LAVA FLOWS OF THEIA MONS VOLCANO, BETA REGIO PLUME CENTRE, VENUS. A. Shimolina[1], R.E. Ernst[1,2], H. El Bilali[1,2]. [1]Faculty of Geology and Geography, Tomsk State University, Tomsk, Russia; arina051299@gmail.com, [2]Department of Earth Sciences, Carleton University, Ottawa, Canada

Introduction: Theia Mons is one of the most important volcanic edifices on Venus (Fig. 1). It is centered at 23.7º N, 280.0º E (79.0º W) on Beta Regio, which along with Atla and Themis Regio, define the BAT (Beta-Atla-Themis region) as the region with youngest volcanic and tectonic activity of Venus. Beta Regio is thought to represent a currently active plume in that it is topographically elevated, has an associated geoid high, is the center of a triple junction rifting system [1] and is also the focus of a giant radiating dyke swarm [2].

The northern half of Theia Mons was previously mapped at 1:5,000,000 scale as part of Beta Regio Quadrangle (V–17) [3]. The southern half of Theia Mons is located in Devana Chasma Quadrangle (V-29), and initial 1:5,000,000 mapping of this quadrangle was reported in [4]. The global compilation of [5] catalogued this as Theodora Patera (24.0º N 280.5º E) with a diameter of 1,000 km [5]. In later publications [1,3] it is referred to as Theia Mons, a label which we use in the present study. We previous reported the dyke swarm history of Theia Mons [7]. Our focus in this abstract is the detailed mapping (1:500,000, which is 10x more detailed than previous mapping) of the lava flows associated with Theia Mons.

Theia Mons' lava flows: The mapped flows have been grouped into 4 geographic sectors (Fig. 2). Below we give a detailed analysis of the parts of these sectors that are located in a 200 km circle centred on the caldera. The oldest and furthest-extending lava flows are reviewed briefly.

Eastern lava flows: Near the caldera we identified 4 large lava flow groups, each with 3-5 separate flow units and with the age order oldest to youngest mapped in the order red, yellow, green and blue (Figs. 2-3). The red flow group (2500 km^2) is interpreted to be the oldest since its flows are overlapped by younger lavas of subsequent groups. These south-southeast trending flows are not sourced from the caldera and their source is not visible on the surface.

The yellow flows (with varying radar brightness) cover an area of about 12,000 km^2. The source for this generation of flows is the central caldera of the volcano.

The green flows (3000 km^2) are sourced from central caldera.

The blue flows (6850 km^2) originate from a parasitic vent on the eastern side of the volcano. They block the flows of other groups, which suggests their relatively young age. Moving away from the source, their radar brightness fades.

Oldest lava flows here are darker and tend to run further from the centre compared to younger flows.

Southern lava flows: These flows (Figs. 2-3, 30,000 km^2) are largely disrupted by Devana Chasma rifting, and are provisionally grouped into only two generations (orange and pink colours) pending further mapping. This group mostly likely originates from the central caldera of Theia Mons. These flows spread radially in the southeast and south direction, covering the entire near-caldera part of the sector.

Far from the caldera, one large lava flow is most visible. It has sharp boundaries and is radar-grey. Its source is not visible due to disruption by rifting.

Western lava flows: This area is covered by a large group (40,000 km^2, Figs. 2, 4) of lava flows. At a distance from the caldera, the flows diverge in two directions: one continues to move west (light green), the second changes direction to the northwest (blue-green). Such a change in direction could be caused by changes in topography during the period of rifting.

Northern lava flows: This sector provisionally includes two flow groups which are partially disturbed by grabens of the Devana Chasma (Figs. 2, 4). The youngest flow group (pink) was analyzed in detail in previous work [7]. We interpret that dykes parallel to, and within, Devana Chasma are the source of flows of the pink group.

The other lava group (with green contour) has a local flow direction that doesn't trend back to the central caldera. We are considering the hypothesis that another large caldera obscured by the Devana Chasma rift system and younger Theia Mons flows (Fig. 4, red circle) could be the source for this flow. Such a cryptic caldera is suggested by some radial and concentric swarms of dykes.

Summary: Theia Mons has many generations of lava flows – more than 8 near the caldera and more further away. The maximum length of lava flows sourced at the central caldera is greater than 700 km; the overall area of lava distribution is about 650,000 km^2. Theia Mons has up to 4 different types of lava flow sources – central caldera, parasitic vent, grabens that are underlain by dykes and a hypothetical old obscured caldera or vent. The disturbance of lava flow patterns on the north and south sectors proves that Devana Chasma rifting is younger than most of the Theia Mons' lavas.

References: [1] Basilevsky A. and Head J. W. (2008) *Icarus*, 192, 167–186. [2] Ernst R. E. et al. (2003) *Icarus*, 164, 282–316. [3] Basilevsky A. (2008) *U.S.G.S. Sci. Invest. Map* 3023. [4] Tandberg E. R. and

Bleamaster L. F. (2010) *LPS XLI*, Abstract #1816. [5] Crumpler L. S. & Aubele J. C. (2000) *In Sigurdsson, H. (ed.). Academic Press*, 727–769. [6] Ernst R. E. and Buchan K. L. (2001). *GSA* Spec. Pap. 352, 247–265. [7] Shimolina A.S. et al. (2022) *LPSC LIII*, Abstract #1153. [8] Herrick, R.R. and Sharpton, V.L. (1999) LPSC, v. 30, p. 1696.

