RADAR BACKSCATTER VARIATIONS IN TESSERA ACROSS VENUS. J. L. Whitten and B. A. Campbell, Smithsonian Institution, National Air and Space Museum, Center for Earth and Planetary Studies, Washington DC, 200013 (whittenj@si.edu).

Introduction: Tesserae are some of the oldest deposits on Venus, appearing bright in SAR images due to their high surface roughness and often an enhanced Fresnel reflectivity [e.g., 1, 2]. The surface properties of this geologic unit as a whole are not well constrained. The range in radar brightness, or backscatter coefficient, across the tesserae has not been quantified, and could provide important information about the distribution of crater ejecta or locally-derived regolith, as well as inherent differences in original tessera materials. Here we present the preliminary results of an ongoing global study of the backscatter coefficient of tesserae across the surface of Venus.

Methodology: Magellan SAR data are used to calculate the backscatter coefficient of individual slopes within tesserae [3]. The polarization of the Magellan SAR (HH) is sensitive to roughness variations at the few-cm scale and to slopes on the scale of tens to hundreds of meters. The variations in backscatter from away-facing slopes (aka backslopes) are compared with various geologic landforms, such as impact craters, to determine if there is a correlation between backscatter and a geologic process. Fine grained ejecta and/or materials erupted during volcanic events can modify the surface roughness of the underlying materials.

Results: The backscatter coefficient varies across tesserae, with values ranging from -28 dB to almost 13 dB (Fig. 1). There is a correlation between the highest elevations across Venus and the backscatter coefficient. For example, the backscatter values associated with Maxwell Montes are high, as are the backscatter values for elevated regions of Rhea Mons.

There are also correlations with the expected location of crater ejecta. The fine-grained ejecta from Stuart crater smooths the surface of the eastern half of Alpha Regio [4, 5]. Ejecta from impact craters is also detected in Tellus, Virilis, and Husbishag tesserae. There is also evidence of preserved crater ejecta in tessera without an obvious source crater [5]. Our analysis indicates that crater ejecta is preserved in the rougher tessera longer than on adjacent low-lying plains (>35±15 Ma Ma [6]). Lower backslope values are identified in Tellus Tessera, but not in the adjacent plains [5].

Discussion and Conclusion: Magellan data can be used to infer the presence of fine-grained materials in tessera, despite the variation in local incidence angles. These materials have to be >5 cm thick to be detected with the Magellan SAR dataset. Some of the backscatter coefficient variations are obviously correlated with craters. None have been unambiguously correlated with volcanic constructs. Other backscatter variations must be related to other processes or inherent differences in the original tessera materials.

References: [1] Ivanov M. & Head J. (1996) *JGR*, 101, 14861–14908. [2] Ivanov M. & Head J. (2011) *PSS*, 59, 1559–1600. [3] Campbell B. (1995) USGS *Open File Report* 95-519. [4] Campbell B. et al. (2015) *Icarus*, 250, 123-130. [5] Whitten J. & Campbell B. (2016) *Geology*, 44, 519–522. [6] Schaller C. & Melosh H. (1998) *Icarus,* 131, 123–137.

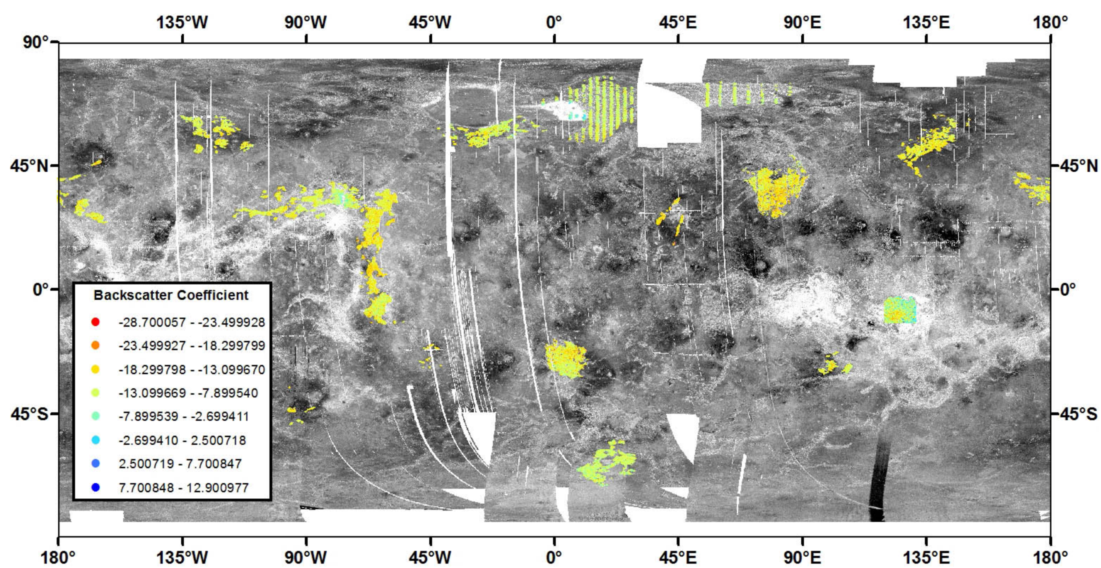

Figure 1. Distribution of tesserae backscatter values (colorful dots) across Venus. Base map: Magellan SAR left and right look data.