Supplementary material for

Potential Volcanic Origin of the 2023 Short-period Tsunami in the Izu Islands, Japan

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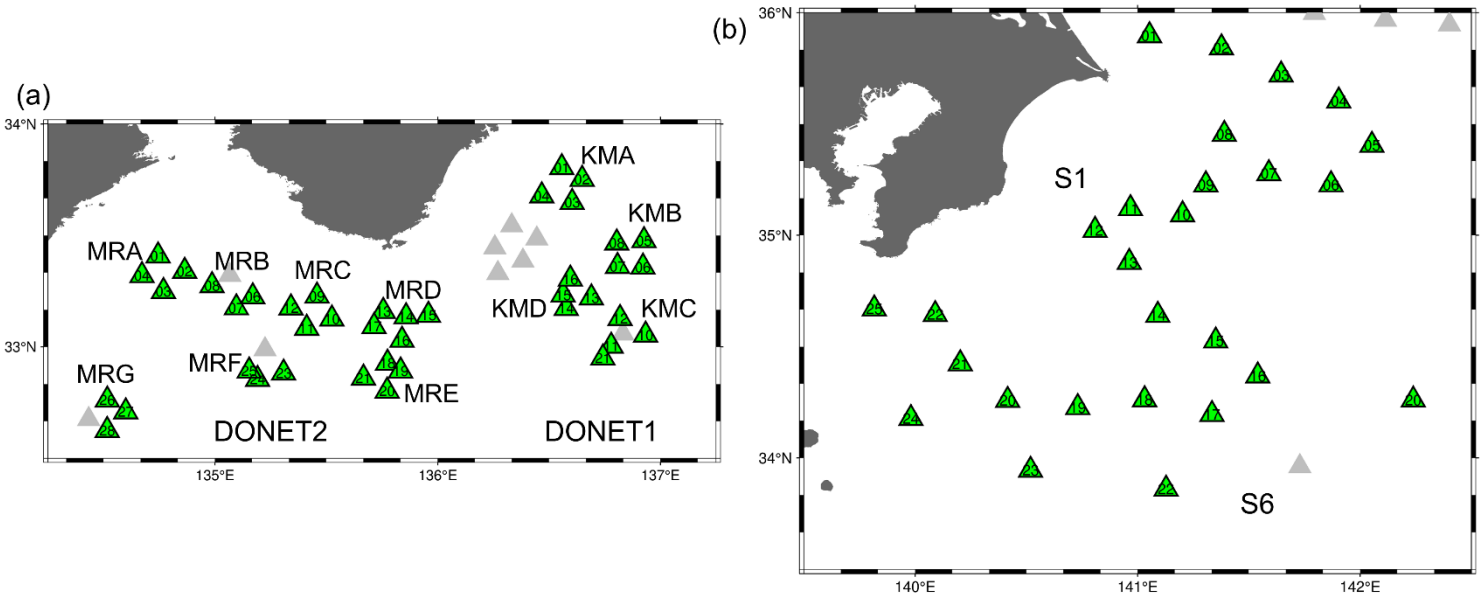

Figure S1. Detail distributions of (a) DONET and (b) S-net. The Green triangles are stations used in the tsunami waveform inversion and the grays are not.

