

Compositional characters of amphibolite from Song Ma suture zone in Northern Vietnam

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Asia consists of numerous continental and oceanic fragments stitched together by continental collision. Indochina Peninsula, which is located at 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. Eastern periphery of the Indochina Block in the Peninsula has been regarded to be one of the main Precambrian continents, however, recent chronological works reveal that basement rocks in this area consist of Permo-Triassic metamorphic rocks experienced extreme metamorphic condition (Osanai *et al.*, 2004; Nakano *et al.*, 2007). Indochina Peninsula, therefore, is an ideal place to study the processes of continental collision and evolution of orogenic collages.

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 (or much lower-grade) to amphibolite facies metamorphic rocks. Besides, high-pressure granulites were also found recently from the suture zone (Nakano *et al.*, 2007). Some ^{40}Ar - ^{39}Ar dating results with 244-230 Ma are reported for the metamorphic rocks (Lepvrier *et al.*, 2004), therefore, the metamorphic rocks might have formed during collision of the South China Block and the Indochina Block. In this study, we report analytical results of whole rock compositions for considering the origin of metamorphic rocks in the suture zone.

Some amphibolite and garnet-amphibolite samples were collected from the Song-Ma suture zone. In them, eclogites consist 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.

Major element compositions of the amphibolites are basaltic, and contents of incompatible elements, especially HFS elements as Y and Zr in them are slightly enriched from the primitive mantle composition although compositional variations of their LIL elements are not so small. In transitional metal concentrations, Ti, V, Mn, Fe, Cu and Zn are more and Cr and Ni are less than primitive mantle. Neodymium isotopic composition of an eclogite was restored to $(^{143}\text{Nd}/^{144}\text{Nd}) = 0.51252$ at 250 million years before. These characters are equivalent to those of basalt originated from depleted mantle.

Samarium and neodymium analytical data of garnet, amphibole-omphacite mixture, and felsic fraction separated from an eclogite are clustered on a Sm-Nd isochron diagram and could not be defined any isochrons. More systematic chronological works with various dating methods for various kinds of rocks are required to understand the evolutionary history of the metamorphic complexes and suture zone in Vietnam during amalgamation between South China Block and Indochina Block.