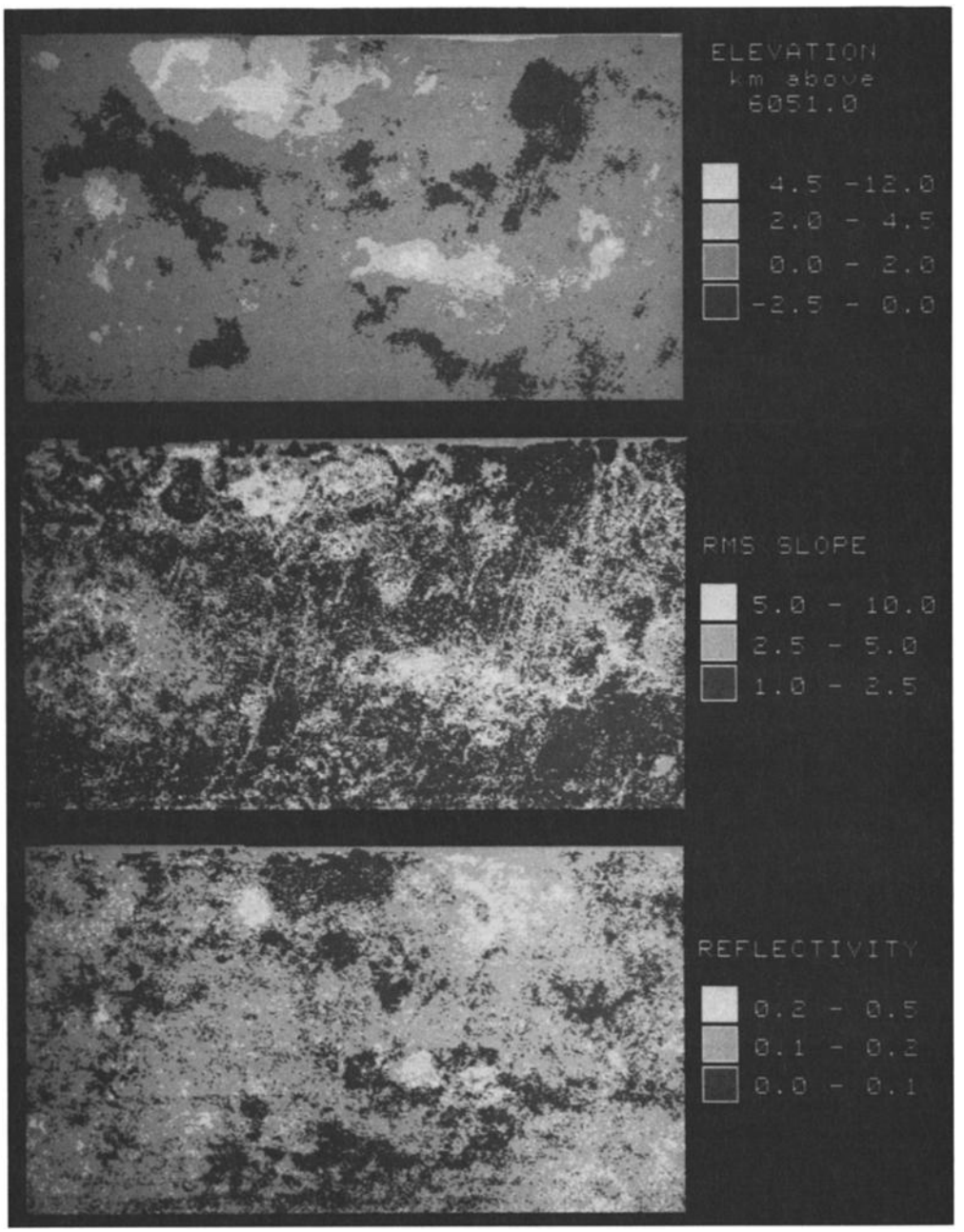

Fig. 1. Pioneer Venus radar data sets in 1° × 1° Mercator map projection. (top) Topography (relative to 6051 km datum), (middle) rms slope (roughness) in degrees, and (bottom) Fresnel reflectivity.

$2.1 < \gamma < 3.1$ g/cm^3 and probably represent low-porosity materials such as typical igneous rocks with a low concentration of high dielectric minerals, and (3) $\rho > 0.20$ correspond to $\gamma > 3.1$ g/cm^3 and represent materials enriched in high dielectrics such as Fe- and Ti-bearing minerals (e.g., ilmenite, rutile, pyrite, magnetite). The high dielectric materials could have a fairly high porosity in some cases; soils containing ~10% by volume of such minerals as ilmenite, rutile, or pyrite would be expected to have radar ρ signatures above 0.20.

Hansen et al. [1973] and *Olhoeft and Strangway* [1975] noticed an apparent correlation of increased dielectric constant with increased Fe and Ti content (especially for ilmenite in basalts). Some terrestrial basalts have dielectric constants above 20 [*Evans and Hagfors*, 1968] which would correspond to $\rho \approx 0.30$, and others (often enriched in ilmenite) have ρ values above 0.18. Unfortunately, there are too few data on the variation of κ with composition, especially as a function of Fe and Ti content, to permit a more quantitative assessment. Nonetheless, it is clear that there are lunar and terrestrial rocks (basalts and others) which have high enough dielectric constants to produce radar ρ values over 0.20. Titanium- or iron-rich basalts cannot be ruled out on Venus. Such basalts are typically undifferentiated and primitive and because of the apparent lack of water within Venus (i.e., water aids in differentiation needed to produce more evolved, acidic magmas) could be expected to result from volcanic activity. Venera lander geochemical analyses [*Florensky et al.* 1978, 1983*a*, *b*, *c*; *Basilevsky et al.*, 1985] support the existence of a variety of basalt types on Venus, and evidence for basaltic volcanism from kilometer resolution radar images [*Campbell et al.*, 1984*a*, *b*] is compelling. Because of this, we feel that most of the high-reflectivity material (cf. maps in Plate 1 and Figure 1)