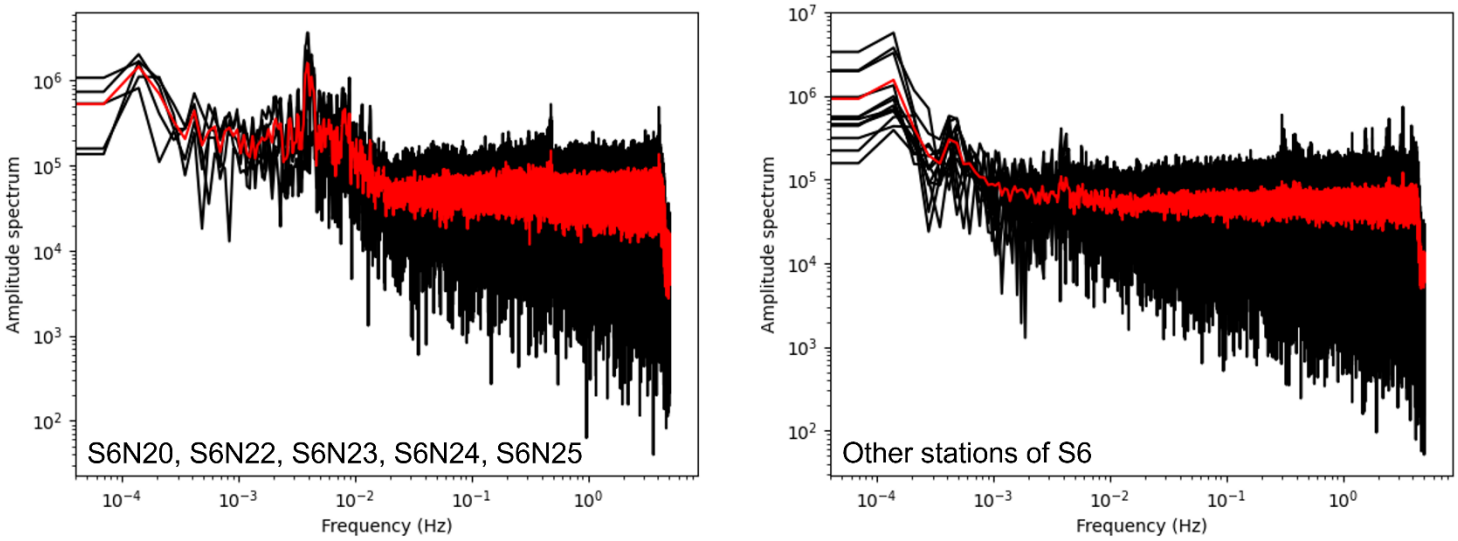

Figure S2. Same as Figure 1b in the main text except that the southern stations of the S6 subnetwork (left) and the other stations (right). Note that the southern stations are represented as green triangles in Figure 1a in the main text or Figure S1b.

