[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS11]tsunami deposit

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The 2011 off the Pacific coast of Tohoku Earthquake and tsunami have an influence on the development of tsunami deposit research. After the tsunami, a lot of findings have been reported on various research fields. However, identification criteria of the tsunami deposit are not yet established. Moreover, it is still uncertain how to use the tsunami deposit in the risk assessment. In this session, we welcome researches from all aspect of sedimentary records of modern and paleo tsunamis both onshore and offshore, and numerical and experimental modeling studies for risk assessment. In addition, we also welcome other event deposits, such as flooding and storm surge, that they are considered to be important for discrimination of tsunami deposit.

[MIS11-P23]Detection of paleo-tsunamis in the eastern Taiwan region using Ground Penetrating Radar

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Large earthquakes had occurred frequently on the east coast of Taiwan, whereas historical tsunamis were not recorded in this area. Recent tsunami sediments survey in this region revealed the runup of the tsunami in this area. However, detailed distribution of the tsunami deposits had not been investigated. We surveyed tsunami sediments from the east coast of Taiwan using Ground Penetrating Radar (GPR). The target of the radar surveys was the marine terrace near Chenggong and Danman. We set six survey lines at the Chenggong terrace (elevation: 18-22 m) and two survey lines (elevation: 25 m) at Danman, with survey lengths varying from 40-80 m. We surveyed at antenna frequencies of 500 MHz and 250 MHz at Chenggong, and 500 MHz at Danman.

At Chenggong, the data revealed that the 1 m thick the middle layer containing GPR scatters overlies the basement layer. This first layer has a weak graded bedding structure, and consists of sandy mud with cobbles; these cobbles are imaged as radar scatters. This layer also contains marine fossils (coral and oysters) which are concentrated at the bottom of the layer. Based on these results, we suggest that the coral fossils were moved by a paleo-tsunami or storm waves. The 14C ages of two coral fossils were 1785~1620 Cal BP and 1910~1785 Cal BP, which suggests that the tsunamis or storms impacted Chenggong 1750 years ago or later. However, coral fossils deposited by tsunamis or storms were not found between 21-22 m a.s.l. in the survey sections. This suggests that the run-up height (the height at which the flow velocity dropped enough for the coral fragments to be deposited) of the tsunami would be approximately 18-21 m. Assuming that the uplift rate at Chenggong is 3.0-5.0 mm/yr (Hsieh and Rau., 2009), the run-up height is 10-18 m, depending on the occurrence age of the paleo-tsunamis.

At Danman, we could not detect fossils moved by tsunamis or storms after the formation of the marine terrace. This suggests that the Danman area was not affected by large tsunamis.

Our results show that the inundation area of large paleo tsunamis is distributed near Chenggong. In a scenario where a M8.3 reverse fault earthquake occurs off the east coast of central Taiwan, the estimated tsunami run-up height is 15-18 m (Ando et al., 2013). However, such a significant run-up height would suggest a much wider area of inundation in eastern Taiwan in the event of such an earthquake. However, if a submarine landslide occurred near Chenggong, the estimated run-up height could exceed 20 m while limiting the inundation area to only the Chenggong vicinity. Although the limited survey area limits our estimates of how much of this part of eastern Taiwan was inundated, we suggest that either a large earthquake near Chenggong or a submarine landslide could be the trigger for a paleo-tsunami in Chenggong.