

DYKE SWARM HISTORY OF LUMIMUUT CORONA REGION, VENUS. L. El-ouali¹, H. El Bilali^{2,3}, R.E. Ernst^{2,3}, N. Youbi¹ ¹Department of Geology, Faculty of Sciences-Semlalia, Cadi Ayyad University, Marrakesh, Morocco; eloualilaila2@gmail.com. ²Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada; hafidaelbilali@cunet.carleton.ca; Richard.Ernst@Carleton.ca, ³Faculty of Geology and Geography, Tomsk State University, Tomsk, Russia;

Introduction:

The relationship between coronae and chasmata (rifts) is a major outstanding question and has been extensively discussed (e.g. [1-6]). Detailed geological mapping of corona can potentially reveal insights into the corona- chasmata relationship. We have selected Lumimuut corona (Fig. 1) for detailed mapping. This large corona is located within Taussig Quadrangle V-39, along the 10,000 km long Parga Chasmata. This quadrangle was mapped at a reconnaissance scale of 1:5,000,000 [7].

Research Goals: In this research we aim to produce a much more detailed map (1:500,000 scale) of graben-fissure lineaments and lava flows toward producing a detailed geological history of this study region. Herein we report on graben-fissure mapping (which we interpret as generally overlying mafic dykes based on criteria discussed in [8, 9]). A total of several thousand graben-fissure lineaments have been mapped in the study area, and grouped into radiating, circumferential, and linear swarms (Figs. 2,3).

Methods: Full resolution (up to 75 m/pixel) right- and left-looking Synthetic Aperture Radar (SAR) images obtained by the Magellan spacecraft were downloaded from the Planetary Data System (PDS). The ArcGIS software suite was used to trace the graben-fissure systems and other features. Detailed linework is shown in Figure 1 and generalized in Figure 2.

Dyke Swarms: Initial mapping of the graben-fissures is shown in Figure 2. These graben-fissures are provisionally grouped into distinct sets and linked to magmatic centres in Figure 3. Notably, there is an impressive radiating swarm centred on Lumimuut Corona (Fig. 3).

Lumimuut Corona Swarm(s): Lumimuut Corona is located about 310 km NE of Toma Mons, 390 km NW of Holla Corona, and 970 km SW of Dhorani Corona. Lumimuut Corona shows both radiating and circumferential dykes. The radius of the circumferential swarm is about 180 km. The green and yellow NE-trending swarm that is crossing Lumimuut Corona is likely part of a radiating swarm from Dhorani Corona (Fig. 3). The NW trending purple swarm may be linked to Ledoux Patera, located 850 km to the NW. Extensive flooding by younger lavas, most likely emanating from Toma Mons to the SW and Holla Corona to the SE of

Lumimuut Corona, appears to have obscured parts of the radiating systems.

Holla Corona Swarm: Circumferential graben-fissure lineaments are associated with Holla Corona and have a radius of about 110 km. No radiating dykes linked to the Holla Corona were identified. This is possibly due to younger flooding emanating from Holla Corona itself. The pink NE-trending swarm (Fig. 3) is most likely also linked to Dhorani Corona.

Additional Centres: Two additional centres are associated with dykes. One, located SW of Holla Corona, shows only circumferential dykes. The second, located west of Lumimuut Corona, shows only a radiating dyke swarm (Fig. 3)

Future work: Mapping efforts are on-going with the goal of completing mapping of all the swarms and then working on the flows in order to determine the flow history of the region. A broader goal is establishing the relationship between the magmatic magmatic centres in this study area, including coronae and mons, and the Parga Chasmata rift zone.

References: [1] Hamilton, V.E., Stofan, E.R. (1996) *Icarus*, 121, 171–194. [2] Martin, P., Stofan, E.R. (2004) 35th LPSC, Abstract no. 1576. [3] Martin, P., et al. (2007). *JGR*, 112, E04S03. [4] Smrekar, S.E., et al. (2010). *JGR*, 115, E07010. [5] Ivanov, M.A., Head, J.W. (2015) *Planet. Space Sci.*, 113-114, 10-32. [6] Graff, J.R., et al. (2018) *Icarus*, 306, 122-138. [7] Brian, A.W., et al. (2005). USGS SIM 2813. [8] Grosfils, E.B., Head, J.W. (1994) *GRL*, 21, 701–704. [9] Ernst, R.E. et al. (2003) *Icarus*, 164, 282–316.

