TESTING CHANNEL ORIGIN HYPOTHESES IN THE MAHUEA THOLUS QUADRANGLE (V-49), VENUS. E. W. Baker, N. P. Lang, and C. A. Nypaver, Department of Geology, Mercyhurst University, 501 East 38th St Erie, Pa 16546

Introduction: There are multiple hypotheses concerning the formation of channels on Venus' surface. Proposed formation methods include: 1) formation via above-surface lava flows, 2) collapsed subsurface lava tubes, and 3) fluvial processes [1, 2].

To help test between proposed channel formation hypotheses, we have utilized Magellan synthetic aperture radar (SAR) satellite imagery (~75 m/pxl) to construct large-scale geologic maps of six channels in the V-49 quadrangle (**Figs. 1-2**: 25° to 50°S, 150-180°E) – Vishera, Matlalcue, Helmud, Umaga, Lusaber, Austrina; this region hosts the largest concentration of channels on Venus, making it an ideal location to test channel formation hypotheses.

Methodology: Magellan SAR imagery of the V-49 quad was obtained via the USGS Map-A-Planet database. We used ArcMap to map channels and surrounding units, terrains, and features in our selected region. For mapped channels, we obtained sinuosity values, measured average width, and constructed elevation profiles.

Data:

Vishera Vallis (Sinuosity 1.58). Vishera Vallis is first visible at approximately 300 km east of Colijnsplaat Corona (**Fig. 2a**). For most of its 1040 km length, the upper channel branch trends parallel to a topographically high coronae flow. At 161°E 32°S, the channel trends upslope, and through this topographic high (**Fig. 3a-b**). The channel transects a relatively low section of the corona flow feature, suggesting uplift post channel formation. The lower branch of Vishera Vallis trends southeast towards Mahuea Tholus. The southern terminus of this lower channel length is obscured by Mahuea Tholus flows.

Matlacue Vallis (Sinuosity 1.3). Matlacue Vallis is located 220 km east of Vishera Vallis (**Fig. 2a**). Matlacue is the longest channel in the quadrangle at 1194 km. Upper Matlalcue trends east to west and across numerous topographic highs. The channel is not visible between 168.8°E 32.6°S and 170.1°E 33.1°S. Lower Matlacue Vallis trends downslope away from the upper channel and towards Mahuea Tholus (**Fig. 3c-d**). The Lower channel terminus is obscured by Mahuea Tholus flows.*Helmud Vallis (Sinuosity 1.49).* Helmud Vallis is located 363 km east of Matlacue Vallis (**Fig. 2a**). The easternmost edge of Helmud Vallis appears to align with the western end of Matlacue. This may indicate that Helmud and Matlacue Vallis share a common origin source. Furthermore, general alignment between all three northern channels is suggestive of a singular channel system. Helmud is the shortest channel in the northern mapping area, 1126 km in length (**Fig. 3e**).

Umaga Vallis (Sinuosity 1.62). Umaga Vallis is located in the Southwest corner of the quadrangle (**Fig. 2b**). The channel is 425 km in length, trending west to east. Umaga is heavily deformed by wrinkle ridges, fractures, and radar-bright flows associated with local shield volcanoes (**Fig. 3f**). The channel terminus is obscured by radar bright flows.

Lusaber Vallis (Sinuosity 1.36). Lusaber Vallis is first visible at 159.1° E 48.5° S, 372 km east of Umaga Vallis (**Fig. 2b**), and runs 845 km east-west (**Fig. 3g**). The western portion of the channel is heavily deformed by wrinkle ridges. The channel terminus is obscured by radar bright flows.

Austrina Vallis (Sinuosity 1.13). Austrina Vallis is located in the southeast corner of the quadrangle, 470 km east of Lusaber Vallis (**Fig. 2b**). The channel is emplaced between two topographic highs with high densities of wrinkle ridges, and is 460 km in total length (**Fig. 3h**). As in the northern mapping area, the visible southern channel lengths have similar east-west trends.

Conclusions: Channels in quadrangle V-49 broadly trend E-W and occur along the northern and southern edges of Zhibek Planitia. The northern channels likely originate from or near Colijnsplaat Corona, trending east and west with varying gradients. Channels in the southern group appear to extend outwards from Mena Colles with variable gradients that slope towards the east and west.

All channels in V-49 are deformed by wrinkle ridges and fractures. Given tectonic and topographic relationships, the channels appear to have formed after the corona flows and before regional long-wavelength warping. Channels have sinuosities of ~1.4, 0.4 points lower than the average for terrestrial river sinuosities [3]. Assuming V-49 channels formed by gravity-driven liquid, their close proximity to volcanic features and their tectonic/topographic relationships suggests an origin involving surface magmatic processes.

References: [1] Gregg T. and Greeley R. (1993) *Journal of Geophysical Research, 98 E6*, 10873-0882. [2] Lang N. and Hansen V. (2006) *Journal of Geophysical Research, 111 E4*, 1-15. [3] Komatsu G. and Baker V. (1994) *Geology, 22.1*, 67-70.

