

1 Real-time Estimation of Seismic Intensity Based on Borehole-To-Surface Intensity Correction

2 Supplementary material

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4 **Additional table**

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Table A1. JMA intensity class

JMA class	Seismic intensity	Number of earthquakes
0	$0.495 < I$	52335
1	$0.495 \leq I < 1.495$	79897
2	$1.495 \leq I < 2.495$	31516
3	$2.495 \leq I < 3.495$	8836
4	$3.495 \leq I < 4.495$	1824
5L	$4.495 \leq I < 4.995$	181
5U	$4.995 \leq I < 5.495$	89
6L	$5.495 \leq I < 5.995$	33
6U	$5.995 \leq I < 6.495$	11
7	$6.495 \leq I$	2
Total		174724

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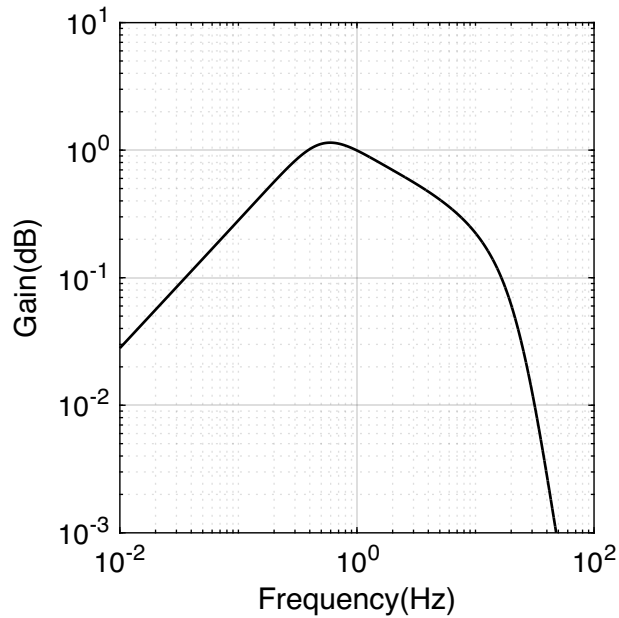
Table A2. Comparison between estimated and directly observed intensities

		Estimated seismic intensity										
		0	1	2	3	4	5L	5U	6L	6U	7	Total
Directly observed seismic intensity	0	37062	15059	214	0	0	0	0	0	0	0	52335
	1	7540	67170	5172	15	0	0	0	0	0	0	79897
	2	11	7506	23083	915	1	0	0	0	0	0	31516
	3	0	48	2898	5732	158	0	0	0	0	0	8836
	4	0	0	29	782	1000	13	0	0	0	0	1824
	5L	0	0	0	8	98	66	9	0	0	0	181
	5U	0	0	0	0	17	31	33	7	1	0	89
	6L	0	0	0	0	1	8	7	17	0	0	33
	6U	0	0	0	0	0	0	1	6	3	1	11
	7	0	0	0	0	0	0	0	2	0	0	2
Total		44613	89783	31396	7452	1275	118	50	32	4	1	174724