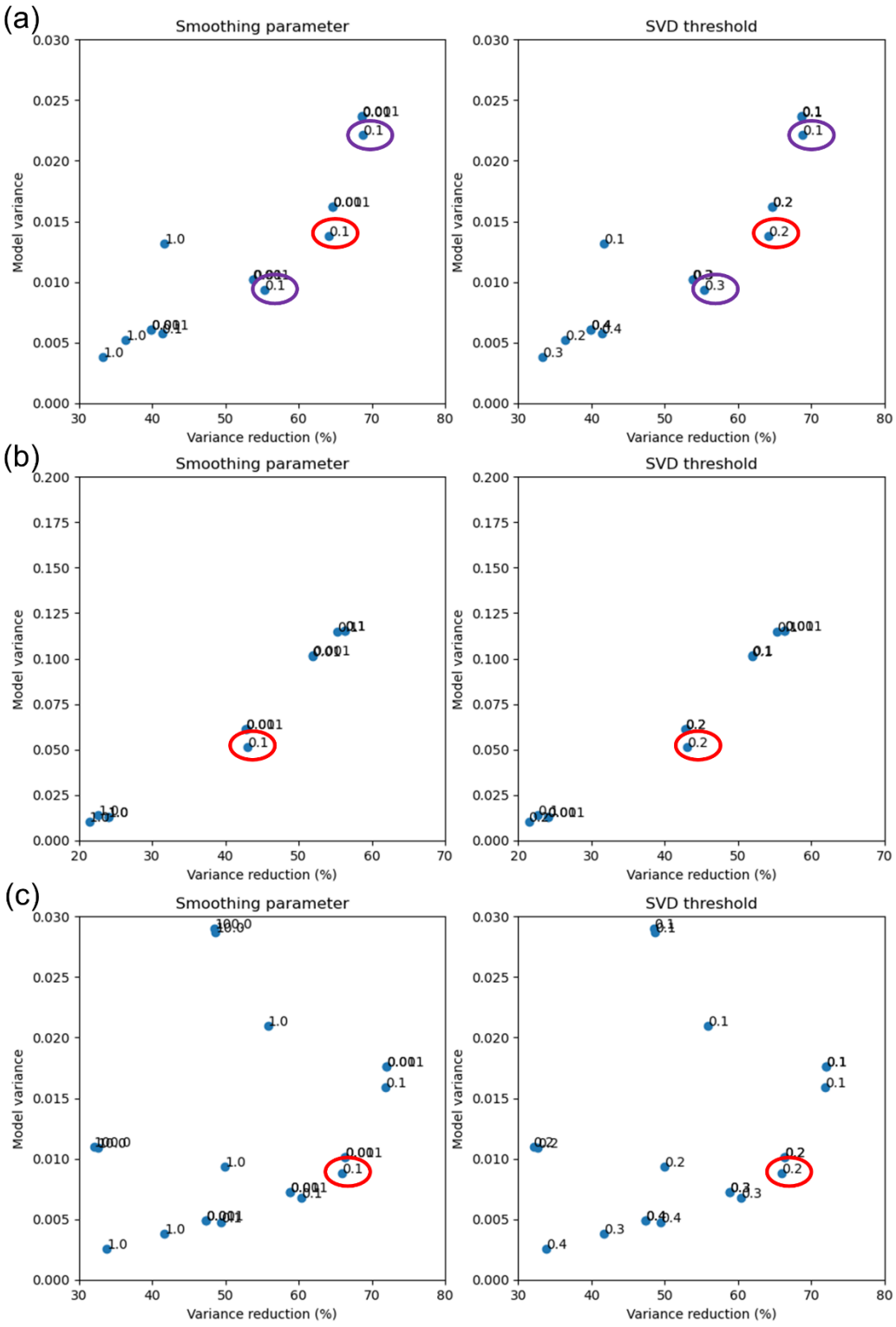

Figure S3. Trade-off curves that used to determine the smoothing parameter (left) and the threshold of the singular value (right) in the tsunami source inversion of (a) Figure 3a in the main text, (b) Figure S6, and (c) Figure S7. The red circles represent the weights we select as the best. The purple circles in (a) are the ones that are used for Figure S5.

