

Trench-ward migration of the paleo-volcanic front in the Kushigatayama block, South Fossa Magna

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Based upon REE chemical analyses, lavas and intrusions of the first collided (Kushigatayama) block in the South Fossa Magna can be divided into i), depleted LREE, D-type (low Zr/Y); ii), flat REE, F-type (high Zr/Y); and iii), enriched LREE with development of Eu negative anomaly, E-type (very high Zr/Y). D-type basalts resemble basalts from Izu-Oshima on the current Izu-Bonin arc, whereas, F-type basalts are similar to basalts of the Higashi-Izu Monogenetic Volcanic Group.

The paleo-volcanic front in the Kushigatayama block migrated towards the paleo-trench with time, similar to the volcanic front of the Higashi-Izu-oki submarine volcanoes on the tip of the Izu-Bonin arc.

According to the multiple collision hypothesis, the Kushigatayama block in the Koma mountains was the first island arc segment to collide in the South Fossa Magna during the Middle Miocene.

Based upon REE chemical analyses, lavas and syn-volcanic intrusions of the Kushigatayama block can be divided into i), depleted LREE, D-type (low Zr/Y); ii), flat REE, F-type (high Zr/Y); and iii), enriched LREE with development of Eu negative anomaly, E-type (very high Zr/Y). D- and F-type basalts plot in the island arc basalt (IAB) fields of the TiO₂ versus FeO*/MgO, and Zr/Y versus Zr diagrams, as well as the island arc tholeiite (IAT) field on the V versus Ti diagram. All types are characterised by an enrichment of LIL elements relative to HFS elements, and negative Ba/Nb anomaly on a MORB normalised spidergram, also indicative of an island arc setting.

The REE pattern of D-type basalts resemble low-alkali tholeiitic basalts from Izu-Oshima on the current Izu-Bonin arc, whereas, F-type basalts are similar to high-alkali tholeiitic basalts of the Higashi-Izu Monogenetic Volcanic Group.

From the distribution of D- and F- type basalts in the Koma mountains, it is clear that a paleo-volcanic front migrated towards the paleo-trench with time. Such trench-ward migration of the volcanic front has also been reported in the Higashi-Izu-oki submarine volcanoes on the tip of the Izu-Bonin arc.