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Thermobaric structure in low P/T type metamorphic belt -Case study of the Ryoke metamorphic belt in the eastern Yamaguc

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Recent seismic studies and EM monitoring imply that there is thermal heterogeneity in present subduction zone (Nakajima et al., 2009., Ogawa et al., 2001), furthermore numerical simulation predicts time variation of these heterogeneities (Iwamori, 2000). On the other hand, by petrological method, the same phenomenon is observed in ancient crust and mantle(Baker, 1987) and the Gibbs method is enabled to estimate P-T path (Okamoto and Toriumi, 2001). In this way, seismic and petrological studies are complementary, extensive data which is corresponded to seismic research should be provided by petrological studies. In this study, we provide specific data on thermally heterogeneity by using petrological method, for the Ryoke metamorphic belt in the eastern Yamaguchi Prefecture.

Using pelitic and psammitic mineral assemblages, the study area can be divided into seven zones, i.e. chlorite, chlorite-biotite, biotite, muscovite-cordierite, K-feldspar-cordierite, garnet-cordierite, sillimanite-K-feldspar zones. The K-feldspar-cordierite, garnet-cordierite and sillimanite- K-feldspar zones continue to east part where Ikeda (1998) preformed metamorphic zonation. The garnet-cordierite zone decreases its width toward west and disappears in around Hikari city. On the other hand, the sillimanite-K-feldspar zone is widely distributed in Murothsu ?Kudamatsu-Oshima area.

Pressure-temperature conditions of seven samples from the sillimanite-K-feldspar zone and three samples from the garnet-cordierite were estimated by using the garnet-biotite thermometer of Hodges and Spear (1982) and the relative geothermobarometry of Ikeda (2004). Addition of result of Ikeda (2004) enables us to reveal the thermobaric structure of this area. Temperature increases toward southeast, exceeding 800 degree in relatively-limited area around Hizumi area, and decrease further toward south below 800 degree . In contrast, pressure increases toward southeast monotonously and it reaches 5-6kbar in the south of Hizumi district-Cape Kandori. The isotherms are oblique to isobaric lines, suggesting that the crust have thermally heterogeneity at the same depth.

Applying the concept proposed by Miyazaki (2007) to the present results suggests that rate of melt migration increases and duration of melt migration decreases in the following order: Yanai-Hizumi area which is east part, Oshima-Murotsu area which is south part, and Kudamatsu area which is west part in study area. Additionally, estimated thermobaric structure enables us to impress west and south parts were formed in same depth.

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