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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Numerical Simulations of the 2004 Indian Ocean Tsunami Deposits Thicknesses and Emplacements" *by* Syamsidik et al.

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COMMENTS FROM REFEREE #2: This study investigated deposits by the Indian Ocean tsunami in 2004 through the field measurement and reproduced it by using numerical simulations, which yields very interesting and valuable findings. However, the significance of this research should be more emphasized in the introduction. In the present manuscript, only the applicability of numerical models seem to be the main subject. The authors should show idea on how to make use of the results of this research in disaster prevention and reduction, such as estimating the magnitude of past tsunamis from sediments and evaluating the energy that the tsunami transports

earth and sand. Although the authors stated that "this study estimated the energy required to transport sediments via a tsunami wave", the answer to this question is not clearly shown in the manuscript.

RESPONSE:

Dear Referee #2,

We sincerely appreciate your input to our paper. In recent years, interests on using tsunami deposits information to estimate source of the tsunami and its magnitude have been in significant increase. Our study offers the use of numerical modeling prior to field investigation. This would provide a complimentary knowledge to locate potential locations of the tsunami deposits. In some studies, such as Jankaew et al. (2008) and Monecke et al. (2008), their important tsunami deposit findings were located after several attempts and identification of geological setting of the locations. Significance of our research is the use of the 2004 Indian Ocean tsunami with two different times of investigations, i.e one in 2005 (Jaffe et al., 2006) and in 2015 by authors. Understanding the energy of the tsunami from sediment transport process could be useful to validate energy generated by the tsunami. As in the 2004 Indian Ocean tsunami case, where monitoring equipments were rarely deployed in the affected area, information deduced from the tsunami deposit could better explain number of waves, wave heights, and wave velocity. In section 4.4, we discuss tsunami wave's shear stress simulated using the 2DH Delft3D model. The shear stress in sediment transport formulae represents the energy produced by the waves/currents during the process. We agree to include more explanation in the introduction part to elaborate the use of the study for disaster prevention and mitigation. Previous studies on tsunami deposits have inspired tsunami mitigation efforts in US and in Indonesia (Dunbar et al., 2008; Rubin et al., 2017). Data on tsunami deposits would provide more scientific evidence to past tsunamis for a significant period of records such as in the case of coastal cave in Aceh that preserved a very long record of past tsunamis in the region (Rubin et al., 2017). A set of tsunami deposits data could help us to estimate the recurrence period of the

tsunami from the subduction zone (Fujiwara, 2007; Minoura et al., 2001). Finding more tsunami deposits would strengthen validation process and ease some ways to estimate its sources through inverse mechanism (Buckley et al., 2012; Moore et al., 2011). A similar explanation will be added to the Introduction part of our revised manuscript.

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