Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

PPS21-04 Room:416 Time:April 29 09:45-10:00

The effect of melt on frictional behavior and the implication for deep moonquake

AZUMA, Shintaro[1*] ; KATAYAMA, Ikuo[1]

[1]Department of Earth and Planetary Systems Science, Hiroshima University

Apollo program (Passive Seismic Experiment) investigated a number of seismic events in moon (e.g., Nakamura 2003). These seismic events (moonquakes) are classified to four categories; thermal moonquake, shallow moonquake, impact moonquake and deep moonquake (Latham et al., 1969). In kinds of moonquake, deep moonquake is especially interesting because the occurrence depth of deep moonquake (700?1200 km) is obviously in plastic deformation region where frictional behavior and fracture does not occur. Analysis of PSE (Passive Seismic Experiment) data and modelling in previous studies suggest that the partial melt layer underlies near the occurrence depth of deep moonquake (Weber et al., 2011). Therefore partial melt possibly is one of important factor on the deep moonquake. Here we show the results of frictional experiments using a borneol?diphenylamine which can be adjusted in melt fraction and dihedral angle (Takei 2000). When dihedral angle is 30o, frictional coefficient becomes small with decrease of melt fraction. Although frictional coefficient is significantly decreased when dihedral angle is 0o, frictional coefficient does not depend on melt fraction. When dihedral angle of partial melt is 0o, frictional behavior is fully dominated by partial melt. Partial melt is considered to have the three effects on the shear strength. First, our frictional experiments found that partial melt decrease frictional coefficient. Second, partial melt behave as the pore pressure. Third, partial melt extracts the water from the surrounded rocks, and induces the shear localization (the stress concentration). Considering these effects of partial melt on frictional behavior, partial melt might be one of important factors on deep moonquake.

Keywords: melt, deep moonquake, moon, frictional behevior