



Supplement of

One-dimensional velocity structure modeling of the Earth's crust in the northwestern Dinarides

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Table S1: Uncertainty classes as defined for the routine daily analysis at ARSO and corresponding numbers of routinely picked first arrival times. All arrival times were picked by hand and uncertainty intervals subjectively determined by the analysts.

Uncertainty class	Uncertainty time interval \pm [s]	Number of first P, S arrival times
0	< 0.1	70,059 (P), 36,857 (S)
1	0.1-0.2	21,849 (P), 23,806 (S)
2	0.2-0.5	33,496 (P), 38,525 (S)
3	0.5-1.0	2,504 (P), 3,148 (S)
4	> 1.0	1,565 (P), 1,944 (S)
9	clock error	774 (P), 739 (S)
Total		130,247(P), 105,019(S)

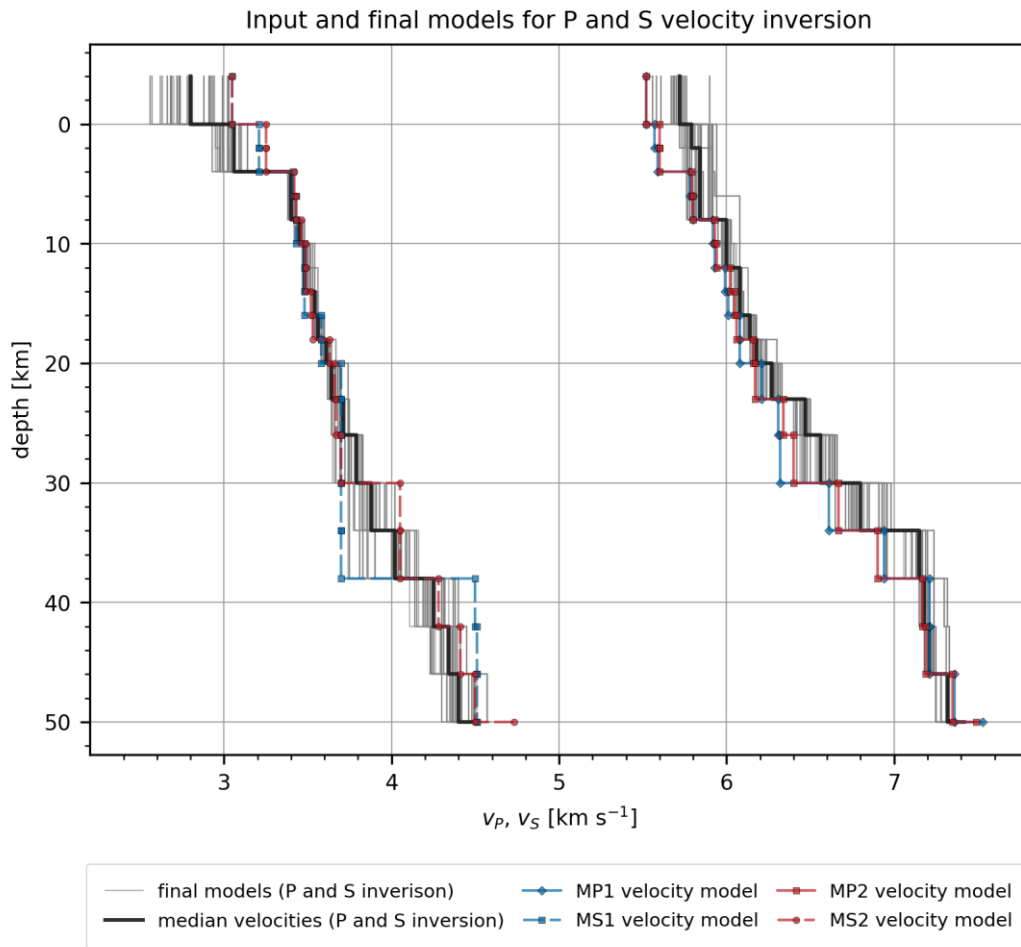


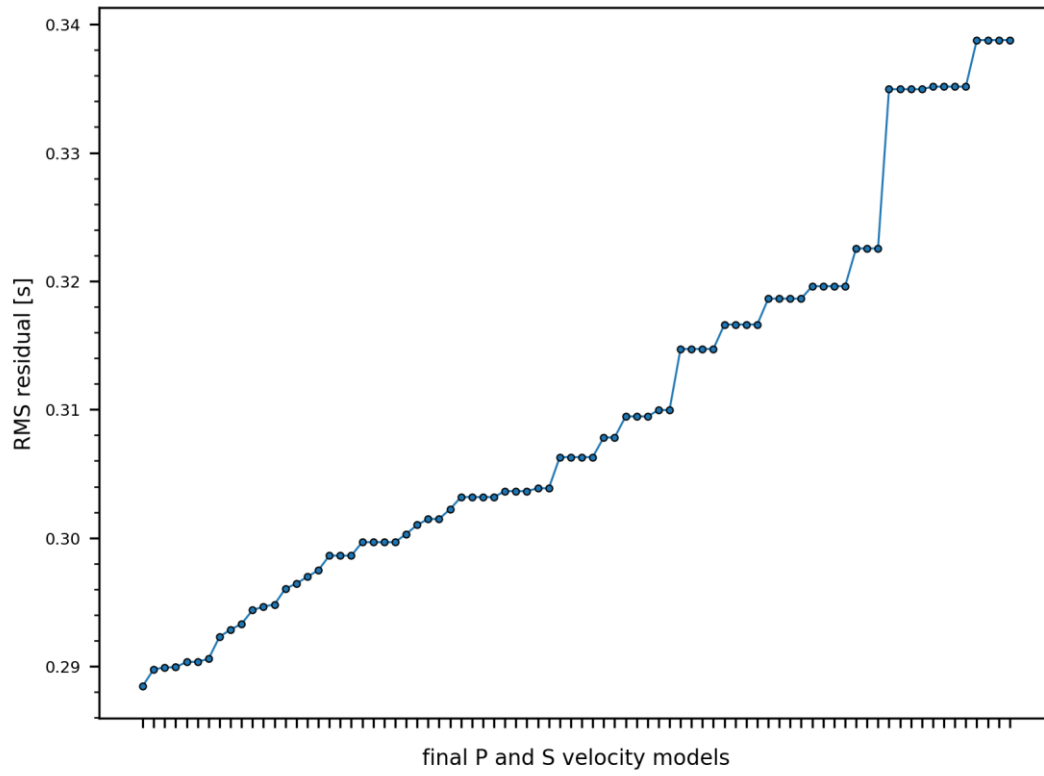
Figure S1: Final regional P and S velocity models obtained for the final set of inversion parameters and variable total number of iterations. Also shown are the selected models from P-only and S-only inversions, which were used as initial models for the combined P and S inversion and the median velocities of the models obtained in the combined P and S inversion.

