

Tadpole crater on the surface of small volcanoes on Mars

Tomohiro Oshima[1]; Kei Kurita[2]

[1] Earth and Planetary Sci., Tokyo Univ; [2] ERI, Univ. of Tokyo

Volcanoes on Mars can be classified into three groups according to their morphology; Mons as a huge volcano, Tholus as a small volcano, and Patera as intermediate rather flat ones. The formation ages (Atlas of Volcanic landforms on Mars 1994) of these volcanoes seem to correlate with the size. The formation ages of small volcanoes are old, and it is suggested that the style of volcanic activity has changed with the time. Clear geographical features of lava flow are not detected on most of the old small volcanoes, and it is thought that the style of the eruption has evolved from explosive one to effusive lava flow. In this research, Ceraunius Tholus, which is the typical example of small volcano, is taken up, and the volcanic eruption style is investigated. Ceraunius Tholus consists of an east side slope which retain old original surface, and a new west side slope which received the resurface process. We paid special attention to the relation between west side slope and volcanic activity.

By MOC high resolution images on Ceraunius Tholus peculiar style of embankments of teardrop shape is found on the western surface of the volcano. They are mostly associated with small sized craters. Combined with circular crater cavity, it resembles the shape of tadpole and here after we call this as tadpole crater. We investigate its distribution, and measure the size and the orientation. They are mostly distributed on the western surface, which suffered severe resurfacing process. The orientation of the tail is mostly parallel to the direction of the local maximum slope. Based on the geomorphological inspections, we suggest following formation process: In strongly erosive flow crater rim resists against erosion and works as a protective wall. In the lee side of the crater rim teardrop shaped leftover remains. As for the origin of erosive flow, following possibilities can be considered: Atmospheric strong wind associated with mountain height, water flow by rain fall, debris flow caused collapse of caldera wall and pyroclastic flow or surge associated with the volcanic activity. The origin of this flow will be discussed based on the geomorphological measurements on the tadpole craters.