NOTT CORONA REGION, ISABELLA QUADRANGLE (V-50), VENUS: DETAILED MAPPING OF GRABEN-FISSURE SYSTEMS IDENTIFIES CRITICAL TARGETS FOR FUTURE MISSIONS. I. Hadimi[1], H. El Bilali[2,3], R.E. Ernst[2,3], N. Youbi[1] [1]Department of Geology, Faculty of Sciences-Semlalia, Cadi Ayyad University, Marrakesh, Morocco; ismail.hadimi@gmail.com, [2]Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada;hafidaelbilali@cunet.carleton.ca; richard.ernst@ernstgeosciences.com, [3]Faculty of Geology and Geography, Tomsk State University, Tomsk, Russia;

Introduction: Coronae are abundant and widely distributed features on Venus and are of critical importance to understanding Venus' geological and geodynamic evolution; however, many unanswered questions remain [1]. Detailed geologic mapping at the 1:500,000 scale provides new insights into these features and identifies targets for future observations to help address these outstanding questions [1].

Nott Corona, located within Isabella Quadrangle (V-50), is 3000 km south of Atla Regio, east of Aditi Dorsa, southwest of Wawalag Planitia and north of Nsomeka Planitia (Figs. 1-3). Nott Corona has a central depression with dimensions of 110 x 80 km and a depth of about 250 m (Fig. 4). Nott Corona has been described in initial reconnaissance mapping of Quadrangle V-50 (e.g., [2-3]), and briefly discussed in [4]. Isabella (175 km diameter) is the second largest impact crater on Venus and has been characterized in detail [5].

Abundant magmatic features in the region include Nott and Epon Corona, Libby Patera, Tursa Tholus, as well as multiple graben-fissure systems. We have geologically mapped the Nott corona region in detail (1:500,000 scale) and constructed a geological history that integrates the volcanic features (lava flows and magmatic centres) along with graben fissure systems, producing features that we interpret to be dyke swarms (c.f. [6])

Of particular interest are the detailed mapping results for the radiating graben-fissure systems in the region and our grouping of these into several different and distinctive swarms. As seen in Figs. 2 and 3 our mapping reveals the impressive radiating swarm associated with Nott corona and additional centres (Nos. 1 and 2, in Fig. 3), and circumferential swarms associated with Libby Patera and Epona corona, as well as addition linear swarms (e.g. blue, red and brown, in Fig. 3) whose source is not yet identified, but could belong to major swarms fed from distal magmatic centres outside the study area (currently under investigation).

A major outstanding question concerning coronae in general, and our mapped features in detail is the question of confidently distinguishing between purely tectonic structures (graben from uplift and lineaments) and those that might have originated from shallow dike-induced deformation forces (for example extension above a shallow dike to induce graben formation). Improved image resolution and significantly enhanced altimetry horizontal and vertical resolution are essential to provide the conclusive evidence to support or modify the radial and concentric dike emplacement process at the major centres identified in Fig. 3. In addition significantly improved topographic data should be obtained over Nott Corona in order to improve quantitative modeling of its topographic and geologic evolution to assess the temporal evolution of the central caldera-like structure.

Furthermore, ongoing detailed mapping (1:500,000 scale) of the associate lava flows and their history, is permitting the identification of magmatic sources, but higher-resolution image data is required to confidently assign many of the fissures/graben to a dike-related origin. We have also identified candidate fissure-fed flows from graben (circumferential and radial) and from shallow collapse features [6], and some apparently from circular fractures associated with caldera collapse [7].

We are preparing these key targets in the form of thematic lists that can be used in the planning of the international armada of upcoming Venus missions.

Acknowledgments: Magellan SAR and altimetry images were obtained from https://astrogeology.usgs.gov/search/?pmi-target=venus, and was based on data obtained from https://pdsimaging.jpl.nasa.gov/volumes/magellan.html#mgnFMAP.

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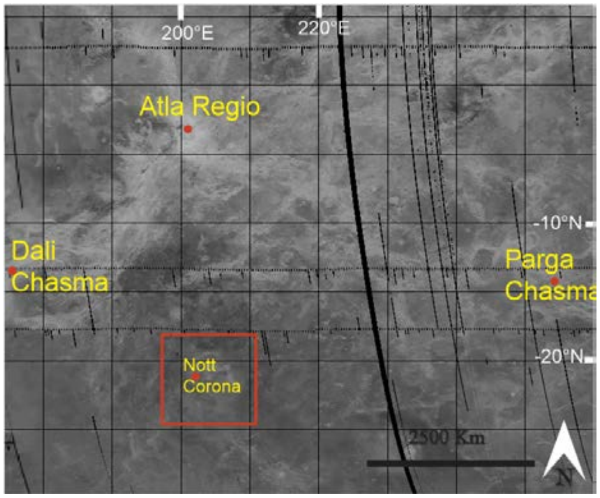

Figure 1: Regional setting of study area.

