THE GEODYNAMICS SEMINAR Nº 539

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Venue: Zoom

A link will be sent @grc-all within 30 minutes before the beginning of the seminar.

A challenge to observe the process of faulting in rocks at high pressures

The subduction zone produces a major fraction of the Earth's seismic activity. The mechanisms of intermediate (> 40 km depth) and deep-focus (> 300 km) earthquakes are fundamentally different from those of shallow (≤ 40 km) earthquakes. This is because the frictional strength of silicate rocks is proportional to the confining pressure and it exceeds the upper limit of the stress level in the upper mantle. To understand the process triggering intraslab earthquakes, many experimental studies on faulting of slab-forming rocks have been conducted at upper mantle pressures using a D-DIA apparatus or a Griggs rig. Shear localization induced by heterogeneous grain size reduction is essential for the occurrence of faulting at high pressures. Although AE monitoring technique enabled us to discuss the process of microcracking, mechanical behavior at the onset of faulting is still unclear due to low time-resolution of stress/strain measurements. The cause of bottleneck in stress/strain measurements is a long exposure time required for the acquisition of a two-dimensional X-ray diffraction pattern of minerals at high pressures. Considering that the timescale of stress drop associating faulting is sometimes as short as ~0.01 sec, we never know whether stress drop occurs prior to the faulting at high pressures without the improvement on stress/strain measurements using synchrotron X-ray. To understand the mechanical behavior of rocks at the onset of faulting at high pressures, I have installed a series of new devices at BL04B1, SPring-8. In this talk, I will report recent progress on in-situ measurements for faulting in rocks at high pressures.

Keywords: 1. Intermediate Earthquakes
2. Faulting
3. in-situ Measurements

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