Table S2: P velocities and statistics obtained for the combined P and S regional inversion. The models used to calculate the statistical parameters are shown in Fig. S1 (final models).

Depth [km]	P velocities of the MPS model [km s ⁻¹]	Median P velocities [km s ⁻¹]	15th perc. [km s ⁻¹]	85th perc. [km s ⁻¹]	Delta perc. [km s ⁻¹]
-4	5.75	5.72	5.66	5.75	0.09
0	5.78	5.79	5.75	5.90	0.15
2	5.78	5.84	5.77	5.91	0.14
4	5.78	5.84	5.79	5.91	0.12
6	5.78	5.84	5.79	5.91	0.12
8	6.02	6.00	5.97	6.02	0.05
10	6.05	6.00	5.98	6.02	0.04
12	6.08	6.08	6.05	6.09	0.04
14	6.08	6.08	6.07	6.09	0.02
16	6.17	6.14	6.11	6.17	0.06
18	6.17	6.18	6.17	6.23	0.06
20	6.28	6.27	6.21	6.31	0.10
23	6.45	6.47	6.42	6.50	0.08
26	6.65	6.56	6.46	6.64	0.18
30	6.84	6.8	6.73	6.93	0.20
34	7.14	7.15	7.10	7.19	0.09
38	7.18	7.18	7.16	7.25	0.09
42	7.23	7.21	7.20	7.26	0.06
46	7.25	7.32	7.25	7.32	0.07
50	7.33	7.42	7.33	7.46	0.13

15 **Table S3: S velocities and statistics obtained for the combined P and S regional inversion. The models used to calculate the statistical parameters are shown in Fig. S1 (final models).**

