

Origin of picritic basalts in arc settings implied from Os isotopes of Cr-spinels & whole-rocks from Kume-jima, central Ryukyu arc

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Knowledge of chemical components of magma is important to discuss origin and evolution of magma. Os isotope system of mafic and ultra-mafic rocks is one of the useful tools to obtain information about source materials of magmas. The Os isotope ratios of picritic basalts are commonly reported because their Os concentrations are relatively high compared with those in the other basalts, to discuss the sources of the basalts (Ellam et al., 1992; Brandon et al., 1998; Zhang et al., 2008). Though the reports of the picritic basalt from arc settings are few, picritic basalts from the northern part of Kume-jima which is located at central Ryukyu arc are described (Ito and Shiraki, 1999). They supposed that the Kume-jima picritic basalt magmas were generated in close association with rift development of the Okinawa Trough, which is located west of Kume-jima. Shinjo (1999) suggested that they were a result of interaction between slab melts and the wedge mantle or, more likely, mixing of high-Mg andesitic magma and wedge-derived primitive magma. If they were originated in arc-trench system, their Os isotope ratios could provide geochemical information about slab-derived material and/or wedge mantle. In addition, at the similar age of the picritic basalt eruption, calc-alkaline and tholeiite magmas erupted in Kume-jima (Miki, 1995; Ito and Shiraki, 1999; Kitagawa and Shinjo, 2001). These suggest that at least two types of magmatic sources were present beneath Kume-jima in late Pliocene (Kitagawa et al., 2004).

We tried to examine the Re-Os isotope systematics of bulk rock and Cr-spinel inclusions of Kume-jima picritic basalts. The Cr-spinel is early formed crystal during crystallization and has high Os contents. The Os isotope of the Cr-spinel holds more primitive information of magma than that of whole-rock (Suzuki et al., 2007). Thus, the difference of the Os isotope between Cr-spinel and whole-rock picrites possibly provides constraints on the history of magma of Kume-jima picritic basalts. The data are also compared to those of picritic basalts from the other geological settings such as ocean islands and LIPs to discuss the source of Kume-jima picritic basalts.