Electronic Supplement to
Amplitude and Q of 0S0 from the Sumatra earthquake as recorded on superconducting gravimeters and seismometers

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1. Testing the effect of the window shift

We decided to perform some supplementary tests on the window overlap. We apply our technique to different time shifts from the 1 hr used in the paper, to 72 hr for all the SG stations. The 72 hr shift gives no overlap, and hence completely independent estimates of A0 and Q for each shift. Fig A1 is the comparison for the recovery of the amplitude, for 9 different shifts. It can be seen that the amplitude remains quite constant up to about 16 hr, but then increases up to 24 hr. At the same time, the error bars on these estimates increases with the shift, no doubt because of the reduced number of data points used in the inversion when the shift gets longer. Thus statistically the amplitudes could all be the same, within the error bars. But smaller error bars are more consistent with the previous results of Davis et al. (2005), so we prefer our results with the shorter time shift (i.e. 1 hr).

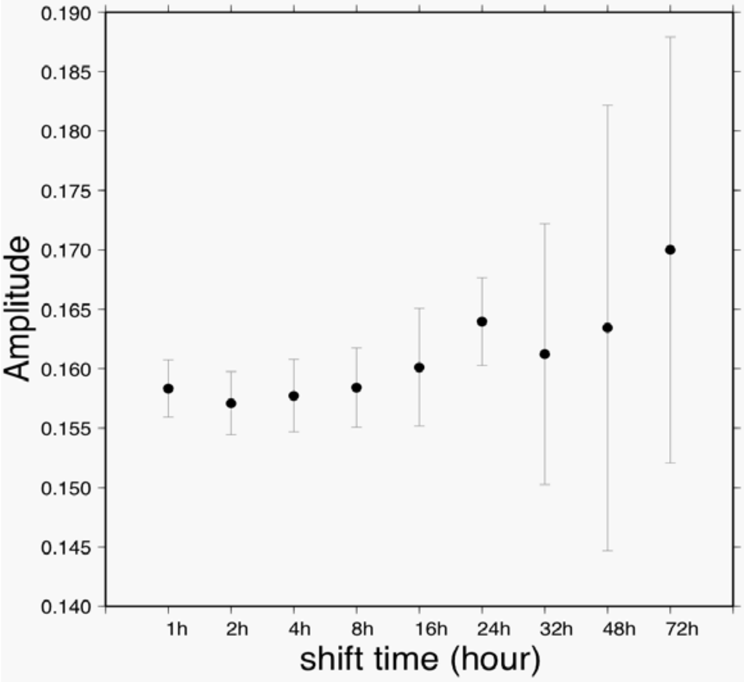

Figure A1. Comparing initial amplitude of 0S0 for different shift times from all SG stations. A 1h shift is the window that was used in the paper (72h represents no window overlap).

We find similar results for the Q values, with different window shifts. It can be seen (Figure A2) that the Q remains constant within the confidence limits, but the shorter shift gives the best determined value (smallest error).

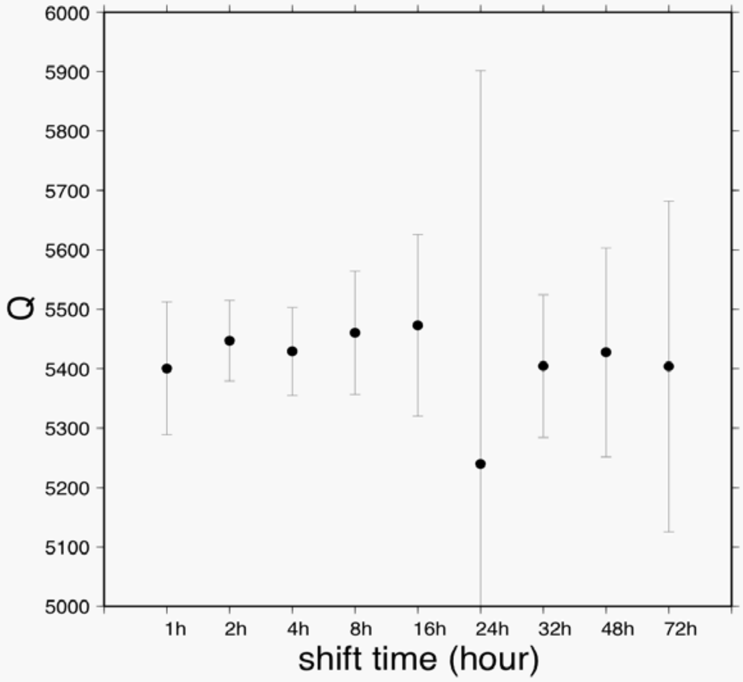

Figure A2. As figure S1, but comparing Q for different window shifts.

