WESTERN JOKWA LINEA GROOVE BELT, SE STANTON QUADRANGLE (V-38), VENUS: PART OF TRIPLE JUNCTION RIFT SYSTEM. R. Oukhro[1], H. El Bilali [2,3], R.E. Ernst [2,3], J.W. Head[4], N. Youbi[1]. [1] Department of Geology, Faculty of Sciences-Semlalia, Cadi Ayyad University, Marrakesh, Morocco; [2]Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada; [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: Lineae are elongated regional features on Venus that are associated with extensional lineaments that occur together in narrow elongated topographic highs. Lineae have also been termed fracture belts, densely lineated material, and more recently, groove belts (see summary of nomenclature in [1,2]). Many interpretations emphasize a extensional origin [2], although a recent interpretation suggest they can represent deformation belts (exhibiting both extensional and compressional features) between small crustal blocks [3]. Excellent examples of groove belts (Antiope, Hippolyta, and Molpadia Lineae) are described from Lavinia Planitia (e.g. [4-5]). Detailed mapping of linea will provide more precise constraints on their origin.

Study Area: We focus on Jokwa linea (Fig. 1) which extends for 1700 km from within southeastern Stanton Quadrangle, V-38 and eastward into the adjacent Taussig Quadrangle, V-39 (Fig. 1), where it has been previously mapped at 1:5,000,000 scale [6]. However, no Quadrangle scale mapping exists for V-38.

Mapping Methodology: We used full-resolution (75 m/pixel) Magellan SAR images and its altimetry data in ArcGIS ArcMap v. 10.3; JMARS (Java Mission-planning and Analysis for Remote Sensing) [7] and ArcGIS 10.3 ArcScene were used to create topographic profiles and digital elevation models (DEMs), respectively. Geological units are distinguished based on changes in radar properties, topography, morphology and stratigraphic relationships (e.g., [1]).

Our mapping is at 1:500,000 scale, and builds on our initial analysis of the Jokwa linea graben systems, interpreted to overlie dykes [8]. Complementary graben-system mapping of the Wawlag Planitia, adjacent to the south, is being done by [9].

Results:

Graben systems overlying dykes: 18,750 extensional lineaments were mapped (Fig. 2) and are mainly interpreted as grabens overlying dyke swarms, although some lineaments parallel to the overall ENE-WSW trend of Jokwa linea are likely normal faults associated with rift formation. Six magmatic centres (labelled 4-9 in Fig. 2) were defined on the basis of their radiating dyke swarms, and most are associated with a central magmatic centre; the largest is Kolias corona (#9 in Fig. 2). Based on cross cutting relationships of the graben systems, their age order is: Purple radiating swarm of centre 4 is younger than the blue radiating swarm of centre 5. Green radiating swarm from magmatic centre 7 is younger than the red radiating swarm of centre 6. Yellow radiating swarm of centre 9 is older than the brown radiating swarm of centre 8.

Topographic variations: Topographic profiles along and across Jokwa linea (Figs. 2 and 3) reveal a generally flat topography outside Jokwa (in Wawalag Planitia both to the north and south), but within Jokwa linea there is rift formation with associated uplift on the flanks of the rift (‘rift flank uplift’; see red arrows in Fig. 3), and locally higher topography along the rift where the magmatic centres are located (Figs. 2 and 3). The highest topography is associated with Kolias Corona (2800 meters) (#9 in Fig. 3).

This rift is not deep, which we interpret to mean that it was filled by volcanic activity associated with rifting centers (green stars in Fig. 4), and also lava flows coming from the north; alternatively, this could be an initial, shallower stage of the opening rifting.

Triple junction rifting: Jokwa linea bifurcates to the east of our map area and the overall linea pattern suggests triple junction rifting (Figs. 3 &. 5). The association of a major magmatic centre, Kolias corona centre, at the focus of the triple junction rifting is suggestive of a link with an underlying mantle plume centred at Kolias corona.

References: [1] Ivanov, M.A., Head, J.W. Space Sci., 2011, V. 59, P.1559-1600.[2] Ivanov, M.A., Head, J.W (2015), 113-114, 10–32. [3] Byrne, P.K. et al. (2021) PNAS, 118, e2025919118. [4] Ivanov, M.A., Head, J.W. (2001) USGS Sci. Invest. Map 2684. [5] Fernández, C. et al (2010) Icarus, 206, 210-228. [6] Brian, A.W. et al (2005) USGS, SIM 2813. [7] Christensen, P. R. et al. (2009) AGU Fall Meeting, Abstract #IN22A-06. [8] Oukhro R. et al. (2022) LPSC 1087. [9] Ounar J. et al. (2022) LPSC 1162.

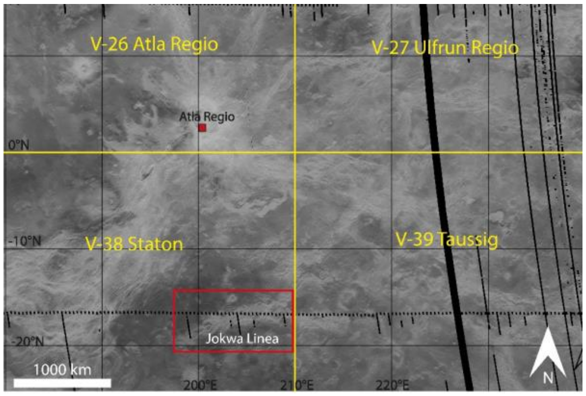

Fig. 1: *Location of the map area in the western portion of Jokwa linea, south of Atla Regio.*

