GEOLOGIC MAPPING OF THE DEVANA CHASMA (V-29) QUADRANGLE, VENUS: PRELIMINARY REPORT. E. R. Tandberg[1,2] and L. F. Bleamaster, III[1,2], [1]Planetary Science Institute, 1700 E. Ft. Lowell Rd., Suite 106, Tucson AZ, 85719, [2]Trinity University Geosciences Department, One Trinity Place #45, San Antonio TX, 78212.

Introduction: The Devana Chasma Quadrangle (V29; 0-25°N/270-300°E; Figure 1) is situated over the northeastern apex of the Beta-Atla-Themis (BAT) province and includes the southern half of Beta Regio, the northern and transitional segments of the Devana Chasma complex, the northern reaches of Phoebe Regio, Hyndla and Nedolya tesserae, and several smaller volcano-tectonic centers and impact craters. In a broad sense, the BAT Province is of particular interest with respect to evaluating global paradigms regarding Venus' geologic history and thermal evolution, considering it is "ringed" by volcano-tectonic troughs (Parga, Hecate, and Devana Chasmata), has an anomalously high-density of volcanic features with concentrations 2-4 times the global average [1], and is spatially coincident with relatively "young terrain" as shown by Average Surface Model Ages (ASMA) [2, 3].

Science Objectives: Detailed geologic mapping of the Devana Chasma Quadrangle will 1) place the geology, structure, and temporal relations along one of three prominent tectonic arms radiating from Beta Regio into a broader geologic context, 2) may constrain rifting models and provide temporal information for north-south Devana Chasma rift-tip interactions [4], and 3) provide the opportunity to directly compare this unique style of rifting with the other main branches (Parga and Hecate Chasmata) of the BAT province rift system [see Bleamaster, this issue] and to evaluate the effect crustal thickness has on rifting styles [i.e., 5].

Several general questions are being posed as the generation of the 1:5,000,000 scale Devana Chasma Quadrangle map gets underway.

- What and where are the source locations for the plains materials both inside and outside of the BAT region (i.e., coronae, paterae, small shield fields, rifts and fissures) and are there different volcanic styles across the transition between the interior of the BAT province and the outlying regions.
- Is the transition across the BAT boundary abrupt or gradational and are there morphological distinctions between "young" ASMA regions within the BAT and "intermediate-old" ASMA regions outside the BAT?
- Are the north and south Devana Chasma rift segments genetically related (tied to the same dynamic process) or are they two independently propagating rifts from Beta and Themis Regiones as suggested by [4], and what are the temporal relations along the segments?

Data Sets & Methodology: Aiming to discover the types of processes that have shaped the Venusian surface, geologic mapping has started with the demarcation of major structural and morphologic features (lava flow boundaries, shield fields and edifices, radial and concentric deformation zones) and we will follow with the formal delineation of geologic map units. Stratigraphic, embayment, and crosscutting relationships as well as crater morphology and crater halo degradation [6] are used to determine the relative age of the map units. All data used were acquired during NASA's Magellan mission (operational 1989-1994) and includes: Synethic Aperture Radar (SAR; basemap provided by the United States Geoloical Survey at 75 meter/pixel), altimetry and reflectance (~10 x 10 km footprint), and emissivity (~20 x 20 km footprint). Mapping is facilitated with the use of a georeferenced digital synthetic stero (red-blue anaglyph, which merges SAR and altimetry together). ESRI ArcGIS software is used along with a WACOM 21 inch interactive monitor and digitizing pen; important geological features are digitized and attributed in the ArcGIS geodatabase as a location feature (point), linear feature (line), or geocontact (polyline features that will be converted into polygon features at a later time). While the published map scale will be 1:5M, accurately identify geological features requires a closer look, thus, linework is constructed at a scale larger than the published scale. Location features and linear features are mapped at a scale of 1:200,000; geocontacts are mapped at a scale of 1:300,000. Excess linework (i.e., very closely spaced lineament sets) may be edited prior to printed map publication but will be presereved in digital archives. The accuracy of the linework is controlled using streaming (500 map units) and snapping tolerances (250 map units). Upon completion of mapping, the geodatabase within ArcGIS will allow for efficient data analysis.

Preliminary mapping: The most prominent feature, and hence namesake of the V-29 quadrangle, is Devana Chasma - a narrow (~150 km) 1000 km long, segmented topographic trough (1-3 km deep with respect to the surrounding terrain), which accomdates 3 to 9 kilometers of extension [4]. Devana Chasma is one of three radiating arms of tectonic lineaments that

trends south from Beta Regio and marks a physiographic divide between the relatively young Beta-Atla-Themis province to the west and the surrounding older highlands and plains. Approximately midway down the map area from Beta Regio, Devana Chasma's lineament density decreases and changes trend to the southeast. Near the center of the map, the northern portion (Beta Regio side) of Devana Chasma meets the southern section, which trends north and then veers to the northwest. Preliminary mapping has delineated major structural trends (mostly large normal faults, which agree with previous investigators [7-10]), but has yet to reveal significant temporal constraints between the north and south segments. Identification and delineation of nearby volcanic units and assessment of their relative timing may provide constraints on the Devana Chasma lineaments that deform the local and regional flows.

