

## Volcanological Setting of a Sinuous Rille Cluster on Venus;

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We generated a 3D perspective for a Venusian sinuous rille cluster (Fig. 1) by combining digital terrain models with Magellan radar images, and using the process described in the companion abstract "Tectonic Deformation of Sinuous Rilles and Canals on Venus". This perspective image illustrates regional settings of the sinuous rille cluster located at 12S090. This region contains a multiple domed complex which is clearly revealed in cross section (Fig. 3). The channels emanate from the flank of the central dome structure.

This cluster of sinuous rilles is of significant interest. It contains the largest sinuous rille on Venus and therefore has the greatest opportunity for success in depth determination by stereo measurements. A number of attempts, including topographic deformation, have been made to characterize the geometry of Venusian channels [1][2][3]. However, no measurements of depths of sinuous rilles have been done. Sinuous rilles are created by constructional and/or erosional processes [4]. Here we present some preliminary measurement results.

Stereo measurements were made using the methodology described by Plaut [5]. Due to a number of technical difficulties, measurements of the depths were limited to the source region (Fig. 2). Depths in the collapsed pit were determined to be on the order of 680 m. With this measurement we were able to calculate a minimum volume estimate of approximately 700 km<sup>3</sup> for the magma chamber. This volume is the biggest of any measured collapsed source of sinuous rille on the Moon.

The longitudinal profiles of these sinuous rilles (Fig. 4) clearly show multiple changes in slope of the region. In fluvial systems channel morphology is a function of discharge rate and slope. The wavelengths and widths of segments A, B and C (Fig. 2) are different and indicate differences in slope and/or discharge for the formative lava-flow system (Fig. 4).

Results: The maximum measured depth of the largest sinuous rille is about 680 meters. This sinuous rille is likely the deepest on Venus. For comparison, we examined depth profiles from sinuous rilles on the Moon. Measured depths of selected Lunar sinuous rilles are less than 900 meters [6]. The range of estimated slopes of the Venusian sinuous rilles is about 0.0019 - 0.0046. This range of morphology may be attributed to discharge, slope, and erosional processes of the lava flow.

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Figure 1. 3D perspective of a sinuous rille cluster and the surrounding region located at 12S090. The sources of many sinuous rilles originate from a multiple-domed complex.



Figure 2. Magellan image of a sinuous rille cluster located at 12S090.

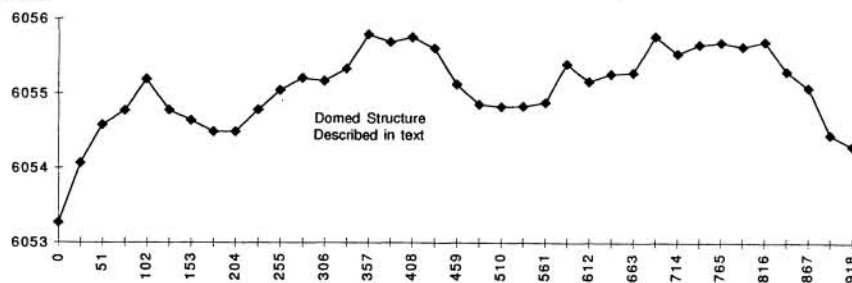


Figure 3. Cross-section of the multiple domed complex. (Location of a part of the cross section is shown in Figure 2.)

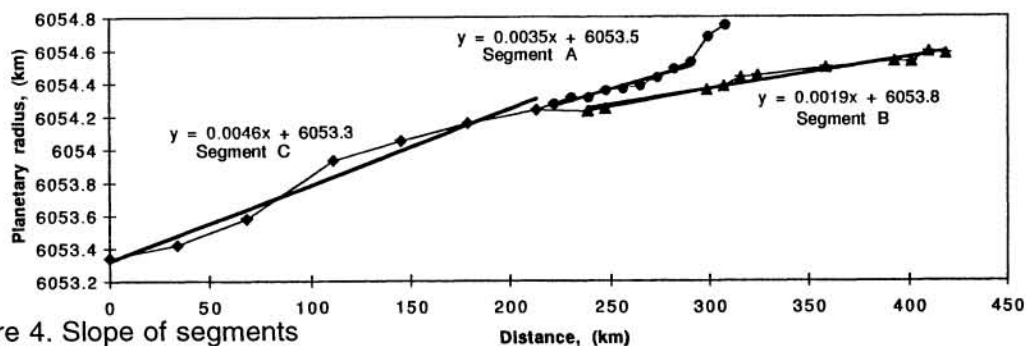


Figure 4. Slope of segments