**DETERMINING FLOW HISTORY AND DIRECTION FOR A POSSIBLE 6000 KM LONG EAST-WEST CANALI SYSTEM SOUTHEAST OF APHRODITE TERRA** V. Gupta[1] , R.E. Ernst[1,2], C. Samson[1], and D.W. Desnoyers[3], [1]Department of Earth Sciences, Carleton University, Ottawa, Canada, K1S 5B6, [2]Ernst Geosciences, 43 Margrave Ave., Ottawa, Canada, K1T 3Y2, Richard.Ernst@ErnstGeosciences.com, [3]Geological Survey of Canada, Natural Resources Canada, Ottawa, Canada K1A 0E8.

**Background:** Venusian canali are narrow sinuous channels which typically have widths of about <1-3 km and extend for distances of up to several thousand kilometres. They are in part constructional and in part erosional. They are generally interpreted to originate from the flow of a highly fluid lava, either komaiitic- or sulphur-rich [1,3], or by sub-surface fluid-flow [4].

Although the longest canale, Baltis Vallis, extends up to 6800 km [5], revised to 7100 km by [6], most canali are much shorter, with lengths between tens to hundreds of kilometres [5]. It is likely, however, that these shorter lengths represent segmentation of originally longer canali by crosscutting younger lava flows and structures [e.g. 7]. Knowing the full extent and distribution of canali is essential to identifying their source areas and terminations, and also to unravelling their flow histories.

**Present mapping**: Full resolution FMAP images from the Magellan mission are used to build on previous work [e.g. 6,7] in testing the potential of extending the known distribution of canali by tracing more subtle features, and toward correlating between separate segments. The area selected for the present study (Fig. 1) (144° to 216° E, 24° to 48° S) contains mainly E-W canali segments (but also some bifurcations) distributed over a distance of >6000 km. Although there are some significant gaps, the general E-W distribution of segments E, H, K, L, M, O and P suggests an originally continuous system. Other segments, such as F, G, R, N are bifurcations, representing changes in flow paths. Using along-canali topographic profiles and geometrical arguments we attempt to determine the flow history of this potentially >6000 km long canali system (provisionally assuming that the canali segments were originally connected).

**Three-way intersection:** The intersection of the three canali segments E, F and G (Fig. 1 & inset) suggests a two-stage flow history. Unfortunately, the gap between E, F and G precludes definite conclusions. However, based on the criteria of [7] in which the initial flow direction is along the straightest line path, it would appear most likely that the initial path was E-G (or G-E). A contrary result seems indicated by the topography. Topographic profiles (elevation measured approximately every 10 km) along the three segments (Fig. 2) reveals a smoother variation along the transition between E & G than between E & F, consistent with an initial flow path of E-F (or F-E), and with a subsequent flow path of E-G (or G-E). Specifically, segment F, adjacent to the three-way intersection, exhibits a narrow (80 km wide) topographic high (200 m of elevation) suggesting that the abandonment of E-F (or F-E) path was caused by the late development of a topographic block. Furthermore, since the F segment is blocked, it would suggest that the initial path was E-F (not F-E) and would imply that the source for the system was to the west.

**Possible canali termination:** A possible outflow structure is identified at the eastern end of segment P (Fig. 3) suggesting this as the possible termination of the canali system. If correct, then the source for the canali system was to the west.

**Topographic slope:** The topographic profile along the proposed canali system (Fig. 4) exhibits a sharp rise of approximately 500 m associated with proximity to the boundary of Aphrodite Terra to the northwest of the study area. However, for most of the length of the canali system, the topography is relatively smooth and slightly increases to the east (300 m of elevation over a distance of 4500 km). Since post-canali tectonism has been shown to obscure primary canali flow patterns [5,8] the preserved slope indicating a source to the east may also not be reliable.

**Discussion:** Our observations suggest that the canali segments mapped in the study area represent a mainly E-W canali system extending for >6000 km. However, flow history and direction are not yet well constrained.

**References:** [1] Baker et al. (1992) JGR 97 (E8), 13421-13444. [2] Komatsu et al. (1993) Icarus 102: 1-25. [3] Kargel et al. (1994) Icarus 112: 219-252. [4] Lang & Hansen (2006) JGR 111, E04001. [5] Baker et al. (1997) in: Venus II, Univ Ariz Press, pp. 757-793. [6] Blinova et al. (2004) 40th Vernadsky-Brown Microsymposium, Moscow. [7] Studd et al. (2006) 44th Vernadsky-Brown Microsymposium, Moscow. [8] Komatsu & Baker (1994) Icarus 110: 275-286.

