STRUCTURAL MAPPING OF DEVANA CHASMA, VENUS: IMPLICATIONS FOR CORONA/CHASMA RELATIONS. B.G.R. Shaw[1] and L.F. Bleamaster III[1,2], [1]Trinity University Geosciences Department, One Trinity Place #45, San Antonio TX, 78212, [1]Planetary Science Institute, 1700 E. Ft. Lowell Rd., Suite 106, Tucson AZ, 85719: bshaw1@trinity.edu.

Introduction: The surface geologic structure of Venus is both complex and highly variable, as illuminated through Magellan Synthetic Aperture Radar (SAR) that can pierce the thick cloud cover [1]. Extensive analysis of radar images has led to the distinction of many terrains and their subsequent geologic interpretations. Of particular interest to this study are coronae, circular volcano-tectonic features unique to Venus [2] and chasmata, which have been interpreted to represent extensional rift zones [3, 4, 5, 6].

A major portion of the surface of Venus, which possesses a large population of both features, is the BAT (Fig. 1), an area of anomalously high volcanic and tectonic landforms [7, 8], demarcated by the three major volcanic centers of Beta, Alta, and Themis Regiones, which is postulated as an expansive mantle upwelling [1]. Connecting the three volcanic centers are three extensive topographic and highly deformed troughs (Parga, Hecate, and Devana Chasmata). These provide a exceptional look at the complex structural relations between coronae and chasmata across a varied physiographic backdrop. Structural analysis of Devana Chasma (Fig. 2) will provide a comparative assessment of styles of coronae and other volcano-tectonic manifestations in rift zones with the extensively studied chasmata such as Parga and Hecate, which possess pronounced coronae development [9].

Previous Work: Studies undertaken to further analyze these two predominate features on the surface of Venus include geoid correlation [10] and coronae spatial and gravity analysis of the largest chasmata on Venus, Parga and Hecate [9]. It has also been shown that 75% of chasma on Venus have been shown to display extensive coronae chain formation [11]. However, analysis of the Ix-Chel, Kuanja, and Vir-ava Chasmata (IKVC) region of Venus [11] suggest that the relationship between these two features is more intricate, and Devana Chasma, like the IKVC region which have a small coronae population, may better illuminate the nature of volcano-tectonic relations along chasmata and why some lack extensive corona development.

Methods/Results: The study area for this analysis is Devana Chasma, a north south trending deformation belt along the eastern BAT that starts north of Beta Regio, extends south through Phoebe Regio, and ends near the northern edge of Themis Regio (Fig. 2). Previous mapping of Devana Chasma designated the material as "rifted terrain material" [12], lumping both the materials present and the structures that deform them into one unit. In this study, Devana Chasma and its surroundings are analyzed to better constrain its detailed structural character including the locations and structural density of major fault systems, the distribution of coronae (albeit a small population), and other volcanic structures and flow units. ArcGIS mapping undertaken at a scale of 1:1,000,000 of surface features such as faults, lineaments, mons, craters, and coronae provide a more detailed look at the Devana Chasma rift system and various geomorphic and geometric attributes that may have been missed in smaller scale studies (Fig. 3).

This study will also search for the presence of pseudocoronae along Devana Chasma. Psuedocoronae are circular to semicircular tectonic features that remain unnamed and/or fail to meet one of the nine formal topographic classifications for corona [as per 2] . By identifying these features we expand the criteria for recognizing volcano-tectonic interactions along chasmata. These subtle features, first identified in the IKVC region of Venus [11], improve the evaluation of rift development and may hold the key to a better understanding of lithospheric/crustal structure, magma genesis, and subsequent migration of that magma, in response to extremely limited extension.

The morphology of the eastern BAT, near Phoebe Regio, is unique and results of this mapping will aid in evaluating the perceived causal relationship between coronae and chasmata by looking closely at chasmata that do not exhibit such extensive coronae development and through comparative analysis of Devana with Hecate, Parga and the IKVC region. Focusing on chasmata/coronae may be limiting the understanding of

the intricate nature of extension and related volcanism on Venus.

References: [1] Solomon, S.C. et al. (1992) *Journal of Geophysical Research*, *97*, P. 13,119-13,255. [2] Stofan, E.R. et al. (1997) In *Venus II*, eds. Bougher, S.W., Hunten, D.M., and Phillips, R.J. (Tucson: Univ. Arizona Press), p. 931-965. [3] Hansen, V.L., and Phillips, R.J. (1993) *Science*, *260*, p. 526-530. [4] Hamilton, V.E., and Stofan, E.R. (1996) *Icarus, 121*, p. 171-194. [5] Bleamaster L.F., and Hansen, V.L. (2001) *LPSC 32,* abstract 1316. [6] Keifer, W.S. and Swafford L.C. (2006) *Journal of Structural Geology* 28, 2144-2155, 2006. [7] Head, J.W. et al. (1992) *Journal of Geophysical Research*, *v. 97*, p. 13153-13197. [8] Crumpler, L.S. et al. (1997) in *Venus II*, eds. Bougher, S.W., Hunten, D.M., and Phillips, R.J. (Tucson: Univ. Arizona Press), p. 697-756. [9] Smrekar, S.E. et al. (2010) *J. Geophys. Res.*, *115*, E07010, doi: 10.1029/2009JE003435. [10] Jurdy, D.M., and Stefanick, M. (1999) *Icarus*, *139*, p. 93-99. [11] Bleamaster, L.F., and Hansen, V.L. (2004) *J. Geophys. Res., 109*, E02004, doi:10.1029/2003JE002193. [12] Basilevsky, A. T. and Head, J. W. (2007) *Icarus* , *192*, pg. 167-186.

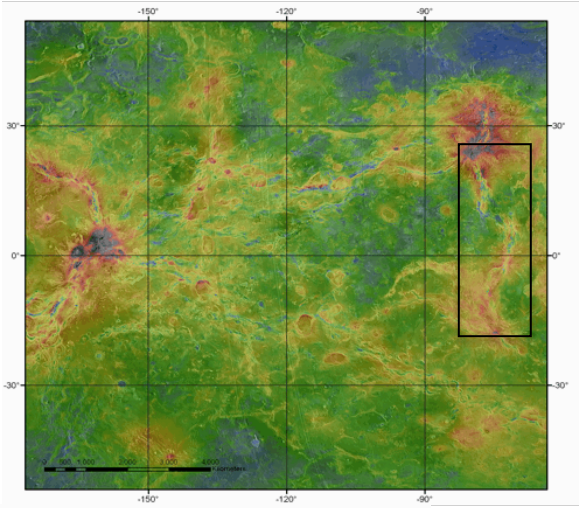

Figure 1. (left) The SAR *Magellan* data merged with altimetry for the BAT region of Venus with Beta in the upper right-hand corner. The black box is the study area of Devana Chasma, which is magnified in Figure 2.

Figure 2. (lower left) *Magellan* SAR radar data merged with altimetry for Devana Chasma. The black box is the area magnified in Figure 3.

Figure 3. (below) An example of the type of mapping undertaken in this study showing faults and lineaments with a crater to the southeast both with (left) and without (right) the radar backdrop.