

ハワイ島キラウエア火山 Pu'u 'O'o-Kupaianaha 火口から
1990年にカイク湾に流下した溶岩流の形態と定置機構

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Morphometric Study of the Lava Entering the Sea: the 1990 Kaimu Bay Flow
from Pu'u 'O'o-Kupaianaha Vent, Kilauea Volcano, Hawaii

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The Pu'u 'O'o-Kupaianaha eruption of Kilauea Volcano has been active since 1983 and effused 2.3 km³ of lavas by September 2002. In 1990, lava flows fed by tubes from Kuapainaha vent covered Kalapana Village and entered Kaimu Bay. Kaimu Bay was covered with "main lobes" emplaced parallel to shoreline and "outflows" emplaced between the main lobes. The edges and surfaces of main lobes are often covered with thin pahoehoe lobes, and have clefts and pits on the surface formed by inflation of the lobes. Flow directions of main lobes indicated from buckled ropy wrinkles were parallel to shoreline, and new lobe branched from edge of older lobe also flowed along the older lobe. The lava lobes are holohyaline at their surface with sporadic varioles of clinopyroxene, and become intersertal at the interiors with increasing microcrystals of plagioclase and clinopyroxene. The solidification temperature of lava estimated from MgO content in the glass of the lobe surface is 1140 (±3) °C. On the other hand, the temperature of lava on Kupaianaha and Pu'u-O'o lava lake is 1154 (±3) °C, the difference is only 14°C when lava carried to Kaimu Bay over 20 km away from vent, hence tube system keep high adiabatic effect. At the last period of Kaimu bay flow, the temperature of lava is 20–24°C lower than the former period. This suggests that whole tube systems in Kaimu bay cooled by air, and molten lava stagnated in lava lobes at the last period. As examined daily outline of expanding flow lobes from observation data of lava flows from land and air by Hawaiian Volcano Observatory and morphometric survey of present lava lobe on Kaimu bay, a mean supply rate of lava flux to Kaimu Bay was 88,000 m³/day during 87 days from 6 August to 26 October. It is consistent with other data of Pu'u 'O'o-Kupaianaha eruption.

The emplacement and development process of lava lobes on Kaimu bay is inferred as following: When lava entered the sea, front part of lava was solidified by rapid cooling of water. Although following molten part avoided solidified front part, it also entered the sea and was solidified by rapid cooling of water. Lava lobe makes barrier to the sea and flow along shoreline. Soon, lava lobes stopped from gentle cooling by air and began inflation due to injection of molten lava. Clefts on "main lobes" resulted from inflation of lava and "outflows" from leakage of molten lava from clefts. When internal pressure rise due to injection of molten lava got over the tensile strength of crust, cracking and large drainage of molten lava occurred, new lobe formed and flew along older lobe. Finally, shallow zone of Kaimu bay was buried by many lava lobes parallel to shoreline.

Key words: Kilauea Volcano, Kaimu Bay, lava lobes, entering the sea, morphometry

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