GRABEN SYSTEMS AND GEOLOGICAL HISTORY OF MBOKOMU MONS REGION, ALONG PARGA CHASMATA, SE OF ATLA REGIO, VENUS. N. Hannour [1], H. El Bilali [1], R.E. Ernst [1], K.L. Buchan [2], J. W. Head [3], M. Ben Marzoug[1]. [1]Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada. (hannournaima83@gmail.com). [2]273 Fifth Ave., Ottawa, Ontario, Canada. [3]Department of Earth, Environmental and Planetary Sciences Brown University, Providence, RI, USA.

Introduction: The relationship between chasmata (rift zones) and spatially associated volcanism (mons and coronae) on Venus has been extensively discussed but remains enigmatic. One region where these features are prominently displayed is along the 10,000 km long, WNW trending, Parga Chasmata, which connects Atla Regio with Themis Regio. We have selected the Mbokomu Mons area (Fig. 1) (located about 2200 km SE of Atla Regio) for the current detailed study [1].

Results: More than 39,000 extensional lineaments (grabens, fissures and fractures) were mapped at 1:500,000 scale using full resolution Magellan Synthetic Aperture Radar (SAR) images and grouped into radiating, circumferential and linear systems [1]. They are (except where noted) interpreted to represent the surface expression of underlying mafic dyke swarms, on the basis of associated volcanic features and terrestrial analogues. Radiating and/or circumferential swarms are associated with Mbokomu Mons and the four coronae in the surrounding area, Among Corona (AC), Repa Corona (RC) and two unnamed coronae (UC1 and UC2) (Fig. 1b).

Mbokomu Mons: There is a clear overall radiating pattern of grabens (interpreted as dykes) associated with Mbokomu Mons. However, because of lava flooding of the central region of Mbokomu Mons during and/or after emplacement of the radiating dykes, there is some ambiguity in the dyke swarm patterns close to the centre. Mbokomu Mons is unique among the tectono-magmatic features in this region of Parga Chasmata, in having both corona and mons characteristics [1]. The initial Corona Phase consists of radiating and circumferential systems mainly preserved in an unflooded annular uplift, while the Mons Phase includes a second radiating swarm associated with a central edifice, and smaller circumferential fracture pattern near the summit that could overlie a magma reservoir. The plume or diapir that is interpreted to have been responsible for the initial Corona Phase is estimated to have had a radius of ~150 km.

Age relationships: Cross-cutting relationships indicate that Mbokomu Mons is younger than three other large nearby magmatic centres: Among Corona (in the study area) and Oduduwa and Onenhtse coronae (outside the study area to the NW and SE, respectively) [1]. In addition, Mbokomu Mons appears to be younger than the Parga Chasmata rift system and the parallel Penthesilia Fossa (PF) (part of the great dyke of Atla Regio [2]), as well as the NE trending Jokwa Linea branch of Parga Chasmata. We propose that the alignment of the four magmatic centres of Mbokomu Mons and Among, Oduduwa and Onenhtse coronae reveals an underlying zone of lithospheric weakness parallel to and likely part of the Parga rift system [1].

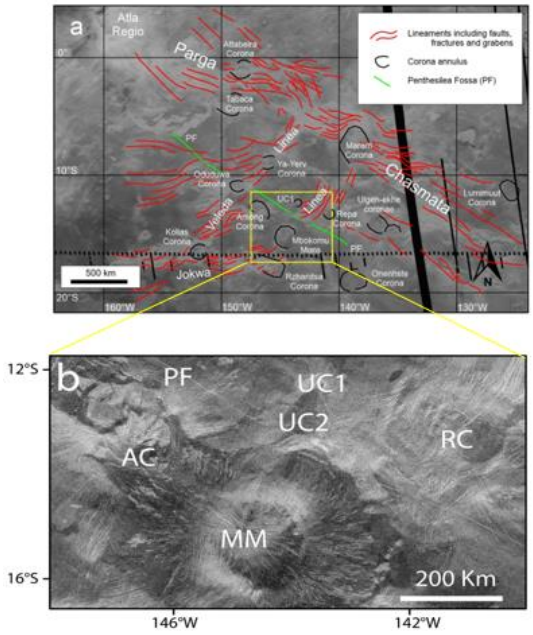

Fig. 1. (a) Major geological features of the northwestern Parga Chasmata region and location of the study area (square box) with the outline of some major features of the Parga Chasmata region. (b) Magellan SAR radar image (study area), MM: Mbokomu Mons, AC: Among Corona, UC1: Unnamed Corona-1, UC2: Unnamed Corona-2, RC: Repa Corona, PF: Penthesilea Fossa (part of Great Dyke of Atla Regio). (After [1]).

References:

[1] Hannour, N., El Bilali, H., Ernst, R.E., Buchan, K. L., Head, J.W., Ben Marzoug, M. (2024) Icarus 423 116268. [2] El Bilali, H., Ernst, R.E. (2024) Nat. Comm. 15 1759.