

Interactive comment on “Possibility of titanium transportation within a mantle wedge: formation process of titanoclinohumite in Fujiwara dunite in Sanbagawa belt, Japan” by S. Ishimaru and S. Arai

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Received and published: 15 May 2012

We greatly appreciate these comments, which are very helpful to carefully reconsider our results. We revised manuscript as you suggested and followings are the replies to specific comments.

We cannot determine the methane source but they possibly came from surrounding Sanbagawa metamorphic rocks.

Basic formation process of titanoclinohumite is the same between the Fujiwara dunite and other localities (dehydration process), but the source of Ti is different. From petrographical (Fig. 2) and geochemical data (Fig. 5), the source of Ti for Fujiwara titanocli-
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nohumite is possibly Ti-rich spinel, but titanoclinohumite is not always associated with spinel. This implies the Ti mobility over at least few centimeters (or more).

Fluorine was not detectable in our qualitative analysis even though F content occasionally shows positive correlations with the TiO₂ content in titanoclinohumite in the literature (e.g. Gaspar, 1992). Anyway this does mean that F is absent in our titanoclinohumite.

We referred to relatively high-Ti mobility at high-T and high-P metamorphic conditions in the revised manuscript.

Based on geochemical and petrological features, we judged the Fujiwara dunite was a cumulate from intraplate high-Ti magma within the oceanic lithosphere (NOT within the mantle wedge). We explained the detailed story (see below) in the revised manuscript. At first the Fujiwara dunite was serpentinized at the ocean floor, and followed by deserpentination process during prograde metamorphism (=Sanbagawa metamorphism) along subducting slab. Second serpentinization occurred during an exhumation process of the Sanbagawa metamorphic belt including the Fujiwara complex (cf. Fig. 9).

Interactive comment on Solid Earth Discuss., 4, 203, 2012.