[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-P04]Compiling physical property data obtained through NanTroSEIZE project

*Suguru Yabe[1], Rina Fukuchi[1], Baiyuan Gao[2], Ginta Motohashi[3], Mari Hamahashi[4], Yoshitaka Hashimoto[5], Gaku Kimura[6] (1.Japan Agency for Marine-Earth Science and Technology, 2.The University of Texas at Austin, 3.Univ. of Tsukuba, 4.Earth Observatory of Singapore, 5.Kochi Univ., 6.Tokyo University of Marine Science and Technology)
Keywords:Nankai trough, Subduction zone, Physical Property

On January to February 2018, “Core-Log-Seismic Integration @ Sea” workshop took place on-board R/V Chikyu along with IODP Exp. 380. During the workshop, participants had access to seismic, logging, and core obtained through the NanTroSEIZE project. We have compiled physical property data from all sites as well as X-ray Computed Tomography scan (XCT) data from sites C0006, C0007, C0011, and C0012. We focus on investigating the porosity, density, and Vp relationships along the sites in NanTroSEIZE, from the incoming section to the inner wedge.

1. XCT data

XCT data of drilled cores was obtained immediately after the core acquisition. XCT image has been utilized to know the internal structures including beddings and fractures without any destruction. In addition to the image, CT value itself contains significant information that reflects the chemical composition and density of the material. However; only a few studies have utilized this valuable information so far in NanTroSEIZE project (e.g., Conin et al., 2014). We compiled the bulk density measurements for discrete samples with CT values in sites C0006, C0007, C0011, and C0012. Then we

convert CT values to bulk density with the sample measurements as Conin et al. (2014) did for the landward sites. The bulk density and porosity relationship shows a good linear relationship in the input sites (C0011 and C0012). The trend line of CT-number vs. density is slightly (~0.1 g/cm^3) deviated from the relation estimated by Conin et al. (2014). Data from C0006 and C0007 actually slightly deviates from the relation of input sites. Although lithology and differences of chemical compositions are examined, the reason of this has not been clarified. Because CT image is three dimensional, we can reconstruct detailed (millimeters scale) three-dimensional bulk density distributions of the core. With proper color scale, this technique is very powerful to identify faults and drilling-induced fractures.

2. Porosity – P-wave velocity (Vp) relationship

Physical properties of sediment vary through the sedimentation and accretion process. One of the indicators for the compaction and diagenesis state of sediment is the porosity – Vp relationship. Through comparison of shipboard porosity measurement with logging porosity measurement available only for C0001 and C0002 sites, shipboard measurements show good agreement with density log-derived porosity. That is, the shipboard porosity measurements can be used as the in-situ value. Hence, we compare on-board porosity measurements with sonic logging Vp measurements in C0001, C0002, C0004, C0006, and C0012 sites. As a result, we observe two different porosity – Vp relations, which is pointed out by Hashimoto et al. (2010) in C0001 site, and are observed to correspond to input / slope sediments and the accreted prism, which may be attributed to the difference in the stress state and/or the diagenesis state. Although a similar plot was presented by Raimbourg et al (2011), they interpreted data as one big trend due to the scattering of data. Interesting point of our data is that Kumano basin sediment in C0002 shows transition of porosity-Vp relationship at around 150 m depth. The deposition age of sediment at this depth is about 1 Ma, which corresponds to the period when the activity of mega-splay faults ceased and when stress state of Kumano basin changed to extensional regime. Porosity-Vp relationship obtained from the accreted prism will be compared with the relationship from the onshore exhumed accreted prism.