GEOLOGY OF THE LACHESIS TESSERA QUADRANGLE (V-18), VENUS. Eileen M. McGowan[1] and George G. McGill[2], [1,2]Department of Geosciences, University of Massachusetts, Amherst, MA 01003, emcgowan@geo.umass.edu, gmcgill@geo.umass.edu.

Introduction: The Lachesis Tessera Quadrangle (V-18) lies between 25° and 50° north, 300° and 330° east. Most of the quadrangle consists of "regional plains" (1) of Sedna and Guinevere Planitiae. A first draft of the geology has been completed, and the tentative number of mapped units by terrain type is: tesserae – 2; plains – 4; ridge belts – 1; fracture belts – 1 (plus embayed fragments of possible additional belts); coronae – 5; central volcanoes – 2; shield flows – 2; paterae – 1; impact craters – 13; undifferentiated flows – 1; bright materials – 1.

Material units: By far the areally most extensive materials are regional plains. These are mapped as two units, based on radar backscatter ("radar brightness"). The brighter unit appears to be younger than the darker unit. This inference is based on the common presence within the lighter unit of circular or nearly circular inliers of material with radar backscatter characteristic of the darker unit. The circular inliers are most likely low shield volcanoes, which are commonly present on the darker unit, that were only partially covered by the brighter unit. Clear cut examples of wrinkle ridges and fractures superposed on the darker unit but truncated by the brighter unit have not been found to date. These relationships indicate that the brighter unit is superposed on the darker unit, but that the difference in age between them is very small. Because they are so widespread, the regional plains are a convenient relative age time "marker." The number of impact craters superposed on these plains is too small to measure age differences (2), and thus we cannot estimate how much time elapsed between the emplacement of the darker and brighter regional plains units. More local plains units are defined by significantly lower radar backscatter or by a texture that is mottled at scores to hundreds of kilometers scale. A plains-like unit with a homogenous, bright diffuse backscatter is present as scattered exposures in the eastern part of the quadrangle. These exposures have been mapped as "bright material," but it is not clear at present if this is a valid unit or if it is part of the brighter regional plains unit.

Tessera terrain is primarily found along the western border of the quadrangle, where Lachesis Tessera refers to the southern exposures, and Zirka Tessera refers to northern exposures. A second tessera unit has been mapped with the symbol "t?." This unit appears to be deformed by the requisite 2 sets of closely spaced structures, but it is so extensively flooded by regional plains materials that the structural fabric is partially obscured. Tessera terrain is present in the adjacent V-17 quadrangle, where both Lachesis Tessera and Zirka Tessera are areally more extensive than in V-18.

Features: Ridge and fracture belts are both present, but not as extensive as is the case in, for example, the Pandrosos Dorsa (3) and Lavinia Planitia (4) quadrangles. As is commonly the case, it is difficult to determine if the materials of these belts are older or younger than regional plains. A recent study using radar properties (5) demonstrated that at least most ridge belts appear to be older than regional plains. The materials of fracture belts probably are also older than regional plains, but the fractures themselves can be both older and younger than regional plains (e.g., 3).

Four named coronae are present, but only Zemire Corona has significant associated flows. An interesting nearly linear structure extends from the fracture belt Breksta Linea in the western part of the quadrangle east-southeastward through Zemire Corona to Pasu-Ava Corona. The tectonic significance of this composite structure is unclear at present. Jaszai Patera is located at 32.0° north, 305.0° east, and is approximately 70 km in diameter. There is an unamed feature just north-northeast of Jaszai Patera. An unnamed feature located in the southeastern part of the quadrangle appears to be a corona that is obscured by a gore.

Volcanic materials and landforms are abundant in the Lachesis Tessera quadrangle. In particular, small domes and shields are abundant and widespread. In places, small shields are not only exceptionally abundant, but they are associated with mappable materials, and thus help define a "shield flows" unit. Isolated flows are common, and where these are areally large enough they have been mapped as undifferentiated flows. Other volcanic features include two relatively large shield volcanoes, both with complete calderas and with flows extensive enough to map. A number of pancake domes occur in the Lachesis Tessera quadrangle. Various mechanisms for forming flat-topped domes such as these have been proposed, but none is really satisfactory. This quadrangle is not likely to provide breakthrough evidence for the genetic processes responsible for pancake domes.

The 13 impact craters in the Lachesis Tessera quadrangle range in diameter from 2.4 to 40 km. Four of these are actually doublets. Five of the craters have associated radar-dark halos or parabolas. Only 2 of the 13 craters are significantly degraded. All 13 craters are superposed on either regional plains or on flows that are, in turn, superposed on regional plains.

The fragmented record of tessera and some deformation belts suggests that flooding by regional plains materials has had a significant effect on the distribution of materials older than the regional plains. This, in turn, indicates that regional plains must be relatively thin in the Lachesis Tessera quadrangle, or else the tessera and deformation belts exhibit less relief than generally is the case.

References: [1] McGill, G.E., V-20 quadrangle, 2000; [2] Campbell, B.A., JGR 104, 21,951, 1999; [3] Rosenberg, E., and McGill, G.E., V-5 quadrangle, 2001; [4] Ivanov, M.A., and Head, J.W., III, V-55 quadrangle, 2001; [5] McGill, G.E., and Campbell, B.A., JGR 111, E12006, doi:10,1029/2006JE002705, 2006.