

Petrological study of layering in the Atsumi dolerite

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We examined the periodic layering in two sills at the Atsumi dolerites. The modal variation and the bulk and mineral compositions were analyzed. The variations in calculated normative compositions of the Shiodawara-iwa and the Konpira-iwa suggest that the crystallization of olivine causes the layering of Shiodawara-iwa, and the crystallization of pyroxene and plagioclase causes the layering of Konpira-iwa. Although these layerings are formed by the interplay between the diffusion of heat and material and crystallization with supersaturation, the difference in controlling minerals in these two sills can be attributed to the difference in the bulk compositions.

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In the Shiodawara-iwa, the wave shape in eroded relief of layering is asymmetrical and the wavelength varies from 10cm to 60cm with the distance from the contact. There is no good correlation between the layering and the modal composition. The bulk and mineral compositions are well correlated with layering. SiO₂, Al₂O₃, CaO and Na₂O contents increase in the protrudent zone (the more resistant zones against erosion). The Mg content of pyroxene increases whereas FeO and MgO contents decrease in this zone.

In the Konpira-iwa, a wavelength is approximately 10cm and the wave shape is nearly symmetrical. There are prismatic pyroxenes and dendritic opaque minerals in the protrudent zone. The zone at which these types of mineral are developed is 0.5mm in thickness. The amount of glass increases at this zone whereas that of plagioclase decreases. The bulk chemical compositions are correlated with the layering. CaO, FeO, TiO₂ and P₂O₅ contents increase but Al₂O₃ content decreases in the protrudent zone. The Mg content of pyroxenes also increases in this zone.

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