Geology and petrology of Mukojima Island Group, Bonin Islands ˜volcanism at the incipient stage of subduction of the Pacific Plate

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The Bonin Islands are rare subaerial exposures that we can observe the temporal variation of incipient arc volcanisms caused by subduction of the Pacific Plate beneath the eastern margin of the Philippine Sea Plate. The volcanisms started from mid-Ca boninite-series volcanic rocks and arc tholeiitic andesite in Chichijima at 48 Ma, which gave way to high-Ca boninite-series and calc-alkalic rocks in northern Chichijima and Ototojima at 45 Ma and to arc tholeiitic and calc-alkalic series rocks in Hahajima at 44 Ma (Ishizuka et al., 2006). In Mukojima Island Group, northern part of Bonin Islands, occurrence of boninite and outline of geology have been reported by Shiraki et al. (1979) and Yuasa et al. (1981). We report the results of geological investigations 4 times in June 2006 - November 2007.

Kitanoshima and Nakinosima, northernmost of Mukojima Island Group, are composed of tholeiite. Kitanoshima is composed of welded breccia and dike, and Nakanoshima is composed of pillow lava and pillow breccia.

Mukojima consists mainly of boninite tuff breccia and pillow lava. Southward-plunging synclinal axis and northward-plunging synclinal axis are in northwest and southeast of the island, respectively, with 16- to 40-dipping limbs. White pumice tuff layers including quartz rhyolite pumice and boninite scoria are exposed in the eastern and southeastern cliff of the island.

Nakodojima is composed of boninite and bronzite andesite pillow lava and hyaloclastite overlain by andesite-dacite tuff breccia interbedded with quartz rhyolite tuff breccia. Quartz rhyolite pumice tuff is distributed in the northeast of the island, which is correlatable to white pumice tuff in Mukojima.

Yomejima consists mainly of boninite and boronzite andesite pillow lava and tuff breccia. Many bininite and aphyric andesite? dikes in the center of the island. Maeshima, southwest off Yomejima, comprises welded and alternated breccia and dikes with pyrite vein.

Boninite in the Mukojma Island Group have phenocrysts of bronzite +- olivine +- clinoenstatite +- augite +- chromspinel and microphenocrysts of bronzite +- olivine +- augite +- magnetite. Boninite with augite microphenocrysts is rare in the Maruberiwan Formation in Chichijima (Umino, 1986) but is common in Mukojima, Nakodojima, Yomejima and Ototojima.