GEOLOGY OF THE JUNO CHASMA QUADRANGLE, VENUS: ASSESSMENT OF THE RELATION BETWEEN RIFTING AND VOLCNAISM, D. A. Senske, Jet Propulsion Laboratory/California Institute of Technology, Pasadena, CA, 91109, dsenske@jpl.nasa.gov.

Introduction: The process of crustal extension, rifting and related volcanism occurs on Venus under a variety of geologic setting. To understand spatial and temporal relations along with the interplay between tectonic and volcanic processes, the Juno Chasma region is mapped [1,2] (Fig. 1). Geologic units are used to establish broad-scale stratigraphic relations and the timing between uplift, stretching and volcanism.

General Structure and Topography: Juno Chasma runs approximately east to west along the crest of an 1.0 km high linear topographic rise. Along the highest topography is a 60- to 90-km wide, 1.0- to 2.5-km deep, graben. Moving in a west to east direction, a cluster of four coronae, Tai Shan, Gefjun, and two unnamed structures (31.8° S, 99.6° E; 29.8° S, 95.0° E) act to divide the rift into two main parts (Fig. 1). The first extends for 530-km between the 2.2-km high, 600-km diameter volcano Kunapipi Mons (outside the map area) and the cluster of coronae. The second lies between the corona cluster and an unnamed caldera-like structure centered at 30.6° S, 110.8° and covers a distance of 820-km. To the east of the caldera-like structure, the rift branches into two arms, forming a "hub & spoke" pattern, the first segment trends N 55° E and the second S 60° E. This area contains the highest topography and the rift is less well defined as a distinct graben, being made up of a series of depressions separated by local highs.

Geologic Units: Eight major units are identified at Juno Chasma (Fig. 1). The definition of each unit is based on an evaluation of relative variations and patterns of radar backscatter and the presence of crosscutting and on-lapping relations. The units are divided into four classes, (1) those that form relatively localized systems of lava flows, (2) regional-scale plains forming materials, (3) tectonic units and (4) impact related materials. Along with the time sequence of events resulting in the emplacement of geologic units, a number of episodes of tectonic activity have acted to shape the surface of this part of Venus. The relative sequence of tectonic activity throughout the history of the region is established

Lava Flow Materials. Volcanic activity has produced a variety of structures that range from small shields (several to 10s of km in diameter), steep sided domes and channels to large constructs such as coronae, calderas, and regional-scale, greater than 100-km in diameter, edifices. The characteristics of units placed in the category of lava flow materials (*fa*,*fb*,*fc*, and *fd*) are distinguished by (1) lobate sets of deposits whose lengths exceed their width, (2) the presence of distinct flow lobes both at the toe and along the margins of the flows and (3) a range of backscatter characteristics for different flows, producing a local mottled texture. Flow units are typically young stratigraphically and correspond to late-stage volcanism associated with coronae and calderas.

Plains Units. Regional plains (*p, pha-b, pm, pl, pju*) make up a majority of the quadrangle. These units generally have a homogeneous texture and are interpreted to be lava flood deposits. Their emplacement covers a major portion of the history of the region. The association of the linetated plains (*pl)* unit with outcrops of tessera suggests that some of the tessera forming tectonic events also coincided with early plains formation. The association of homogeneous plains unit b (*phb*) with the Juno rift and its subsequent deformation by rift related faulting suggests that its emplacement is related to early chasmata formation.

Tectonic Units. Located on the distal flanks of the Juno rift, but still associated with the elevated topography are areally extensive, elevated outcrops of material identified as tessera (*t*), Husbishag and Sudice. Tessera represents the stratigraphically oldest terrain in this area.

Impact Crater Materials. Impact processes have modified the surface materials throughout the regrion. The 73-km diameter crater, Boulanger, and its associated dark surficial deposits (dark parabolas of low emissivity material) dominates the western part of Juno Chasma. The Boulanger impact is relatively recent as its associated deposits superpose all other units.

Geologic History: The relations between the regional-scale units provide insight into the major geologic events, from oldest to most recent, in the formation of Juno Chasma: (1) tessera formation followed by extensive regional plains (*p*) emplacement. (2) uplift and extension forming the Juno topographic rise and early faults, (3) emplacement of widespread homogeneous plains (*pha* and *phb*) on the flanks of the rise, (4) continued extension resulting in the removal of the source vents for the flanking flows, (5) volcanic activity forming the coronae, Tai Shan, Gefjun and their associated deposits. Although impacts have occurred throught the history of the region, the crater, Boulanger appears to be geologically recent.

