GEOLOGICAL HISTORY OF ATAI MONS REGION, SE OF PHOEBE REGIO, VENUS. K. Budko[1], R.E. Ernst[1,2], H. El Bilali[1,2], [1]Faculty of Geology and Geography, Tomsk State University, Tomsk, Russia, sayanaro90@mail.ru, [2]Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada; Richad.Ernst@ErnstGeosciences.com, hafidaelbilali@cunet.carleton.ca

Introduction: We report on detailed mapping (1:500,000 scale) of graben-fissure lineaments in the area SE of Phoebe Regio (Fig. 1). This area is on the border between Phoebe Regio Quadrangle (V-41) which has not been previously mapped (Fig. 1), and Themis Regio Quadrangle V-53 to the south (25 S to 50 S), which has been mapped at 1:5,000,000 scale.[1].

Dyke Swarms of Atai Mons Region: Many of the mapped radiating and circumferential graben systems likely overlie dyke swarms [2,3], and therefore, are an important igneous component of their magmatic centres. In addition, those major sets of linear graben-fissure sets (that overlie dykes, and are not purely rift related) would represent major dyke swarms belonging to more distal magmatic centres, potentially up to more than 1000 km away [2,3].

Over 3000 lineaments have been mapped (Fig. 2). There are intense distributions of grabens in our study area and they can be grouped into sets based on trend and geometry. Preliminary analysis of Figure 2 suggests that there are radiating and circumferential graben (dyke) systems linked to at least 5 magmatic centres including Atai Mons. The generalized lines are shown in Figure 3.

Atai Mons (Centre 1): The main magmatic centre (Atai Mons, labelled 1 in Figs. 2 and 3) has both a radiating swarm (green) and circumferential swarm (light green). The circumferential dyke swarm has a maximum radius of at least 200 km, and the radiating swarm has a maximum mapped radius of at least 200 km. The radiating dykes are partially flooded to the NE, SW, and S and therefore the radius of the radiating swarm could be much larger.

Centre 2: The unnamed magmatic centre 2 (Figs. 2 and 3) is located at about 320 km NE of Atai Mons. This centre is partially flooded by younger flows, possibly emanating from Atai Mons. Both the radiating and circumferential dykes of Centre 2 are also partially covered by younger flows. The radius of Centre 2 circumferential dykes is 70 km.

Centre 3: This unnamed centre is located to the north of Centre 2. Centre 3 has both radiating and circumferential dykes that are partially flooded by younger flows. The radius of the circumferential swarm is about 100 km, whereas that of the radiating swarm is difficult to estimate due to the younger flooding.

Centre 4: A cryptic centre labelled 4 is found east of Centre 2. It is mostly flooded and only a few partially flooded radiating dykes are recognized and mapped (Figs. 2 and 3).

Centre 5: The fifth centre identified is located SE of Bugoslavskaya impact crater (23°S 59.6°W). Radiating dykes are mapped to the W and SE of the centre. The maximum radius of the circumferential swarm is about 50 km.

Linear Swarms: There are multiple linear dyke swarms crossing the study area, and the largest are likely linked to major magmatic centres outside the study area. Notably the NNW trending dykes (both the yellow- and probably also the pink-coloured) extend toward Vostrukha Mons located about 1900 km away. The NW-trending purple swarm is likely to be linked to Yunya-Mana Mons, 750 km away (Fig. 1).

Future Work: The next stages of this research will build on the preliminary insights from detailed mapping of the graben systems (dyke swarms) associated with Atai Mons and other centres in the region (Figs. 2 and 3). Detailed mapping of grabens and their link to magmatic centres will continue to the west and east across the map area in Figure 1, extending to Iweridd Corona and covering the intervening Dzerassa Planitia. The next task will be determining the age relationships of the magmatic centres through evaluating the cross-cutting relationships of their graben systems.

Another important component of this research will be detailed (1:500,000 scale) mapping of the flows and integration of the flow relationships within the framework built from the graben (dyke swarm) relationships.

The result will be a detailed and integrated understanding of the magmatic and tectonic history of this region SE of Phoebe Regio.

