

## Can crack-seal veins record recurrence intervals of slow earthquakes?

\*Naoki Nishiyama<sup>1</sup>, Kohtaro Ujiie<sup>1</sup>, Masayuki Kano<sup>2</sup>

1. University of Tsukuba, 2. Tohoku University

The repeated slow earthquakes down-dip of the seismogenic zone may trigger megathrust earthquakes by transferring stress to the locked seismogenic zone. Recent geodetic study in the Nankai subduction zone suggested that recurrence interval of slow slip event has decreased from >5 years to ~1 year toward next megathrust earthquake. Repeated brittle thrusting near the downdip limit of the seismogenic zone was recorded in quartz-filled, crack-seal shear veins in the Makimine mélange of the Late Cretaceous Shimanto accretionary complex, southwest Japan. The crack-seal texture in the veins is defined by phyllosilicate inclusion bands subparallel or oblique to the vein margins. The geometry of inclusion bands in the veins indicates temporal order of crack-seal events. The measurement of the thickness of inclusion bands in shear veins show that there are three patterns of temporal change in inclusion band thickness: monotonous decrease or increase in band thickness or decrease and then increase in band thickness. We estimated the minimum time interval between crack-seal events by using a kinetic model of quartz precipitation. We assume fluid pressure drop from lithostatic to hydrostatic values at each crack-seal event, which is supported by large variations in fluid/vapor ratio of two-phase fluid inclusions between inclusion bands. The results show that the minimum time interval between crack-seal events decreased from 3–8 years to 0.2–0.5 years during 50–100 years, which is comparable to the temporal change in recurrence interval of slow slip toward next megathrust earthquake. If repeated brittle thrusting coincided with slow slip events (i.e., episodic tremor and slow slip), the crack-seal veins may be geological indicators for identifying past temporal change in slow slip recurrence interval. The progressive increase in recurrence interval of crack-seal events may reflect an increase in recurrence interval of slow slip after megathrust earthquake, while decreased and increased band thickness may represent the change in recurrence time of slow slip events before and after megathrust earthquake.

Keywords: crack-seal vein, recurrence interval