

マリアナ弧パガン火山の三つの初生マグマと島弧マグマ成因への意義 Three primary magma types from Pagan volcano in the Mariana arc and implications for arc magma genesis

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Pagan is an active volcano located in the volcanic front of the central Island Province of the Mariana arc and is one of the largest volcanoes in the Mariana arc; its main edifice rises from a base ~3,000 m below sea level and has a volume of 2,160 km³. Tamura et al. (2011) demonstrate the existence of near-primitive, phenocryst-poor lavas at NW Rota-1 volcano in the Mariana arc, which is located about 40 km west of the volcanic front. These magnesian basalts are petrographically distinct cpx-olivine basalt (COB) and plagioclase-olivine basalts (POB).

The active Pagan volcano has erupted near-primitive lavas on its submarine flanks. The least fractionated compositions recovered from the NE flank (HPD1147) extend to higher MgO (7-11 wt %) and Mg# (60-70), than have ever been sampled from Pagan island lavas.

The Fo contents of olivine (up to Fo94) and Cr-number of spinels (up to 0.8) suggest that these magmas formed from high degrees of mantle melting. There are three geochemical groups of cpx-olivine basalt (COB1, COB2 and COB3) (Fig. 1). TiO₂, Na₂O, K₂O, Rb, Nb are lowest in COB1 and highest in COB3. COB3 have steeper LREE-enriched patterns but the REE patterns of COB1 show contrasting LREE-depleted patterns, suggesting that COB1 formed from higher degrees of mantle melting. On the other hand, COB1 have the highest Ba/Th ratios and COB3 have the lowest, suggesting that a shallow subduction component is more important for COB1 than COB3, with COB2 intermediate. COB1, COB2 and COB3 show a negative trend on the Ba/Nb-Nb/Yb diagram. The higher Ba/Nb of the COB1 indicate that the COB1 contain greater abundances of slab-derived subduction components than the COB2 and COB3. Nb/Yb suggests that the degree of melting of the COB1 source is higher than for the COB2 and COB3.

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