WINDOW INTO 4 KM CROSS SECTION OF VENUSIAN CRUST EXPOSED BY NORMAL FAULTS OF DALI CHASMA AND TROUGHS OF SOUTHERN MARGIN OF ATAHENSIK CORONA, SW OF ATLA REGIO.

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Introduction: Dali Chasma is a 4,000 km long rift system extending SW from Atla Regio. Dali Chasma together with its continuation to the SW, Diana Chasma, extends 7,500 km long and connects Thetis Regio in the west with Atla Regio in the east. The Dali and Diana chasmata display slopes of more than 30° [1], the steepest and deepest trenches on Venus [2]. Both chasmata host landslide deposits probably sourced from the steep chasmata walls. Diana Chasma and the western portion of Dali Chasma were mapped at 1:5,000,000 scale as part of mapping of Diana Chasma Quadrangle (V-37) [1]. The eastern portion of Dali Chasma in Stanton quadrangle (V-38) has not been previously mapped.

Figure 1a shows the location of our research area on Dali and Diana Chasmata within Stanton quadrangle (V-38) and the Diana Chasma quadrangle (V–37). Mapping of volcanic and tectonic features of this rift is being done at 1:500,000 scale. Within our map area we note structural features of interest that is the focus of the remainder of this abstract. These features are interpreted to represent a 4 km thick section of Venusian crust exposed through normal faulting associated with asymmetric rifting in Diana Chasma and producing a major scarp of Atahensik Corona (Figs. 1a and b).

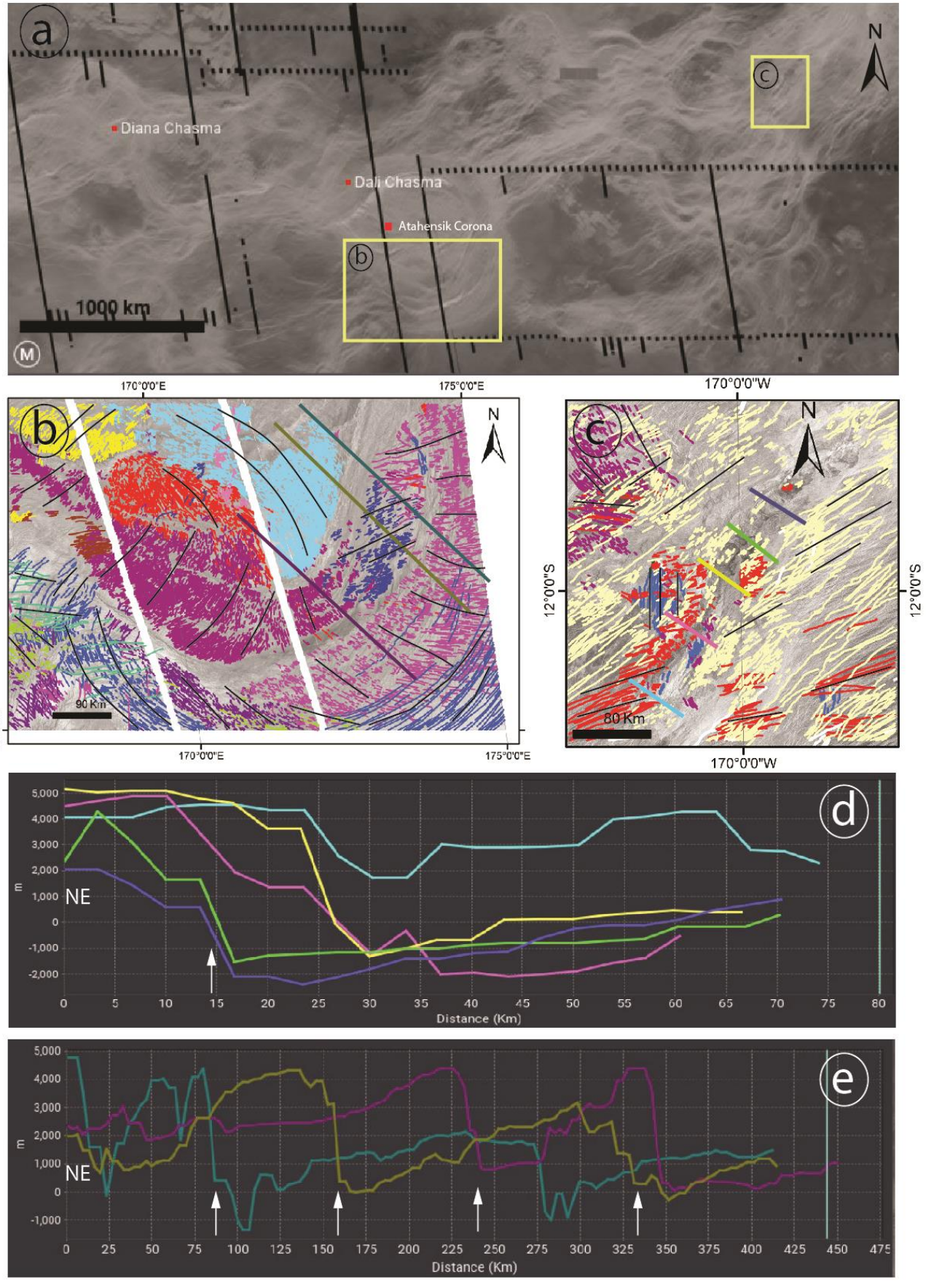
Asymmetric Rift of Dali Chasma and Exposer of 4 km Section of Venusian Crust:

