BASIN RING SPACING ON THE PLANETS: NEW DATA FROM VENUS Joseph M. Boyce, NASA Headquarters, Washington, DC 20546; R. J. Pike, US Geological Survey, Menlo Park, CA 94025; and P. D. Spudis, US Geological Survey, Flagstaff, AZ 86001, and Geol. Dept. Ariz. State Univ. Tempe, AZ 85287

Because basin rings are features unique to impact basins, their characteristics, such as spacing, have generally been regarded as important in constraining models of basin formation. Basin ring spacing, both single and multiple rings, has been shown to be similar for basins on the Moon, Mars, Mercury, Earth, Callisto and Ganymede (1, 2, 3, 4, 5, 6, 7, 8). The multi-ring basins on Callisto (and possibly Ganymede) are the only exceptions (9).

The recent Venera 15 images of Venus have expanded our knowledge of Venus and of basin ring spacing. An image of a subdued peak-ring structure (figure 1) located in the northern hemisphere of Venus was taken during the first several weeks of operation of Venera 15. The structure, here interpreted to be an impact basin based on simple continuous nature of the rings, is about 60 km in diameter and has an interior ring about 30 km in diameter. This 2:1 ratio of rim to peak-ring, plotted in figure 2 is similar to the relationship of rim to peak-ring diameters for basins on other solid planetary bodies.

This new Venus datum indicates that basin ring spacing on solid planetary bodies throughout the solar system is remarkably uniform, though those bodies have greatly differing characteristics (gravity, crustal physical and chemical properties, etc.) and have been exposed to impactor populations also with greatly differing characteristics (different model velocities and compositions). Hence, the general properties of a solid planet or of the bombarding population of impactors, have little effect on the formation and spacing of basin rings.

Therefore, the coupling of energy, or at least the distribution of stresses in the target, during all basin forming events on solid bodies must be very similar. These new data are consistent with the hypothesis (10) that the stress distribution responsible for ring formation and spacing is controlled by a standing wave function and that the wave function is, itself, a function of the dimensions of the "strength crater" a dynamic zone of crushed target materials created during impact.

References

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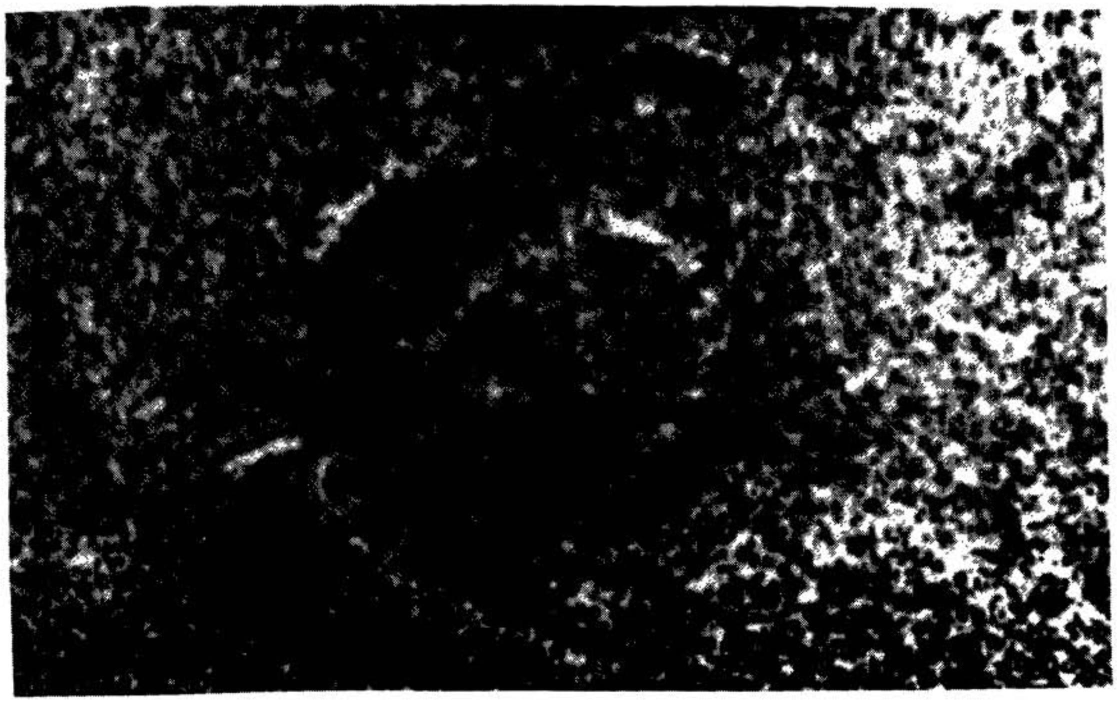

Figure 1

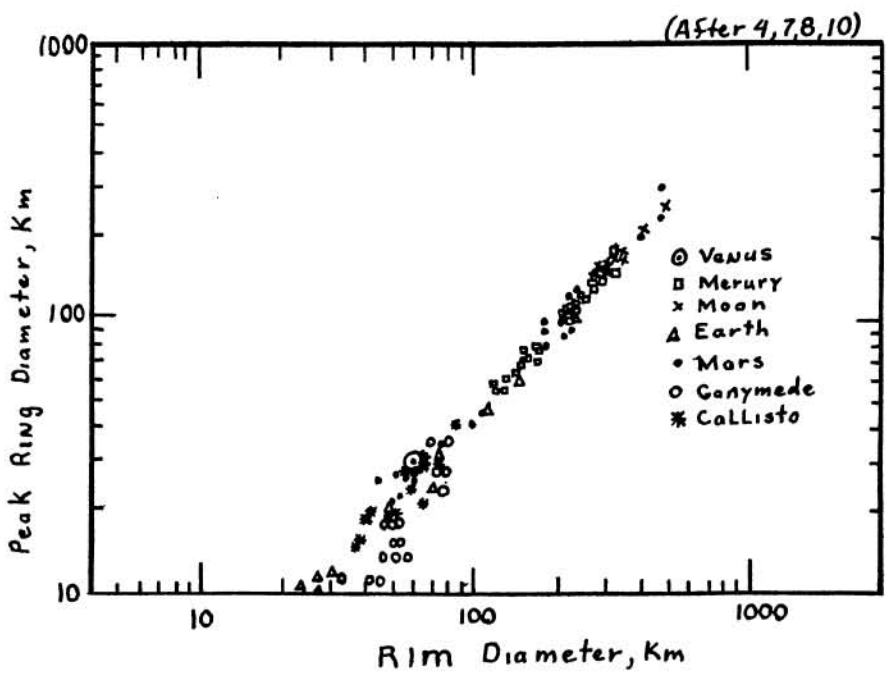

Figure 2