OVDA FLUCTUS, THE FESTOON LAVA FLOW ON OVDA REGIO, VENUS: MOST LIKELY BASALT.

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Introduction: A fundamental question about Venus is whether its highlands areas, its tesserae and the 'continent' of Ishtar Terra and Maxwell Montes, are made of granitic (silica-rich) igneous rock [1]. On one such Venus highland, Ovda Regio (Fig. 1), sits a lava flow, with a rumpled surface, that has been interpreted as silica-rich [2,3]. The flow, Ovda Fluctus or 'the festoon flow', has not been mapped in detail. Here we have mapped the flow using all available data, emphasizing properties that might be diagnostic of its chemical composition. The preponderance of data is consistent with Ovda Fluctus being of basaltic, not silica-rich, lava.

Data and Methods: All data are from the Magellan Venus orbiter mission, mostly downloaded from the USGS "Map-a-Planet" site. Magellan altimetry was augmented with the stereo radar DEM [4]. Images were processed and interpreted in ArcGIS. Fractal dimensions of lava flow margins were calculated using the 'ruler' method [5,6].

Results: We evaluated several properties of Ovda Fluctus that are affected by its lava's rheology.

Roughness. Silicic lava flows are very rough at the meter-scale [7], more so than a'a basalt, because of their viscosity. Ovda Fluctus is relatively smooth at this scale (Fig. 1), suggesting that it is not of silicic lava (despite the larger-scale roughness of its festoons, Fig. 2).

Fractal Dimension. The fractal dimension of a lava flow's margin depends on its effective viscosity – less viscous flows are more digitate, and have higher dimensionality [6]. Sixteen flow lobes (Fig. 2) gave dimensions of 1.15 – 1.42, average 1.26. This range is consistent with pahoehoe basalt flows, and not with silicic lavas (rhyolite or dacite).

Overall Morphology. The area and volume of Ovda Fluctus (~60,000 km^2 and ~6,000km^3 [8]) are more consistent with basalt effusions than silicic lava, at least on Earth [9,10]. The center of the Ovda Fluctus flow is lower elevation than its rim – such depression is common with basalt lava flows [11], but seemingly not observed on silicic flows. Festoon surface ridges (Fig. 2) may be present on both silicic and basaltic flows [12].

Results: The bulk of available data on Ovda Fluctus are consistent with it being basaltic, and inconsistent with a silicic composition. A test of this inference could come from near-IR emissivity data [1].

Acknowledgements: This work was performed during an LPI/ARES Summer Internship to the second author, mentored by the first and third authors. The LPI is operated by Universities Space Research Association, under a cooperative agreement with NASA.

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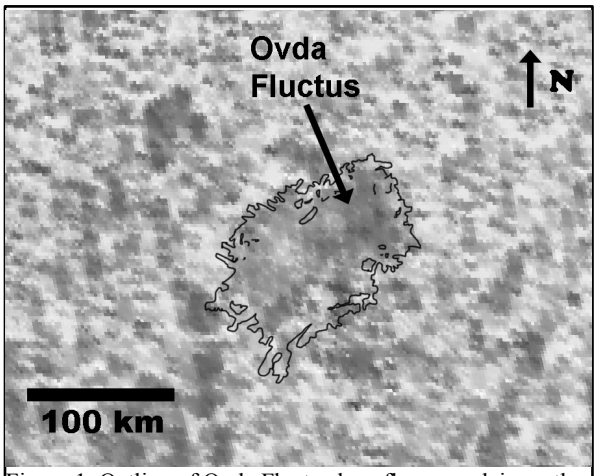

Figure 1. Outline of Ovda Fluctus lava flow, overlain on the Magellan meter-scale roughness map. Flow center at ~[95.4E, 6.0S]. The flow is significantly smoother than the surrounding tessera surfaces.

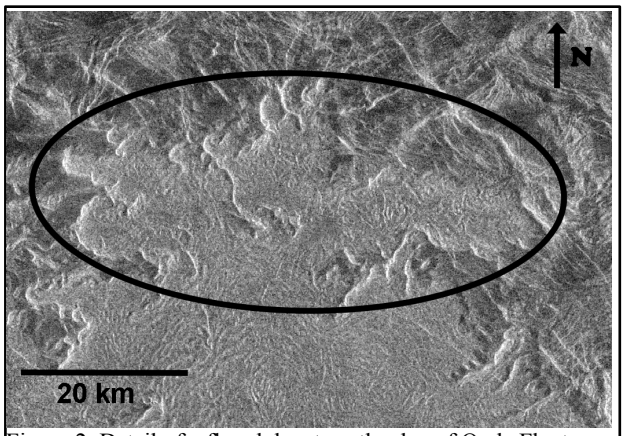

Figure 2. Detail of a flow lobe at north edge of Ovda Fluctus, ~[96.5E, 5.0S]. Note the festoon folds on the flow surface, esp. at bottom of image. The margin of the flow lobe in the ellipse has a fractal dimension of ~1.3, consistent with a pahoehoe basalt flow but not dacite or rhyolite.