THE HYPSOMETRIC DISTRIBUTION OF IMPACT CRATERS ON VENUS; M. Banks, S. Emerson, R.G. Strom, Univ. of Arizona, Tucson, AZ, and G.G. Schaber, U.S.G.S., Flagstaff, AZ.

The spatial and hypsometric distribution of impact craters on Venus places important constraints on resurfacing models. Phillips, et al. (1992) have shown that the spatial distribution of impact craters on Venus cannot be distinguished from a random distribution. This is illustrated by Figure 1 which shows cylindrical projections of 5 Monte Carlo simulations of 932 spatially random points compared to the distribution of the 932 craters on 98% of Venus. If the spatial distribution can not be distinguished from a random one, then one would expect that the distribution of impact craters with respect to elevation should also be indistinguishable from a random one. Figure 2 is a histogram showing the percentage of all observed craters and the percentage of surface area in 500-m elevation bins. The histogram shows no more than a 1.6% difference between the percentage of craters and the percentage of surface area in any 500-m bin containing a crater. Multinomial chi square statistical tests were performed of the data set. In these tests probability values (P values) greater than 0.05 show "no evidence against a random distribution" of craters with respect to elevation. The P value for all categories of altitude is 0.17. However, this test is not as reliable because the 5 highest altitude categories contain too few craters per category. To achieve statistical stability the five highest altitude categories where combined and the observed, expected, difference, and "normalized difference" for altitude categories were compared. This is statistically more trustworthy and yields a P value of 0.31. Thus, both tests indicate that there is "no evidence against a random distribution" of impact craters with respect to elevation, with the more reliable test indicating a greater probability of randomness. These results are not in agreement with an earlier report of possible ancient terrains on Venus (Schultz, 1993), or crater density variations of about 10% within 2-km elevation bands (Herrick, 1993). Our results support a remarkably random distribution of craters with elevation and agree with the observed spatially random distribution of the crater population. Therefore, on average, the highlands and lowlands have the same crater density and age. In reality, there are surely age differences within each venusian terrain that can be determined by stratigraphic relations, but the correspondence in average ages suggests that the differences are not great on an absolute time scale. Even recent activity has not had a statistically significant effect on the crater population, which remains largely intact since it was formed. Consequently, it is not possible to determine relative or absolute ages of local or regional areas by crater densities, because the crater population has a spatially and hypsometrically random distribution with stochastic variations.

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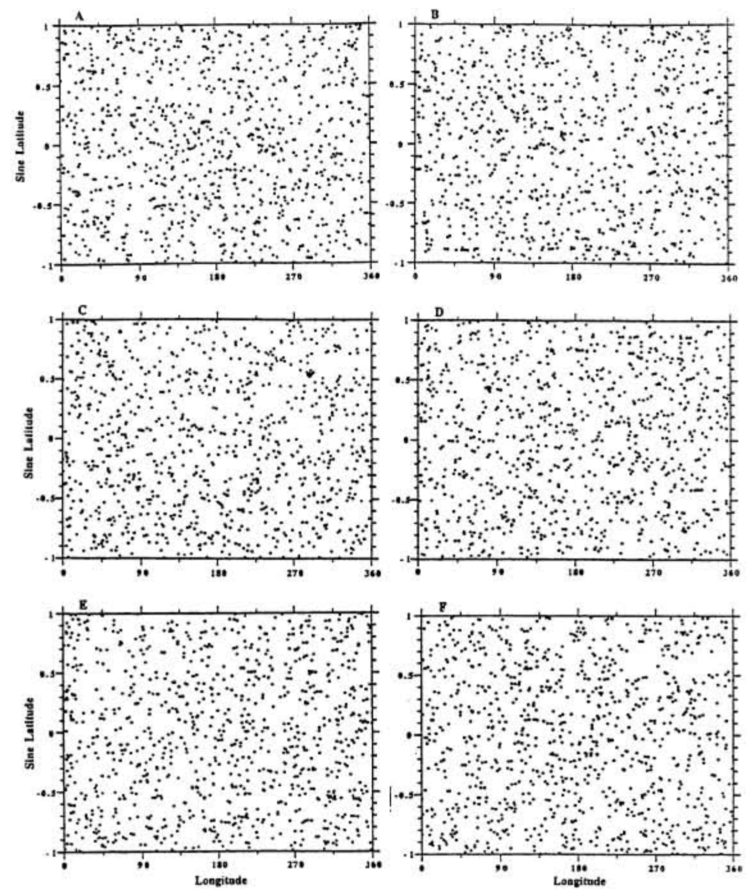

Fig. 1. Cylindrical projections of 5 Monte Carlo simulations of 932 spatially random points compared to the distribution of the 932 craters on 98% of Venus. Note the "clusters" and "holes" due to stochastic variations. Venus is B.

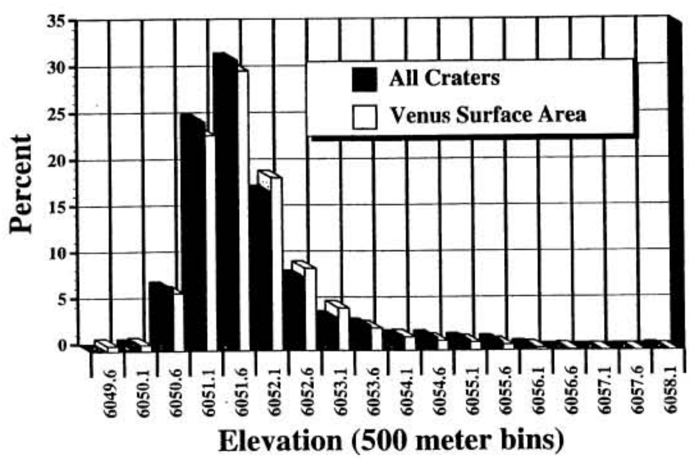

Fig. 2. Histogram showing the percentage of all observed craters and the percentage of surface area in 500-m elevation bins.

References: Herrick, R.R.,*Lunar Planet. Sci. Conf. XXIV*, Abstract, 645-646, 1993; Phillips, R.J. et al., *J. Geophys. Res., 97, E10,* 15,923-15,948, 1992; Schultz, P.H., *Lunar Planet. Sci, Conf. XXIV,* 1255-1256, 1993.