2009 Portland GSA Annual Meeting (18-21 October 2009)

Paper No. 154-8

Presentation Time: 10:25 AM-10:40 AM

7.5 KA EARTHQUAKE RECURRENCE HISTORY IN THE REGION OF THE 2004 SUMATRA-ANDAMAN EARTHQUAKE

PATTON, Jason R.1, GOLDFINGER, Chris2, MOREY, Ann3, ERHARDT, Morgan3, BLACK, Bran3, GARRETT, Amy M.3, DJADJADIHARDJA, Yusuf4, and HANIFA, Udrekh4, (1) College of Oceanic and Atmospheric Sciences, Oregon State University, 104 COAS Admin Bldg, Corvallis, OR 97331, jpatton@coas.oregonstate.edu, (2) COAS, Oregon State University, Corvallis, OR 97331, (3) COAS, Oregon State University, 104 COAS Admin Bldg, Corvallis, OR 97331, (4) Bandan Penghajian Dan Penerapan Teknologi (BPPT), BPPT 2nd Building, 19th Floor, Jl.MH.Thamrin 8, Jakarta, 10340, Indonesia

Earthquakes and tsunamis are some of the most deadly natural disasters, with the 26 December 2004 Sumatra-Andaman earthquake and tsunami responsible for the deaths of nearly a quarter of a million people. Knowledge about the earthquake cycle, through many cycles, is fundamental to understanding both the societal risk and the nature of the seismogenic process. 109 piston-, gravity-, kasten-, and multi-cores were collected along the length of the Sumatra margin, from the 26 December 2004 Mw 9.3 rupture zone in the north, to the southern tip of Sumatra Island. 49 cores were located in the region of the 2004 rupture and are considered in this study.

Using core logs, physical property data (density and magnetic susceptibility “fingerprints”), 14C and 210Pb age control, and computed tomography (CT) data, turbidite stratigraphy is correlated between cores collected in slope basin and trench sites in an attempt to estimate recurrence of earthquakes in this region. We apply criteria developed in Cascadia, Japan, and in Sumatra thus far to discriminate such events from those triggered by other mechanisms. Testing the turbidite stratigraphy for synchronous triggering of turbidity currents from sedimentologically isolated basins is our method for discriminating seismic from other triggering mechanisms. Turbidites examined thus far pass tests of synchronous triggering based on temporal and spatial correlation among sedimentologically isolated sites. The uppermost turbidite is also consistent with deposition following the 2004 earthquake. The most likely triggers for these events are past earthquakes.

19 turbidites in 8 cores are interpreted to have been triggered during strong ground shaking from earthquakes over the past ~7,200 years. The recurrence interval (RI) estimate for earthquakes in the 2004 rupture region for the last 7.2 ka is 400±60 years. The recurrence pattern appears to include significant clustering through the Holocene, with

several gaps of 700-1000 years. The turbidite record is also compatible with the developing onshore record of paleoearthquakes in Aceh, Thailand, and the Andaman Islands.

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General Information for this Meeting

Session No. 154--Booth# 0

Paleogeodesy at Subduction Zones

Oregon Convention Center: A107/108/109

8:00 AM-12:00 PM, Tuesday, 20 October 2009

Geological Society of America Abstracts with Programs, Vol. 41, No. 7, p. 408