DETAILED MAPPING, SWARM INTERACTIONS, AND GEOLOGICAL HISTORY OF ONENHSTE'S DYKE SWARMS AND SURROUNDING CORONAE IN PARGA CHASMATA, SE OF ATLA REGIO, VENUS.

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Introduction: Parga Chasmata is a 10,000 km long rift system on Venus with abundant coronae (enigmatic circular tectono-magmatic features) (Fig. 1a). To further investigate the rift-corona relationship, detailed 1:500,000 geological mapping was focused on Onenhste Corona and the surrounding region (16˚-24˚S, 145˚-131˚W) [1]. This region hosts numerous coronae that formed within the Parga Chasmata rift system and adjacent Wawalag Planitia to the south (Fig. 1a).

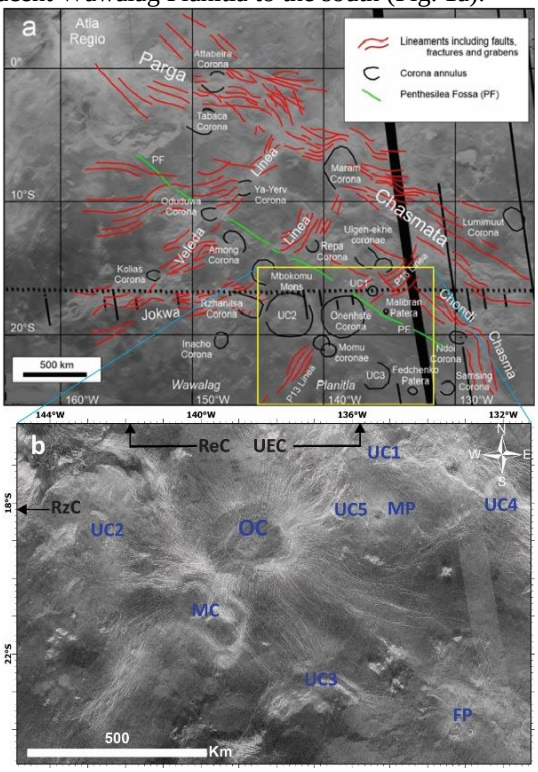

Fig. 1: *(a) Major geological features of the northwestern Parga Chasmata region and location of the study area (square box). (b) Magellan SAR image, OC: Onenhste Corona, MC: Momu Coronae, UC 1-5: Unnamed Coronae 1-5, MP: Malibran Patera, FP: Fedchenko Patera. The arrows show the direction toward Ulgen-ekhe Coronae, Rzhanitsa, and Repa Coronae centres, which are located 80, 100, and 250 km, respectively, outside the study area (after [1]).*

The current study has the following goals:1) Provide detailed mapping (1:500,000 scale) of the sets of grabens-fissures-fractures and link them to magmatic centres, 2) Determine the relationship between Onenhste and nearby coronae with respect to the Parga Chasmata rift zone and the orthogonal trending rift segments and 3) Establish the relationships and geological history of the coronae and the rift zone.

Results: More than 46,000 extensional lineaments were mapped and grouped into 50 sets, comprising 17 radiating, 28 circumferential and 5 linear sets (interpreted to overlie mafic dyke swarms) [1]. Radiating and circumferential swarms are linked with Onenhste Corona (OC), Momu Coronae (MC), Ulgen-ekhe Coronae (UEC), Rzhanitsa Corona (RzC, centred just outside the study area) and 5 Unnamed Coronae (UC1–5), as well as Malibran Patera (MP) and Fedchenko Patera (FP) (Fig. 1b). Linear swarms are provisionally linked with magmatic centres outside the study area. Crosscutting relationships between the graben sets (dyke swarms) were used to identify the relative ages of magmatic centres. We applied an additional approach to recognize coeval centres, the swinging or deflection of radiating and circumferential dyke swarms to reveal the stress interaction between different coeval centres [1]. The relative ages (oldest to youngest) of the magmatic centres are UC2 > RzC > MC ≥ OC = UC1 = UEC ≥ MP > UC5, and FP > UC3. These new detailed data provide significant information on coronae timing, evolution and relation to rift zones that will serve as a basis for future quantitative studies of lithospheric and mantle evolution and the combined cause and effect of rifting and mantle diapiric upwelling.

Relationship to Parga Chasmata and P13 Linea: Several centres, RzC, UC2, MC, UC3 and FP, ordered from NW to SE, are aligned along a trend parallel to Parga Chasmata but offset about 900 km to the south from the main zone of rifting. It is inferred that this alignment is related to a zone of weakness associated with the rift extension. Along this trend the centres do not show an age progression.

Coronae MC, OC, UC1 and UEC are aligned along the NNE trending P13 Linea, orthogonal to the main Parga Chasmata rift. The main centre, Onenhste, is coeval with UC1, which in turn is coeval with UEC. Additional age relationships indicate that the late stage of OC was active at the same time as MP, MC and the UC2–9 centre of UC2. Linea P13 is older than Chondi Chasma (branch of Parga Chasmata rift zone).

Acknowledgments: Magellan SAR images obtained from https://astrogeology.usgs.gov/search?pmi-target=venus

Reference: [1] Ben Marzoug, M. El Bilali, H. Ernst, R. E., Buchan, K. L. Head, J. W., Hannour N. (2024) Icarus, v. 424, 116269.