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Field Survey of the 28 September Earthquake Tsunami of Sulawesi, Indonesia

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On 28 September 2018, a large earthquake of magnitude 7.5 occurred at 72 km away from the city of Palu, Central Sulawesi, Indonesia. Following the main shock, a series of tsunami attacked the eastern coasts of central Sulawesi and the severe damages were reported along the coast of Palu Bay.

In the aftermath of the event, since the rupture was occurred along Palu-Koro strike-slip fault, the tsunami impact was expected to be relatively low compared with the other past tsunami events caused by the thrust fault rupture. However, the reported damage, more than 70,000 houses were reported to be damaged, was much more severe than expected because of the combination of strong ground motion, landslides, mudflows and tsunamis.

After the event occurred, as a part of the Indonesian government's reconnaissance, we conducted a post-tsunami field survey to identify the tsunami impact. The survey was conducted on 21 and 22 October, 2018, and aimed to measure the extent of tsunami inland penetration with RTK-GPS, flow depths and to inspect the structural damage. The survey also aimed to collect the ground truth information for satellite remote sensing and survivor video analysis to understand how the tsunami attacked and devastated the coastal areas of central Palu.

From the survey at the central Palu, we found that the major tsunami impact was concentrated within about 200 m inland from the shoreline. The spatial distribution of tsunami flow depths was scattered in the narrow range of tsunami inundation zone of the central Palu coast; 1-3m flow depths in average, 6 m the maximum at the central Palu.

Some survivor videos provided important information on tsunami attack, especially on the time series of the first and second tsunami attacks. From the video analysis, we found that the second tsunami hit Palu Grand Mall with the splash height of almost 8 m above the sea level, and the difference of 1st. and 2nd. tsunami attack was likely to be 2 minutes. This implies that these tsunamis were generated by a phenomenon with short time scale or different sources.