REINVISTIGATION OF VENUSIAN SPLOTCHES WITH MAGELLAN AND ARECIBO RADAR DATA. N. R. Izenberg[1] and J. A. Kelly[1,2]. [1]Johns Hopkins University Applied Physics Laboratory, Laurel, MD, USA (noam.izenberg@jhuapl.edu), [2]Liberty High School, Eldersburg, MD, USA.

Splotches, or airblast features are diffuse irregularly circular areas of radar contrast on the surface of Venus, likely caused by atmospheric pressure waves created by the disintegration and incineration of meteorites or comets too small to survive transit through the thick atmosphere the surface [1]. A total population of 401 was characterized by [2] using Magellan synthetic aperture radar (SAR) maps. Of the total, 138 splotches are also visible from earth via the Arecibo Observatory radar system [3]. The Arecibo data, although at lower spatial resolution (1 km/pixel at best, vs. 75 m/pixel at best of Magellan), was fully polarimetric, as opposed to the horizontal transmit-receive polarization of Magellan.

Splotch features are usually dark in SAR images, indicating a smooth, forward scattering, surface on the scale of 12-cm S-band radar [4]. This has been interpreted as shock waves and fine-grained ejecta like material, possibly the remains of the pulverized meteorite, covering the surface to some depth. Some splotches interact with topography such as ridges or rifts or tesserae, and some can have bright centers or concentric halos around the dark material (Fig. 1), possibly indicative of surface disruption or scouring effects [4].

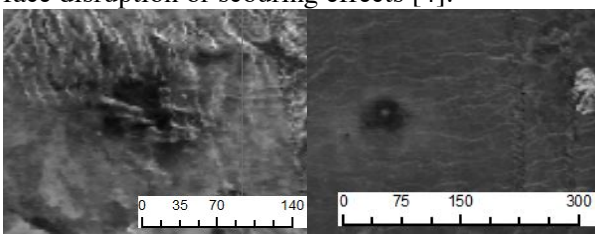

Fig. 1. Example splotches from Magellan global SAR images. Scales in km. Left: splotch #348 (-34.1, 359.5E) just south of Eve Corona. Right: Splotch #83 (36.1, 351.9E) in southeast Sedna Planitia.

In [5] we used profiling in SAR, direct comparison of Magellan and Arecibo radar backscatter, and Arecibo Same sense/opposite sense circular polarization (SC/OC) ratios to investigate the properties of a small pilot set of splotches in the Arecibo incidence angle vs. resolution 'sweet spot', and found examples where contrasts muted or reversed between the two data sets. Some differences are due to resolution, but in some cases, comparing Magellan/Arecibo backscatter of splotches Arecibo SC/OC ratios implied that the depths, compositions, or relationships of the splotch materials with the background varied.

We have begun a systematic evaluation of the splotches in the Magellan, Arecibo overlap, beginning with the ~59 in the Arecibo sweet spot region using both 2015 Arecibo data [6] and derived degree of linear polarization (DLP) and circular polarization ratio (CPR) data from Arecibo campaigns from 1999-2004 [3] and [7]. The derivation process results in the DLP and CPR maps having lower spatial resolution (12-16 km/pixel), which may be too coarse for small features like the center of Splotch #321 (Fig. 1) but is certainly sufficient for general comparison of large splotch features with surroundings. Early results show DLP values of some splotches indistinguishable from surrounding materials, and some with DLP slightly elevated from surroundings (Fig 2).

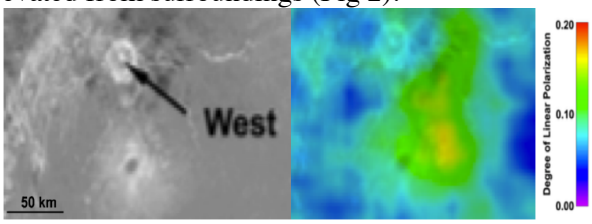

Fig. 2. Splotch #125 (25.1, 303.3E) south of crater West in Magellan SAR (left) and DLP (right) from [3]. The splotch DLP is elevated from the surroundings, though its relationship with West needs to be determined.

A deep (on the scale of several radar wavelengths) mantling of fine ejecta like material over more competent subsurface (e.g. lava flows) should show elevated DLP, so the lack of such a sign may be indicative of shallow deposits, or other material differences in some locations. We also are evaluating splotches in derived emissivity and roughness, and elevation data from Magellan altimetry and SAR stereo.

References: [1] Allen (2000) University of Arizona PhD Thesis. [2] Saunders et al. (1992) *JGR*, 97 E8, 13067-13090. [3] Carter et al. (2004,). *JGR*, 109, E06009. [X4] Schaber et al., *JGR,* 97 E8, 13257-13301. [5] Kelly et al., (2018) 49th LPSC, #1487 [6] Campbell, B. A. (2017) Pers. Comm. [7] Carter et al. (2006). *JGR*, 111(E6) E06005.