References. [1] Senske, D. A., *et al*., LPSC XXV, 1245-1246, 1994; [2] Senske, D. A., LPSC XXVII, 1171-1172, 1996; [3] Senske, D. A., Geologic Map of the Juno Chasma Quadrangle (V-47), Venus, in prep. for submittal to USGS, 2008.

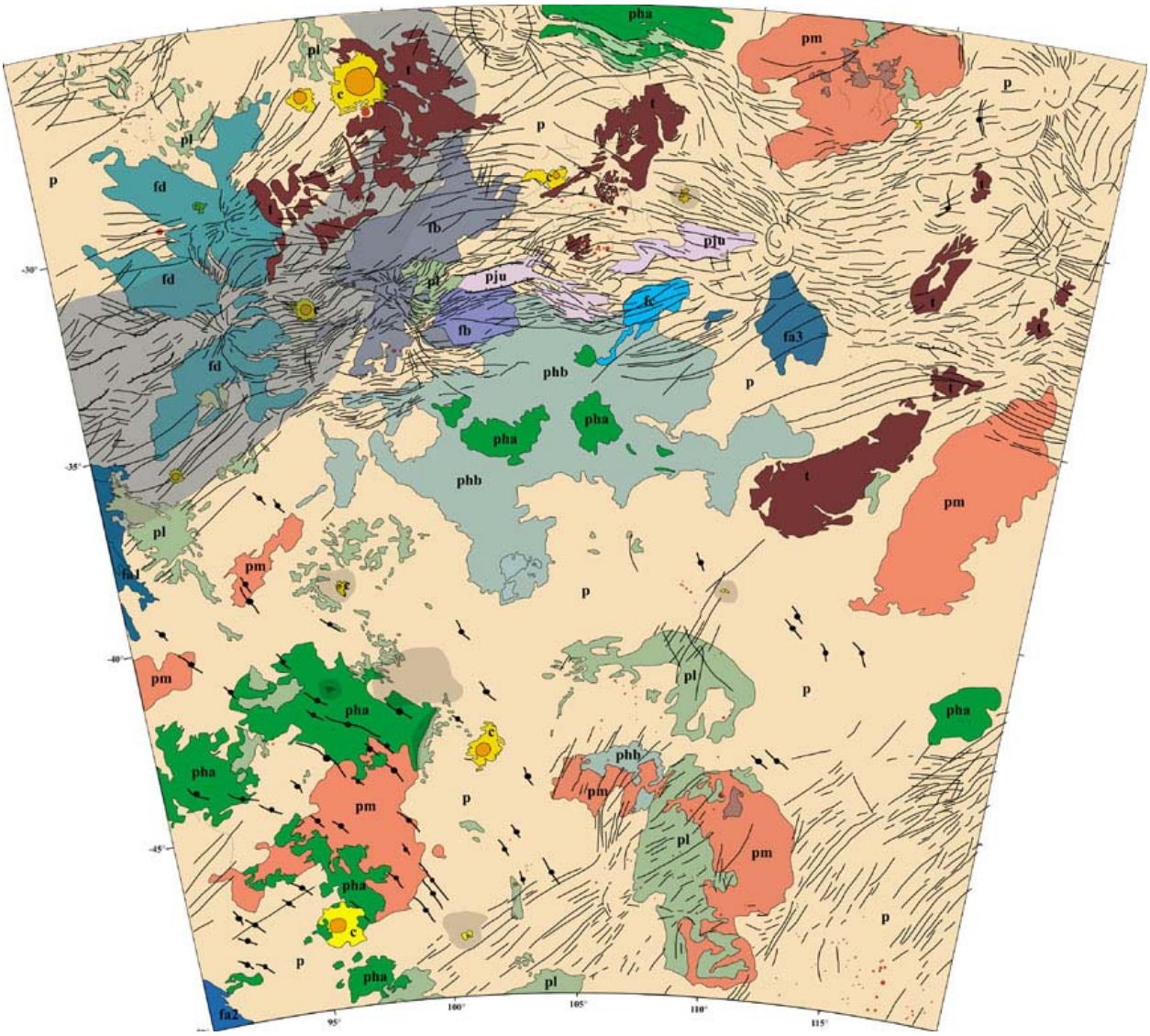

Figure 1, Regional-scale geologic map of the Juno Chasma Quadrangle (V-47). Units are defined on the basis of patterns in radar backscatter and cross-cutting and on-lapping relations.