

Supplementary Material for

**“Seismic Impact of Large Earthquakes on Estimating Global Mean Ocean
Mass Change from GRACE”**

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Contents

S1. Impact of varying τ values on estimating the seismic correction of GMOM change rate (Table S1)

S2. Impact of varying spatial window ranges on estimating the seismic correction of GMOM change rate (Table S2)

S3. Seismic correction of the GMOM change rate for a shorter time span 2003.01 – 2007.12 (Figure S1)

S1. Impact of varying τ values on estimating the seismic correction of GMOM change rate

Table S1. The 2003.01 – 2015.12 GMOM rates with seismic effect over the Sumatra earthquake region corrected using different τ values in the time series fitting.

e-folding relaxation time parameter (τ)	6 months	7 months	8 months	9 months
CSR RL06 GMOM rate after seismic correction (mm/year)	2.0777	2.0777	2.0776	2.0775

S2. Impact of varying spatial window ranges on estimating the seismic correction of GMOM change rate

Table S2. The 2003.01 – 2015.12 GMOM rates with seismic effect over the Sumatra earthquake region corrected by considering different spatial window ranges.

Spatial window range for the correction	-5N° ~ 15N° 85E° ~ 105E° (20° × 20°)	-13N° ~ 17N° 81E° ~ 111E° (30° × 30°)*	-22N° ~ 18N° 75E° ~ 115E° (40° × 40°)
CSR RL06 GMOM rate after seismic correction (mm/year)	2.088	2.078	2.079

*Note: The 30° × 30° area is the one used to correct the effect of Sumatra earthquakes in section 3.1.

S3. Seismic correction of the GMOM change rate for a shorter time span 2003.01 – 2007.12

Figures S1(a) and S1(b) show the global EWH trend rates for the period from January 2003 to December 2007, before and after seismic correction, respectively. During the GRACE data processing, we only consider the impact of the 2004 Mw9.1 Sumatra earthquake. The correction region for the seismic effects ranges from -10° N to 15° N in latitude and from 80° E to 109° E in longitude. Figure S1(c) shows the GMOM rates before and after seismic correction, i.e., 1.24 mm/year vs. 0.99 mm/year, indicating that the impact of the 2004 Sumatra earthquake on the 2003 – 2007 GMOM rate is -0.25 mm/year.

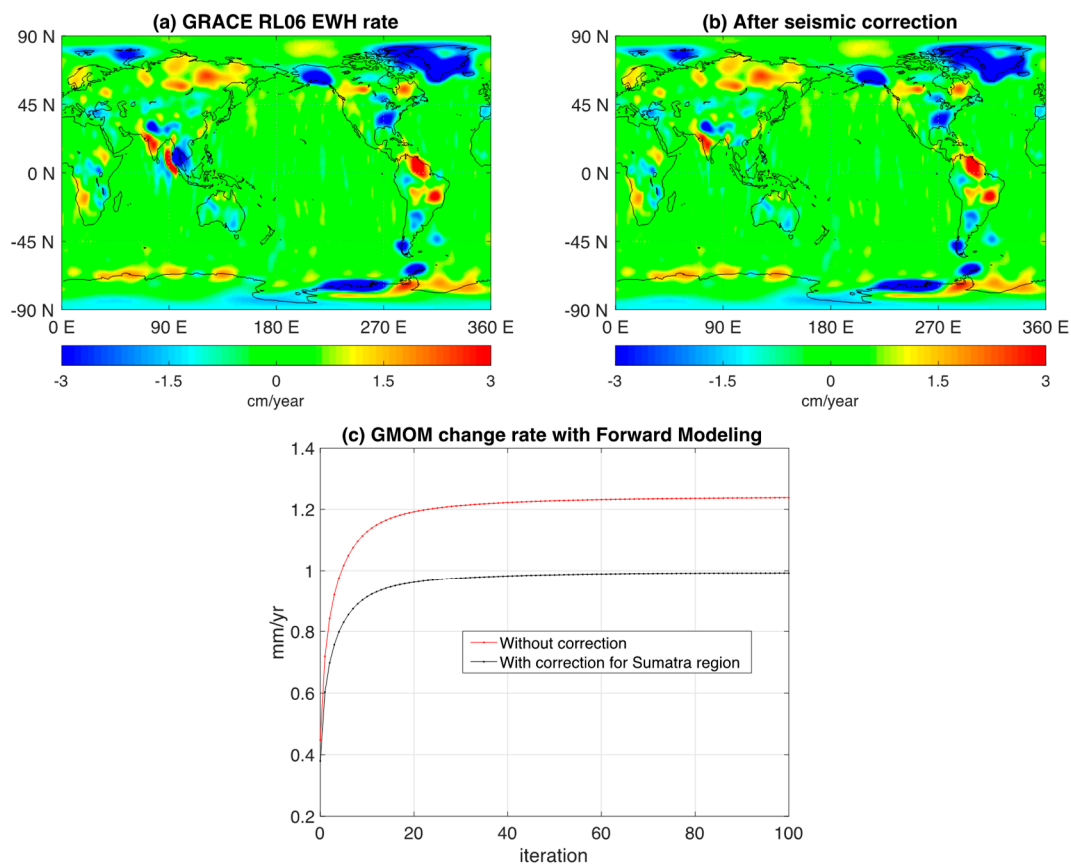


Figure S1. Seismic correction of the GMOM change rate for a shorter time span 2003 – 2007. (a) The GRACE global EWH trend rates for the period January 2003 to December 2007; (b) The global EWH rates after the seismic effect correction considering the impact of the 2004 Sumatra earthquake; (c) The GMOM change rate convergence curves with respect to the Forward Modeling iterations, before (red) and (black) after the seismic correction.