GEOLOGY OF SOUTHERN GUINEVERE PLANITIA, VENUS, BASED ON ANALYSES OF GOLDSTONE RADAR DATA; R. E. Arvidson, J. J. Plaut, McDonnell Center for the Space Sciences, Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri 63130, R. F. Jurgens, R. S. Saunders, M. A. Slade, Jet Propulsion Laboratory, Pasadena, California 91103

The ensemble of forty backscatter images of Venus acquired by the Goldstone radar system covers approximately 25 million square kilometers and includes the equatorial portion of Guinevere Planitia and parts of Devana Chasma and Phoebe Regio (Goldstein et al., 1978; Jurgens et al., 1980; Jurgens et al., 1988). The images and associated altimetry data are unique, combining relatively high spatial resolution (1 to 10 km) and small incidence angles (less than 10 degrees) for regions not covered by either Venera Orbiter or Arecibo radar data. A systematic analysis of the Goldstone data shows that: (a) The abundance of craters with impact features is similar to the global average defined from Venera and Arecibo data, implying that the terrain imaged by Goldstone has typical crater retention ages, measured in hundreds of millions of years; (b) Volcanic plains dominate, including groups of small volcanic constructs, lava flows of variable radar return, and volcano-tectonic depressions. For example, flow-like features in Navka Planitia exist with length scales similar to those seen in Venera Orbiter and Arecibo data located in Sedna Planitia. The relative abundance of volcanic features is similar to that found in Venera radar images in northern Guinevere Planitia; (c) Some of the surfaces imaged by Goldstone have surfaces containing high dielectric materials (e.g., Jurgens et al., 1988), demonstrating that resurfacing exposes high dielectric materials in the low plains, in addition to the global trend inferred from Pioneer-Venus data that shows high reflectivities at high elevations (Pettengill, et al., 1988). Higher elevations may simply be sites of vigorous volcanism and thus maximum exposure of these materials; (d) A 1000 km diameter circular feature located at approximately 5 degrees north latitude, 5 degrees west longitude may be a large corona structure. The northern section corresponds to Heng-O Chasma. (e) Devana Chasma is part of the large Beta and Phoebe Regio rift complex. The Goldstone data in northern Phoebe Regio and southern Devana Chasma show a 300 km wide rift valley with upturned flanks (e.g., Malin and Saunders, 1977). The floor has low backscatter. At the low incidence angles for Goldstone observations, backscatter is controlled by quasi-specular reflections and low returns correspond to surfaces that are rough at length scales many times the radar wavelength (12.6 cm). Thus, rifting processes, associated volcanism, and perhaps mass wasting seem to be ongoing processes that continue to generate rough topography; (f) A number of ridge belts can be discerned in the Goldstone data, mainly trending NW-SE and NE-SW, directions similar to those discerned in Pioneer-Venus topography throughout the equatorial region (Schaber, 1982). The ridge belt and topographic orientations suggest deformation due to a large-scale stress system. For example, with an appropriately thin lithosphere, equatorial to mid latitude strike-slip faulting may have occurred as the planet's equatorial bulge relaxed as the spin rate slowed to its present value (e.g., Melosh, 1977).

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