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First results from the SAGER-OBS deep seismic cruise (July/August 2006) offshore Sumatra

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The 26th December 2004 great Sumatra earthquake (Mw=9.1) is among the 4 largest earthquakes ever recorded and the largest of the last 40˜years. It initiated at a depth of 20-30˜km and ruptured about 1300˜km of the Indo-Australian/Sunda plate boundary, from the vicinity of Simeulue Island up to the north of Andaman Islands. The SAGER program is part of an ongoing international effort to study the rupture zone of this great earthquake. The main objective of the SAGER-OBS cruise on board R/V Marion Dufresne (July 7th to August 9th 2006) was the acquisition of deep penetrating wide-angle seismic data to constrain the crustal and upper mantle structures in the epicentral area and in the zone of greatest co-seismic slip. Forward and inverse modeling of the data will help to identify potential heterogeneities along the subduction thrust, such as subducted topographical features, to obtain the velocity structure within the subducting lithosphere and overlying deep fore-arc crustal zones. The cruise was performed simultaneously with the acquisition of coincident reflection seismic profiles by the Western-Geco/Schlumberger's "Searcher" seismic vessel on the same profiles (Singh et al., 2006). During the cruise, 56 ocean-bottom seismometers (OBS) were deployed successively along two profiles located north of Simeulue Island (250˜km length) and north of Sumatra, close to the limit of Indonesian waters (520˜km-long profile). The two profiles are sub-parallel (oriented NE-SW), roughly perpendicular to the margin, and extend well onto the oceanic basin; the northern one crosses the submerged arc north of Sumatra. Seismic shots along the profiles were generated using a 8260˜cu inch air-gun array. All OBS's were successfully recovered. The resulting data quality is good with deep penetrating arrivals on most of the instruments. Additionally, shots fired by the second vessel while acquiring the coincident reflection profiles were recorded by the instruments deployed along the northern profile. These dense

shots (50˜m spacing) will allow construction of a high-resolution velocity model of the sedimentary and upper crustal layers.