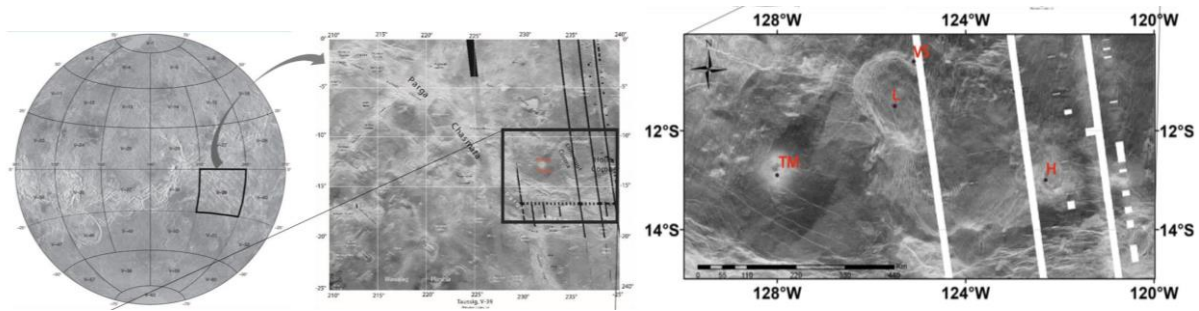


Figure 1: Magellan SAR Image showing the location of the study area. L = Lumimuut Corona. TM = Toma Mons. H = Holla Corona. VS = von Suttner impact crater.

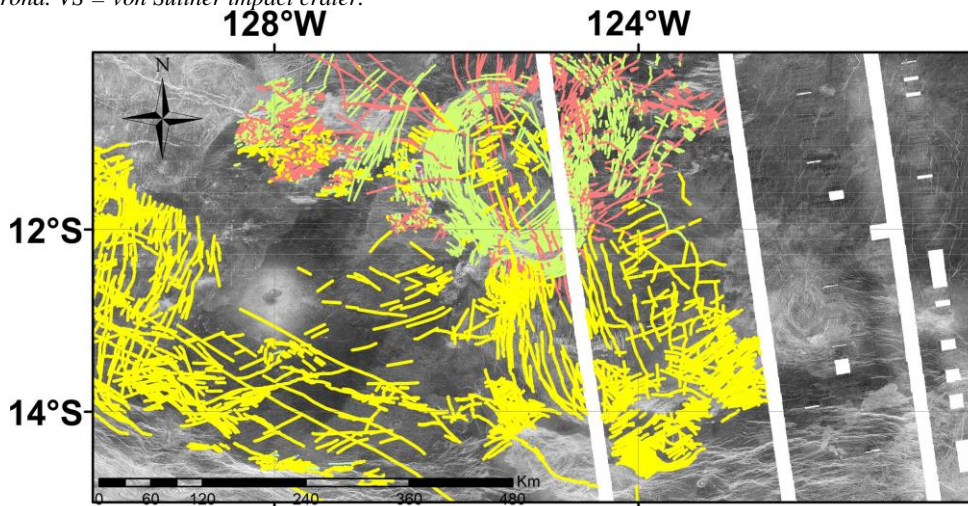


Figure 2: Detailed mapping of grabens. Seral thousand lineaments mapped so far.

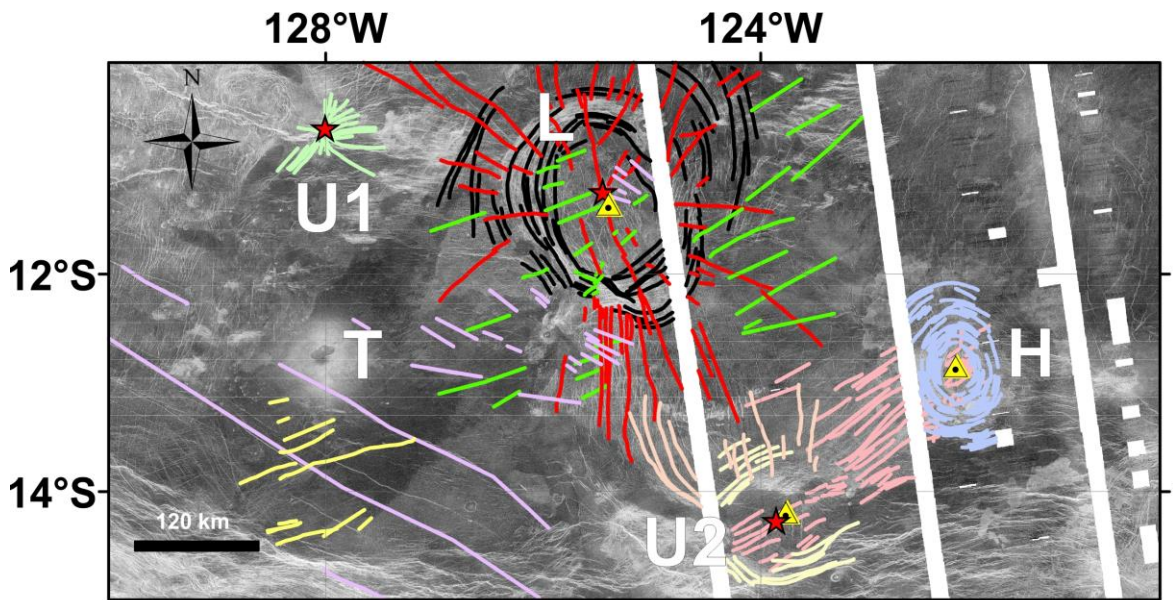


Figure 3: Generalized distribution of graben-fissure lineaments grouped into distinct sets, distinguished by colour. LC = Lumimuut Corona. TM = Toma Mons. HC = Holla Corona. U1 and U2 are unnamed centres. Stars locate radiating centres. Triangles located circumferential centres.