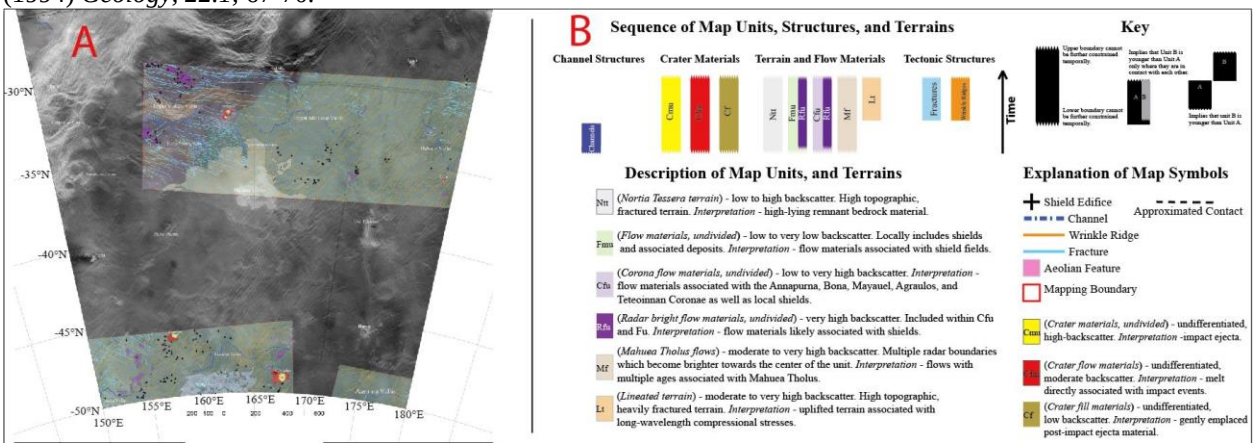
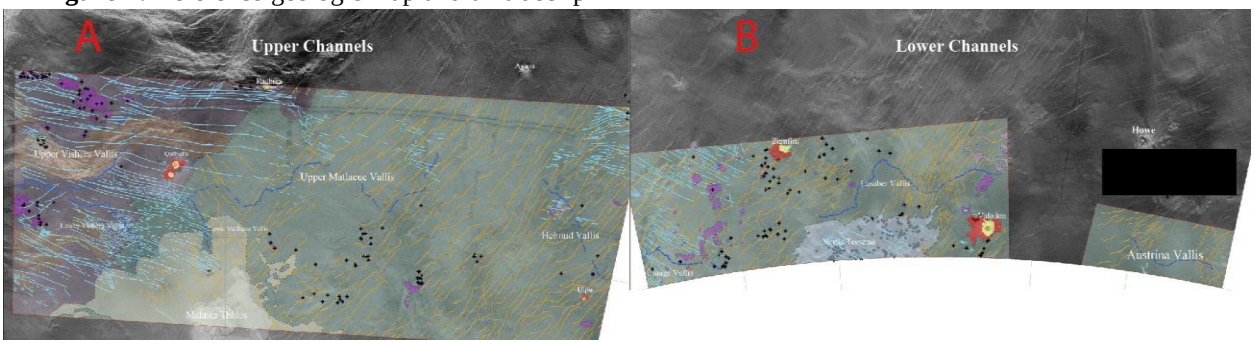


Figure 1: Reference geologic map and unit decrip-



tions.

Figure 2: Upper and lower channel maps.

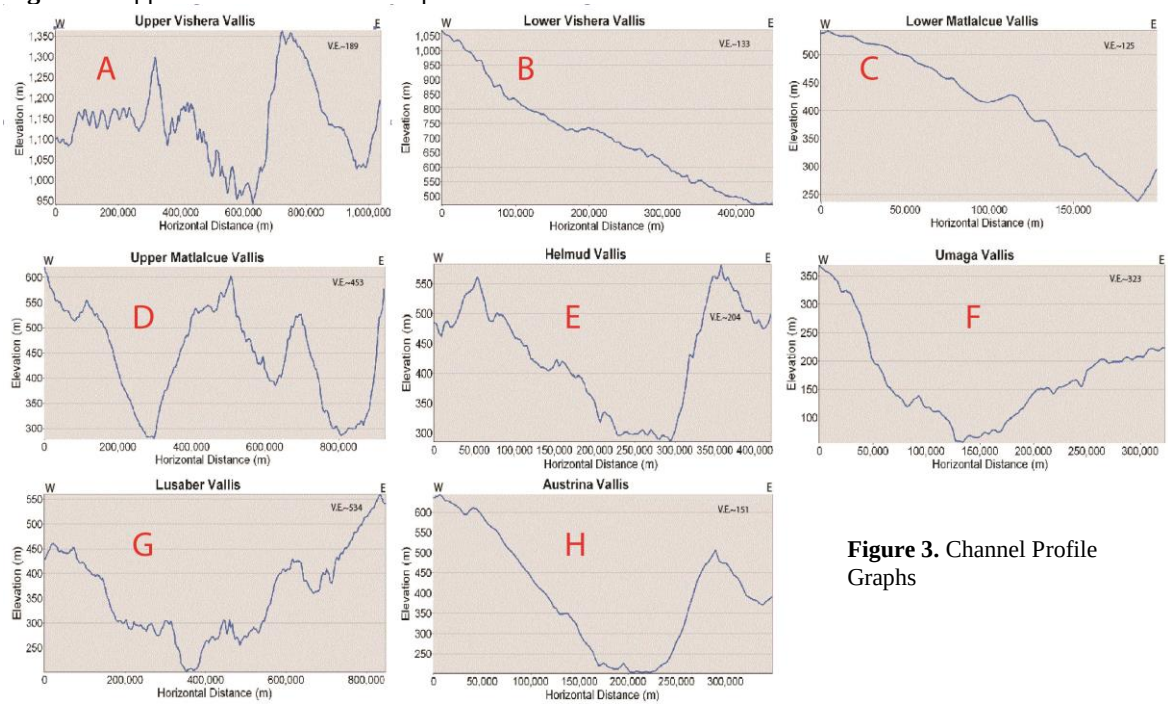


Figure 3. Channel Profile Graphs