Depth [km]	S velocities of the MPS model [km s ⁻¹]	Median S velocities [km s ⁻¹]	15th perc. [km s ⁻¹]	85th perc. [km s ⁻¹]	Delta perc. [km s ⁻¹]
-4	2.62	2.80	2.68	2.95	0.27
0	2.99	3.06	2.98	3.10	0.12
2	2.99	3.06	2.98	3.10	0.12
4	3.39	3.40	3.39	3.41	0.02
6	3.39	3.40	3.39	3.41	0.02
8	3.47	3.45	3.43	3.47	0.04
10	3.49	3.48	3.47	3.50	0.03
12	3.52	3.48	3.47	3.51	0.04
14	3.55	3.54	3.53	3.56	0.03
16	3.56	3.56	3.55	3.58	0.03
18	3.61	3.61	3.59	3.63	0.04
20	3.66	3.64	3.64	3.69	0.05
23	3.70	3.71	3.66	3.74	0.08
26	3.81	3.79	3.72	3.82	0.10
30	3.83	3.88	3.82	3.93	0.11
34	4.09	4.02	3.85	4.09	0.24
38	4.22	4.25	4.19	4.34	0.15
42	4.25	4.34	4.25	4.39	0.14
46	4.37	4.40	4.35	4.50	0.15
50	4.41	4.51	4.48	4.58	0.10



20 **Figure S2:** Root mean square residuals obtained after inversions for the final regional P and S models (Fig. S1) in increasing order.