2. Testing the analysis on synthetic data

As a further means of testing our procedure with overlapping windows, we made some tests with synthetic data. Our method is to use the program Minos (G. Masters and others) to generate an accelerogram that simulates the data from station CB (Canberra). Starting with anisotropic PREM (aniprem489), we sum the amplitudes of all modes from a period of 6 hr down to 20s, including of course a known amplitude and Q for 0S0. The vertical amplitude factors are corrected for the free air effect and gravity perturbation (where applicable), and for each mode the vertical displacement is multiplied by ω^2 and converted to microgal. We use the Harvard CMT solution scaled by the moment magnitude of Okal and Stein (2005) for the Sumatra event; this yields the moment tensor components: exp 30, 0.259, -0.111, -0.148, 0.756, -0.600, 0.137. With these we compute the initial amplitudes of all the modes at station CB, including 0S0. The accelerogram was computed for 36 days and filtered to approximate the antialiasing SG filter (which has no effect on the amplitude of 0S0, Figure 1). Finally, we added two levels of flicker (1/f) noise to the data, at amplitudes of 0.2 and 0.5 microgal to simulate the noise levels in typical gravity residual series.

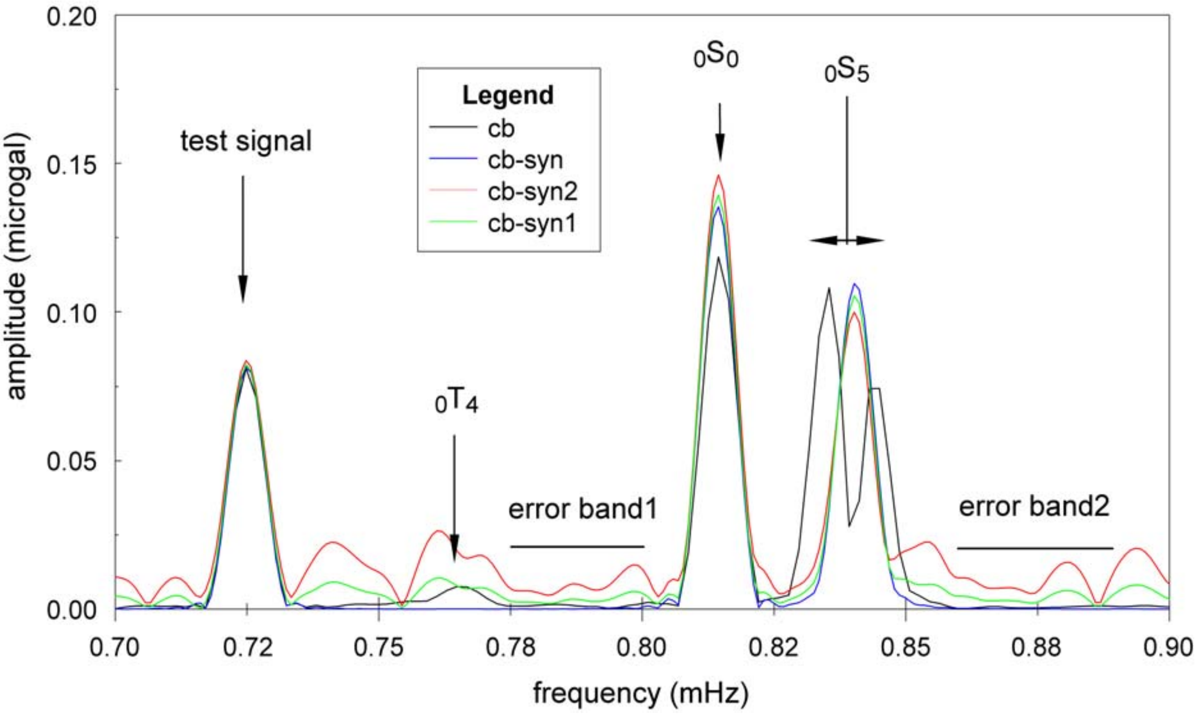

Figure A3. Spectrum of 3 days of data from station CB, with the 3 synthetic spectra (no noise, 0.2 microgal noise, and 0.5 microgal noise). Note the fixed amplitude of the test signal and the variable amplitude of 0S0 according to the level of the noise. This can be compared with Figure 3 in the main text.