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9 **Additional figure**

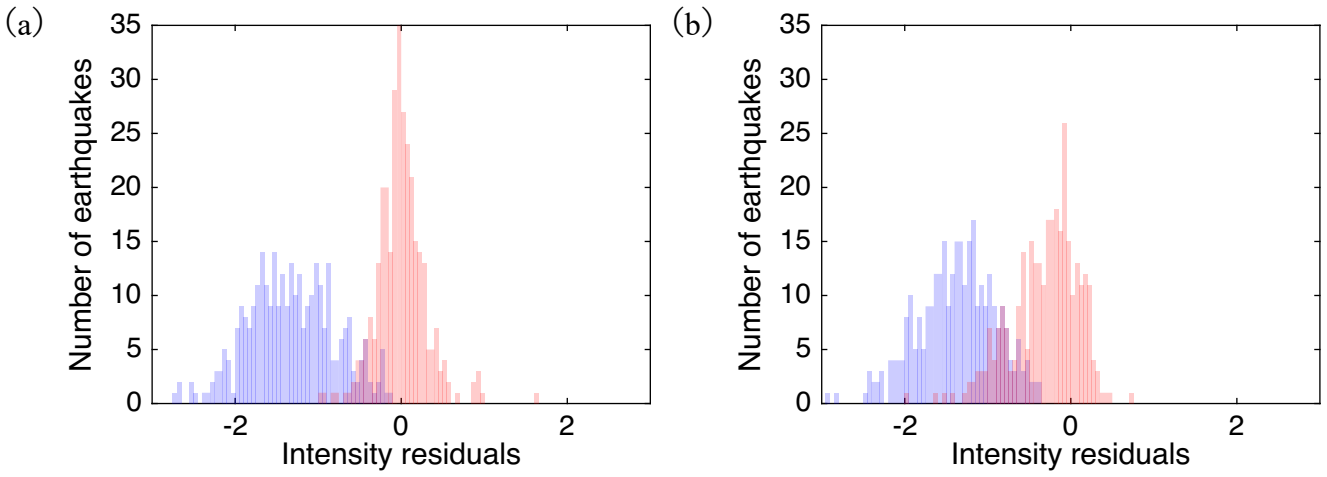
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Figure A1. Frequency filter for calculating seismic intensity.

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Figure A2. Distribution of seismic intensity residual for different level of intensities.

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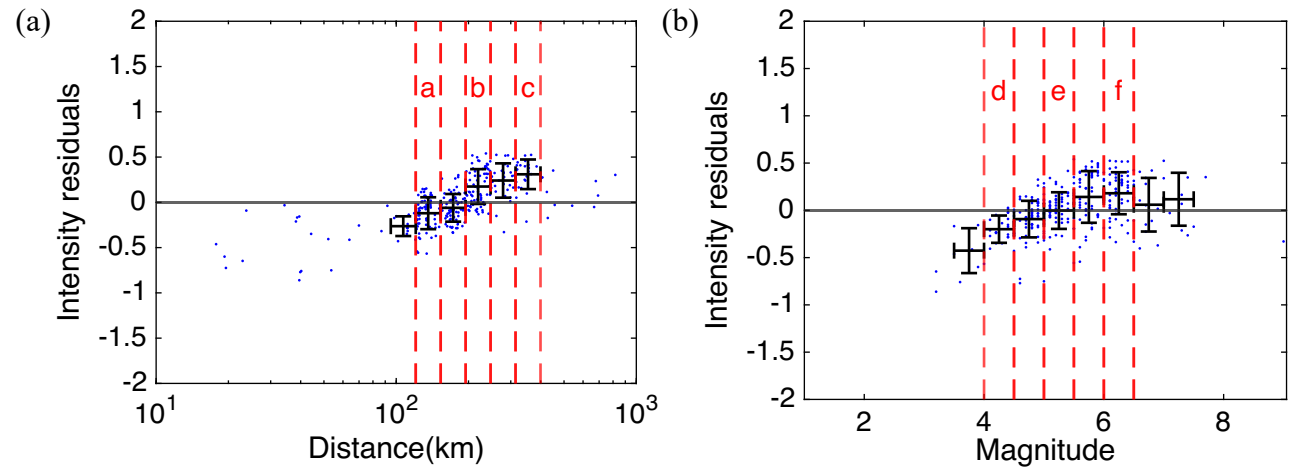
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(a) Distribution of seismic intensity residuals for earthquakes with an instrumental intensity of smaller than 4.5. To ensure a consistent comparison, 316 records were randomly sampled to match the number of available records in panel (b). (b) Distribution of seismic intensity residuals for earthquakes with an instrumental intensity greater than 4.5.