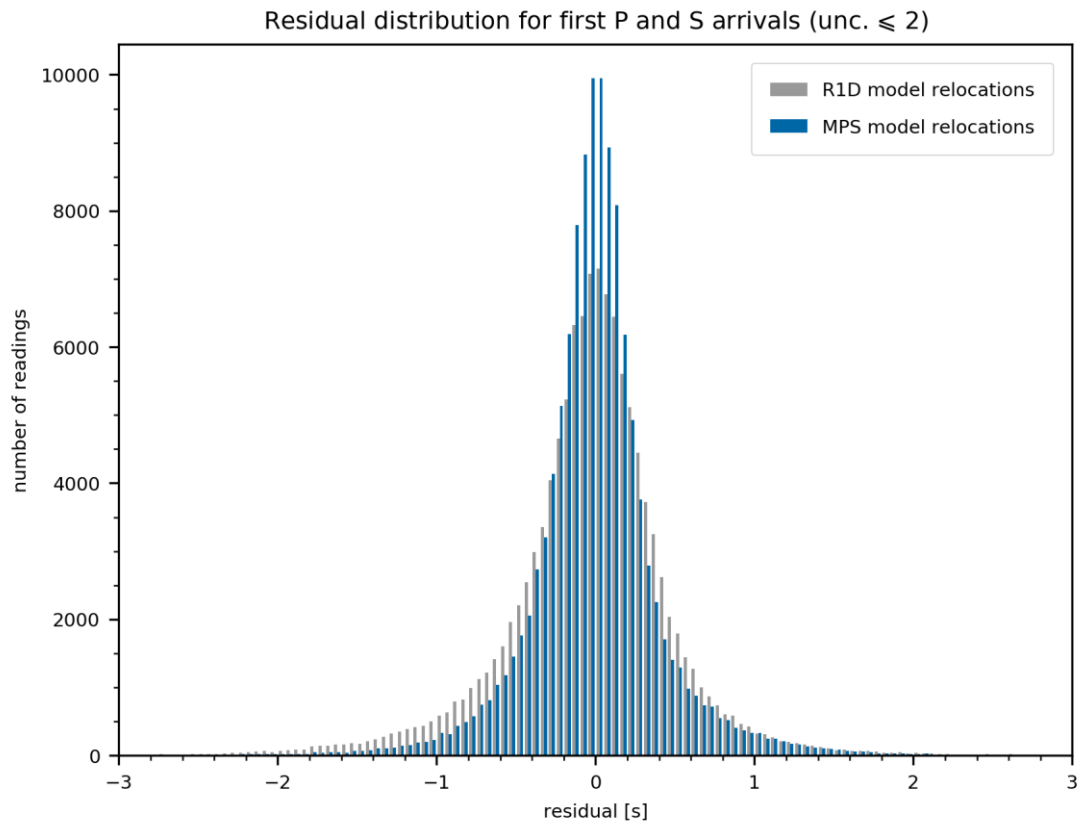
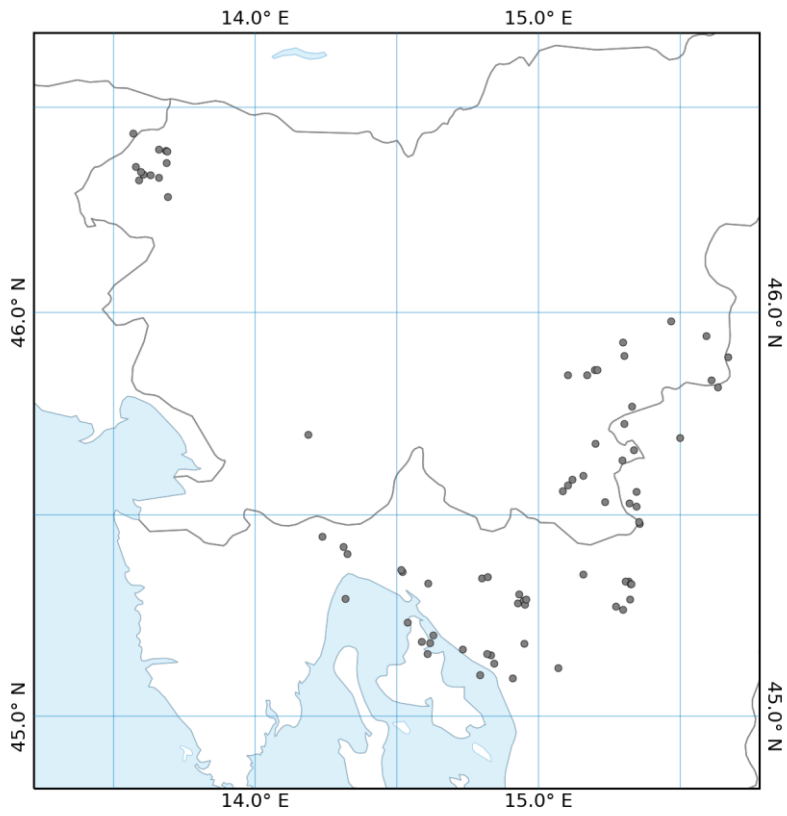
