ANALYSIS OF VENUSIAN CANALI, DETERMINATION OF EMPLACEMENT DIRECTION: D.B.J. Bussey[1,3], S-A Sørensen[2], and J.E. Guest[1], [1] University of London Observatory, University College London U.K., [2] Department of Computer Science, University College London U.K., [3] Now at Lunar and Planetary Institute, Houston, Texas

The Magellan high resolution radar mapping of Venus discovered several different types of channels on the surface of the planet [1]. Some closely resemble the sinuous rilles on the moon whilst the most spectacular type of channel, referred to as 'canali', are simple channels, up to several thousand kilometres long. One of the most remarkable features of the canali is that they often appear to have undergone erosional processes during their formation. Ambient conditions on Venus make any association with water unlikely, and point to a volcanic origin.

Early studies of the venusian surface [1,2] have found the density of canali type channels to be unusually high in a region south east of Aphrodite Terra measuring approximately 30° square. This area has been re-examined and twelve channels have been identified and studied. The data collected include length, present day slope, and cross-sectional profile. Determination of the latter is based on the oblique incident angle of the Magellan radar, which results in an association of characteristic signatures with specific geometry's for channels running in a North-South direction [3]. Four types of cross-sectional profiles are identified; erosional, leveed, roofed and indistinct, and a map of the inferred cross-sectional profile has been produced for each point along the length of all the channels. The analysis also included determining in which direction the channels were emplaced. Present day slopes can be calculated using the GTDR data set. However there is the problem that there may have been large scale deformation of the region being considered so that the slopes that are seen now may be significantly different from those present when the channels were formed. In order to decide on the orientation of formation it is necessary to consider the physical attributes of the channels, such as evidence for erosion or branching of the channel. Clearly it is more probable that a channel bifurcates than two separate channels merge to form one channel. Another piece of evidence for determining flow direction is the presence of a flow deposit emanating from one end of a channel.

Of the twelve channels studied, it has been possible to determine the direction of emplacement for seven. For each channel section the present day average slope is measured by dividing the difference in planetary radius of the two ends of the channel section by the great circle distance between them. The results are shown in Figure 1. Negative gradients are represented by positive angles for slope on the y axis. It is reasonable to assume that when the channels were emplaced, the vast majority of slope angles were positive. Assuming the

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orientation of any vertical deformation to be random, large scale changes should not affect the mean slope, as the gradients of the channel sections will have been increased or decreased to the same extent. We would expect the deformation to widen the range of slope angles, producing some which are relatively large, and also some negative slope angles where the channel section now lies in an opposite direction to the one when it was emplaced. Analysis of the data indicates that there has been some movement in this region, 13% of the slope angles are negative. Also there are some slope angles which are much greater than the average. There appears to be no correlation between slope angle and section type. This is remarkable as steeper terrain would promote mechanical erosion. Figure 1 also shows that the channels were emplaced on very low inclines, the average slope being 0.04°.

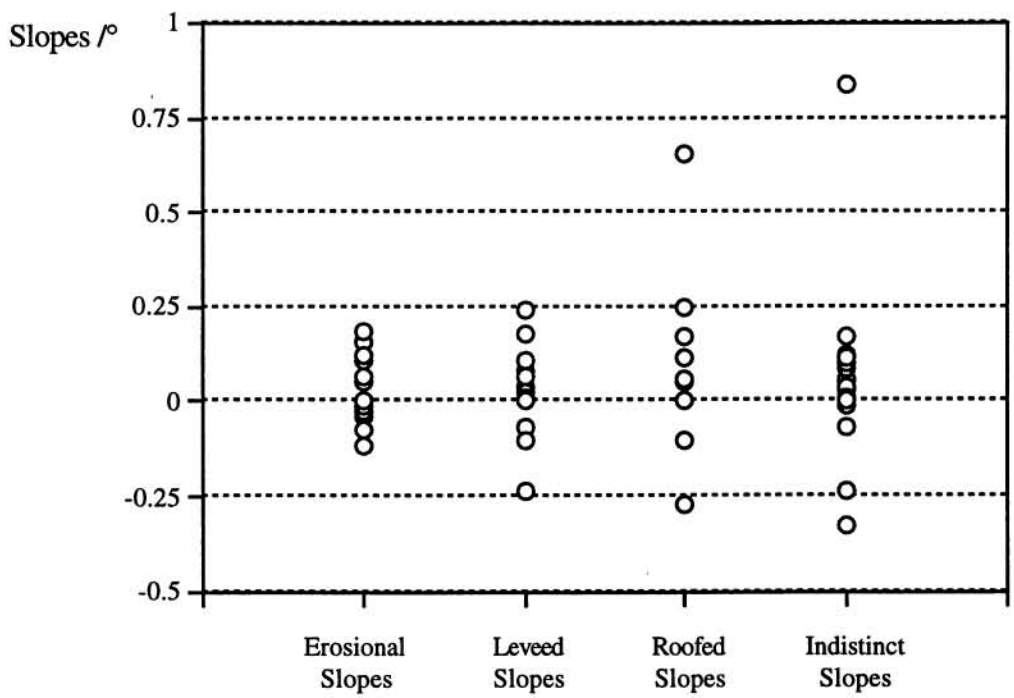

Figure 1. A graph showing the current day slope angles for different channel sections. Negative gradients are represented by positive angles for slope on the y axis.

References. [1] Baker et al. (1992) *JGR* **97**, 13,421. [2] Bussey, D.B.J., and J.E. Guest. (1992) *International Colloquium on Venus*, LPI Contrib. **789**, 18. [3] Bussey et al. (1995) *JGR* **100**, 16,941.