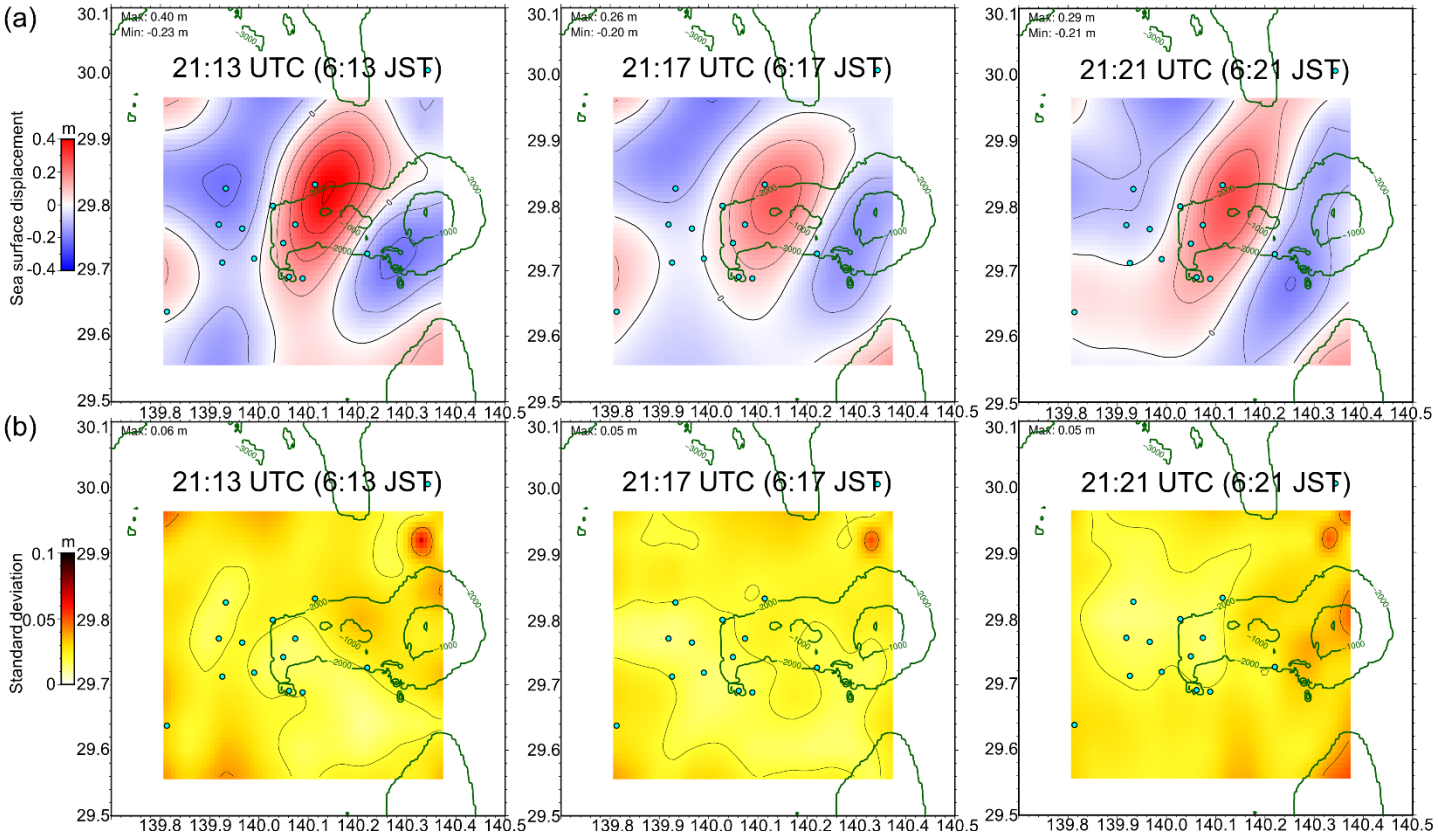

Figure S4. Same as Figure 3a in the main text except that the (a) average and (b) standard deviation of 100 samples by the bootstrap method.

