[EJ] Evening Poster | S (Solid Earth Sciences) | S-MP Mineralogy & Petrology

[S-MP37]Deformed rocks, Metamorphic rocks and Tectonics

convener:Yoshihiro Nakamura(Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology), Yumiko Harigane(Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology (AIST))
Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
We invite all researchers who aim to understand the dynamics of the earth's crust and mantle at the plate boundaries, to discuss the latest results from various viewpoints. The scope will include contributions through petrology and structural geology as well as various techniques including rheology and transformation of heat and mass.

[SMP37-P12]Geology of the Kamabuseyama serpentinite unit in the Sanbagawa belt of the Kanto Mountains and implications for fluid flow along the base of the mantle wedge from 30–20 km depths

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Geological studies show the Kamabuseyama area of the Sanbagawa belt in the Kanto Mountains consists of two subhorizontal units of serpentinite approximately 100 m thick. Both serpentinite units are underlain by pelitic schist interlayered with lesser amounts of quartz, mafic and calcareous schists. Petrological studies show the regional metamorphic grade corresponds to the chlorite zone and Raman carbonaceous material thermometry shows the temperature is 343–357°C. A comparison with other studies of the Sanbagawa belt gives a pressure estimate of around 0.6 GPa equivalent to a depth of approximately 20 km. The main regional foliation is subhorizonal although open upright folds with fold axes oriented approximately E–W are common. Mineral and stretching lineations are also oriented approximately E–W. These are somewhat oblique to the WNW–ESE orientations for these linear features documented by earlier studies (e.g. Abe et al., 2001; Hashimoto et al., 1992). Microstructural studies show that the main regional foliation formed after the peak of metamorphism and can be correlated with the Ss phase reported in other parts of the Sanbagawa belt (e.g. Wallis et al., 1992). The schist units sandwiched between the two serpentinite layers preserve pre-peak metamorphism deformation suggesting the sandwich structure was formed by thrusting before the onset of exhumation.

The Kamabuseyama serpentinite consists almost entirely of antigorite (Atg). The main exceptions are domains of brecciated antigorite serpentinite with voids filled by secondary carbonate and in other places by chrysotile. Chrysotile serpentinite is more common close to the boundary domains with the pelite. The boundary zones are also commonly associated with a narrow zone (~1 m) of metasomatic rocks with actinolite, talc and other minerals. The lack of any associated gabbro and the lack of any evidence for the presence of early low-T serpentine minerals (lizardite and chrysotile) supports the general interpretation of serpentinite blocks in the Sanbagawa belt as derived from the mantle wedge (Aoya et al., 2013). Hydration of olivine-rich mantle wedge material results in the formation of antigorite + brucite—a clear example is given in the Shiragayama area of central Shikoku (Kawahara et al., 2016). Therefore, to form the observed Atg rock requires a supply of extra SiO_2. The

SiO_2 may be sourced from orthopyroxene in peridotite before serpentinization or an external SiO_2-rich fluid. Point-counting of bastite pseudomorphs after opx suggests an original orthopyroxene content of 5–10 vol% far less than the ~40 vol% required for the formation of Atg-serpentinite. In addition, a compilation of published studies shows that harzburgite peridotite containing such a high proportion of orthopyroxene is extremely rare. We conclude, infiltration of an SiO_2-rich fluid is necessary to form the Atg-serpentinite, and the SiO_2-rich fluid was supplied to the entire Kamabuseyama body by pervasive veining. Veins of Atg that cut the boundary probably represent original fluid pathways for the SiO_2-rich fluid. A comparison with the Shiragayama body suggests fluid flow along the base of the mantle wedge changes from restricted to a 100 m thick shear zone channel at 30 km to a dispersed and pervasive network of veins at depths of ~20 km.

References: Abe, T. et al. (2001) *Jour. Geol. Soc. Japan*, **107**, 337–353; Aoya, M. et al. (2013) *Geology*, **41**, 451–454; Hashimoto, M. et al. (1992) *Jour. Geol. Soc. Japan*, **98**, 953–965; Kawahara, H. et al. (2016) *Lithos*, **254–255**, 53–66; Wallis, S. R. et al. (1992) *Island Arc*, **1**, 176–185.