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Reconnaissance of the 25 October 2010 Mentawai Islands Tsunami in Indonesia

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On 25 October, 2010 a magnitude Mw 7.7 tsunami earthquake occurred offshore of Indonesia's Mentawai Islands some 280 km South of Padang. The resulting waves caused substantial damage and loss of life on Pagai and Sipora Island, with the majority of the 500 fatalities attributed to the tsunami. Unfortunately, the relatively weak shaking of the 2010 event compared to the September, 2007 Bengkulu earthquake misled residents into believing that there was no tsunami threat. In many cases, evacuation was only triggered by the noise of the approaching tsunami waves. This highlights the importance of fine-tuning public education material and messages such that earthquake duration, as well as strength of ground shaking be prompts for an immediate evacuation. Sites studied in the survey also highlight the important role that easy access to evacuation routes, high ground or tsunami resistant multi-story structures play in saving lives.

A multi-disciplinary international tsunami survey team (ITST) was deployed within days of the event to document flow depths, runup heights, inundation distances, sediment deposition, damage patterns at various scales, performance of the man-made infrastructure and impact on the natural environment. The 9 to 17 November ITST travelled by R/V Andalas from Bengkulu in southern Sumatra, along the west coast of the Islands of Pagai and Sipora, on to the southern tip of Siberut island before returning to Padang in West Sumatra. Helicopter based aerial reconnaissance highlights significant variation in tsunami impact at local and regional scales. The collected survey data includes more than 100 tsunami runup and flow depth measurements. The tsunami impact peaked with a localized maximum runup of approximately 16 m on Sibigau Island off Pagai Island. The Islands of Sibigau and neighbouring barrier islands are reminders that pristine forests can be overpowered by tsunami waves exceeding 10 m resulting in a barren landscape with scattered tree debris and sharp trimlines marking runup and inundation. While forests do provide some degree of tsunami attenuation for tsunami heights below 10 m and are fairly efficient at reducing tsunami waves with less than 5m flow depth over a few hundred meters, they are not so effective for more extreme events. Observations from the Mentawai tsunami are compared against the 2006 Java tsunami. Field observations, video recordings and satellite imagery are presented. The team interviewed numerous eyewitnesses and educated residents about tsunami hazards since community-based education and awareness programs are essential to save lives in locales at risk from locally generated tsunamis.