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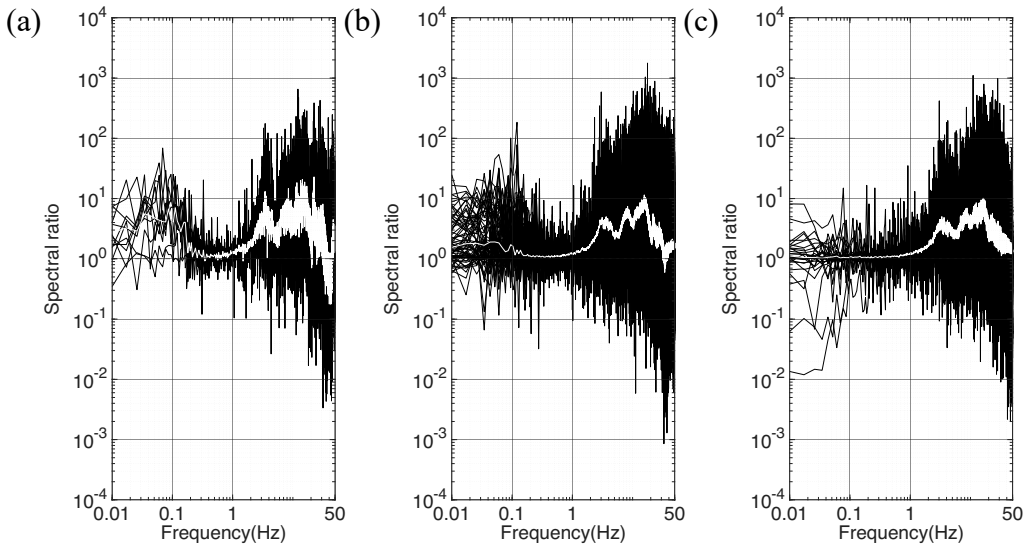
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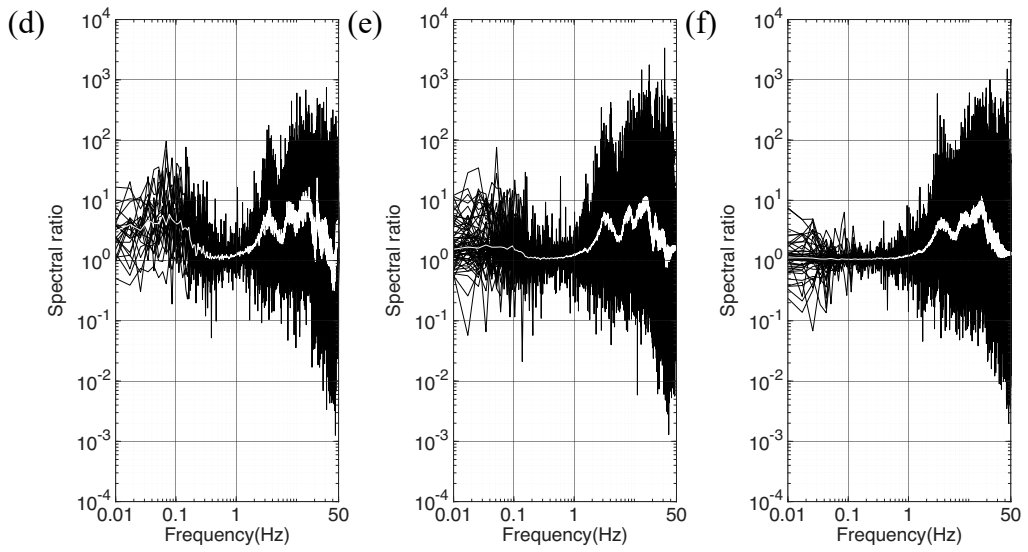
Figure A3. Dependency of seismic intensity residuals on surface intensity on (a) distance and (b) magnitude at the station N.ASRH.

Black bars represent the standard deviation for the selected ranges. The ranges defined by red dashed lines correspond to the segments analyzed for the spectral ratios presented in Figure A4.

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Figure A4. Variations in spectral ratios.

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Surface-to-borehole spectral ratios. These plots are categorized by the magnitude or distance ranges indicated in Figure A3. The spectral ratio at the low-frequency range is stabilized around unity as the hypocentral distance or magnitude increases.