EXTENSIONAL LINEAMENTS OF NW WAWALAG PLANITIA, STANTON QUADRANGLE (V-38), VENUS. J. Ounar[1], H. El Bilali[2], [3] R.E. Ernst [2], [3], J.W. Head[4], N. Youbi[1], Department of Geology, Faculty of Sciences-Semlalia, Cadi Ayyad University, Marrakesh, Morocco; jihaneounar@gmail.com, [2]Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada; richard.ernst@ernstgeosciences.com [3]Faculty of Geology and Geography, Tomsk State University, Tomsk, Russia, [4]Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, Rhode Island, USA.

Introduction: Outstanding questions on lineaments (in regional volcanic plains) include: 1) What is the origin of lineaments in the regional plains that make up the Planitia? 2) What is the sense of deformation (e.g., extension, compression, shear)? 3) Do the lineaments decrease in abundance as a function of time (distribution in older versus younger units)? 4) What is their orientation (particularly in relation to regional structures)? 5) Do any of these lineaments show radial or circumferential structure that might be linked to potential centers of magmatism [5]? 6) Can we distinguish extensional lineaments related to underlying dykes from purely tectonic extensional structures?

Study Area: The study area is located south of Atla Regio, in northern Wawalag Planitia just south of Jokwa Linea [11] (Fig.1).

Wawalag Planitia: We have selected Wawalag Planitia for detailed mapping (1:500,000) in order to attempt to provide insights into the above questions related to its lineaments particularly those of extensional origin. Wawalag Planitia spans southeast Stanton Quadrangle (V-38) southwest Taussig (V-39), northeast Isabella (V-50), and northwest Imdr Regio (V-51). Of these, only V-39 has been mapped at the quadrangle scale [5]. Preliminary geological mapping results for V-50 are reported in [2-3]. Preliminary mapping results for V-51 are reported in [9].

Methodology: To map this area (Wawalg Planitia), we used Magellan SAR images with resolution (75 m/pixel) and the results are presented through ArcMap 10.7, and JMARS (Java Mission Planning and Analysis for Remote Sensing).

Observations and Interpretations: We have mapped and identified 20,000 extensional lineaments, 5000 wrinkle ridges, 10 magmatic centers, 4 impact craters, 1 tick, lava flows. Small shield volcanoes are concentrated in the eastern and south western parts of the area. In the rest of this abstract we provisionally interpret that the extensional lineaments are linked to underlying dykes.

Dyke swarms and magmatic centers: Studies of Planitia have generally been focused on their flows and not their dyke swarms. However, this study is showing that Wawalag Planitia, is rich in dykes which are linked to numerous magmatic centers (10) (Fig. 2). Figure 6 shows that R1 dykes (yellow) radiate from magmatic center 8. The R3 (red) and Q1 (green) (Fig. 2) dykes each converge toward a magmatic center to the north in Jokwa Linea [cf. 8] (Fig. 2 & 4). Yellow dykes (of center 8) seem to cut green circumferential dykes (of center 1) (Fig. 4). So provisionally center 8 is younger than center 1. Cross-cutting relationships indicate that R3 (red) dykes are younger than R1 dykes (yellow) (Fig. 5) and thus the magmatic center in Jokwa Linea, to which the R3 dyke swarm [8] is linked, is younger than magmatic center 8 (the source of R1).

Lava Flows: The age relationships between lava flows show that: 1). The light black flows are younger than dark black flows (Fig. 5 & 6). 2). The dark grey flows are older than grey flows and younger than light black flows (Fig. 5 & 6). 3) The grey flows are older than light grey flows (Fig. 6).

Wind effect: Wind streaks trending S-N in SW Wawalag Planitia, show the effect of small shield volcanoes. (Fig. 7).

Conclusion: Our mapping reveals the sources of the different mapped swarms: 1). The western ones come from Jokwa Linea (to the north), such as R3 (Red), Q1 (Dark green), and Q4 (Light green). 2). The eastern ones are from the same Jowka Linea R5 (pink), or from elsewhere in the Planitia. For instance, swarm R1 (Yellow) radiates from center 8. The oldest flows are the dark black flow, but the mapping is still in progress to identify the youngest flows.

References: [1] Banerdt, W.B. et al. (1997). Venus: Eds. S.W. et al., Univ. of Ariz. Press. [2] Bleamaster, L.F. (2006) 37th LPSC Abstract 2233. [3] Bleamaster, L.F. (2008). Abstr. Ann. Mtng Planet. Geol. Mappers, Abstr. [4] Brian, A.W., et al. (2005) USGS SIM 2813. [5] Buchan, K.L., Ernst, R.E. (2021). Gond. Res. Res. 100, 25–43.[6] Ford, P. G., Pettengill, G.H. (1992) JGR, 97, 13,103-13,114, 1992. [7] Ivanov, M.A., Head, J.W. (2011). Planet. Space Sci., 59, 1559-1600. [8] Ivanov, M.A., Head, J.W. (2015). Planet. Space Sci., 113-114, 10–32. [9] Lang, N.P., Thomson, B.J. (2020). Planet. Geol. Mappers, abstr 7037. [10] Masursky, H., et al. (1980). JGR, 85, 8232-8260, 1980. [11] Oukhro et al. (2021) LPSC abstr. 1087.