References: [1] [Stofan E.R. and Brian A.W. (2012) USGS SIM 3165. [2] Grosfils E.B., and Head J.W. (1994) GRL, 21, 701–704. [3] Buchan K.L. and Ernst R.E. (2021) Gond. Res., 100, 25-43. [4] Christensen P. R. et al. (2009) AGU Fall Meeting, Abstract #IN22A-06.

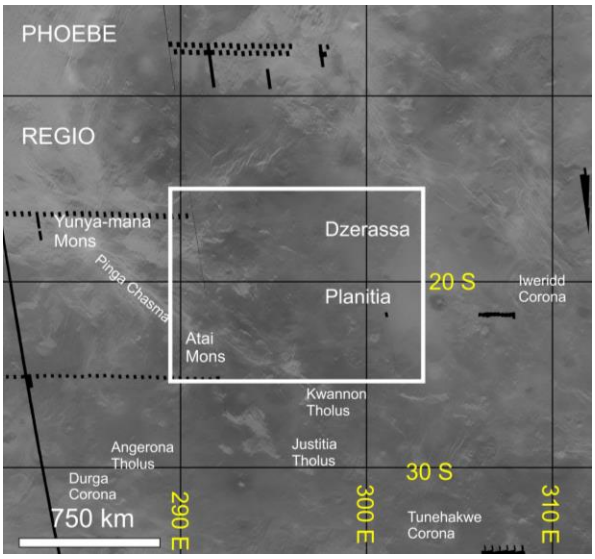

***Figure 1**. Region of area of study (white box). Phoebe Regio is located to the NW. Background image is Magellan SAR image from JMARS [4].*

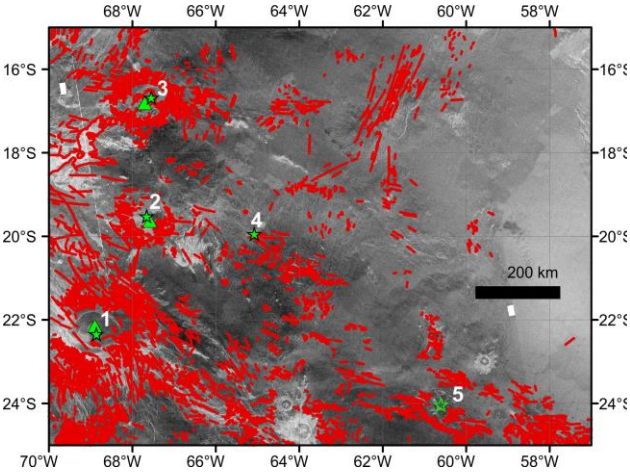

***Figure 2.** Distribution of mapped extensional lineaments. 3000 mapped so far.*

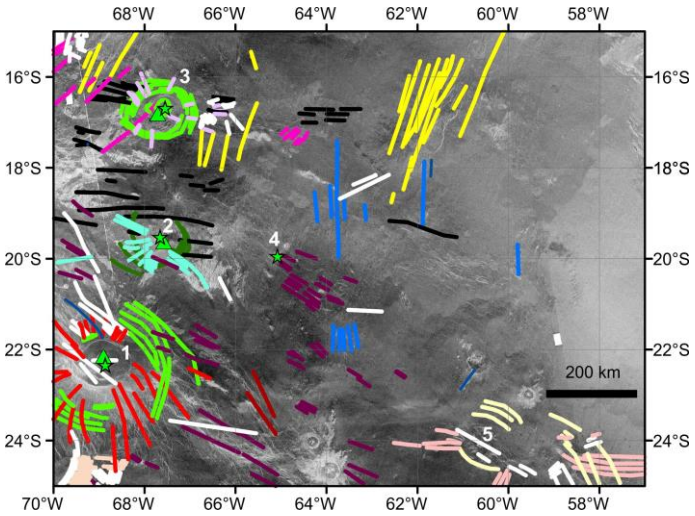

***Figure 3.** Generalized graben-fissure trends grouped by colour into discrete swarms. See text for details. Numbers mark magmatic centres discussed in the text.*