

LUNAR PLAINS-STYLE (SMALL SHIELD) VOLCANISM

PLESCIA, Jeffrey, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Drive, Laurel, MD 20723-6099, jeffrey.plescia@jhuapl.edu

Abstracts:

The lunar mare make up the bulk of the volcanic products on the lunar surface. These basalts were presumably erupted from deep-seated fissures and spread out across the mare basins slowly filling them over time. Eruptions are envisioned to be Columbia Plateau like with large-volumes of low viscosity magma erupted onto the surface or intruded into the volcanic pile. In addition, there is class of lunar volcanic features referred to as "lunar domes." In the context of lunar geology, the term "dome" simply refers to a topographic feature with possible volcanic morphology (e.g., summit crater, lava flow) and does not imply anything about composition. It has generally been assumed that the domes were more silicic than the mare basalts based on the morphology. More recently, remote sensing spectral and compositional data, as well as morphology indicate that some are more silicic (e.g., Compton-Belkovich). However, there are a large number of volcanic vents, many controlled by regional structure that fit into the category of plains style volcanism as defined by Greeley. These vents range in size from a few (5-10 km) to perhaps 30 km across and have heights of a few tens of meters to over a kilometer (most are in the range of a few hundred meters). Many have a summit crater; a few exhibit radial lava flows; slopes are generally shallow. The morphology of these features is similar to low relief shield volcanoes such as Mauna Ulu or the vents of the Snake River plains (e.g., Wapi). These features, and lunar domes in general, occur in clusters on the mare rather than being randomly distributed. Within a given cluster, vents appear to be randomly scattered or, in some cases, controlled by pre-existing structure (typically narrow graben). Those that are controlled by pre-existing structure are typically wider in one direction and have elongate summit vents, both parallel to the structural strike. The similarity of relief and dimensions of the lunar low shields to the terrestrial examples suggest a similar eruption style. In the areas where they are observed, these features represent the terminal phase of mare volcanism, a style different from the bulk of the mare eruptions. The recent LROC high resolution images have allowed the identification of many more vents than were previously recognized.

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