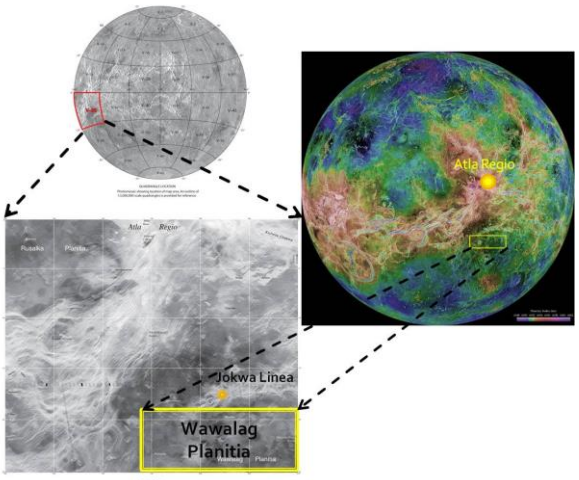

Figure 1: *Study Area of Wawalg Planitia.*

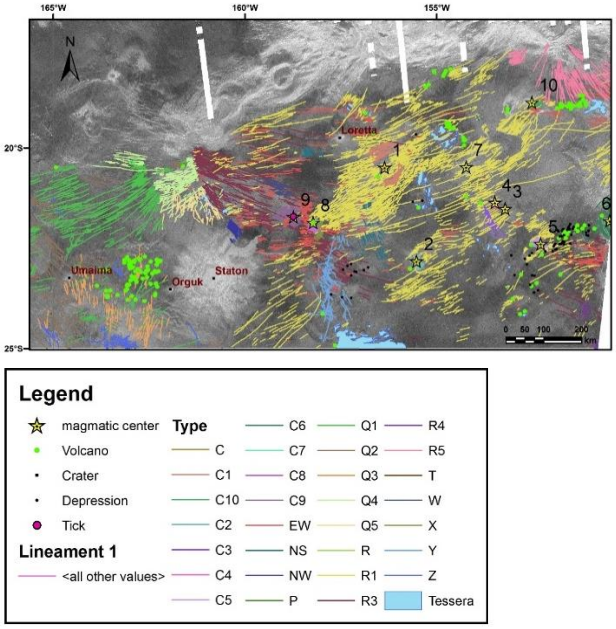

Figure. 2: *Extensional lineament mapped in study area, Wawalag Planitia.*

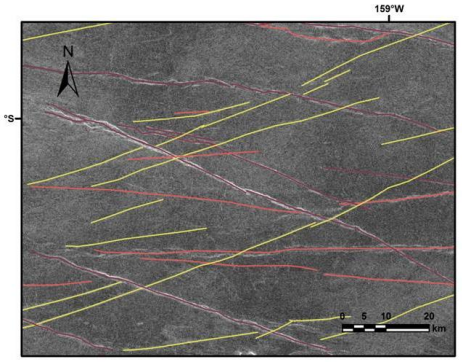

Figure. 3: *Dykes R3 (Red) younger than R1 (Yellow).*

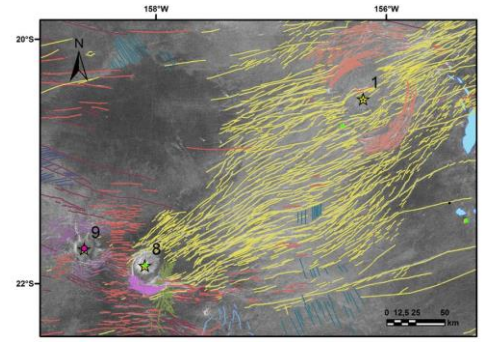

Figure 4: *Dykes R1 (Yellow) concentrate towards center 8.*

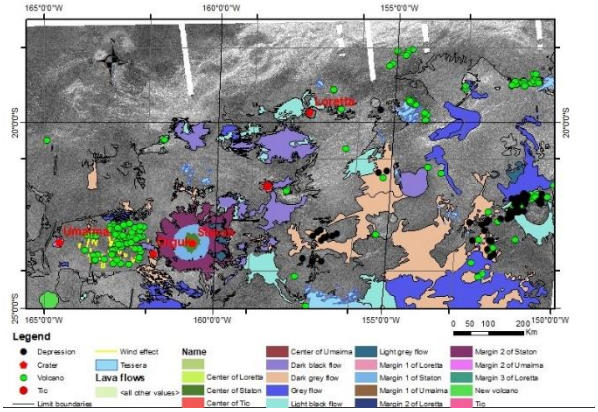

Figure 5: *Preliminary mapping of lava flows in Wawalag Planitia.*

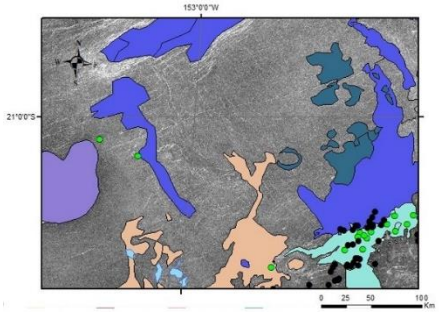

Figure. 6: *Age relationship between the flows.*

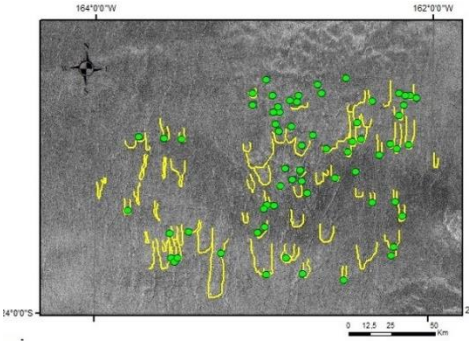

Figure.7: *Interaction of wind (from south) with small shield volcanoes (green).*