Geophysical Research Abstracts
Vol. 15, EGU2013-6009-2, 2013
EGU General Assembly 2013

Insights into the Tohoku earthquake rupture history from coastal uplift and tsunami deposits

Mustapha Meghraoui (1), Silke Mechernich (1), Tsoyushi Haraguchi (2), Esra Cetin (1,3), Shinji Toda (4), Koji Okumura (5), Matthieu Ferry (6), and Hiroyuki Tsutsumi (7)

(1) EOST - Institut Physique du Globe, Geodynamics and Active Deformation, UMR 7516, Strasbourg, France (m.meghraoui@unistra.fr), (2) Dept. of Earth Sciences, Osaka University, Japan, (3) Dept. of Geology, Istanbul Technical University, Turkey, (4) Dept. of Earth Sciences, Tohoku University, Japan, (5) Dept. of Geography, Hiroshima University, Japan, (6) Geosciences Montpellier, France, (7) Dept. of Geology, Kyoto University, Japan

The strain accumulating between M9-class earthquakes is a major component of the active deformation that contributes to resolve the pattern of seismic cycle at plate boundary zones. Recent geodetic and seismotectonic works constrain the $\sim$ 500-km-long 2011 Tohoku megathrust rupture and related slip distribution. Here, we investigate marine terraces at 132 sites and palaeotsunami deposits at 7 estuaries in east Honshu and assess a prevailing late Quaternary coastal uplift and seismic coupling on a segmented Japan subduction zone. The tectonic process shows 0.2 and 0.4 mm/yr uplift rate of Pleistocene marine terraces in northern Tohoku, and 0.1 – 0.2 mm/yr along the Sanriku and southern Tohoku coastline. This variation depicts two active tectonic sub-regions where the area of low uplift rate correlates with the 2011 subsidence. Holocene benches and notches reveal $\sim$ 1.1 mm/yr uplift rate in northern Tohoku which denotes clear upheaval acceleration during late Quaternary. The palaeotsunami record in the last 7 kyr on the Sanriku and Sendai coastline constrains the 400 – 800 years recurrence interval of palaeoearthquakes. Our modelling of crustal deformation indicates how the successive coastal subsidence during M9-class earthquakes may be concealed by the long term upheaval.