

Interactive comment on “Post-event Field Survey of 28 September 2018 Sulawesi Earthquake and Tsunami” by Wahyu Widjianto et al.

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Referee 2 – Authors Interaction

We would like to thank Prof Ahmet Cevdet Yalciner for the constructive comments and suggestions towards improving our manuscript. Our response manuscript was uploaded in the form of a supplement. We summarize comments from Referee 2, author's response, and author's changes in manuscript as follows.

Comment 1: Page-1 Line 14: Indicating the name of the university mentioned would provide more clear information. Line 22-23: Do the authors have any reference for the earthquake parameters given? Line 23-24: Do the authors have any reference for the numbers reported?

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Response 1: Page-1 Line 14 The name of the university is Tadulako University, the biggest university in Palu City. We remove it from abstract and add it in paragraph. Line 22-23 The earthquake parameters given are from Meteorological, Climatological and Geophysical Agency (Indonesian: Badan Meteorologi, Klimatologi, dan Geofisika, BMKG) (<http://inatews.bmkg.go.id/?act=tsuevents> and <https://www.bmkg.go.id/press-release/?p=gempabumi-tektonik-m7-7-kabupaten-donggala-sulawesi-tengah-pada-hari-jumat-28-september-2018-berpotensi-tsunami&tag=press-release&lang=ID>). The parameters are also available in BMKG's earthquake catalog. Line 23-24 The numbers reported are from the Indonesian National Disaster Management Agency (Indonesian: Badan Nasional Penanggulangan Bencana, BNPB) which was broadcasted by media. We took one of them from <https://nasional.tempo.co/read/1138400/jumlah-korban-tewas-terkini-gempa-dan-tsunami-palu-2-113-orang/full&view=ok> We add these references in the manuscript.

Changes in manuscript: P1 L13 supplement The survey results show that the runup height and inundation distance reached 10.7 m in Tondo and 488 m in Layana respectively.

P1 L17-19 supplement On Friday, September 28, 2018, at 18:02:44 Central Indonesia Time (UTC + 8), Palu Bay was hit by a strong earthquake with magnitude MW = 7.5. The epicenter was located at -0.22°N 119.85°E at a depth of 10 km and 27 km northeast of Donggala City (BMKG, 2018).

P1 L19-20 supplement As of October 21, 2018, as many as 2,113 people were killed, 1,309 missing, and 4,612 injured (Hadi and Kurniawati, 2018).

Comment 2: Page-3 Line 2-5: "For tsunamis, post-incident surveys are often carried out. Major tsunamis such as : :." Only stating some of the tsunami post-event surveys like "giving examples" may not be appropriate. Two suggestions: Either state the importance and relation of them with this study OR delete these sentences. Line 9: "Observation of damage was also conducted." Too general sentence. What kind of

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damage data is collected? Any details on the data collection processes?

Response 2: Page-3 Line 2-5 We delete these sentences “For tsunamis, post-incident surveys are often carried out. Major tsunamis such as : :.” Line 9 We emphasized damage to buildings and infrastructures. We identified the difference about damage by earthquake, liquefaction and tsunami. We made videos to document damage along Trans Sulawesi Road, compared them to Google Street View[®] , Google Map and Google Earth and concluded that the severe damage was limited in 150 m from coastline. We also measured dimension of a bridge because we assume it was special case we found. We add about this in paragraphs of the manuscript.

Changes in manuscript 2: P2 L25-28 supplement Ulrich et al. (2019) assume that a source related to earthquake displacements is probable and that landsliding may not have been the primary source of the tsunami. On the contrary, Takagi et al. (2019), Sassa and Takagawa (2018), Arikawa et al. (2018) tend to assume that landslides produced the tsunami. Field surveys play an important role to support seeking answer for question arisen.

P2 L31-31 supplement Tsunami flow depth on land was also measured in some sites. In addition, tsunami arrival time was analyzed and observation of buildings and infrastructures damage was conducted.

P5 L4-8 supplement Damage observation was carried out at each site of surveys. We emphasized on damage to buildings and infrastructures although other kind of damage are interesting, such as vegetation, shoreline, and properties (cars, boats, fisherman tools, etc.). Videos and photographs were produced to assess the damage. Video recorded along trans Sulawesi Road were compared to Google Street View, Google Map, and Google Earth in order to assess the distance of damage from coastline. In addition, detail measurement of dimension was done for special object (for instance bridge) which is useful for tsunami force analysis.

Comment 3: Page 9: Line 14: “There were three main tsunami waves that reached the

beach." Which beach? Not clear. Line 14: "The first wave was relatively low." With respect to what? You should State it more clearly and in an understandable way. Line 18: "The wave that hit the beach was quite high." This sentence by itself does not provide any meaningful information.

Response 3: Page-9 Line-14 We modify "There were three main tsunami waves that reached the beach." to be "Most informants in the survey site testified that there were three main tsunami waves that reached the coastal zone inside Palu Bay. The second was the highest". Line-18 We replace "The wave that hit the beach was quite high" with "The tsunami waves that hit the coastal zone in Palu Bay were very strong as indicated by massive damage at each site we surveyed. These include the shifting of a 38-ton bridge."

Changes in manuscript 3: P9 L27-29 supplement Most informants in the survey site testified that there were three main tsunami waves that reached the coastal zone inside Palu Bay. The second was the highest.

P10 L1-2 supplement The tsunami waves that hit the coastal zone in Palu Bay were very strong as indicated by massive damage at each site we surveyed. The severe damage was limited within 150 m from coastline.

Comment 4: General Comments: - A brief summary and citation of previously published papers on 2018 Palu Event field survey is necessary. - Section 5.1, Aftershock information is not related with the focus of this study and the work done. - The conclusion section should be rewritten by clear sentences and providing a comprehensive summary of the results obtained. For example, Giving ranges such as "2 to10 m and the inundation distances were 80 to 500 m." Or "The arrival time of waves varied from 3 to 10 minutes.." does not provide satisfying information. The authors, at least, may add the locations of these measurements.

Response 4: Thanks for the suggestions. We provide a brief summary and citation of previously published papers e.g. Omira et al (2019), Mikami et al (2019), Yalciner

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et al. (2018), Muhari et al (2018), and Arikawa et al. (2018). We remove section 5.1 about aftershock information which is also suggested by Referee 1. We modify the sentences, the ranges of numbers are replaced by the maximum and significant run up height and inundation distance with mentioning the locations. Your comments and suggestions are accommodated in uploaded supplement file (and a revised paper manuscript if this process continue to next phase).

Changes in manuscript 4: P3 L5-12 supplement Many groups have conducted field surveys of the Sulawesi tsunami event or also known as Palu tsunami. Muhari et al. (2018) investigated wave height and inundation depth at several points with a focus around the end of the bay. A UNESCO international tsunami survey team surveyed 125 km of coastline along the Palu Bay up to the earthquake epicentre region. The team performed 78 tsunami runup and inundation height measurements throughout the surveyed coastline (Omira et al., 2019; Yalciner et al., 2018). Putra et al (2019) focus more on tsunami deposits. Meanwhile, Arikawa et al. (2018), Sassa and Takagawa (2018), and Takagi et al. (2019) each conducted a survey related to coastal subsidence, coastal liquefaction or submarine landslide detected in Palu Bay. This survey data can be combined with data from other groups, especially we contribute to provide data of runup, inundation distance, and damage.

Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2019-91/nhess-2019-91-AC2-supplement.pdf>

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2019-91>, 2019.

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