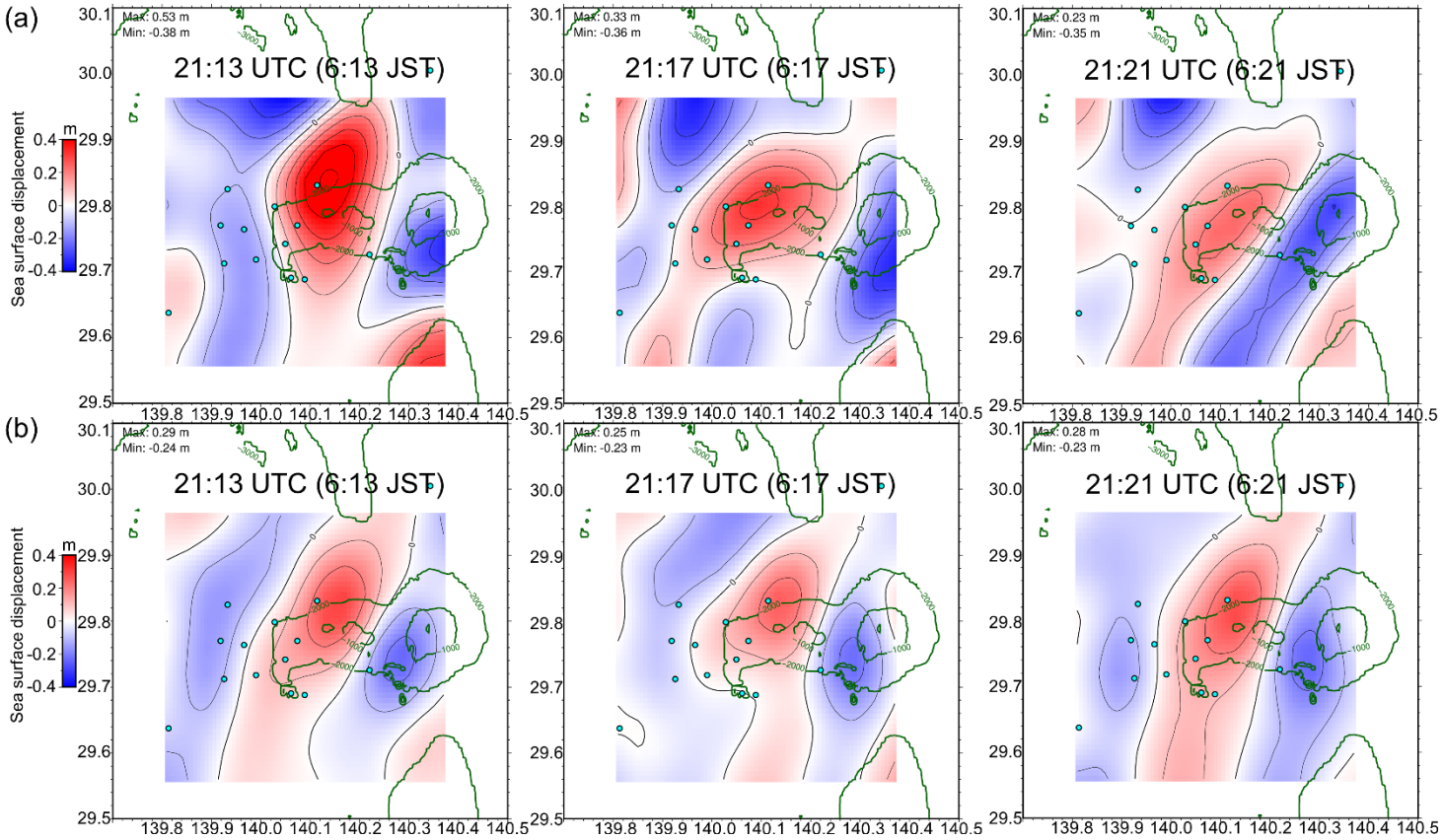

Figure S5. Same as Figure 3a in the main text except that (a) the result with the smoothing parameter of 0.1 and the threshold in the singular value decomposition of 0.1 and (b) the ones of 0.1 and 0.3. Note that the variance reduction of these results is (a) 68.8% and (b) 55.3%.

