Geochronological constrains on the evolution of late Cenozoic volcanism in the Chugoku area, SW Japan

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The late Cenozoic magmatism in Chugoku district, southwest Japan is attributed to subduction of Shikoku Basin on the Philippine Sea Plate (PHS), started at ~17 Ma [1]. The Chugoku district is divided into Sanyo, Sekiryo and Sanin zones, from fore- to back-arc side. A variety of volcanic rocks occur in the district, including alkaline basalts, sub-alkaline basalts, intermediate to felsic rocks, and adakites.

To understand the mechanism responsible for such a diverse magmatic activity, geochemical and geochronological studies have been conducted on 82 samples selected from the disparate types of basaltic rocks. Based on the new dataset, the authors discuss about the temporal and spatial variations in the geochemical compositions of these lavas. K-Ar ages range from 20 Ma to Holocene era. Combined with published chronological datasets [2,3], we identified 4 stages in the PHS-related magmatism: stage I (20–12 Ma); stage II (12–7 Ma); stage III (7–4 Ma); and stage IV (4 Ma–present). Volcanoes are classified chemically into two series; ocean island basalt (OIB) and island arc (IA) types, respectively.

On the stage I, IA-type andesites occurred dominantly in Sanin zone (northern Hyogo and Matsue). Sr-Nd-Pb isotopic compositions suggest the existence of PHS beneath the rear-arc volcanic region at 20 Ma. The stage II is characterized by eruptions of OIB-type basalts that formed sporadic volcanic clusters in the Chugoku district. The source of this magma lacks the influence of slab subduction, and would be derived from sub-slab asthenospheric mantle. In the stage III, the volcanism shifted to Sekiryo and Sanin zones, and erupted both OIB- and IA-type basalts. The stage IV began at 4 Ma, and occurred mainly in Sanin zone. The activity is characterized by eruption of various types of volcanic rocks, including OIB- and IA-type basalts, IA-type andesites, and adakitic dacites. The secular change in magmatism is interpreted as the result of slab-mantle interaction. This in turn allows us to elucidate the location of the leading edge or the presence of gaps on the PHS slab during the last 20 Ma.

[1] Seno and Maruyama (1984) *Tectonophysics*, **102(1-4)**, 53-84. [2] Kimura *et al*. (2003) *The Island Arc*, **12(1)**, 22-45. [3] Uto (1989) *PhD Thesis*, University of Tokyo, Tokyo, Japan.