Minor elements and isotopic compositional characters of amphibolite from Song Ma suture zone in Northern Vietnam

Tomoharu Miyamoto* (Kyushu Univ.), Yasuhiro Osanai (Kyushu Univ.), Nguyen Thi Minh (Kyushu Univ.), Nobuhiko Nakano, (Kyushu Univ.), Masaaki Owada (Yamaguchi Univ.), Tran Ngoc Nam (Hue Univ.)

Indochina Peninsula on southeast Asia is divided into three major tectonic provinces from northeast to southwest: the South China Block, the Indochina Block, and the Shan-Thai (Sibmus) Block, and many suture zones were developed along their boundaries. Northern Vietnam is considered to be a part of the southwestern margin of South China Block. Song Ma suture zone is a metamorphic complex developed between the South China and the Indochina Blocks, and composed of greenschist to amphibolite fades metamorphic rocks, with 40Ar-39Ar dating results of 244-230 Ma (Lepvrier et al., 2004). Besides, high-pressure granulites were also found recently from the suture zone (Nakano et al., 2007), therefore, the metamorphic rocks might have formed during collision of the South China Block and the Indochina Block. In this study, analytical results of whole rock compositions of amphibolites are reported for considering the origin of metamorphic rocks in the suture.

Some amphibolite and garnet-amphibolite samples were collected from the Song-Ma suture zone. In them, eclogite consists of abundant garnet, omphacite, phengite, quartz, zoisite, Na-Ca amphibole with minor rutile and magnetite. Plagioclase, Na-free augite and epidote occur around the veins, suggesting that this mineral association was produced during decompression after the highest-pressure condition for the metamorphic rock. Other amphibolites from the suture zone are composed from hornblende, epidote, plagioclase with subordinate diopside and rare biotite and titanite.

The amphibolite show basaltic compositions with slightly enriched incompatible elements, especially HFS elements as Y and Zr from the primitive mantle composition. Almost amphibolites show nearly flat REE patterns with restored isotopic compositions of $^{143}\text{Nd}/^{144}\text{Nd} = 0.5125-0.5126$ at 250 million years before. Such compositional characters of HFSE and REE, which seem to be difficult to move by common fluid activity, are equivalent to those of basalt originated from depleted mantle. On the other hand, an amphibolite with LREE-enriched composition was also found. This has comparatively much LILE. Its isotopic compositions showed $^{87}\text{Sr}/^{86}\text{Sr} = 0.7135$ and $^{143}\text{Nd}/^{144}\text{Nd} = 0.5122$ at 250 million years before. Protolith of the amphibolite was possibly originated from enriched mantle. Based on such compositional evidence, amphibolites in the Song-Ma suture zone were probably metamorphosed mid-ocean ridge basalt with a few ocean island basalts.

Keywords: amphibolite, eclogite, Song-Ma suture zone, depleted mantle

*Corresponding author: miyamoto@geo.kyushu-u.ac.jp