



Origin of basement of Izu-Bonin-Mariana arc - implications for subduction initiation -

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The origin of an oceanic island arc basement is critical for understanding the tectonic setting prior to subduction initiation. International Ocean Discovery Program Expedition 351 recovered basement of the Izu-Bonin-Mariana (IBM) arc in its rear arc area (Amami Sankaku Basin). $^{40}\text{Ar}/^{39}\text{Ar}$ dating of the low-Ti tholeiitic basalt basement gives an age range of 49.3 – 46.8 Ma, with a weighted average of 48.7 Ma; these ages overlap those for basalt outcropping in the present-day IBM forearc (forearc basalts: 52- 48 Ma (Ishizuka et al., 2011) which were generated by seafloor spreading at the time of subduction initiation.

A similarity in age range and geochemical character (e.g., low Ti/V, highly depleted in incompatible elements compared to N-MORB) between the rear arc and forearc basalts implies the ocean crust newly formed by seafloor spreading during subduction initiation extended from fore- to reararc of the present-day IBM arc, i.e. most of the subsequent IBM arc stratovolcanoes formed on ocean crust which was produced immediately following subduction initiation, and not on significantly older oceanic crust.

The revealed origin of the IBM arc basement requires revision of models for subduction initiation of this arc, which assume juxtaposition of two oceanic plates. The Mesozoic remnant arc terrane (the Daito Ridges) comprised the overriding plate at subduction initiation, while the Pacific plate became the downgoing plate. This remnant arc terrane was rifted prior to the onset of spreading at subduction initiation. The juxtaposition of a relatively buoyant remnant arc terrane adjacent to an oceanic plate was more favourable for subduction initiation than would have been the case if both downgoing and overriding plates had been oceanic.

Further reconstruction of Philippine Sea Plate before 50 Ma is required to test the above hypotheses, and recent progress in the study of Philippine Sea ocean crust will also be discussed in this contribution.