[EE] Evening Poster | S (Solid Earth Sciences) | S-CG Complex & General

# [S-CG53]Science of slow earthquakes: Toward unified understandings of whole earthquake process

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Accumulating observational studies on various types of slow deformation events, such as tectonic tremors, very low frequency events, and slow slip events, portrays some universal characteristics in generally complex behavior, including interaction among events and influence by various outer loadings. Some of these phenomena seem to have causal relation with the occurrence of very large earthquakes. A unified understanding of these slow and fast earthquake processes requires an approach integrating geophysics, seismology, geodesy, geology, and non-equilibrium statistical physics. We welcome presentations based on, but not limited to, geophysical observation, data analysis, analytical theory, numerical simulation, field study, and laboratory experiments.

## [SCG53-P18]**Estimation of pore fluid overpressures for tensile cracking at depth of shallow slow earthquakes**

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Pore fluid pressure $P_f$ is important for understanding slow earthquake mechanics. In this study, we estimated the pore fluid pressure during the formation of foliation-parallel quartz veins filling mode I cracks in the Makimine mélanges, eastern Kyushu, SW Japan. In the coastal region of the Makimine mélanges (Late Cretaceous Shimanto accretionary complex of SW Japan; temperature = 300–350°C, Palazzin et al., 2016), the mélange preserves quartz-filled shear, foliation-parallel veins and tension vein arrays. We applied the stress tensor inversion approach proposed by Sato et al. (2013) to estimate stress regimes by using foliation-parallel vein orientations. The estimated stress is a reverse faulting stress regime with a sub-horizontal σ$_1$-axis trending NW–SE and a sub-vertical σ$_3$-axis, and the driving pore fluid pressure ratio $P^*$ ($P^*$ = ($P_f$ – σ$_3$) / (σ$_1$ – σ$_3$)) is ~0.1. When the pore fluid pressure exceeds σ$_3$, veins filling mode I cracks are constructed (Jolly and Sanderson, 1997). The pore fluid pressure that exceeds σ$_3$ is the pore fluid overpressure Δ$P_f$ (Δ$P_f$ = $P_f$ – σ$_3$). To estimate the pore fluid overpressure, we used the poro-elastic model for extension quartz vein formation (Gudmundsson, 1999). $P_f$ in the case of the Makimine mélanges are ~280 MPa (assuming depth = 10 km, density = 2750 kg/m$^3$, tensile strength = 5 MPa and Young’s modulus = 7.5–15 GPa). The normalized pore pressure ratio *λ** ( *λ** = ($P_f$ – $P_h$) / ($P_l$ – $P_h$), $P_l$: lithostatic pressure; $P_h$: hydrostatic pressure) is ~1.03 ($P_f$ >$P_l$ ).