For each of the 3 series, we recovered the amplitude A0 and Q for 0S0 as for the observed data. The reference amplitudes from Minos were 67.7 micron (0.17732 microgal) and the Q from PREM was 5327.1. These tests were done for the same window shifts of 1hr to 72 hr, as described above, and we shown in Figure A4 the results for the noise of 0.2 microgal for the amplitude, and the Q results in Figure A5. In both plots we note that the error are much larger than the differences between the input and output amplitudes. As in the first test, we conclude our method yields the best results (in terms of accurate recovery of the known A0 and Q) for the short window shifts.

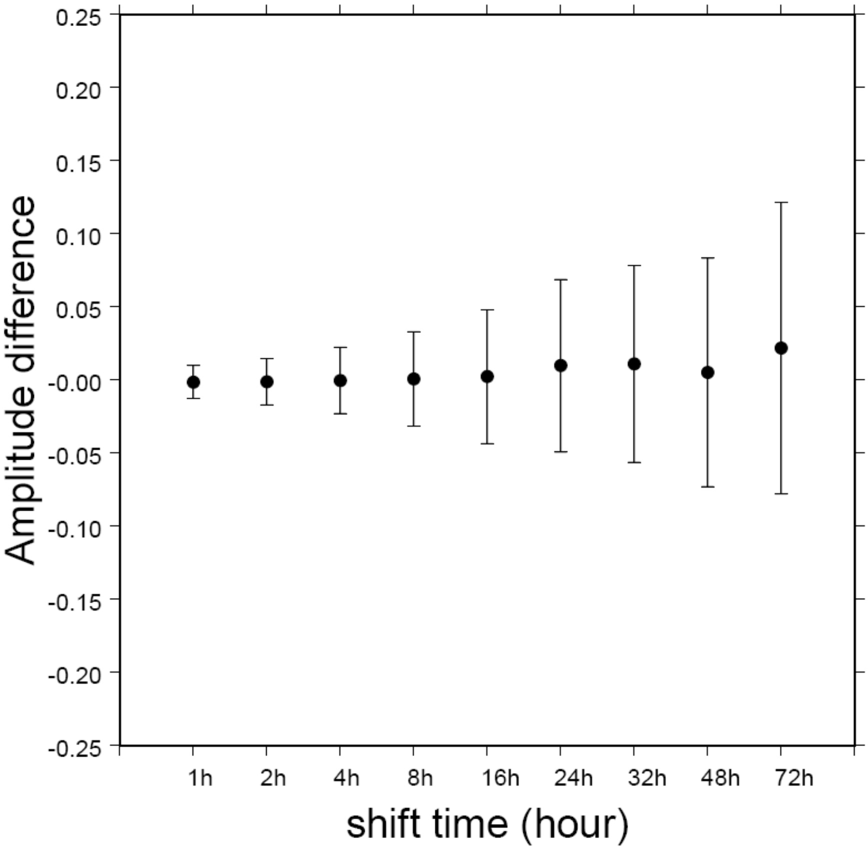

Figure A4. Recovery of the amplitude of 0S0 from a synthetic accelerogram of the Sumatra earthquake at station CB. The y axis is the difference in microgal from the reference level, and the x axis is the difference window shifts.