An unusual feature (1000 km long and 30-70 km wide) is centered at 190°E / 10°S and trends NE, parallel to the overall trend of the Chasmata. It stands out from the rest of the Chasmata by having areas lacking in lineaments. A cross section (Figs. 1c and d) shows that this portion of Dali Chasma represents an asymmetric rift bordered to the north-west by major normal faults and by many less extended normal faults to the south-east. These faults expose a 4 km section through the crust with radar brighter ~3 km section overlying a radar darker ~1 km section. The radar brighter section locally exhibits parallel lineations which can be interpreted as horizontal layering, potentially reflecting a flood basalt sequence (or sequence of sills). Irregular units interpreted to represent talus are accumulated through mass wasting at the base of the exposed escarpment.

The Troughs of Atahensik's southern margin: Atahensik Corona (about 700 km in diameter), centered at 170° E/ 19° S, also known as Latona Corona is part of a chain of Coronas that includes Inari Corona to the west-southwest and Zemina Corona to the northeast [1]. Atahensik Corona is considered active because of the clear trenches on its southeast and north side, respectively [3]. These trenches constitute deep topographic troughs around Atahensik; the northern trough with a steep north-facing slope and three sub-parallel troughs. They mark Atahensik's southern margin. Each of these troughs shows similar asymmetric topography with sharp inner slopes and more moderate outer slopes. The lineaments mapped in our work, representing likely fractures and graben (Fig. 1b), can be traced from the interior across the topographic troughs to the surrounding region. Local trough deposits likely represent slope collapse rather than magmatic flows [4].

[1] Hansen V.L. and DeShon H.R. (2002). USGS SIM I-2752. [2] Ford P. G., and Pettengill G. H. (1992). JGR, 97(E8), 13103. [3] Gülcher A. et al. (2020). Nature Geoscience, 13(8), 547–554. [4] Hansen, V. L. (2007). Chem. Geol., 241(3-4), 354–374.

Figure 1: (a) Magellan SAR image of the studied part of Dali and Diana Chasmata rift system. Yellow boxes indicate Figure 1b and 1c. (b) Detailed Mapping of graben/ fracture systems in progress of Diana Chasma Quadrangle (V-37). (Sinusoidal Venus projection). (c) Mapping of graben systems around the structural feature of interest in progress of Stanton quadrangle (V-38). Black lines indicate generalized trends of grabens/dykes/fractures. (d) and (e) Topographic profiles across Dali chasma asymmetric rift system and southern margin of Atahensik corona generated from JMARS. The white arrows in the profiles indicate the location of Atahensik's southern margin troughs.


a
N
c
Diana Chasma
Dali Chasma
Atahensik Corona
b
1000 km
M
170°0'0"E
175°0'0"E
b
N
90 Km
25°0'0"S
170°0'0"E
175°0'0"E
170°0'0"W
c
N
12°0'0"S
80 Km
170°0'0"W
d
5,000
4,000
3,000
2,000
1,000
0
-1,000
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m
NE
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
Distance (Km)
e
5,000
4,000
3,000
2,000
1,000
0
-1,000
m
NE
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 450 475
Distance (Km)