Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SCG57-P34 Room:Convention Hall Time:May 27 18:15-19:30

Interseismic plastic deformations at ancient crustal seismogenic zones in the Hidaka metamorphic belt and Napier Complex

TOYOSHIMA, Tsuyoshi[1*]

[1]Niigata University

Pressure solution-precipitation structures are characteristically abundant in pseudotachylyte-producing fault zones in the Hidaka metamorphic belt, Hokkaido, northern Japan (Toyoshima et al., 2004; Wada et al., 2005). The zones occurred at the lowermost part of upper continental Hidaka crust. Pseudotachylytes formed under granulite-facies conditions (lower continental crustal conditions) occur at Tonagh Island in the Napier Complex, Eastern Antarctica (Toyoshima et al., .1999). Seismic faulting (pseudotachylytes-producing faulting) and plastic deformation (formation of ultramylonite) alternated under lower continental crustal conditions in Tonagh Island (Toyoshima et al., 1999). I illustrate interseismic deformations related to the Hidaka and Tonagh pseudotachylytes as examples of ancient seismogenic zones in upper and lower crust, respectively.

Modes of occurrence of the Hidaka pseudotachylytes indicate that seimic slip with pseudotachylyte generation and slow plastic deformation (pressure solution with precipitation) occurred alternatively and repeatedly in the same fault zones and fault surfaces (Wada and Toyoshima, 2006, 2007). Pressure solution-precipitation is likely one of the principal deformation mechanisms for interseismic plastic deformation and time-dependent strength recovery of fault zones (Wada and Toyoshima, 2006, 2007). The pressure solution-precipitation processes lead to increase in number of grain-to-grain contact and in real contact areas of the fault surfaces, resulting in healing of the fault zones (Wada and Toyoshima, 2007). Very thin and sharp shear zones filled with very fine-grained materials cut the pressure solution-precipitation structures and are cut by pseudotachylytes-producing faults. The shear zones are deformation structures formed immediately before seismic faulting in the upper Hidaka crust.

Granulite-facies ultramylonites are characteristically abundant in and along the Tonagh pseudotachylyte-producing fault zones. There are two different types of the granulite-facies ultramylonites in microstructures of recrystallized plagioclase grains: type 1 and 2. Type 1 ultramylonites have polygonal medium grains of plagioclase with smooth grain boundaries and very weakly undulose extinction. Type 2 ultramylonites include very fine grains and elongated fine grains of plagioclase with strongly undulose extinction and irregular grain boundaries. Type 2 ultramylonites occur along granulite-facies pseudotachylytes-generating fault surfaces and have been cut by fault veins of pseudotachylyte. Some of the granulite-facies pseudotachylytes became type 1 and 2 ultramylonites, which have also been cut by other granulite-facies pseudotachylytes. These may also be conspicuous difference between dynamic recrystallization mechanisms of plagioclase immediately before and after seismic faulting.

Keywords: pseudotachylyte, pressure solution, ultramylonite, plastic deformation, interseismic deformation, time-dependent strength recovery