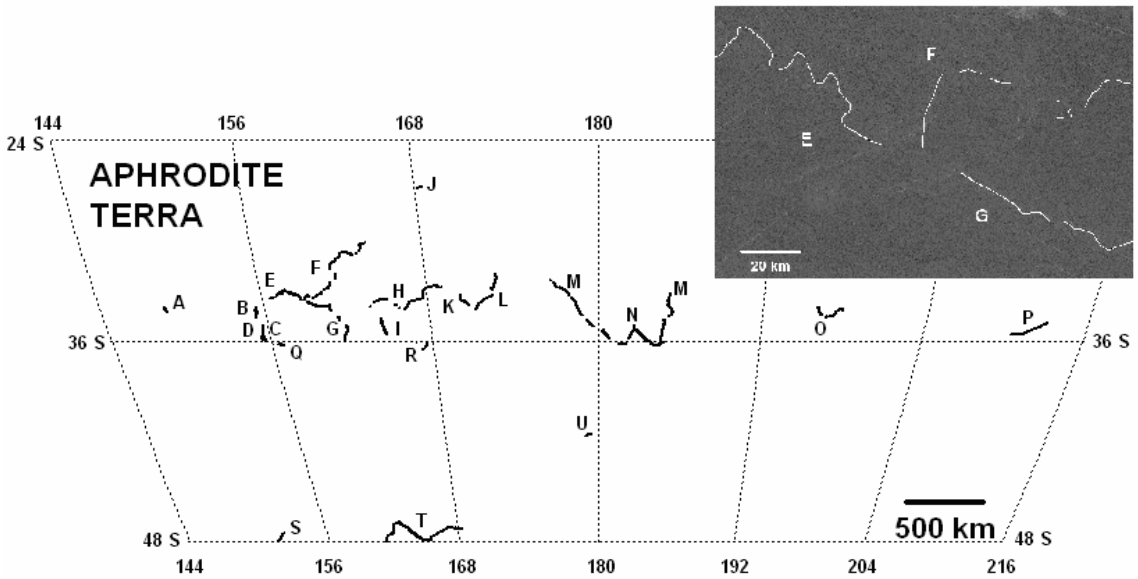


Fig. 1. Distribution of mapped canali. Canali segments F, H and L correspond to Vishera Vallis, Matlalcue Vallis and Helmud Vallis, respectively.

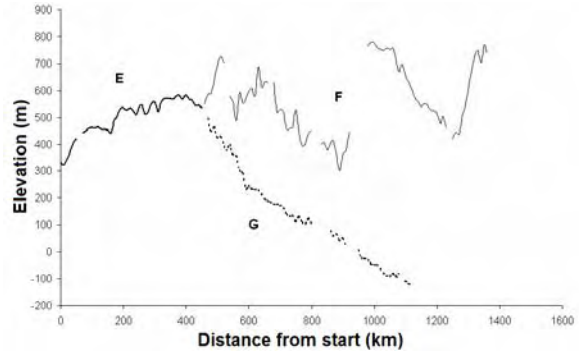


Fig. 2. Along-canali topographic profiles for segments E, F and G of the three-way intersection. Vertical scale with respect to mean planetary radius. Start point is 156.5° E, 33° S.

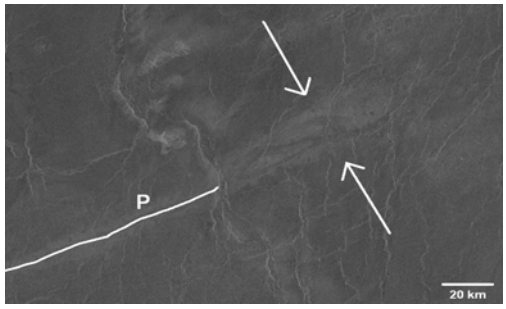


Fig. 3. Arrows pointing to possible outflow structure emanating from the eastern end of segment P, possibly marking terminus of flow.

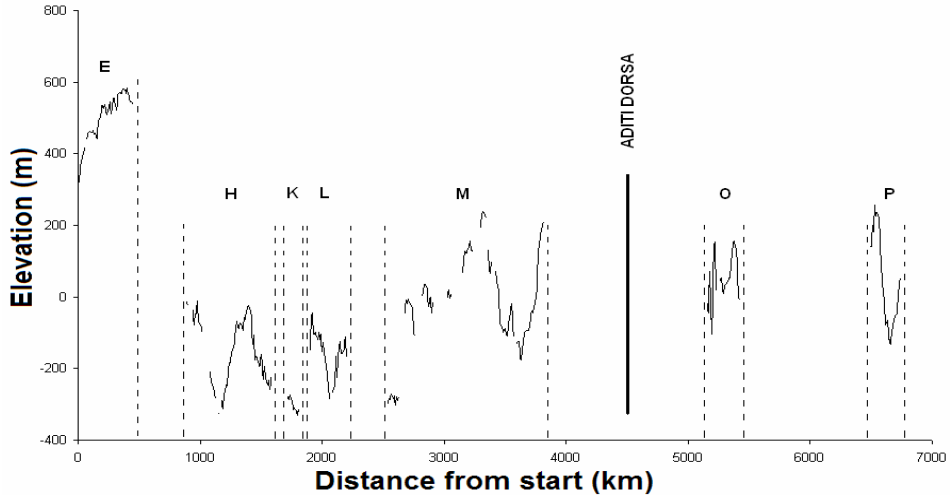


Fig. 4. Topographic variations along the main W-E segments of the proposed canali system.Vertical scale with respect to mean planetary radius. Start point is 156.5° E, 33° S.