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Parameters of inundation, run-up and deposition of the South Asian Tsunami of 26 December 2004 in southeastern India and Kenia

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The recognition of tsunami deposits as evidence of past tsunami is hampered by the poor preservation potential of the deposits in the commonly subaereal zones of run-up. Preservation potential is greater in the marine realm. However, event beds are frequently not recognised as tsunami deposits or tsunami related deposits because of the absence of uniquely indicative sedimentological features and the lack of physical continuity into run-up zone sediments. There is no tsunami facies model or any depositional model with predictive power in three dimensions.

We surveyed beaches north of Pondicherry, Tamil Nadu, India and in Kenya north of Malindi which were affected by the Sumatra tsunami of December 26, 2005. We also sampled the deposits laid down by the tsunami. In Tamil Nadu, the tsunami struck shortly after high tide at c. 8:40 local time, c. 2 hs after the initial Sumatra earth quake. Depending on the beach profile, the major tsunami wave covered a run-up distance of up to 600 m, had a run-up height of c. 5.40 m, and a flow depth of over 3.5 m. Run-up distances for two lesser waves following the major one could also be established. In Kenya, the tsunami hit the coast at noon, c. 8 hs after the earth quake and shortly after low tide. Run-up distance on relatively steep beaches unprotected by reefs was c. 45 m, the run-up height 3 m, the flow depth was probably less than 1 m.

The sampled tsunami deposits commonly have erosive bases, the grain size distributions reflect the respective characteristics of the pre-tsunami shelf sediments. In Tamil Nadu, the deposits consist of coarse to medium sand and display a landward decrease

in grain size. Minor cross bedding and dewatering structures are present. The deposits taper off at c. 300 m, i.e.about half the run-up distance. In Malindi, coarse sand together with oyster and gastropod shells >5 cm in diameter were transported all the way to maximum run-up. Here, the deposits are sometimes weakly cross bedded and rich in heavy minerals originally delivered to the sea by a nearby river. Pending the detailed grain size analysis, there do not seem to be obvious lateral grain size trends. At all studied beaches, currents induced by the tsunami during run-up had minimum velocities of 200 cm s^{-1}.