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Schlumberger seismic vessel Geco Searcher provides unprecedented images of the Great Andaman Sumatra earthquake megathrust rupture plane

H. Carton [1], S. C. Singh [1], N. Hananto [1,2], D. Hartoyo [3], A. Chauhan [1], P. Tapponnier [4], N. White [5], T. Bunting [6], P. Christie [7], H. Lubis [8], J. Martin [9]

[1] Laboratoire de Geosciences Marines, Institut de Physique du Globe de Paris, 4 place Jussieu, Paris, 75005, France
[2] LIPI, Jl. Sangkuriang, Bandung, 40135, Indonesia
[3] BPPT, Jl. MH Thamrin 8, Jakarta, 10340 Indonesia
[4] Laboratoire de Tectonique et Mecanique de la lithosphere, Institut de Physique du Globe de Paris, 4 place Jussieu, Paris, 75005 France
[5] Bullard Laboratories, Department of Earth Sciences, University of Cambridge, Madingley Road, Cambridge, CB3OEZ United Kingdom
[6] WesternGeco, Rohas Perkasa No. 8 Jalan Perak, Kuala-Lumpur, 50450 Malaysia
[7] Schlumberger Cambridge Research, High Cross, Madingley Road, Cambridge, CB3OEL United Kingdom
[8] PT WesternGeco Indonesia, Sentra Mulia Jl. H.R. Rasuna Said Kav. X-6 No.8, Jakarta, 12940 Indonesia
[9] Schlumberger K.K, 2-2-1 Fuchinobe, Sagamihara-shi, Kanagava-ken, 2290006 Japan

From July 13 to 27, 2006, we carried out a deep seismic reflection survey along two lines on board the WesternGeco seismic vessel Geco Searcher. The vessel was equipped with one 12 km and one 5.5 km Q- Marine streamers. The long streamer was towed at 15 m depth, providing low frequency signal for deep targets, and the short streamer was towed at 7.5 m depth for high-resolution imaging of shallow sediments. The Q-Marine technology, developed by Schlumberger, is the most advanced technology available in seismic industry where individual hydrophones spaced at 3.125 m intervals sample and transmit data continuously back to the vessel. These data are then decimated to the appropriate trace interval, in this case 12.5m, after application of a digital spatial anti-alias filter, providing 960 channels of data. An array of 48 air guns provided a 10,170 cubic inch source with approximately 330 bar-m output. The shot interval was 50 m, providing 120 fold data at 6.25 m CMP intervals. The long streamer would allow us to remove seafloor multiples whereas high fold coverage would be extremely valuable for removing noise. Two deep seismic reflection lines were shot. The first line is 255 km long and runs close to the epicenter of the 26th December event, traversing the subduction front, a narrow accretionary wedge, the Simeulue plateau and the Simeulue forearc basin. The second line is 455 km long and located 255 km farther west: it traverses the whole margin, from the oceanic basin on the Indian plate up to the Andaman Sea, running across the the deformation front, the accretionary wedge, the West-Andaman Fault, the Aceh forearc basin, the submarine Sumatran fault and volcanic arc. Onboard processing of these data shows reflectors down to 18 s two-way travel time (TWTT), i.e. down to about 50-60 km depth. The subducting oceanic crust, including the oceanic Moho, could be seen down to 12 s TWTT. The megathrust that produced the earthquake could be followed from the source region at about 30 km depth to the surface near the subduction front. Extensive processing is under way and should provide unprecedented reflection images of this megathrust and hence insight about the nature of the tsunamigenic Great Andaman- Sumatra earthquake.