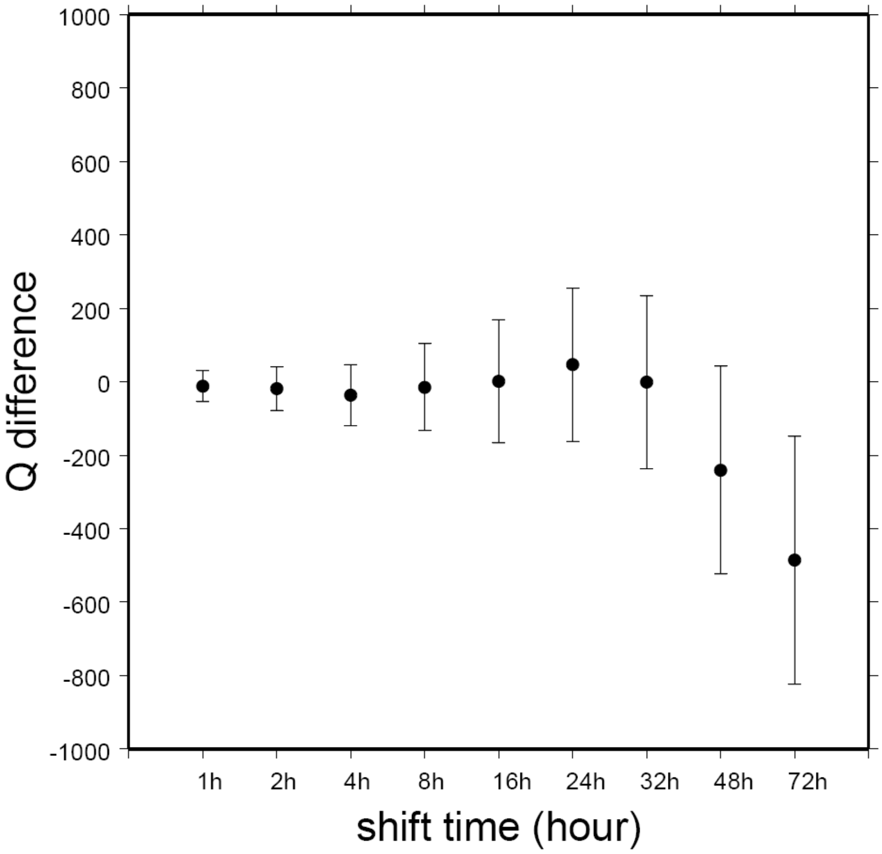

Figure A5. As Figure A4 but for recovery of the Q of 0S0. Note that for the longer time shifts the Q value is reduced.

3. Tables of 0S0 for seismometers and superconducting gravimeters

In the paper we compare the frequency of 0S0 for three studies. Here we show the frequency of 0S0 for our 18 superconducting gravimeters in Table A1.

Table A1. Frequency of 0S0 from 18 SG series

Station	frequency (mHz)	error
cb	0.8146570325	0.0000000154
es	0.8144970536	0.0000153474
h1	0.8146594763	0.0000000252
h2	0.8146561980	0.0000000071
m1	0.8146510124	0.0000000922
ma	0.8148326278	0.0000507263
mc	0.8146544695	0.0000000298
me	0.8146504164	0.0000003092
ny	0.8146561384	0.0000010314
s1	0.8146531582	0.0000035819
s2	0.8146579862	0.0000000250
st	0.8146559000	0.0000000115
tc	0.8146912456	0.0000026154
vi	0.8146281838	0.0000165310
w1	0.8147283792	0.0000042002
w2	0.8147932291	0.0000142357
wu	0.8145219684	0.0000117092
mean	0.8146564960	0.0000011910

Tables A2 and A3 are the amplitude and Q for superconducting gravimeters and seismometers, respectively.

Table A2. Amplitude and Q for SG stations

Station	amplitude	error	Q	error
	(microgal)			
cb	0.156871	0.001	5416	5
es	0.156213	0.0247	5112	101
h1	0.157739	0.0014	5371	5
h2	0.158265	0.0010	5380	4
m1	0.157627	0.0010	5403	4
ma	0.157786	0.0017	5382	7
mb	0.159544	0.0022	5430	9
mc	0.164826	0.0020	5377	8
me	0.155941	0.0073	5261	31
ny	0.160926	0.0056	5421	22
s1	0.160587	0.0017	5469	7
s2	0.159600	0.0017	5435	7
st	0.157797	0.0017	5425	6
tc	0.156783	0.0030	5373	12
vi	0.159190	0.0046	5431	18
w1	0.158162	0.0017	5396	7
w2	0.156185	0.0020	5395	7
wu	0.154223	0.0335	5732	137