Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SMP43-P14 Room:Convention Hall Time:May 24 16:15-17:30

Reaction and structural development of antigorite serpentinite in the Higashi-akaishi ultramafic body, Sambagawa belt

Hironori Yokoyama[1], Tomoyuki Mizukami[2*]

[1]Depart. Earth and Environ. Studies, Grad. Sch. of Natural Sci., Kanazawa Univ., [2]Earth Science Course, School of Natural System, College of Science and Engineering, Kanazawa Univers

Serpentinization of mantle wedge is a key process controlling fluid flux across subduction boundaries. In order to model progressive serpentinization and its effect on subduction system, it is important to understand mechanism of the fluid-rock reactions in open system. For direct information on the kinetic reactions, we made field observations on antigorite (Atg) serpentinite in the Higashi-akaishi ultramafic body in the Sambagawa belt.

Schistosed Atg serpentinite develops at the lower half of the body. Modal proportions of Atg to olivine (Ol) show a bimodal distribution representing an interlayering between Ol-rich (5-20% Atg) and Atg-rich (30-60% Atg) layers. Such layering can be seen in scales of several mm to 20 meters. Each layer is generally distinctive but local gradual decrease of Atg proportion in a single unit indicates the direction of fluid transport from bottom to top. Veins and network structures of Atg connect these strongly foliated parallel layers with the hydrous mineral.

Brucite (Brc) and magnetite (Mag) are found in highly serpentinized layers. However, there is no concentration of Brc and Mag in the outcrops and strain shadows are filled by Atg or carbonate indicating extraction of Mg and Fe is minor during serpentinization. Mineral chemistry of Atg and Ol suggests re-distribution of Ni and Fe during serpentinization. These observations indicate that Atg formation is owing to an additional SiO2 dissolved in aqueous fluids. Minor Brc and a small amount of Mag can be explained by a reaction involving SiO2.

These observations indicate that discontinuous layers with high concentrations of Atg represent fluid pass ways supplying SiO2 and H2O required for serpentinization of peridotite. Syn-deformational serpentinization causes strong schistosity defined by parallel alignment of platy Atg. Such foliated layers probably enhanced channelized fluid flow and, as a result, formation of Atg. This positive feedback is considered as a major mechanism to increase the amount of Atg in the Ol-rich Higashi-akaishi body. It is also indicated that contributions of interconnecting channels were important for advancing of serpentinization front into the mantle wedge.

Keywords: serpentinization, structural development, reaction