

アイスランド・ルートレスコーン調査報告ー火星のアナログとしてー Investigation report of rootless cone in Iceland -as an analogue of that of on Mars-

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Rootless cone is a pyroclastic cone which has a variety of shape. It's formed by lava-water interaction [e.g. Fagents et al., 2002, Hamilton et al., 2010], but details such as formation conditions are still unknown. Since pervasive existence of various types of rootless cones has been clarified on the martian surface, terrestrial rootless cones are key to understand Martian volcanism and strong interests have been paid in the field of planetary science. We surveyed rootless cones in Iceland by RTKGPS (Real-Time Kinematic GPS) with material-scientific investigations on the constituent materials.

We investigated 3 rootless cone fields; Myvatn (northern Iceland), Landbrot (eastern Iceland), and Thjorsardalur (western of Hekla volcano). In this presentation, we will focus on Myvatn area. In Myvatn, rootless cones were formed by lava-lake water interaction. The lava is basaltic, and emanated from the fissure which locates in east of the lake [Thorarinsson, 1951], and flowed into the lake. We mapped more than 500 rootless cones by aerial photo survey. Most of cones locate around the lake, but some cone locates in in the down-flow region (40 km far from the lava source) area. In Myvatn, here exists unique rootless cone which has an inner cone in the summit crater. We named this as double cone. We focus on this type and conducted detailed morphological survey.

We found that slope angle of rootless cone depends on its size. For double cone, inner cone has gentler slope than that of outer cone. In case of single cone (no inner cone), large cones have steeper slope than that of small cones. Also, large cones have constant slope (repose angle: 32-33 degree), despite the slope angle of small cone varies. In case of the double cone, we found that the constituting material of the inner cone differs from that of the outer cone. The component material of the outer cone is lapilli - coarse ash size pyroclast. On the other hand, that of the inner cone is welded pyroclasts or agglutinate. For small cones, the summit part is covered with agglutinate. These differences should indicate different condition of the formation such as the amount of available water/heat supply by magma.

A We measured bulk chemical composition of the lava and the pyroclasts by XRF confirming no significant change along lava flow traveling. We also measured bulk density and size distribution of the pyroclasts of the rootless cones. We found density of the lava concordantly increases with traveling distance, which means bubbles progressively escaped from the lava during traveling while the formation of rootless cone seems not to be influenced by the vesicularity of lava. The size distribution seems to be correlated with the slope value of the cone, which strongly suggests the control of fragmentation on the formation of rootless cone.

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