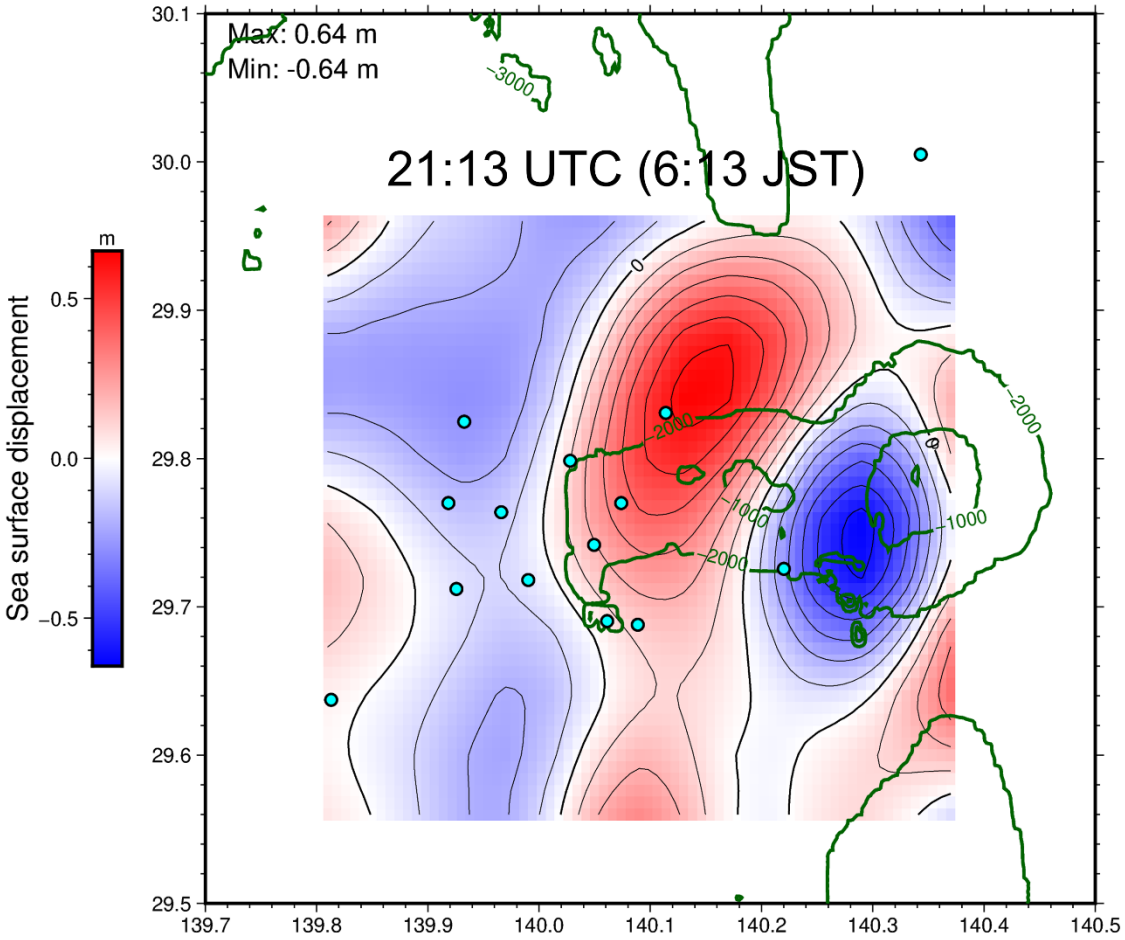

Figure S6. Same as Figure 3a in the main text except for the single tsunami source at 21:13 UTC (6:13 JST). Note that the variance reduction of this model is 43.0%.

