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Rupture Propagation of recent large TsE off-coast Sumatra and Java

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We compare the spatio-temporal evolution of the three most recent large tsunamogenic earthquakes in the Indian Ocean (Mw9.3 on 26 December 2004 off-coast N-Sumatra, Mw8.5 on 28 March 2005 off-coast Nias, and Mw7.7 on 17 July 2006 off-coast Java). Parameters are retrieved from broad-band seismograms using array techniques at teleseismic and regional distances. Especially, we exploit coherency and beam-power as measures for energy release. They can be determined shortly after recording of the first-arrival phases allowing for processing in a near real-time fashion. We summarise major event features that can be obtained by the applied method.

For the three events, the rupture front could be tracked over about 1150, 150, and 200 km, respectively. The events in 2004, 2005, and 2006 had source durations of at least 480, 120, and 180 s, respectively. Whereas average rupture speed of the events in 2004 and 2005 is in the order of the S-wave speed ($\approx 2.5\,kms^{-1}$), slow rupturing ($\approx\ 1\,kms^{-1}$) is indicated for the July 2006 event. Different rupture phases can be distinguished. We observe unilateral rupture propagation for all events except for the rupture onset, where there is evidence for bilateral rupturing.