

Unique characteristics of cone in Central Elysium Planitia, Mars

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Martian magmatism within recent several hundreds of millions years is still inside the certain of enigma. Thanks to high-resolution images taken by recent Martian orbiters, analysis technology for Martian morphology have developed. We investigate Martian recent magmatism based on volcanic morphologies.

Central Elysium Planitia (CEP) is suspected as a site of the latest magmatism on Mars. In CEP, there are several distinct morphological features: Cerberus Fossae, Athabasca Valles, young flow, and cone morphology. The origin of the young flow is unknown; whether lava flow or mud flow because these morphologies are difficult to distinguish only by its appearance. Cones in CEP have unique characteristics. It will be a key to reveal detail activity style of recent magmatism in CEP. In previous works, there are 2 models proposed for the origin of CEP cones; volcanic rootless cone [e.g. Jaeger et al., 2007] and periglacial pingo [e.g. Burr et al., 2002].

In this study, we described distribution and size of CEP cones by using high-resolution images ($>0.25\text{m} / \text{pixel}$).

Result from this study, we found 25578 of cones in CEP. CEP cones are classified into 3 morphological types; Single Cone Structure (SCS), Double Cone Structure (DCS), and Lotus fruit Cone Structure (LCS). DCS have an inner cone in summit crater of outer cone, and LCS has several inner cones in summit crater of outer cone. Several cones have moat structure around cone edifice with peripheral rise. CEP cones distribute on the young flow. DCS and LCS distribute in specific area in the vicinity of Cerberus Fossae. Several SCS are found in border area of the young flow and original plain. Several CEP cones are aligned parallel to the young flow direction. The diameter of CEP cone is 2, 3 m - 150 m. The larger the cone diameter, the more complex the cone structure. DCS and LCS are larger than SCS.

We compared CEP cones with terrestrial rootless cones and pingos by using aerial photos. In Lake Myvatn, Iceland, there are several double rootless cones and lotus fruit rootless cone. We could not find double cone type pingos in North America, which is famous for pingo area.

From result of this study and these comparisons, it is indicated that CEP cones are rootless cone, a volcanic origin.

Keywords: Mars, volcano, cone, rootless cone, lava-water interaction, Central Elysium Planitia