# The extent and variety of exotic rocks identified from the Kebara Formation, NW Kii Peninsula

*Ryoji Kato[1], Takao Hirajima[1]

1. Department of Geology and Mineralogy, Graduate School of Science, Kyoto University

The metamorphic zoning in the regional metamorphic belt can be defined as area in which a particular mineral or suite of minerals is predominant or characteristic(s) reflecting the original rock compositions, the pressure and temperature of formation, and the duration of the metamorphism (e.g., Jackson, 1997). If we found rocks with some of different nature to the metamorphic zoning, the earth scientists generally try to consider its reason and it becomes a long term controversy in some case, e.g., the origin of tectonic blocks of blueschist and/or eclogite in direct contact with greywacke or serpentinite in the Franciscan complex (e.g. Colman and Lanphere, 1971).
Metabasites with barroisite (Brs) + epidote (Ep) assemblage, which is stable under higher-*T* (>450 ºC: Kato and Hirajima, 2017), have been recognized in the SW part of the Kebara Formation (KF), the southern margin of the Sanbagawa belt, NW Kii Peninsula, of which peak metamorphic temperatures for pelitic rocks, which are main lithotype of the KF, are <340 ºC estimated by the stability conditions of diagnostic minerals (Tomiyoshi and Takasu, 2009) and by the Raman spectra of carbonaceous material (RSCM) geothermometer (Yoshida et al., 2016). This study describes the mode of occurrence and mineralogy of metamorphic rocks exposed nearby the Brs-bearing metabasites and discusses its tectonic significance.
Brs-bearing rocks are identified from a metabasite layer in N-S striking 30 m-long outcrop. The dominant schistosity in the outcrop strikes ENE-WSW and dips steeply to the south, which is consistent with that of the main schistosity in the KF. No clear fault-bounded contact is observed in the outcrop. Following three rock types are recognized in this layer; A) weakly schistose metabasite rich in relict pyroxene, B) metamorphosed mixtures of volcaniclastic materials and pelagic sediments characterized by distinct schistosity and the high modal amount of phengite accompanying with relict pyroxene, and C) basic schist whose schistosity is mainly defined by the arraignment of amphiboles, Ep and chlorite (Chl).
A/B) type rocks occupy the northern half of the out crop and most of them contain pumpellyite (Pmp) + Chl + Ep assemblage, which is the identical assemblage with the previous report (Kurimoto, 1986), suggesting the Pmp-actinolite facies metamorphism.
C) type rocks mostly occupy the southern half of the outcrop and they can be distinguished into two types based on the composition of amphibole: C1) Brs-Ep schist and C2) glaucophane (Gln)-Ep schist.
C1) type rocks are recognized from two parts; i.e., from more than 2.5 m and 70 cm thick layers. The mineral assemblage and the zoning structure of representable minerals of the 2.5 m thick layer are identical with those in 70 cm layer as reported in Kato and Hirajima (2017).
C2) type rock is recognized from 7 m thick layer exposed to the north of the 2.5 m thick Brs-Ep schist. All analyzed Gln are rich in Al content [$Y_{Fe} = Fe^{3+} / (Al + Fe^{3+}) = 0.00 – 0.30$] with constant Fe-Mg ratio [$Fe^{2+} / (Mg + Fe^{2+}) \sim 0.40$], and some grains are rimmed by actinolite. Ep is $Fe^{3+}$-rich composition ($Y_{Fe} = 0.27 – 0.34$). Al content of Gln associated with Ep increases with the metamorphic grade (e.g. Hosotani & Banno, 1986), and those of C2 type rock are equivalent to or higher than those in the garnet zone of the Sanbagawa belt in central Shikoku, suggesting the higher-*T* than 350 ºC.
These data indicate that most basic schists in the southern half of the outcrop underwent higher-*T* metamorphism than those of the KF. Such occurrence of these basic schists can be interpreted as tectonic blocks or olistostromes, because the irreversible nature of RSCM geothermometry suggests that the pelitic schist of the KF never experienced temperatures higher than ~350 ºC. Further geological and

 

geochronological studies are requested to interpret the origin of these exotic rocks, which will shed a light on the material cycling in the shallower part of the subduction zone.

Keywords: exotic rock, Kebara Formation, Sanbagawa metamorphic belt

 