[EE] Evening Poster | S (Solid Earth Sciences) | S-SS Seismology

[S-SS04]Nankai Trough Seismogenic Zone Experiment toward the final challenge

convener:Kyuichi Kanagawa(Graduate School of Science, Chiba University), Gregory F Moore (University of Hawaii at Manoa), Masataka Kinoshita(東京大学地震研究所, 共同), Keir Becker(University of Miami)

Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

The Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) is a multidisciplinary investigation of fault mechanics and seismogenesis along the megathrust at the Nankai Trough subduction zone, and includes reflection and refraction seismic imaging, direct sampling by drilling, in situ measurements, and long-term monitoring in conjunction with laboratory and numerical modeling studies. During the past 11 IODP expeditions off Kii Peninsula since 2007, 15 sites have been drilled by D/V "Chikyu" down to depths from 100s of meters to more than 3000 meters below seafloor, where the inner and outer wedge of the Nankai margin has been sampled extensively, and two state-of-the-art real-time downhole observatories are now in operation. NanTroSEIZE is now at the final stage with only two more expeditions planned for another downhole observatory installation at the toe site in early 2018, and for resuming riser drilling toward the megathrust at ~5200 meters below seafloor starting from late 2018.

In this session jointly held with AOGS, we expect presentations on scientific outcomes from the NanTroSEIZE project and discussions toward the final challenge. We welcome presentations on, but are not limited to, seismic imaging, borehole logging and monitoring, chemical analyses of pore water and mud gas, lithology, structures, physical properties and laboratory experiments of cuttings and core samples, and theoretical and numerical modeling.

[SSS04-P06]Frictional properties of incoming sediments/rocks at shallow conditions of the Japan Trench subduction zone

Taiga Eguchi[1], *Kyuichi Kanagawa[1], Michiyo Sawai[1], Atsuyuki Inoue[1] (1.Graduate School of Science, Chiba University)

Keywords:frictional properties, incoming sediments/rocks, Japan Trench

In order to examine the change in frictional properties of incoming sediments/rocks at shallow conditions of the Japan Trench subduction zone, we conducted triaxial friction experiments on the following samples at effective confining pressures of 50–150 MPa and temperatures (T) of 50–150˚C, and at displacement rates (V) changed stepwise among 0.1155, 1.155 and 11.55 μm/s. We used hemipelagic and pelagic mud samples collected from the cover sediments on the Pacific plate off Sanriku, a chert sample cored from the footwall of the plate boundary thrust near the Japan Trench, and a basalt sample cored from the oceanic basement of the Philippine Sea plate off Kii Peninsula. We then fitted the friction data for each step change in V by the rate- and state-dependent friction constitutive law, and obtained the optimized ($a-b$) value, i.e., an indicator of frictional stability, at each V.

The results show that steady-state friction coefficient μ_{ss} decreases with increasing content of clay minerals (wt%) from 0.58–0.61 of the chert sample (0 wt%), through 0.52–0.53 of the basalt sample (≈21 wt%) and 0.33–0.36 of the hemipelagic mud sample (≈55 wt%), to 0.21–0.32 of the pelagic mud sample (≈89 wt%). μ_{ss} of a given sample tends to increase with increasing T, the amount of which is greater for the mud samples than that for the chert and basalt samples. Because the mud samples contain significant amounts of smectite (μ_{ss} ≈0.2), which is transformed into illite (μ_{ss} ≈0.5) at temperatures of 50–150˚C, more amount of μ_{ss} increase is expected with increasing T for these samples than that for the chert and basalt samples. For the chert and basalt samples with a small or no amount of smectite, the μ_{ss} increase with increasing *T* is possibly due to increasing gouge lithification, which is promoted by thermally activated dissolution–precipitation creep.

Our results also show that ($a-b$) value tends to increase with increasing content of clay minerals, while ($a-b$) value of a given sample tends to decrease with increasing *T*. The former is attributable to the stabilizing effect of clay minerals, while the latter is likely due to the effects of dissolution–precipitation creep, because its activity increases gouge lithification with increasing *T* or decreasing *V*, resulting in higher μ_{ss}. The transition *T* from $a-b>0$ to $a-b<0$ also increases with increasing content of clay minerals; 50°C $<T<$100°C in the chert sample, $T\approx$100°C in the basalt sample, 100°C $<T<$150°C in the hemipelagic mud sample, 150°C $<T$ in the hemipelagic mud sample. This implies that the transition from stable aseismic faulting to unstable, possible seismic faulting occurs with increasing *T* at the Japan Trench subduction zone, but the transition *T* is different among incoming sediments/rocks.