Tectonic Boundary between the Sanbagawa belt and the Shimanto belt in central Shikoku, Japan

Kazumasa Aoki[1]; Tsuyoshi Iizuka[2]; Takafumi Hirata[3]; Shigenori Maruyama[4]

[1] Dept. of Earth & Planetary Sci., TITech; [2] Dept. of Earth and Planet. Sci., T.I.Tech; [3] Earth and Planetary Sci., TITech; [4] Earth and Planetary Sci., Tokyo Institute of Technology

Mode of occurrence of high-P/T regional metamorphic belt is a key to understand the exhumation mechanism of deep-seated accretionary complex along the subduction zone. Nevertheless, the overlying and underlying unit of the metamorphic belt have not yet been paid enough attention, and most geologists imagined that the metamorphic grade continuously changes to unmetamorphic unit above and higher-grade unit below.

In central Shikoku, Japan, the type area of the Cretaceous Sanbagawa belt has been well-mapped to establish the classic coherent stratigraphy by Kojima (1951). In descending order of apparent stratigraphy, the Minawa, Koboke and Kawaguchi Formation is exposed along the Yoshino and Iya River. To determine the depositional age of sedimentary rocks for each Formation, either fossil or zircon age is useful. We have separated igneous zircons from psammitic schists of the Minawa Formation and the Kawaguchi Formation, and from conglomeratic schist of the Koboke Formation. Spot analyses were performed on the laser ablation-inductively coupled plasma mass spectrometer (LA-ICP-MS).

The U-Pb ages of zircon grains from the Koboke Formation showed 92+-4 and 94+-4 Ma as for the Qtz-porphyitic and granitic pebbles. From the Kawaguchi Formation, much younger zircons, clustered 90-80 Ma, were obtained (the youngest age = 82+-11 Ma). On the other hand, zircons from the Minawa Formation yielded remarkably older age clustered around 1900-1800 Ma. There is a large chronological gap between the Minawa and the other two formations.

The radiometric ages of the Sanbagawa metamorphism have been well constrained as ca. 120 Ma for the progressive metamorphism (e.g. Okamoto et al., 2004). Therefore, both Koboke and Kawaguchi Formations must not be the Sanbagawa belt, because the timing of formation of accretionary complex must be later than 92+-4 Ma from the Koboke Formation and 82+-11 Ma from the Kawaguchi Formation. Both the Koboke and Kawaguchi Formations correspond to the late Cretaceous accretionary complex, equivalent of Northern Shimanto belt and were formed simultaneously with the Northern Shimanto belt within the same subduction system. Because, depositional age of the Northern Shimanto belt is considered to have been same time between 130 and 65 Ma, based on fossil age (e.g. Taira et al., 1982). Thus the boundary between the Sanbagawa and the Northern Shimanto belts is present in the core of the Sanbagwa belt in central Shikoku. The Northern Shimanto belt appears as a tectonic window in the Sanbagawa belt. Moreover, the same tectonic boundary was confirmed in central Kii Peninsula (Sasaki and Isozaki, 1992; Masago et al., 2005). Hence, the Sanbagawa belt is sandwiched between an overlying low-grade Chichibu belt and an underlying low-grade Northern Shimanto belt, and the thickness is calculated to be about 2-3km in central Shikoku.