



## SSA 2010 Annual Meeting Abstract

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**Session:** **Characterizing the Next Cascadia Earthquake and Tsunami**

**Schedule:** Wed 21 Apr – 11:00 AM

**Location:** Salon F

**Presentation Type:** Oral

**Presenter:** Patton, Jason Jay R.

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### TEMPORAL CLUSTERING AND RECURRENCE OF HOLOCENE PALEOEARTHQUAKES IN THE REGION OF THE 2004 SUMATRA-ANDAMAN EARTHQUAKE

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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. Recurrence of great earthquakes (7.25 ka, years before present, BP, 1950) is estimated based on turbidite stratigraphy (representing earthquake events) correlated between 49 deep sea sediment cores in the region of the 2004 rupture. We apply criteria developed in Cascadia, Japan, and in Sumatra thus far to discriminate such events from those triggered by other mechanisms by testing the turbidite stratigraphy for synchronous triggering of turbidity currents between sedimentologically isolated basin core sites and deeper trench sites using radiocarbon, multiple proxies and ash stratigraphy. Nineteen turbidites are interpreted to have been triggered during strong ground shaking from earthquakes over the past ~7,250 years. The youngest turbidite is most likely the result of the 2004 earthquake. Calibrated probability density function peak ages for events 4 – 13 are  $640 \pm 60$ ,  $800 \pm 70$ ,  $1190 \pm 100$ ,  $1500 \pm 90$ ,  $1600 \pm 80$ ,  $2090 \pm 70$ ,  $2750 \pm 60$ ,  $3910 \pm 80$ ,  $4480 \pm 80$ ,  $4830 \pm 60$  years BP and events 15 – 19 are  $5150 \pm 110$ ,  $5460 \pm 110$ ,  $5720 \pm 100$ ,  $6540 \pm 80$ , and  $7230 \pm 70$  years BP. The turbidite record is also compatible with the developing onshore record of paleoearthquakes in Aceh, Thailand, Sumatra, and the Andaman Islands, but the terrestrial record is less complete. The recurrence interval (RI) estimate for earthquakes in the 2004 rupture region for the last 7.25 ka is  $390 \pm 60$  years. The recurrence pattern appears to include significant clustering through the Holocene, with three apparent clusters, and two gaps of 700-1000 years.

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