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

[S-SS32_1AM1]Fault Rheology and Earthquake Dynamics

Convener:*Kiyokazu Oohashi(Graduate School of Science, Chiba University), Takeshi Iinuma(International Research Institute of Disaster Science, Tohoku University), Wataru Tanikawa(Japan Agency for Marine-Earth Science and Technology, Kochi Instutute for Core Sample Research), Yuta Mitsui(Department of Geosciences, Graduate School of Science, Shizuoka University), Chair:Kiyokazu Oohashi(Graduate School of Science, Chiba University), Yuta Mitsui(Department of Geosciences, Graduate School of Science, Shizuoka University)

Thu. May 1, 2014 9:00 AM - 10:45 AM 315 (3F)

Interdisciplinary discussions on the rheology of seismogenic faults and earthquake generation processes among the following specialists; (1) fault rocks and fault zones, (2) theoretical and numerical studies on earthquake dynamics, and (3) seismology and geodesy. Presentations on fault-zone drilling projects are also welcome.

10:30 AM - 10:45 AM

[SSS32-P07_PG]Observation of 2-D rupture propagation for stick-slip events during large-scale biaxial frictional experiments

3-min talk in an oral session

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Keywords:stick-slip event, rupture propagation, large-scale biaxial frictional experiment

Pre-slip was expected to occur prior to large earthquakes, since a pre-slip model was proposed by Ohnaka and Kuwahara (1990) based on their rock frictional experiments. The pre-slip accelerates toward an unstable sliding event. However, such phenomena have never been clearly observed for natural earthquakes. Ohnaka and Kuwahara (1990) observed a 1-D strain distribution along a sample surface, and estimated the apparent rupture propagation speed. In addition, the fault was narrow, and the rupture growth might be affected by free surfaces at the edge of the sample, though the free surface effect is not so common for natural earthquakes. Therefore, we closely observed two-dimensional rupture propagation on a wider fault during rock frictional experiments. We carried out meter-scale rock frictional experiments (Fukuyama *et al.*, 2013), and investigated rupture propagation of stick-slip events and some of their characteristics, using AE (acoustic emission) and strain records. The fault consisted of an interface of two Indian gabbro blocks. Their width and height were 0.5 m, and the length of upper and lower blocks were 1.5 m and 2.0 m, respectively. The arrays of strain gauges and AE sensors were installed within the lower block in order to understand two-dimensional rupture propagation. Twenty four sets of AE sensors and biaxial strain gauges were attached 60 mm below the sliding surface at intervals of 150 mm parallel to the slip direction and at intervals of 75 mm perpendicular to the slip direction. We analyzed time series of strain and AE data, and found stick-slip events accompanied with slow and accelerating strain decrease that propagated at a speed much slower than elastic wave speed.
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