Geophysical Research Abstracts
Vol. 16, EGU2014-12326, 2014
EGU General Assembly 2014

Millennia-long histories of Indian Ocean tsunamis recorded in a coastal cave, Aceh Province, Sumatra

Charles Rubin (1), Ben Horton (1,2), Kerry Sieh (1), Jessica Pilarczyk (1,2), Jedrzej Majewski (1), Patrick Daly (1), Andrea Hawkes (3), and Nazli Ismail (4)

(1) Earth Observatory of Singapore and Division of Earth Sciences, Nanyang Technological University, Singapore (cmrubin@ntu.edu.sg), (2) Department of Earth and Planetary Sciences, Rutgers University and Institute of Marine and Coastal Science, Piscataway, New Jersey (bphorton@marine.rutgers.edu), (3) Department of Geography and Geology, University of North Carolina Wilmington, Wilmington, North Carolina (hawkesa@uncw.edu), (4) Department of Physics, Universitas Syiah Kuala, Banda Aceh, Indonesia (nazlisma@yahoo.com)

Geological and microatoll studies of coral reefs and coastal plains have uncovered short and incomplete records of predecessors for the 2004 Indian Ocean tsunami. Here we present a complete mid- to late Holocene tsunami history from an extraordinary sedimentary deposit in northwestern Aceh Province, Sumatra. We exposed clastic sediment in six trenches within a sheltered limestone cave 200 m from the present coastline. The trim line of the 2004 tsunami is about 25 m above sea level and 15 m above the top of the 10-m high entrance to the cave. Within the cave, the deposits of 2004 comprise of a laterally continuous sand sheet. Beneath the 2004 tsunami sand is a <3-cm thick bed rich in guano dropped by insect feeding microbats. Many similar couplets of sand and bat guano occur lower in the stratigraphic sequence. The sands have many diagnostic features of the 2004 deposit, consisting of a distinctly marine geochemical signature, high-diversity foraminiferal assemblages that include offshore species, normal grading, basal rip-up clasts, lenticular laminations, and articulated bivalves. Minor, local, non-tectonic normal and decollement faults that break the layers at several locations are likely due to strong ground shaking. Radiocarbon dating of detrital charcoal establish a mid- to late Holocene age range for the tsunami sands. Together these records show a marked variability in recurrence of large tsunamis along the Acehnese coast. Time between inundations averages close to 500 years but vary in recurrence, from only 60 years to about 2000 years