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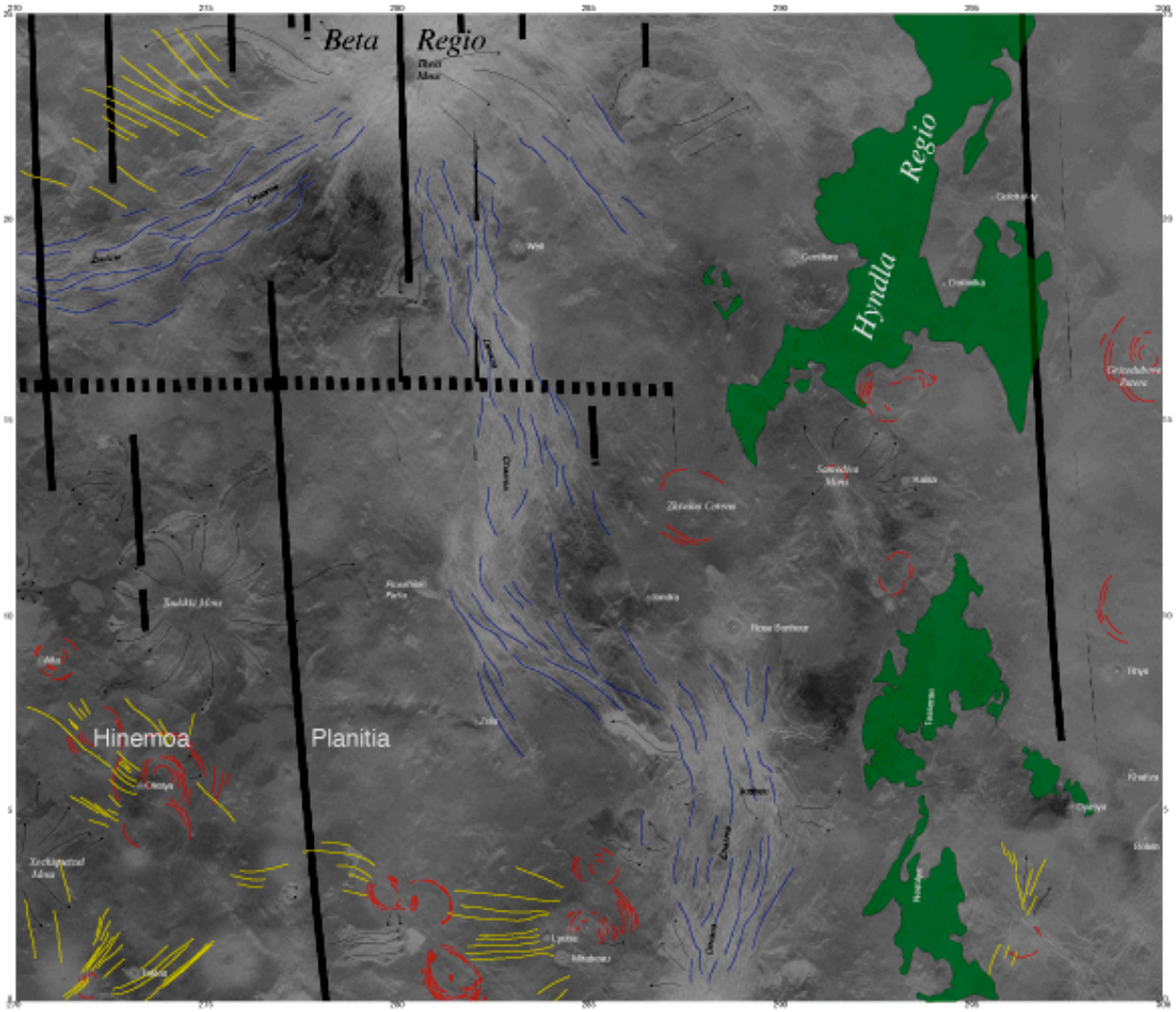

Figure 1. Preliminary reconnaissance map of the Devana Chasma Quadrangle (V-29) showing major areas of extensional deformation (blue), volcanic and tectonic centers (black arrows – flows; red and yellow – concentric and radial deformation, respectively), and tessera terrain (green).