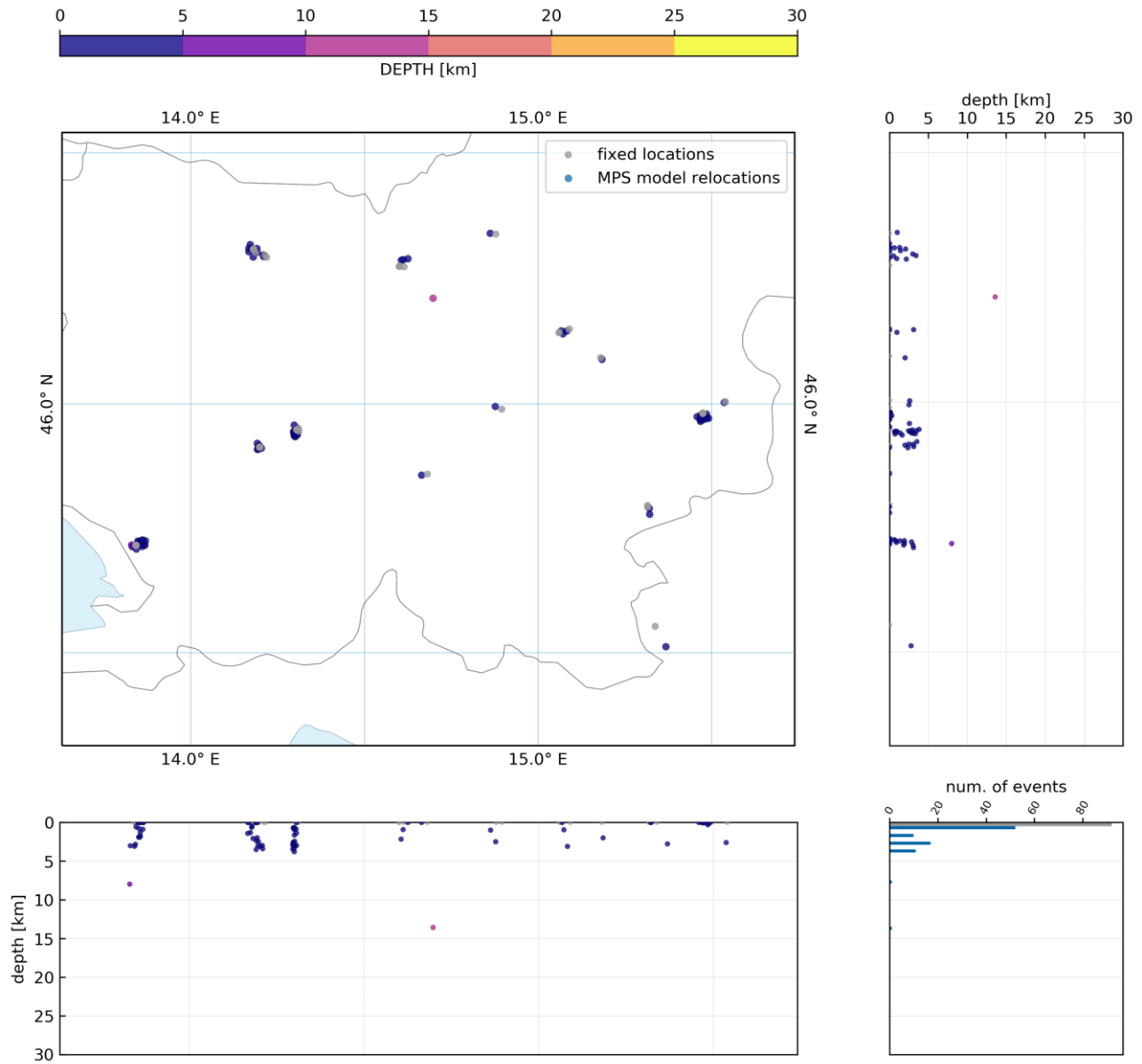