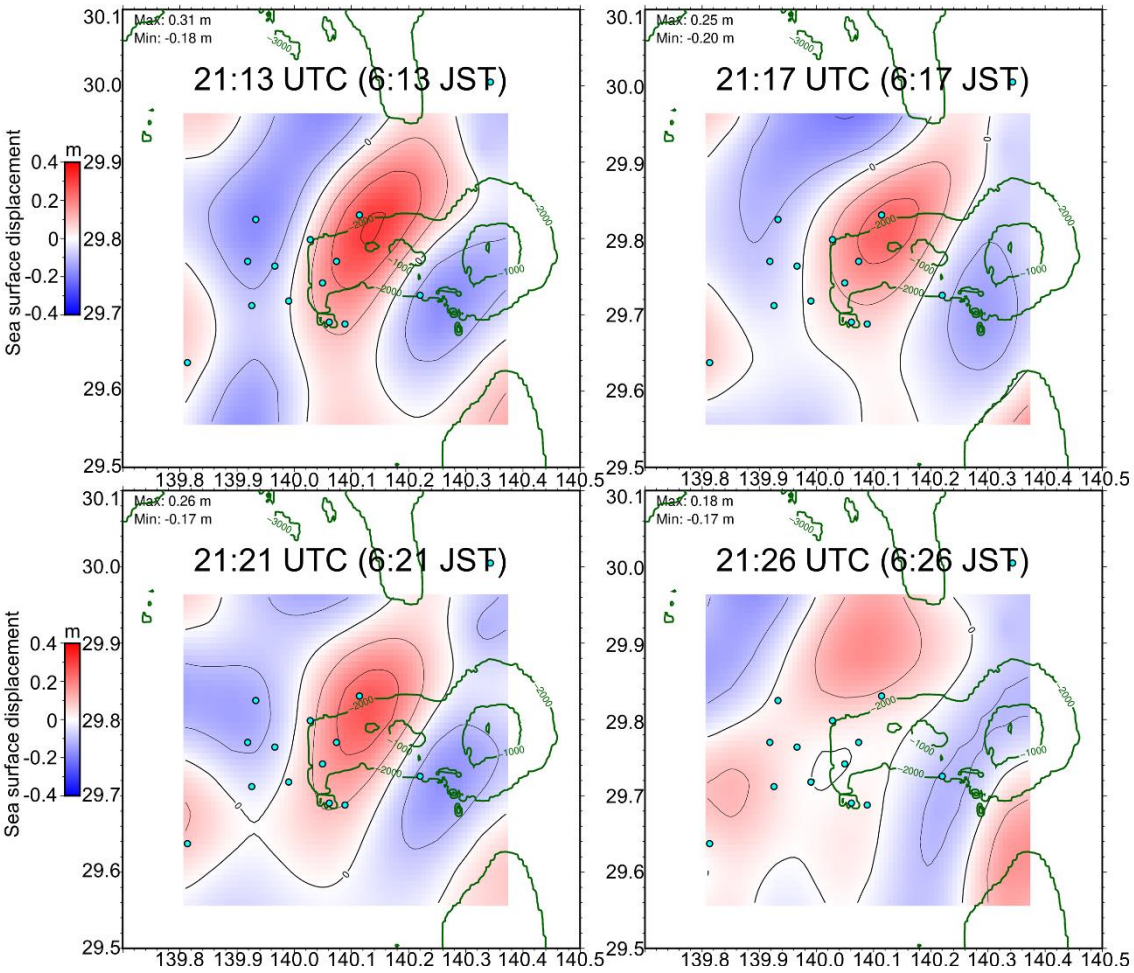

Figure S7. Same as Figure 3a in the main text except for the multiple tsunami source at 21:13, 21:17, 21:21, and 21:26 UTC (6:13, 6:17, 6:21, and 6:26 JST). Note that the variance reduction of this model is 65.9%.

