

Detailed formation processes of the island-arc system in NE Honshu arc

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Authors have been investigating the relationship between the volcanic history of the Hokuroku Kuroko district and the petrotectonic evolution of the inner Honshu arc based on petrographical and petrochemical studies with volcanic rocks emplaced into pre- and post-Kuroko formation. It has been concluded that so-called Kuroko belt should be recognize as a constituent rift system of island arc forming process in NE Honshu arc. Considering with previous studies (Fujioka, 1983; Yagi et al., 2001; Sato et al., 2004), detailed formation history of NE Japan island arc system is as follows:

1. Back-arc rift system of Sea of Japan consists of three individual rift zones those are Yamato rift, Aosawa rift (same as the eastern Sea of Japan rift named by Suzuki, 1989) and Kuroko rift (tentatively given in present work) arranged parallel from west to east. Syn-rift volcanisms are characterized by high-almina to alkali-olivine basalt in the Yamato rift during 21-19 Ma, mainly high almina basalt in the main part of Aosawa rift during 16.5-15 Ma, high almina to tholeiite basalt with subordinate amounts of felsic volcanics in the eastern wing of Aosawa rift, and mainly felsic hyaloclastite with a few low alkali tholeiite basalts in Kuroko rift during 16.5-13.5 Ma. After 13.5 Ma, whereas the sites of Yamato and Aosawa rifts had been put under subsiding environment with thick bathyal sediments, Kuroko rift and the eastside range had been uplifted with large amounts of felsic to intermediate caldera-forming activities under shallow to sub aerial condition. After 5 Ma, the inner belt of the arc became upheaval environment with terrestrial intermediate to felsic volcanism.

2. Petrological study revealed that alkali contents of basaltic rocks are generally decreasing from west to east. Increasing Th with decreasing Nb contents are also recognized in both basalt and felsic rocks from western to eastern rifts volcanism with time. Felsic volcanisms in the Kuroko rift have changed from dacite lavas and hyaloclastite without quartz phenocrysts in the rifting stage (pre-ore stage) to explosive pumice flows with dacite lavas containing much amounts of quartz phenocrysts in the transitional period (post-ore stage) to island-arc. The secular change of the modal and normative compositions of felsic volcanics indicate that the depth of magma reservoir changed from deeper to shallower after Kuroko formation.

3. In relation to the transition of tectonic setting, Kuroko type mineralizations are recognized in bi-modal volcanic fields subsequent to rift basalt activity and many of vein type ones are consequently generated with caldera-forming activities.

4. Secular change of the petrotectonic associations is concordant to the rift-forming model (Sato et al., 2004), therefore, the present results must be common tectonic history in northern Honshu arc.

Reference

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