Figure S3: Comparison of the residual distributions before and after the relocation of the earthquakes shown in Fig. 11.

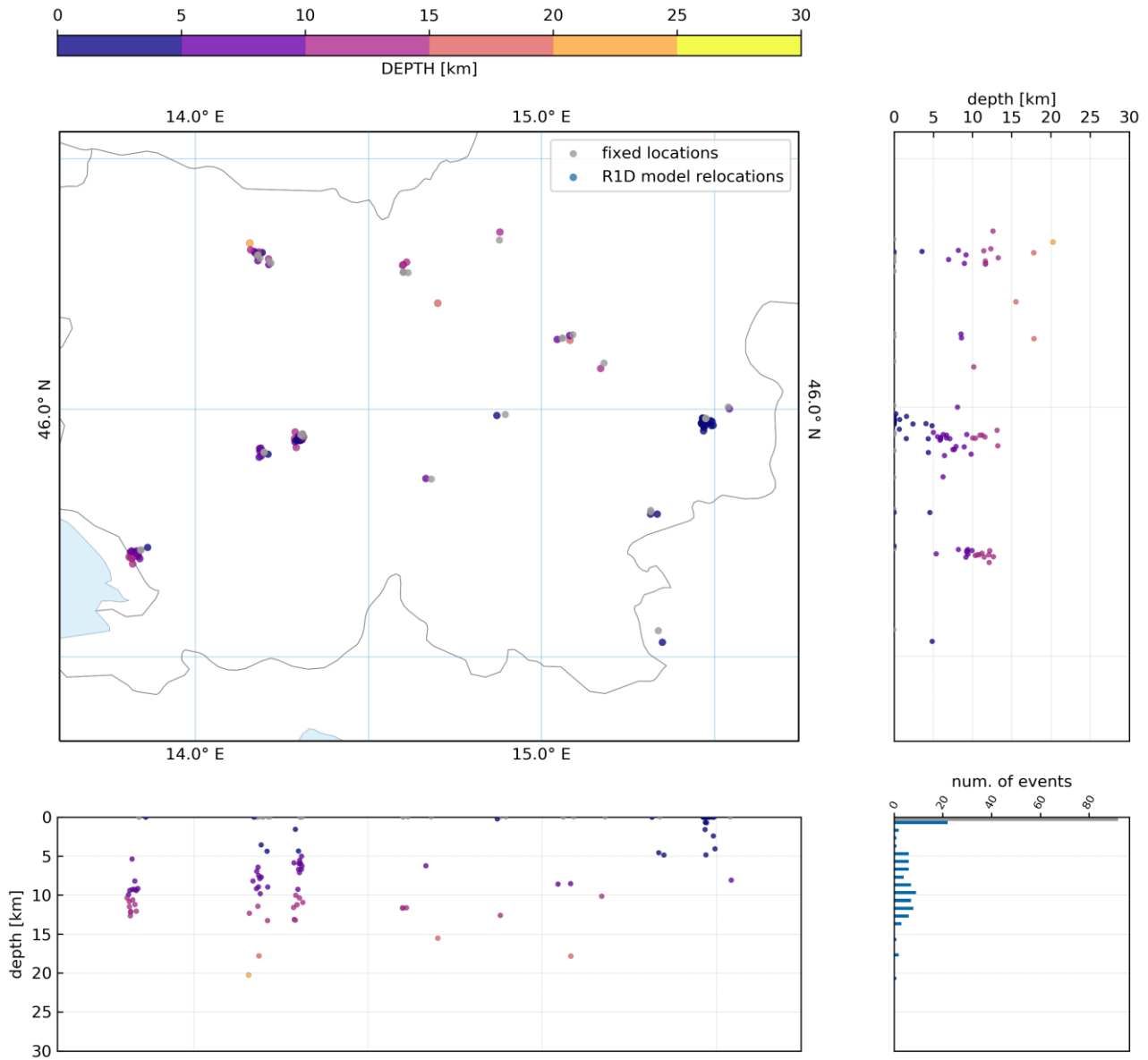


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Figure S4: Map of 75 events relocated to depths above 1.0 km with the MPS velocity model.



30 **Figure S5: Relocation using the MPS velocity model of 92 quarry blasts with a maximum azimuthal gap of 180° and at least 8 P and 5 S first arrivals with uncertainty class of 2 or less. The right and bottom panels show the relocated quarry blasts projected on N-S and W-E oriented profiles, respectively. The histogram in the lower right corner shows the number of relocated quarry blasts in 1 km depth bins.**



35 **Figure S6: Relocation using the routine 1-D velocity model (R1D) of 92 quarry blasts with a maximum azimuthal gap of 180° and at least 8 P and 5 S first arrivals with uncertainty class of 2 or less. The right and bottom panels show the relocated quarry blasts projected on N-S and W-E oriented profiles, respectively. The histogram in the lower right corner shows the number of relocated quarry blasts in 1 km depth bins.**

Table S4: Velocities and v_p/v_s of the model selected for the eastern subregion.

Depth [km]	P velocities [km/s]	S velocities [km/s]	v_p/v_s
-4	5.55	2.59	2.14
0	5.63	2.86	1.97
2	5.69	3.04	1.87
4	5.79	3.37	1.72
6	5.79	3.48	1.66
8	6.04	3.56	1.70
10	6.04	3.56	1.70
12	6.04	3.58	1.69
14	6.04	3.58	1.69
16	6.06	3.65	1.66
18	6.16	3.75	1.64
20	6.22	3.78	1.65
23	6.39	3.81	1.68
26	6.87	3.81	1.80
30	6.94	3.83	1.81
34	7.74	4.09	1.89
38	7.77	4.22	1.84
42	7.77	4.25	1.83
46	7.77	4.37	1.78
50	7.78	4.41	1.76

Table S5: Velocities and v_p/v_s of the model obtained for the north-western subregion.

Depth [km]	P velocities [km/s]	S velocities [km/s]	v_p/v_s
-4	5.84	2.61	2.24
0	5.95	2.96	2.01
2	5.95	2.96	2.01
4	5.98	3.33	1.80
6	5.98	3.37	1.77
8	5.98	3.38	1.77
10	6.06	3.38	1.79
12	6.07	3.43	1.77
14	6.07	3.47	1.75
16	6.07	3.59	1.69
18	6.14	3.59	1.71
20	6.2	3.59	1.73
23	6.4	3.62	1.77
26	6.46	3.90	1.66
30	6.84	4.01	1.71
34	7.14	4.09	1.75
38	7.18	4.22	1.70
42	7.23	4.25	1.70
46	7.25	4.37	1.66
50	7.33	4.41	1.66

45 **Table S6: Velocities and v_p/v_s of the model obtained for the south-western subregion.**

Depth [km]	P velocities [km/s]	S velocities [km/s]	v_p/v_s
-4	5.80	2.61	2.22
0	6.00	2.92	2.05
2	6.00	2.97	2.02
4	6.02	3.27	1.84
6	6.02	3.27	1.84
8	6.02	3.37	1.79
10	6.07	3.37	1.80
12	6.11	3.44	1.78
14	6.16	3.45	1.79
16	6.18	3.51	1.76
18	6.18	3.51	1.76
20	6.20	3.58	1.73
23	6.56	3.58	1.83
26	6.67	3.64	1.83
30	6.77	3.71	1.82
34	7.08	3.89	1.82
38	7.18	4.02	1.79
42	7.23	4.20	1.72
46	7.25	4.37	1.66
50	7.33	4.41	1.66