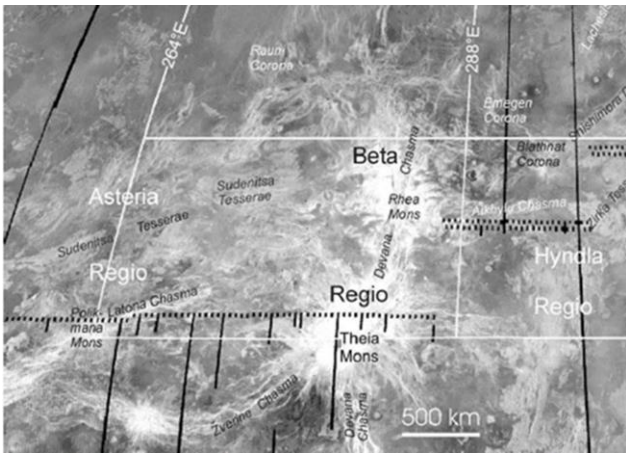

Figure 1 *– Magellan SAR image of Beta Regio with the main features labelled.*

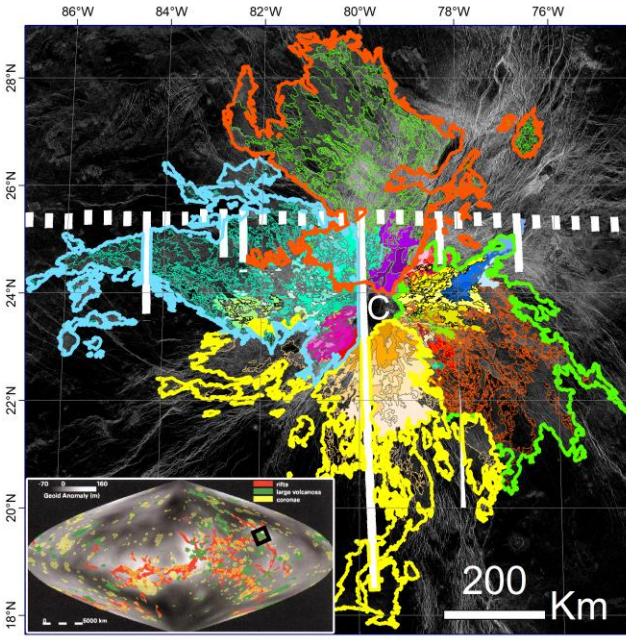

Figure 2 *– Lava flows of Theia Mons. Colored contours divide volcano into 4 sectors (green contour is for Eastern sector, yellow for Southern, blue for Western and orange for Northern). «C» is for central caldera. In the lower left is a map of Venusian rifts and volcanoes (after [8]) with Theia Mons marked with black box.*

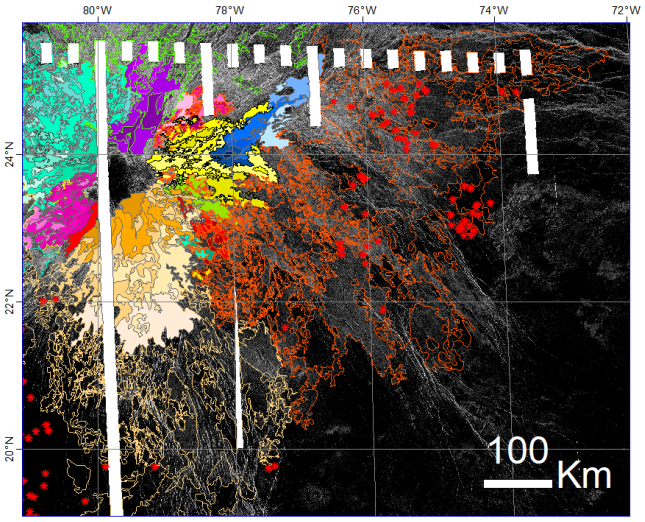

Figure 3 *– Map of Eastern and Southern sectors of Theia Mons.*

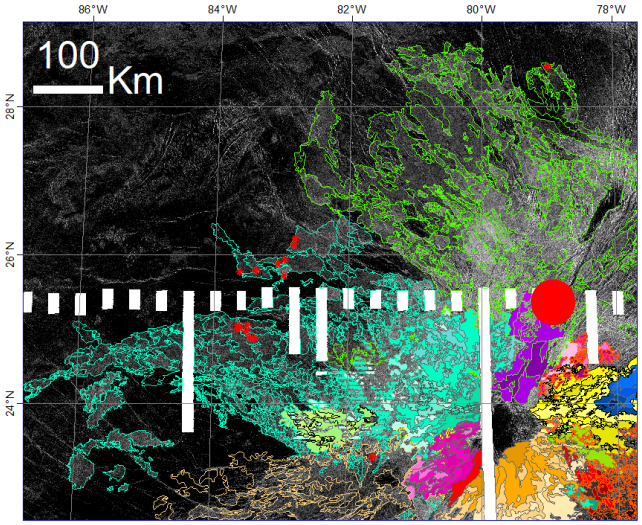

Figure 4 *– Map of Western and Northern sectors of Theia Mons. Red circle marks hypothesized older center (25.3° N, 280.5° E).*