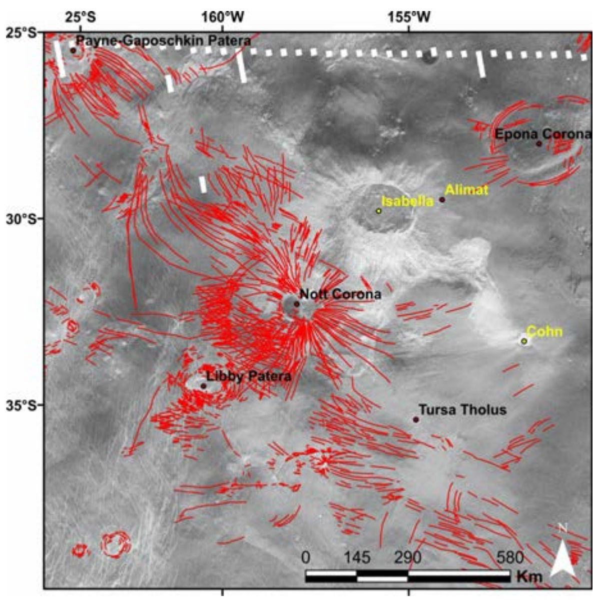

Figure 2: Detailed graben-fissure mapping for parts of the study area. N = Nott Corona, L = Libby Patera, E = Epona Corona, T = Tursa Tholus, U = Unnamed Centre, and I = Isabella Impact Crater. Other impact craters are labelled in yellow font. Background is Cycle 1 Magellan SAR image. NW-trending narrow white rectangular bands indicate missing data.

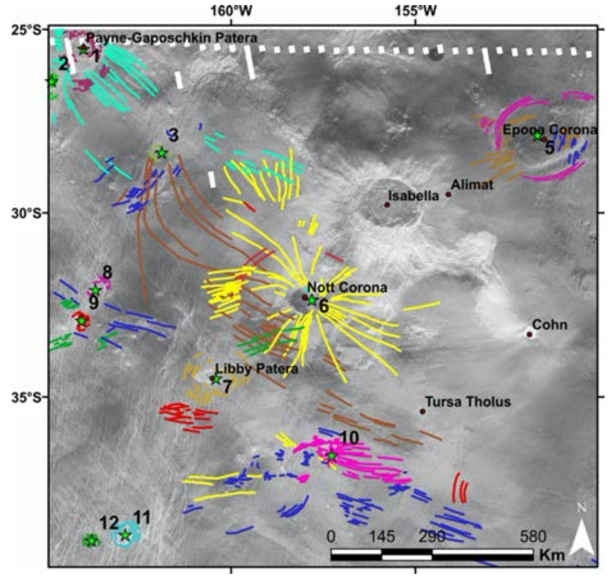

Figure 3: Generalized trends for some sets of graben-fissure lineaments mapped in Fig. 1. Colours correspond to different generations of interpreted sets and interpreted to likely overlie dykes [5]. Labels same as in Fig. 1. Background is Left-looking Cycle 1 Magellan SAR image. NW-trending narrow white bands are areas of missing radar data.

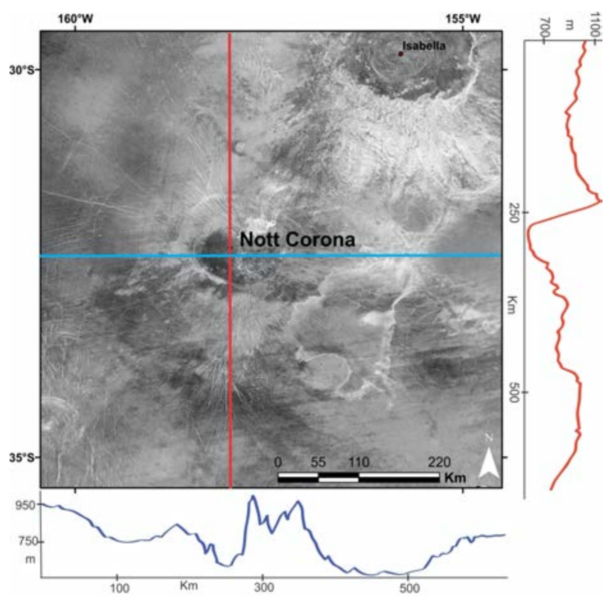

Figure 4: Topographic profiles across Nott Corona.