[EE] Evening Poster | S (Solid Earth Sciences) | S-IT Science of the Earth's Interior & Tectonophysics

[S-IT26]Stress geomechanics integrations: Observations, Modelings and Implications (OMI)

convener:HungYu Wu(Japan Agency for Marine-Earth Science and Technology), Weiren Lin(Graduate School of Engineering, Kyoto University), Yoshinori Sanada(（国研）海洋研究開発機構, 共同), Chung-Han Chan(Earth Observatory of Singapore, Nanyang Technological University)
Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Stress geomechanics specifies how rocks respond to strain, fluid and heat that provide essential information on understanding seismic behaviors. Thus, some outreach researches address the stress state in the geological structures or along plate boundaries through geophysical, geodetic, geothermal and/or hydrological approaches, especially after recently great earthquakes. Such studies have raised the importance on the stress analysis, including stress evolution by seismic and volcanic activity, in-situ stress measurements, crust heterogeneity, and geodetic modeling for earthquake cycle. This session is to bring the multi-disciplinary studies together on stress geomechanics, including but not limited, to inland/ocean drilling, borehole measurement, focal mechanism of crustal and volcanic earthquakes, subsurface anisotropy analysis and geomechanical model applications. We focus our discussion not only on the observation in association with physical models, but also interdisciplinary cooperation in each research field.

[SIT26-P04]Applications of DCDA method for in-situ crustal stress measurement using recovered core samples

*Kentaro Omura[1], Weiren Lin[2], Takatoshi Ito[3], Akio Funato[4] (1.National Research Institute for Earth Science and Disaster Resilience, 2.Graduate School of Engineering, Kyoto University, 3.Institute of Fluid Science, Tohoku University, 4.Fukada Geological Institute)
Keywords:DCDA method, in-sitsu crustal stress, rock core

In-situ crustal stress is an important factor to understand earthquake mechanism. However, the reliable stress data are not yet enough in the global area in Japan. We investigate to apply the DCDA (Diametrical Core Deformation Analysis) method for in-situ crustal stress measurement using recovered rock core samples. DCDA method measures the circumferential diameter variation and elastic constants of recovered core sample without complicate procedures in the borehole. We expect the method can be applied to old-time recovered rock cores from boreholes, and we may collect global in-situ crustal stress data around global area in Japan.
We used recovered hard rock cores of active fault drillings by NIED (more than 10 years ago) from the depth about 200m - 2000m. The circumferential core diameter variation was measured by an especially designed apparatus at Kyoto Univ. that consists of an optical micrometer, a pair of motor-driven rollers and a data processing system (Funato and Ito, 2017, IJRMMS). We estimated stress magnitude from a theoretical elastic relationship between the in-situ stresses and the core diameters (Funato and Ito, 2017, IJRMMS). The elastic constants (Young's modulus and Poisson's ratio) included in the theoretical relationship were already measured by standard laboratory rock tests just after the drilling. The estimated stress magnitudes were consistent to those estimated by another independent methods, such as, hydraulic fracturing and borehole breakout method conducted in the same borehole at the depth next to the recovered cores. This confirmed consistency between DCDA method and another method suggests that the stress magnitudes can be estimated reliably at many core drilling sites where the in-situ stress measurements were not yet performed.