

by Arthur E. Berman
Director PetroleumReports.com and
Houston Geological Society Bulletin Editor

The Northern Sumatra Earthquake of 2004: Forty Years of Ignoring Plate Tectonics

The article has been abridged. See the *Bulletin* Web version for the full abstract and images: /www.hgs.org/2005/April

The December 26, 2004 Northern Sumatra Earthquake has been recently recalculated to be magnitude $M_w = 9.3$, making it the second largest earthquake in recorded history along with Maullín, Chile (1960). Due to the magnitude of the December 2004 earthquake and ensuing tsunami, these types of events are widely viewed as beyond the range of scientific predictability or probability.

More disturbing than the presumption that the Sumatra earthquake and tsunami were beyond probabilistic determination is the nearly universally held notion that what is needed is a deep-ocean-buoy monitoring and warning system, like the Deep Ocean Assessment and Reporting of Tsunamis (DART) network in the United States and Japan. The DART system is extremely expensive and has never been proven to predict a tsunami. Initial tsunami waves arrived in 15–30 minutes of the earthquake in Aceh Province, Sumatra, one hour in Thailand, and two hours in Sri Lanka and India. The frequency of DART transmission (once every hour) and associated processing time is inadequate to have provided meaningful warning for any of the areas most affected by the 2004 tsunami in the Indian Ocean.

In the case of the tsunami that destroyed Hilo, Hawaii, following the 1960 Maullín, Chile earthquake, ample warning was provided from seismological information alone, yet many deaths and injuries occurred due to lack of awareness about the behavior of tsunamis.

Tsunami detection is, after all, a second derivative approach. Why not focus on the causal mechanism—earthquake—which is something we can measure very effectively and quickly? I believe that an appropriate, immediate response to the Indian Ocean tsunami disaster should focus on.

1. Immediate awareness training about tsunamis for all coastal residents of the Indian Ocean region,
2. Immediate implementation of a seismological first-warning system that uses existing monitoring stations in the region along with an inexpensive network of coastal sirens, and

3. Assessment of the feasibility and cost benefit of a deep-ocean-buoy tsunami warning system like the U.S. DART network. ■

Biographical Sketch

ARTHUR E. BERMAN is Director of PetroleumReports.com and current editor of the Houston Geological Society *Bulletin*. He has an MS in geology from The Colorado School of Mines and has worked in the petroleum industry since 1978 doing geological and seismic interpretation.



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