Radiophysical Properties of Venusian Impact Craters

C. M. Weitz, R. S. Saunders, J. J. Plaut, and C. Elachi (Jet Propulsion Laboratory, Pasadena, CA 91 109)
H. J. Moore (USGS Menlo Park, Menlo Park, CA 94025)

An analysis of 222 large (> 20-km-diameter) impact craters on Venus using both cycle 1 and 2 Magellan data is being conducted to determine the radiophysical properties (i.e. backscatter cross-section, emissivity, reflectivity, rms slope) of the craters and to search for correlations with target region properties and subsequent geologic history. Because of the poor resolution in emissivity, reflectivity, and rms slopes, we are looking at these 3 properties only for craters with diameters greater than 30 km (147 craters). The majority of craters have similar radiophysical properties to each other and to the surrounding terrain. However, 17 craters have floors with much lower emissivities than the surrounding terrain, All of these 17 craters lie below 6053.5 km altitude, and 11 have associated extended parabolic deposits. While the majority of impact craters have radar-dark floors, many craters have radar-bright floors and several have a mixture of both radar-bright and -dark floors. Radar-bright floors generally are associated with low-emissivity floors or with craters located on rough terrain (i.e. fracture belts, tessera). In many cases, these radar-bright floors probably represent the same rough impact melt that forms the crater outflow deposits. However, there are also examples of radar-bright floors that differ in their emissivity, reflectivity, and rms slopes from the outflow deposits, indicating that the radar-bright floors are the result of high dielectric constants, rather than surface roughness. Radar-bright crater outflow deposits have higher rms slopes and emissivities than the surrounding plains, indicating that the outflows are composed of rough deposits. Radar-dark floors appear to have the same morphology as the surrounding plains and they have similar radiophysical properties to the plains, suggesting that the floors have been filled with lavas similar to those making up the plains. At small incidence angles, many of the craters in cycle 1 images have both radar-bright and -dark floors. Because the floors at the larger incidence angles do not show these striking variations in crater floor brightness, these variations are most likely the result of differences in the dielectric constant that cannot be seen at the larger incidence angles where variations in roughness dominate.

1. 1993 Spring Meeting

2. 006932132 (Steve Saunders)

3. (a) Cathy Weitz
Jet Propulsion Laboratory
4800 Oak Grove Drive
M/S 230-225
Pasadena, CA 91109

(b) 818-393-0876

(C) 818-393-0530

4. P

5. (a) P09 Venus Surface Properties and Processes
(b) 5415 Cratering; 5470 Surfaces
(c)

6.

7. 309'0 at 1992 International Colloqium on Venus

8. $50 check enclosed

9. C

10. None

11. No