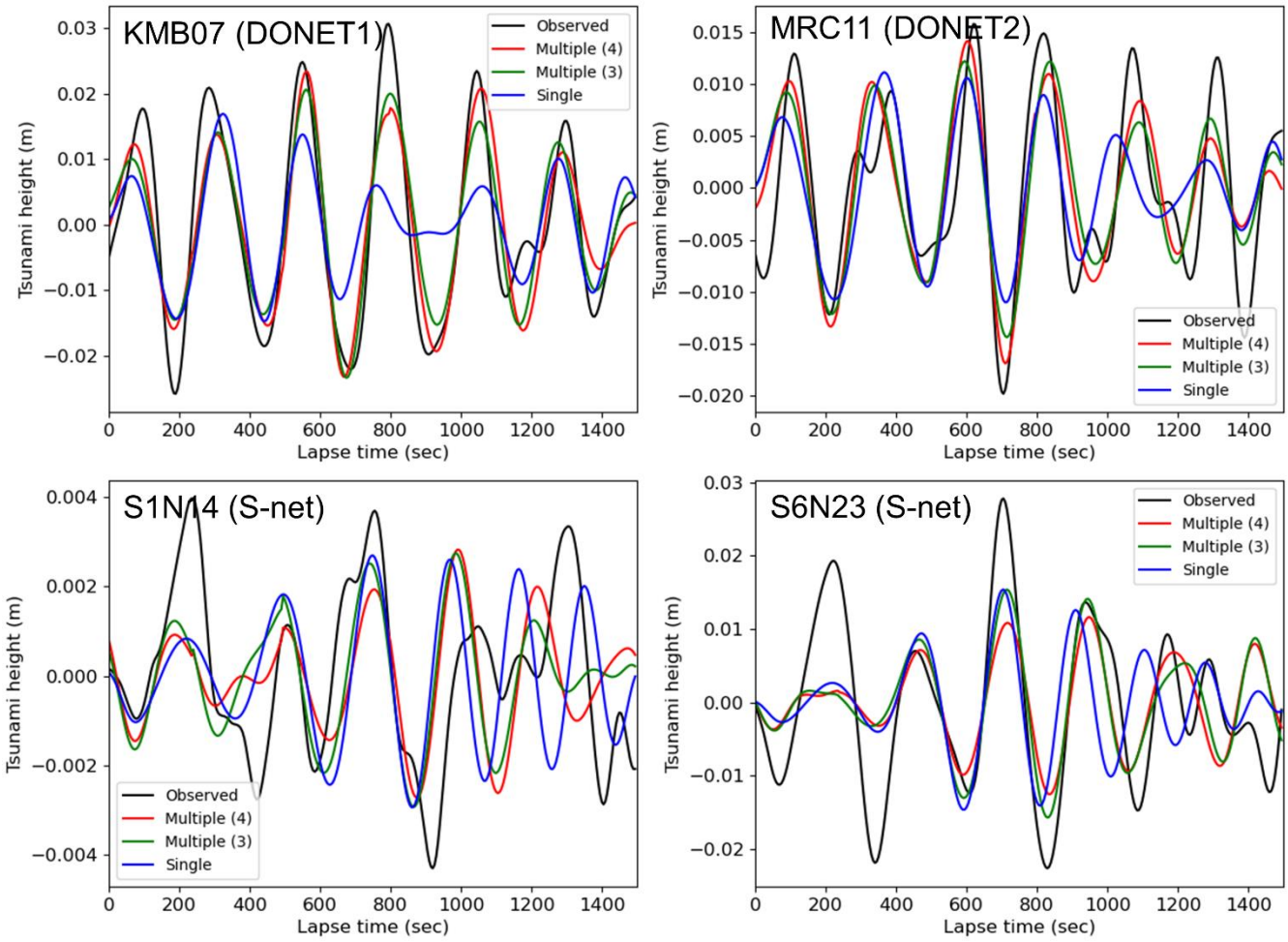

Figure S8. Comparison of the observed pressure records (black) and the synthetic records by the tsunami source model by the multiple time window inversion of three sources (Figure 3a in the main text; green) and four sources (Figure S7; red), and by the model by the single-source inversion (Figure S6; blue).

time	latitude	longitude	depth	mag	magType	updated
2023-10-08T21:26:45.096Z	30.005	140.3431	10	4.5	mb	2023-10-30T05:38:35.040Z
2023-10-08T21:21:41.729Z	29.6373	139.8132	10	4.9	mb	2023-11-06T03:22:35.040Z
2023-10-08T21:17:28.430Z	29.77	140.0739	10	5.3	mb	2023-11-06T03:57:07.346Z
2023-10-08T21:13:27.937Z	29.7985	140.0281	10	5	mb	2023-11-06T04:15:44.040Z
2023-10-08T21:09:16.452Z	29.8308	140.114	10	4.9	mb	2023-11-06T04:26:47.040Z
2023-10-08T21:05:32.437Z	29.7638	139.9661	10	5.4	mb	2023-11-06T05:19:23.375Z
2023-10-08T21:00:40.543Z	29.7418	140.0495	10	5	mb	2023-11-06T06:30:34.040Z
2023-10-08T20:56:48.379Z	29.8249	139.9328	10	4.9	mb	2023-10-12T19:40:23.040Z
2023-10-08T20:51:25.664Z	29.77	139.9186	10	4.7	mb	2023-10-12T19:34:13.040Z
2023-10-08T20:43:09.456Z	29.7256	140.2201	10	4.8	mb	2023-10-12T19:25:04.040Z
2023-10-08T20:34:32.705Z	29.7181	139.9904	10	4.7	mb	2023-10-12T19:11:59.040Z
2023-10-08T20:25:22.652Z	29.7121	139.9258	10	4.7	mww	2023-12-11T21:25:58.040Z
2023-10-08T20:13:50.973Z	29.688	140.0888	10	4.7	mb	2023-11-15T19:55:00.040Z
2023-10-08T19:53:46.086Z	29.6904	140.0613	10	4.5	mb	2023-11-29T16:23:52.040Z

Table S1. The USGS earthquake catalog used in this study.