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**Introduction:** Initial mapping has begun in Venus' Neptys Mons Quadrangle (V54, 300-330°E, 25-50°S). Major research areas addressed are how the styles of volcanism and tectonism have changed with time, the evolution of shield volcanoes, the evolution of coronae, the characteristics of plains volcanism, and what these observations tell us about the general geologic history of Venus. Reported here is a preliminary general stratigraphy and several intriguing findings.

**Location and Major Geographic Features:** The western part of the quadrangle, from its border at 300°E to ~310°E, contains large coronae. Many of these structures are at the eastern termination of Parga Chasma, a broad zone of rifts and coronae striking ESE-WNW over a distance of nearly 8000 km. A large edifice, Tefnut Mons, intermediate in morphology between a classic shield volcano and corona, is also present. The eastern sector of the quadrangle, from ~320°E to the border at 330°E, is marked by Dione Regio, a regional volcanic topographic rise ~2700 km N-S by 1200 km E-W [1]. The rise has been identified as a potential surface manifestation of mantle upwelling, where hotspots feed prodigious volcanism [2]. Unlike other highlands that have gravity anomalies on the order of 150 mGal, the anomaly at Dione is small (20 mGal) and diffuse [1,3]. Dione Regio is similar to other rises on Venus, such as Western Eistla and Bell, that lack large scale rift systems [4]. Dione Regio contains four large shield volcanoes (Ushas, Innini, Hathor, and Nepthys Montes) elevated 1.1-2.4 km above the adjacent plains. All are partially or wholly contained within the quadrangle. The area between Parga Chasma and Dione Regio, extending from ~310°E to 320°E, lacks prominent coronae and large volcanoes. Rather, it is characterized by complex arrays of structures, many associated with Parga and Dione, and small scale flows and edifices.

**General Stratigraphy and Structure:** Preliminary mapping of SAR images indicates an overall quadrangle stratigraphy similar to that found for the Dione Regio area by [1] and in other regions on Venus [5-10] (Figure 1). Tesserae, distributed as scattered inliers, appears to be the oldest unit and is truncated by tectonic plains which are, in turn, truncated by untextured plains. Stratigraphically above these regional plains units are scattered fields of shields and associated flows. Flows associated with coronae and shield volcanoes cap the sequence. In all cases, craters appear to be younger than adjacent units, consistent with other areas on Venus [11]. No craters are located on the large shields. In all cases, attempts have been made to define the stratigraphy based on observed cross-cutting relationships and to not map structures as units or define units by structures within them [12].

**Shield Volcano Evolution:** Initial work has begun on analyzing the stratigraphic units, structures, and landforms on the large shield volcanoes in the quadrangle: Ushas, Innini, Hathor, Neptys, Tefnut, Rakapila, and Faravari Montes. All of the large volcanoes in the quadrangle share broad similarities in stratigraphy. The oldest material is generally made up of radial-dark flows. Radial flows, which are generally radar-bright, post-date these. Late stage volcanism, represented by small domes, cones, and pits, and possible pyroclastic deposits in the form of radar-bright regions, appear to occur after the radial flows, although in some cases the stratigraphy is difficult to interpret. The relationships at Tefnut Mons indicate that regional extension, represented by fractures associated with Parga Chasma, occurred prior to the radial flows, at least in this one case.

**Coronae** Numerous coronae, some of which are transitional in morphology to shield volcanoes, occur within V54. Temporal relationships between and among coronae are apparent in some cases. For example, radial fractures emanating from the corona-like volcano Tefnut Mons are clearly deflected around Bibi-Patma Corona to the south. This indicates that the Tefnut structures were influenced by the stress regime associated with the corona and therefore formed after Bibi-Patma. Many fractures and lineaments near the coronae are aligned along a similar strike to regional structures of Parga Chasma (~E-W), an association indicative of contemporaneous formation like that seen elsewhere on Venus [13-15]. In several cases, coronae radial fractures clearly cut ~E-W lineaments, indicating that coronae development probably post-dated regional tectonism associated with Parga.

**Shield Plains:** Plains with abundant small shields define three plains units ($p_1$, $p_2$, $p_3$). Unlike relationships found in some areas of Venus that indicate a relatively old age for shield plains [16,17], those here are relatively young (Figure 2). This is consistent with observations of other workers who find that shield plains can be stratigraphically young [18,19].

Figure 1 Preliminary stratigraphy in V54. First letter of units names are: t for tesserai (V54), s for shield plains, f for flows, and c for craters. Complete names are identified in the text, where discussed.
Figure 2a: Close-up of shield fields near von Paradis crater. Note that crater impact melt flows around one shield, indicating that the impact occurred after the shield formed (black arrow). Radar- dark flows associated with the shields truncate structural fabric on the adjacent plains, indicating that they are younger (white arrows).

Figure 2b: Shield plains truncating structures on adjacent plains units (arrows), indicating that the shield plains are younger.

Polygonal Plains: Plains characterized by polygonal patterns (pp) are common and in many cases define a stratigraphic unit or series of units. Stratigraphic relationships indicate that polygonal plains are sandwiched between homogeneous plains (ph) and member 3 of the shield plains (ps3) (Figure 3). The fact that 1) the polygonal pattern does not extend onto ph and 2) the homogeneous plains generally lack primary structures that might otherwise cause the unit to accommodate thermal stresses differently than pp, argues for the patterns being a lava flow cooling structure. This observation (although perhaps not pervasive over all of Venus) is at odds with interpretations by others that polygonal patterns on Venus are the result of temperature variations resulting from climate change [20-22].

Figure 3: Contact relationships among homogeneous plains (ph), polygonal plains (pp), and member 3 of the shield plains (ps3). Stratigraphic relationships elsewhere indicate that ph is older than pp, arguing that the polygons are lava flow cooling structures.

Conclusions: Although a more complete understanding of the stratigraphy in V54 must await the completion of mapping, two findings thus far have implications for Venusian geology: 1) Shield plains are a young unit, and 2) The stratigraphic relationships of polygonal plains are inconsistent with an origin induced by global temperature changes.