942.4	
386	1159	31.33696	35.70999	935.2	not deployed on 20th March 2006
388	1040	31.33446	35.71698	923.5	
389	1043	31.33178	35.72028	921.1	
390	1044	31.32820	35.72415	923.0	
392	1045	31.31193	35.73184	923.1	
393	1184	31.31219	35.73508	925.0	
394	1181	31.31285	35.73835	928.9	
396	1182	31.30729	35.74498	938.3	
397	1187	31.30704	35.74860	940.0	
398	1185	31.30994	35.75107	937.1	
400	1190	31.31069	35.75749	919.2	
401	1183	31.31090	35.76073	912.8	
402	1186	31.31133	35.76370	899.5	
404	1191	31.31050	35.77022	886.3	
405	2368	31.30985	35.77352	880.6	
406	2370	31.30869	35.77665	883.3	
408	2373	31.30800	35.78308	885.6	
409	2350	31.30800	35.78637	885.4	
410	2330	31.30796	35.78934	886.6	
412	2353	31.30344	35.79608	887.2	
413	2318	31.30307	35.79927	882.6	
414	2339	31.30404	35.80244	869.6	
416	2281	31.30378	35.80894	849.0	
417	2280	31.30474	35.81185	833.5	
418	2278	31.30474	35.81500	818.4	

420	2272	31.30594	35.82120	786.8	
421	2266	31.30619	35.82457	782.1	
422	2242	31.30679	35.82743	772.3	
424	2236	31.30657	35.83393	790.1	
425	2224	31.30637	35.83711	787.4	
426	2216	31.30591	35.84030	795.4	
428	2210	31.30300	35.84703	803.6	
430	2215	31.29529	35.85417	765.6	
432	2200	31.29354	35.86065	603.6	
433	2177	31.28580	35.86513	546.0	
436	1192	31.30108	35.87255	820.1	
437	1193	31.30286	35.87552	818.0	
438	1194	31.30593	35.87829	817.9	
440	1205	31.29919	35.88543	818.5	
441	1211	31.29932	35.88859	814.6	
442	1264	31.29979	35.89186	804.2	
444	1263	31.30436	35.89742	803.7	
445	1265	31.30568	35.90037	804.0	
446	1266	31.30690	35.90352	813.6	
448	1269	31.30923	35.90961	809.0	red light on pick up, no time correction
449	1180	31.30853	35.91277	797.8	
450	966	31.30763	35.91615	796.3	
452	971	31.30778	35.92231	777.0	
453	1005	31.30860	35.92543	785.2	
454	996	31.30947	35.92856	792.0	
456	994	31.31530	35.93443	792.4	
457	1014	31.31621	35.93736	797.5	
458	1017	31.31792	35.94030	801.8	
460	1020	31.31778	35.94678	809.6	
461	1015	31.31823	35.94975	819.2	
462	1018	31.31897	35.95287	814.0	
464	1021	31.32170	35.95903	800.7	
465	1019	31.32177	35.96191	801.4	
466	1023	31.32206	35.96510	801.9	
468	2347	31.32202	35.97146	807.2	
469	2319	31.32182	35.97473	808.7	
470	2315	31.32142	35.97808	812.0	
472	2333	31.31952	35.98449	813.5	
473	2338	31.31779	35.98813	812.8	
474	2360	31.31652	35.99106	813.0	
476	2341	31.31823	35.99716	821.4	
477	2328	31.31913	36.00060	825.4	
478	2325	31.31692	36.00359	844.2	
480	2305	31.31768	36.01026	853.4	
481	2367	31.31418	36.01361	856.0	
482	2335	31.31039	36.01703	885.9	
484	2337	31.31398	36.02292	862.3	
485	2349	31.31335	36.02615	856.1	
486	2296	31.31155	36.02968	845.4	
488	2309	31.30947	36.03622	836.4	
489	2300	31.30977	36.03922	837.6	
490	2314	31.31015	36.04267	834.9	
492	2312	31.31072	36.04851	824.4	
493	2320	31.31223	36.05167	815.4	
494	2303	31.31689	36.05437	823.7	
496	2313	31.31732	36.06050	804.9	
497	2321	31.31838	36.06369	806.2	
498	2326	31.32264	36.07173	792.1	
500	1068	31.32406	36.07732	782.9	red light on pick up, no time correction, only recorded shot-points 6 & 7
501	1067	31.32412	36.08048	777.8	