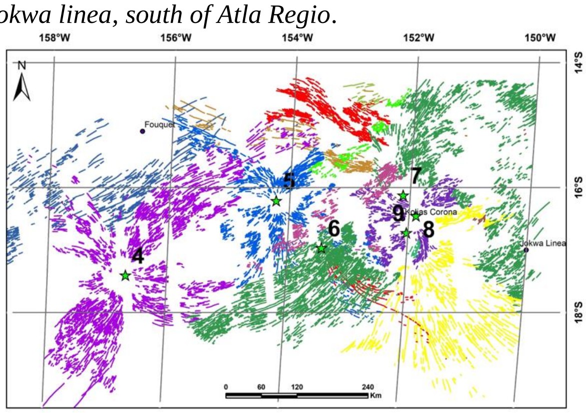

Fig. 2*: Distribution of radiating graben systems (dyke swarms) within the study area of western Jokwa Linea. Numbers 4-9 show magmatic centres, which are also the focus of the interpreted radiating dyke swarms.*

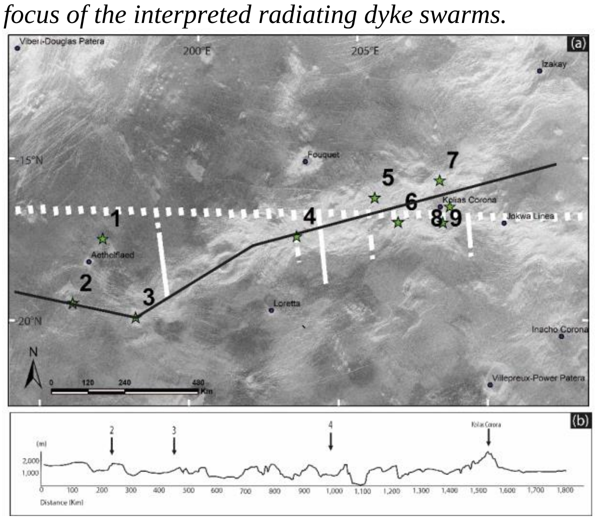

Fig. 3: (a) *Schematic map of the Western part of Jokwa;* ***(b)*** *East-West profiles along the Jokwa linea. The number in part b corresponds to the magmatic centres shown in part a.*

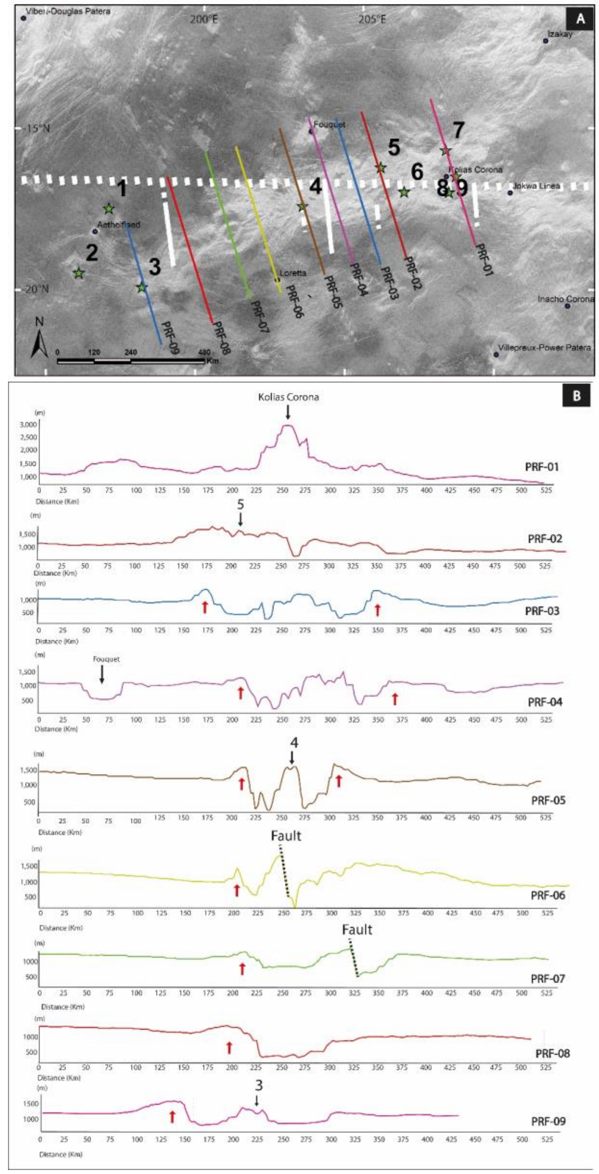

Fig.4: (a) *Jokwa Linea: a schematic map with positions of the profiles;* ***(b)*** *North-South profiles along the Jokwa linea.*

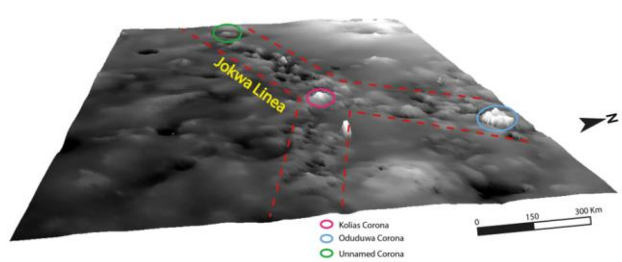

Fig. 5: *Perspective views of Magellan Topography image, generated using ArcGIS 10.3 ArcScene*