Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SSS019-13 会場: 303 時間: 5月24日10:45-11:00

南海トラフ地震・津波発生分岐断層の時空進化

Space-time evolution of the sesimo-tsunamigenic splay fault in the Nankai Trough

木村 学[1*], Moore Gregory[2], Strasser Michael[1], Elizabeth Screaton[4], Daniel Curewitz[5]

Gaku Kimura[1*], Gregory Moore[2], Michael Strasser[1], Elizabeth Screaton[4], Daniel Curewitz[5]

[1]東京大学, [2]ハワイ大学, [3]ブレーメン大学, [4]フロリダ大学, [5]シラキュース大学

[1]The University of Tokyo, [2]University of Hawaii, [3]University of Bremen, [4]University of Florida, [5]Syracuse University

Great earthquakes and tsunamis along subduction zones are generated when large areas of the plate boundary megathrust rupture and slip along faults rapidly propagates close to ocean floor. Tsunamis are also generated when catastrophic submarine landslides are produced due to unstable slope collapse. Slope collapses simultaneous with great earthquakes might enhance tsunami generation.
Many studies inferred that coseismic slip along splay faults branched from plate boundary megathrust may generally provide a mechanism by which earthquakes generate tsunamis, although 3D geometry, physical properties, conditions and evolving process of the splay faults are poorly known.
Nankai Trough Seismogenic Zone Experiment (NantroSEIZE) of Integrated Ocean Drilling Program (IODP) stage 1 was conducted from September 2007 to February 2008 and successfully acquired the geological and physical data from the shallow portion of the megasplay fault. Substantial long-term slip is documented by sequence boundaries and progressive landward tilting of strata in the forearc basin and drilling into the shallow portion of the splay fault.
Combined with detailed analysis of 3D seismic data around the shallow part of the splay fault, seabed topography, and geological and structural data from core and boreholes, The 3D evolving processes and recent activities of the splay fault are clarified. Then, we discuss factors to control the fault activity in shallow depth and seabed intimately linked with co-seismic tsunami generation in this margin.
ENE striking eastern portion of the splay fault to the east of inline 2520 keeps its activity since the birth at about 1.95 Ma. Early phase of activity started as an in-sequence-thrust near the trench and evolved to out-of-sequence thrust, in another term to the splay fault. Fast syn-sedimentary uplift of the hanging wall prism is well recorded between 1.55 and 1.24 Ma. After 1.24 Ma, the mode of activity of the splay fault is recorded not only just cutting the strata but also erosion of slope sediments due to over-steepening slump scar, deposition of mass wasting deposits overlying the fault, which are observed on the seismic profiles and seabed topography. Abundant mass wasting sediments are documented by the mixed fauna of nanno-fossils.
The activity of the splay fault is not limited only in the splay fault itself but affects much broader and scattered deformation, especially the deformation of the lower slope basin. ENE striking elongated dome like anticline is developed in the accretionary prism together with doming of slope sediments situated in the footwall of the splay fault. Low angle detachment fault located around the crest of the anticline controls the arrangement of slump scar and abundant development of mass wasting in the slope basin. NW and WNW trending normal faults cut the crest of the

anticline and up-flexed slope basin sediments. These features document that the folding is active and is related to the splay fault activity. Co-seismic slip along the splay fault may induce collapse of the slopes due to shaking seabed and enhance gravitational instability of wide area around the splay fault.

Keywords: subduction, tsunami, earthquake, Nankai trough, NantroSEIZE, IODP