502	1066	31.32444	36.08372	772.7
504	1272	31.32463	36.08966	768.6
505	1070	31.32496	36.09290	769.5
506	1069	31.32534	36.09602	770.4
508	1075	31.32638	36.10254	777.1
509	1074	31.32645	36.10550	781.9
510	1072	31.32668	36.10877	787.2
512	1080	31.32691	36.11517	785.9
513	1079	31.32747	36.11812	780.2
514	1077	31.32804	36.12115	774.4
516	1105	31.32826	36.12769	771.7
517	1082	31.32852	36.13070	775.0
518	1115	31.32875	36.13389	778.6
520	1113	31.32903	36.14079	787.6
521	1111	31.32904	36.14397	792.2
522	1121	31.32930	36.14710	796.7
524	1127	31.32957	36.15265	796.1
525	1130	31.32952	36.15611	788.7
526	1136	31.33018	36.15930	782.0
528	1137	31.32907	36.16550	778.8
529	1134	31.32827	36.16885	782.0
530	1139	31.32749	36.17221	785.3
532	1135	31.32656	36.17950	792.9
533	1125	31.32657	36.18297	796.7
534	1128	31.32660	36.18652	800.6
536	1129	31.32684	36.19321	806.4
537	1126	31.32671	36.19635	808.2
538	1162	31.32682	36.19955	810.1
540	1177	31.32702	36.20570	814.0
541	1063	31.32716	36.20885	816.1
542	1268	31.32735	36.21201	818.1
544	1064	31.32688	36.22139	826.6
546	1065	31.32213	36.23172	836.0
548	1175	31.31616	36.24159	850.2
550	1165	31.31364	36.25394	882.2
552	1178	31.31684	36.26630	876.1
554	1081	31.31758	36.27887	908.7
556	1059	31.32011	36.29123	926.3
558	1056	31.31847	36.30413	959.3
560	1057	31.31989	36.31660	965.8
562	1058	31.31638	36.32968	924.5
564	1053	31.31256	36.34262	918.3
566	1046	31.30639	36.35608	910.8
568	1047	31.30908	36.36836	888.0
570	1048	31.31222	36.38067	885.1
572	2332	31.31704	36.39279	861.7
574	2324	31.32716	36.40446	850.0

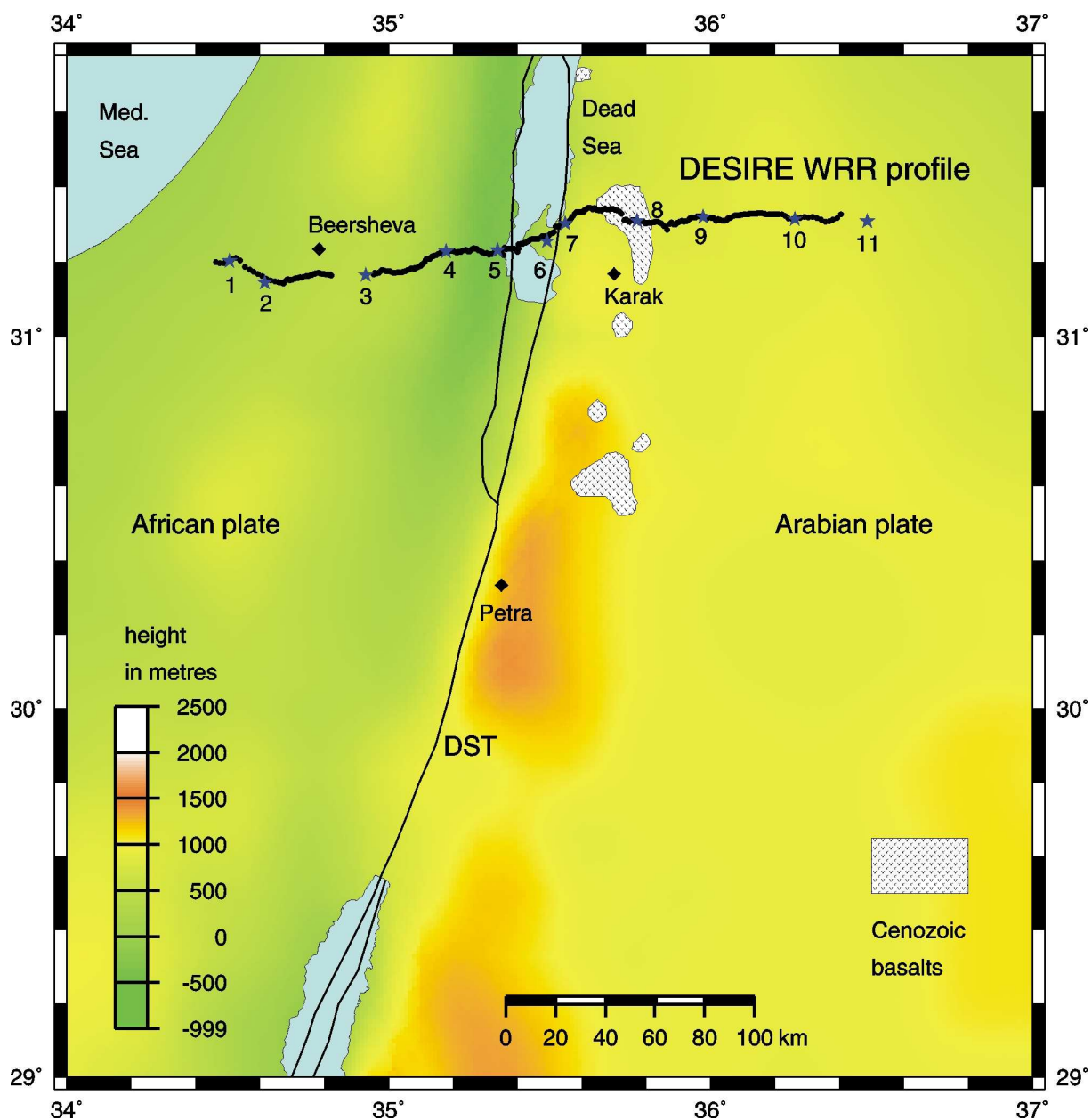


Figure 1. Location map for the DESIRE 2006 wide-angle reflection / refraction (WRR) experiment. The locations of the 370 Reftek RT 125 instruments (black dots) which recorded any useful data during the experiment are shown, together with the locations of the 11 shots (blue stars) executed during the experiment.