Geochemistry of submarine Southwest-Oahu volcano, Hawaii: New type of Hawaiian volcano?

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The sea beam survey during 2001 R/V KAIREI-Hawaii cruise revealed detailed topography of submarine shield shaped volcano (SW-Oahu volcano) southwest Oahu Island. The volcano consists of the shield, on which many cones and lava flows are distributed. The 2001 KAIKO dive and the 2002 SHINKAI dive collected samples of pillow, sheet lavas and hyaloclastite from both the shield and the cones. Thickness of Mn-coating of the sample is various, suggesting that activity of the volcano had continued for >2 My. Preliminary K-Ar age of lava of one of the cones is about 3Ma (Noguchi and Itaya, in prep.).

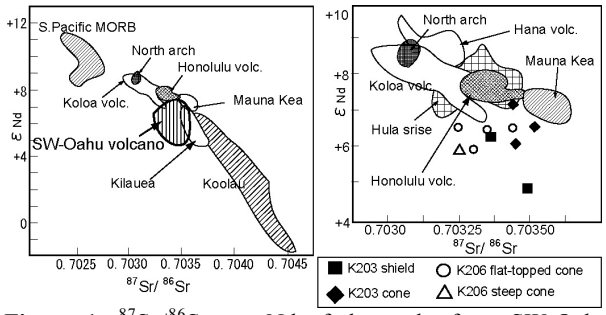

Figure 1. $^{87}Sr/^{86}Sr$ vs. _Nd of the rocks from SW-Oahu volcano and other Hawaiian volcanoes

All the samples are classified into the alkaline rocks, showing wide compositional variations (SiO_2=40.1-50.7wt.%, MgO=3.3-14.0wt.%). Based on the geochemical classification for Hawaiian volcanic rocks, basalt are divided into two types, the post-shield stage and the rejuvenated stage ones. Furthermore, chemical compositions of the rocks of the former type ranges from relatively primitive to extremely differentiated. However, no rocks of typical shield building stage have been found. In contrast, Sr-Nd isotope ratios of all the samples show little variations, which are intermediate between the rejuvenated stage and the shield building stage magmas.

Although the SW-Oahu volcano shows similar topographic feature of typical Hawaiian volcano (ex. Haleakala), its geochemical feature differs from those of the typical ones. The volcano would have been active off the main axis of Hawaiian plume during the formation of Koolau and Waianae volcanoes (Oahu Island). Considering both geochemical feature and the location of SW-Oahu volcano, it seems that the volcano could be considered as a newly recognized type in Hawaiian volcanoes.

CI-like chondrite clasts in ordinary chondrite regolith breccias and their implication to the investigation of the surface material of asteroids

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Introduction

Our recent studies on two H chondrite regolith breccias, Tsukuba and Willard (b) revealed that they contain carbonaceous (hereafter CC) chondrite clasts [1,2]. These carbonaceous chondrite clasts are rare but important to discuss the evolution of surface material of ordinary chondrite parent bodies.

Resuts and discussion

Synchrotron radiation X-ray diffraction (SR-XRD) and TEM data show that CC clasts in Tsukuba contain saponite, serpentine, magnetite, and pyrrhotite as major phases. Ferrihydrite is minor. Mineral phases and their matrix texture indicate that the clasts have CI affinity. SR-XRD and TEM data of similar chondrite clasts in Willard (b) contain saponite, serpentine, magnetite, pyrrhotite, pentlandite, dolomite, Mg-Fe carbonate, and ferrihydrite as major minerals. Their mineralogy suggest that the clasts have features common to both CIs and Tagish Lake carbonaceous chondrite [3,4].

Because saponite and serpentine are well preserved in them, the temperature did not exceed about 500 ºC during incorporation of the clasts and lithification [2,5]. These clasts contain fine-grained (100-300 nm long) olivine and low-Ca pyroxene derived from their hosts. During impacts of these CC-like materials onto unconsolidated H chondrite materials, fine-grained host mineral fragments probably sticked into the soft CC-like fragments. In Tsukuba, we observed that the CI-like material is injected as narrow (< 100 nm across) veins among angular mineral fragments of the host at the boundary between a clast and the host. Probably what occurred during incorporation of CC-like materials into their hosts is similar to what would happen when soft mud clumps are shooted with hypervelocity into unconsolidated sand. We have to recognize a possibility that sub-µm sized CC-like materials exist ubiquitously on the surface of O chondrite parent bodies although their abundance may be low.

References

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