P-T path recorded in lawsonite-blueschists from the Kurosegawa Belt at Itsuki, central Kyushu, Japan.

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Serpentinite melange of Kurosegawa Belt in middle Kyushu occurs in several zones. The one called Kosaki tectonic belt (Karakida et al, 1977) is distributed in Itsuki area. This zone contains lawsonite-blueschist as a tectonic block. Detailed petrology and analysis of metamorphic condition of this rock has not been well presented. Our study identified the following three stages for the formation of this rock.

1.chlorite+pumellyite+quartz+albite
2.lawsonite+ferroglacouphane+quartz+albite
3.ferrorichterite+riebekite+epidote+albite+quartz

Lawsonite-blueschist

The lawsonite-blueschist is exposed in 20 m along a stream. One shear zone within blueschist is observed in this outcrop. The blueschist is composed of fine-grained and fibered crystals, forming schistosity. Quartz, calcite and albite cut this schsitsity as veins. This rock can be classified three types, 1Blue part, 2Green part, 3Green part in shear zone, based on mineral assemblage. Blue part1 and Green part2 contain ferroglaucophane, lawsonite, pumpellyite, muscovite, chlorite, titanite, albite, quartz, clinopyroxene. Albite and quartz is rarely observed. Blue part1 is rich in ferroglaucophane and green part2 is rich in chlorite, although the assemblage is the same. Lawsonite has quartz and albite inclusions. Pumpellyite and ferroglaucophane are euhedral. These textures may suggest the follwing reaction:

Lawsonite + Ferroglaucophane =Pumpellyite + Albite + Chlorite + Quartz + H2O :R1

Green part in shear zone3 contain ferrorichterite, lawsonite, epidote, albite, quartz, magnesioriebekite and titanite. Pumpellyite is not observed. The quantity of quartz and albite is larger than that of 1 and 2. Ferrorichterite is in contacts with magnesioriebekite and cuts epidote. Epidote has ferrorichterite, lawsonite, albite and quartz inclusions. These texture suggest that ferrorichterite, epidote, albite, quartz, magnesioriebekite, (lawsonite) coexisted.

PT estimation

Pressure-Temperature pseudosection are used here to establish the stability relationship of mineral assemblage2. The pseudosection modeling was done with THERMOCALC 3.23 (Powell et al, 1998) and the internally consistent thermodynamic dataset 5.5 in the system NCMASH. The datafile coding of the activity-composition relationship of the minerals used in calculations involves chlorite by Holland (1998), and amphibole by Dale et al.(2005). Epidote was assumed to be clinozoisite.

As a result of calculation, the absence of jadeite and the presence of albite means jd+q=ab serves as an upper pressure limit. The upper temperature limit is provided by the coexistence of lawsonite and albite, instead of clinozoisite, paragonite and quartz. The lower pressure limit is provided by reaction R1. This reaction also limit the lower temperature by 290 degrees Celsius. These indicate the metamorphic condition of 2 is range in 290-420 degrees Celsius, 5.5-11kbar.

On the pseudosection, epidote is stable in temperature's higher 2. This indicates higher temperature condition of 3 than that of 2.This result suggests that blueschist has a retrograde path from lawsonite-blueschist to epidote-blueschist facies.