Oral | Symbol S (Solid Earth Sciences) | S-SS Seismology

[S-SS30_28AM2]New perspective of great earthquakes along subduction zones

Convener:*Kyuichi Kanagawa(Graduate School of Science, Chiba University), Takashi Furumura(Center for Integrated Disaster Information Research (CIDIR) Interfaculty Initiative in Information Studies, The University of Tokyo), Shuichi Kodaira(Institute for Research on Earth Evolution Japan Agency for Marine-Earth Science and Technology), Masanobu Shishikura(Active Fault and Earthquake Research Center, GSJ/AIST), Chair:Saneatsu Saito(Japan Agency for Marine-Earth Science and Technology)

Mon. Apr 28, 2014 11:00 AM - 12:42 PM Main Hall (1F)

We explore a new perspective of great earthquakes along subduction zones by integrating results of historical earthquake and tsunami surveys, seismic and geodetic observations and experiments, laboratory experiments, material analyses, and numerical modeling on pre- and co-seismic processes and slips, seismic links, and the recurrence. We welcome presentations not only on great earthquakes along Japan Trench, Nankai Trough, and other subduction zones in the world, but also on their precursory or inducing large inland earthquakes.

11:00 AM - 11:15 AM

[SSS30-P23_PG]Effects of shear displacement and fault zone structure on the frictional be havior of montmorillonite-quartz gouge

3-min talk in an oral session

*Tomoaki KAWAI[1], Akito TSUTSUMI[1] (1.Graduate School of Science,Kyoto University)

Keywords:montmorillonite, frictional experiment, fault zone structure

Recent observation of the low frequency earthquakes in the shallow part of the Nankai subduction zone has demonstrated that faulting there is slow yet seismic; suggesting that frictional velocity dependence along the fault would be negative. However, in a widely accepted model, sediments there is expected to exhibit velocity-strengthening frictional behavior. We have reported that the fault material along the megasplay fault in the Nankai Trough exhibited both velocity-strengthening and velocity-weakening frictional behavior [Tsutsumi et al., 2011]. Fault zone structures may be important to understand why the samples exhibited different velocity dependence. In this study, we have conducted frictional experiments on artificial gouges composed of montmorillonite and quartz mixtures, in order to understand the relationship between the fault zone structures and velocity dependent frictional behavior. We examined frictional behavior and fault zone structure of the artificial gouge samples composed of montmorillonite/quartz mixtures. All of the experiments were conducted under water-saturated conditions at 1 to 5MPa of normal stress, with shear displacement of 30 mm to 14 m, using a rotary-shear friction testing machine. Velocity step tests were conducted in a range of velocities from 0.003mm/s to 30 mm/s, in order to examine velocity dependent frictional behavior. Results of these experiments reveal influences of normal stress and displacements on frictional behavior. Velocity weakening behavior was observed for the mixtures of montmorillonite/quartz = 20/80 and 40/60 wt%, respectively, at large displacement. In velocity-weakening samples, montmorillonite becomes to be finer-grained and is well mixed with quartz in the gouge layer after long shear displacements and at high normal stresses. These observation demonstrates that frictional behavior of the montmorillonite/quartz gouge changes with the development of the deformation structures. It is suggested that fault zone

structure is one of the important factors of describing the frictional behavior along faults at the Nankai Trough.