Solid Earth Discuss.,
https://doi.org/10.5194/se-2018-101-RC1, 2018

Solid Earth
Discussions
Open Access

Interactive comment on "Effects of finite source rupture on landslide triggering: The 2016 M_W 7.1 Kumamoto earthquake" *by* Sebastian von Specht et al.

H. Setiawan (Referee)

hendy.kyoto@gmail.com

Received and published: 19 November 2018

Your manuscript presents the pattern of co-seismic landslides due to the M7.1 Kumamoto earthquake in 2016, related with the ground motion. Since some of the geomorphic parameters did not sufficiently explain the pattern and location of these earthquake-triggered landslides, then the analysis for about 15,000 resulted landslides is carried out by engineering seismology approaches, including rupture directivity effect and the variation of amplitude on a fault-normal and fault-parallel motion. By look at these two key points within a low-frequency ground motion, the spatial pattern distribution and landslide aspects are clearly defined and clarified. In further, results suggest

Printer-friendly version

Discussion paper

a physical-based ground-motion model that incorporates the azimuth-dependent seismic energy as well as the moment magnitude. This model would give benefits for co-seismic landslide hazard assessment, due to strike-slip or subduction earthquakes, when the distribution of co-seismic landslides is strongly correlated with the rupture effects rather than the hydrological factors from soil moisture variability or antecedent rainfalls (if any). No significant objections came to this manuscript.

However, some necessary amendments below are needed to clarify: 1. Page 8 line 29, the safety factor of FS<1.5 for unstable hillslopes, is this statement applied for seismic induced, or rainfall-induced or both in general?

2. Page 9 line 7-8, please check the equation of Arias intensity, is it phi/2g or 2/phi.g, see reference i.e Jibson (2007), USGS (1993) or Stafford et al (2009).

3. Page 10 line 6, please add remark M0 for the seismic moment directly. Some equations remarks also should be checked and added (if not yet mentioned).

4. Page 13 line 1, "...since energy is proportional to the seismic moment M0 (Eq.9)..." this should be (Eq.10)?? (Hanks and Kanamori, 1979).

5. Page 13 line 12, "... and ’teta’E and ’teta’E are the azimuths of the maximum." This should be ’teta’E and ’teta’I

6. Figure 14 indicates that mostly landslides concentrated in the aspect of about 120 degrees, south-east, with distance for the rupture approximately within 1-2km, which from location densely surrounding Aso caldera. Besides rupture effects, does distinctive lithology condition in Aso caldera itself also contribute to this finding?

7. Does the rupture propagation energy also (at the end) include the compressional waves (page 9 line 24) in the Aso caldera, south-east side, where the landslides densely concentrated as described in your finding? What is your opinion as an additional explanation in the Discussion? Since your manuscript only applies the shear waves only for estimating the energy in the model.

Printer-friendly version

Discussion paper

8. Related to questions 6 and 7, after your findings, do the normal faulting component should be accounted into your model? For example, if we look both at strike-slip and normal components. Does it significantly affect the spatial pattern, asymmetrical distribution or landslides depth?

9. Landslides aspects and asymmetric spatial distribution are well described in your manuscript. Do the depth variability of those recorded co-seismic landslides also can be related with the rupture propagation processes and can be explained through your physical-based ground motion model?

Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2018-101, 2018.

Printer-friendly version

Discussion paper