MITTIGATING THE EFFECTS OF LARGE SUBDUCTION-ZONE EARTHQUAKES IN WESTERN SUMATRA

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No giant earthquakes have struck the outer-arc islands of western Sumatra since the sequence of 1797, 1833 and 1861. Paleoseismic studies of coral microatolls reveal that failure of the subduction interface occurs in clusters of such earthquakes about every 230 years. Thus, the next such sequence may well be no more than a few decades away. In the meantime, GPS measurements and paleogeodetic observations show that the islands continue to submerge, dragged down by the downgoing oceanic slab, in preparation for the next failures of the subduction interface. Uplift of the islands and seafloor one to two meters during large events leads to large tsunamis and substantial changes in the coastal environments of the islands, including the seaward retreat of fringing reef, beach and mangrove environments.

Having spent a decade characterizing the seismic history of western coastal Sumatra, we are now beginning to work with the inhabitants of the islands and the mainland coast to mitigate the associated hazards. Thus far, we have begun to creat and distribute posters and brochures aimed at educating the islanders about their natural tectonic environment and guiding them in preparing for future large earthquakes and tsunamis. We are also installing a continuous GPS network, in order to monitor ongoing strain accumulation and possible transients.