Middle Miocene igneous activities in the near trench region of SW Japan in relation to the subduction of the Shikoku Basin

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(1) Introduction

In the near trench region of southwest Japan Arc, are distributed middle Miocene igneous rocks with various chemical compositions. The igneous activities were concentrated in 14+/-1Ma. We have determined bulk rock composition and radiometric ages of the igneous rocks to classify the igneous bodies and clarify the duration of the magmatism. In this presentation, we will discuss the role of the subduction of the newly born Shikoku Basin of the Philippine Sea Plate for the magma production in the near trench region of SW Japan.

(2) Melting of the subducted Shikoku Basin of the Philippine Sea Plate

Subduction of the newly born hence hot Shikoku Basin of the Philippine Sea Plate may have caused the melting of the subducting slab. Some of the rhyolite/dacite of the Setouchi Volcanic Rocks (SVR) are highly depleted in HREE and have no, or small if exists, Eu negative anomalies. This geochemical characteristics suggest that the felsic rocks were formed with the garnet-bearing residue without plagioclase, which is in common with that of adakites. These rhyolite/dacite usually have high K contents, and may not be formed by melting of the basaltic precursor in the depth, which is widely known as for the origin of adakitic magmas. Shimoda and Tatsumi (1999) proposed that rhyolite of the SVR in Shodoshima island were formed by melting of the subducted sediments on the slab. Distribution of the rhyolite/dacite with similar chemical characteristics are found from SVR at least in Kii peninsula and Eastern part of the Shikoku. Orihashi et al. (2000) suggests that some of the felsic igneous rocks in the Outer Zone were also formed by melting of the subducted slab.

(3) Magmas derived from mantle beneath the Shikoku Basin

Tholeiitic basalt/gabbro of the Shionomisaki and Murotomisaki bodies were compared with basalt of the Shikoku Basin based on their similarity of the chemical compositions. Further, resemblance of alkali basalt of the Takakusayama to the those formed by off ridge volcanism of the Shikoku Basin was also suggested (Takahashi, 1986). Excepting these mafic igneous bodies closest to the trench, we found both alkaline and subalkaline basaltic dikes in the Outer Zone of the Kii peninsula. Some of them were dated to be formed in Miocene time (Wada, 1999).

We have found dolerite enclaves from Kumano Acidic Rocks, one of the large felsic igneous complexes in the Outer Zone. The last stage of spreading of the Shikoku Basin continued for the highest stage of the near trench magmatism as noted before. These fact may suggest that the mafic magmas derived from mantle beneath the Shikoku Basin intruded and melted accretionary complex sediments to form large felsic igneous bodies in the Outer Zone.

(4) Summary

Time and space distribution of the igneous bodies is the crucial information to discuss the origin of the magmatism in relation to the tectonic environments including the development of the Philippine Sea Plate. Along arc contemporaneity of the SVR and felsic igneous rocks of the Outer Zone have been verified by our new K-Ar dating (Sumii and Shinjoe, this volume). However only poor information of the age of emplacement and chemistry of the mafic igneous bodies which are supposed to be derived from mantle beneath the Shikoku Basin, have been known so far. So the systematic dating and chemical analysis for these igneous bodies are urgent subjects in the future.