

Petrological study on Marcus Island

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Marcus-Wake seamount trail is located in West Pacific Seamount Province (WPSP), where the oceanic plate is oldest in the world, around 160 Ma Pacific plate. WPSP had occurred during Cretaceous and was reconciled with current active hotspots of French Polynesia in South Pacific. Marcus (Minami-tori) Island is located 50 km away from Marcus-Wake seamount trail to the north. Most of seamounts, particularly well-studied seamounts, are more voluminous than the edifice of Marcus Island, whereas no islands and atolls are found around the island within 500 km. In this study, mineralogical and whole rock analysis of lava samples, obtained in submarine survey of northwest flank of Marcus Island, are adopted in order to compare with volcanic samples from WPSP and South Pacific islands of active hotspot volcanism. High TiO₂ in relic of chrome spinel indicates the typical intra-plate volcanism to be similar characteristics with those of WPSP. Major element compositions reveal normal-alkali basalts. Nb/Zr and Nb/Y ratios can classify the origins of shallow mantle plume, not in superplume as old Polynesian hotspots, like the Marcus-Wake seamounts of WPSP. Therefore, Marcus Island was produced from intraplate volcanism which differs from hotspot activities forming the Marcus-Wake seamounts.

Keywords: Marcus-Wake seamount trails, seamount, WPSP, HFSE, superplume, alkali-basalt