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2018 年アナク・クラカタウ山体崩壊：地すべりの運動メカニズムと津波シミュレーション
The 2018 edifice collapse event of Anak Krakatau, Indonesia: Landslide movement history and Tsunami simulation

○山田真澄・綿田辰吾・中道治久・Iyan Mulia・Karyono
○Masumi Yamada, Shingo Watada, Haruhisa Nakamichi, Iyan Mulia, Karyono

We performed the seismic waveform inversion for the 2018 edifice collapse of Anak Krakatau, Indonesia using the near-source broadband seismic data. Our result shows the onset of the event was about 14:55:50 (UTC), December 22, 2018. Based on the scaling relationship, the mass was estimated as 0.2-0.4 * 10^{12} kg. The particle motion of the source time function suggests the event was occurred from northeast to southwest direction with very low dipping angle.

On December 22, 2018, a huge Tsunami occurred at the Sunda strait in Indonesia, and more than 400 people were killed. There was no large earthquake at that time and the tsunami was associated with the volcanic eruption and edifice collapse in Anak Krakatau island.

The seismic signals due to this event are recorded by the broadband seismic network in Indonesia. There are about 150 broadband stations all over Indonesia, with a spacing 50-100 km. We performed the seismic waveform inversion using long-period component (20-100 s) at the near-field distance (60-200 km), assuming a single force mechanism. We also performed a grid search with 10 km spacing to estimate the location of the source.

Our result shows that the onset of the event was about 14:55:50 (UTC), December 22, 2018. The duration of the source time function is about 1 min with a large amplitude, followed by a smaller signal about a few min. The particle motion of the source time function suggests the event was occurred from northeast to southwest direction with very low dipping angle (about 10 degree). The location of the event was estimated at the Anak Krakatau.

Based on the scaling relationship between single force amplitude vs mass of the landslide (Ekström and Sterk, 2013), the mass was estimated as 0.2-0.4 * 10^{12} kg. This number is consistent with the volume estimated by the tsunami waveform simulation (Maeno and Kaneko 2019; Watada et al., 2019). We think that the edifice collapse was very low-dipping and moved like a landslide, and the mass sliding into the ocean caused the huge tsunami.

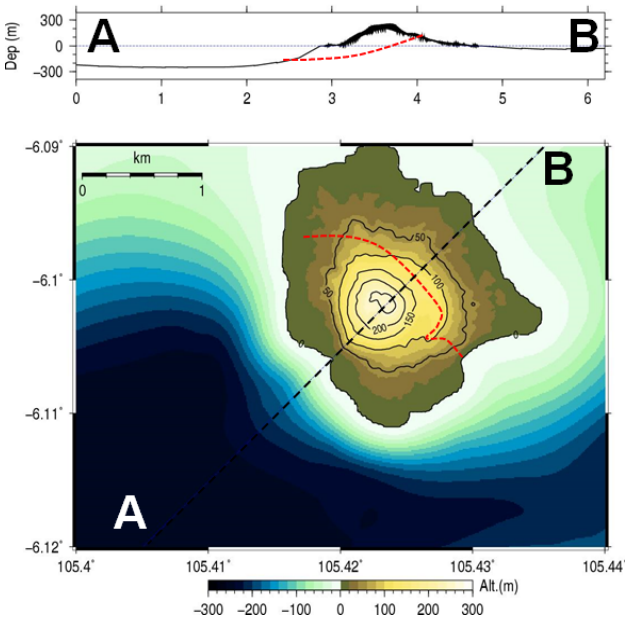

Figure 1: Topography of the Anak Krakatau

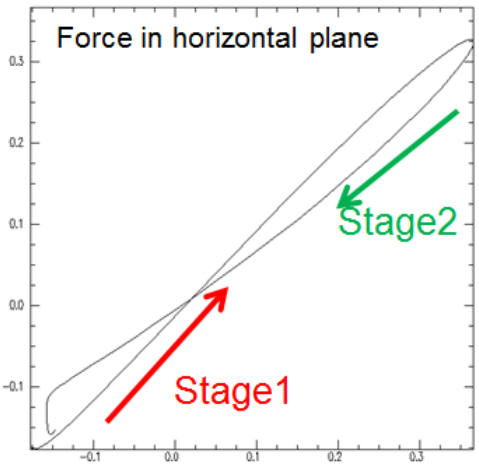

Figure 2: Particle motion of the source time function