

## Rootless cones as Martian cone analogues and miniature volcanoes

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Rootless cones are a type of volcanic pyroclastic cones formed through lava-water interaction. When hot lava flows onto a region of waterlogged sediments secondary explosion is induced triggered by intense vesiculation of water and forms a pyroclastic cone. They are peculiar in that they are formed at remote places from lava emanation site. On Mars even at distal part of long lava flow such as 1000 km from the source rootless cones are found. Until recently much attentions have not been paid on rootless cones and they have been regarded as a minor existence so that even the basic information such as the morphology of the cones and the pyroclastic constituents is lacking. But in the recent 10 years significant meanings have been gradually recognized in planetology and terrestrial volcanology.

Although the formation of terrestrial rootless cones is regionally restricted to several areas such as Iceland and Hawaii high-resolution imaging has revealed the pervasive existence on Mars (e.g., Greeley and Fagents, 2001). Martian rootless cones are located in very young volcanic regions which were thought to be active in 2 Ma at the latest (e.g., Burr *et al.*, 2002). The existence of these young rootless cones is an evidence of 1) the distribution of subsurface water ice on recent Mars and 2) hot interior of recent Mars enough to generate amount of flood lava (e.g., 5000-7500 km<sup>3</sup> in Athabasca Valles; Jaeger *et al.*, 2010). Thus, rootless cones show recent environment and thermal state of Mars, and terrestrial ones should contribute to this field.

Rootless cones would be nature analogues of huge terrestrial volcanoes. There are several good points to focusing rootless cones in point of volcanology; 1) they are formed as groups (more than 1000 cones), i.e., they can be a target of statistical analysis which is difficult for limited numbers of huge volcanoes, 2) they help simple understanding of volcanic explosions because of their simpler formation system, and 3) easier field working thanks to their small edifices.

In the presentation at first we show typical examples of rootless cones in Iceland and on Mars; their distributions and the cone morphometry in comparison with other pyroclastic cones based on our surveys of 5 years. Then we will discuss the relative position of the rootless eruption among cone-forming eruptions by magmatic and phreatomagmatic.

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