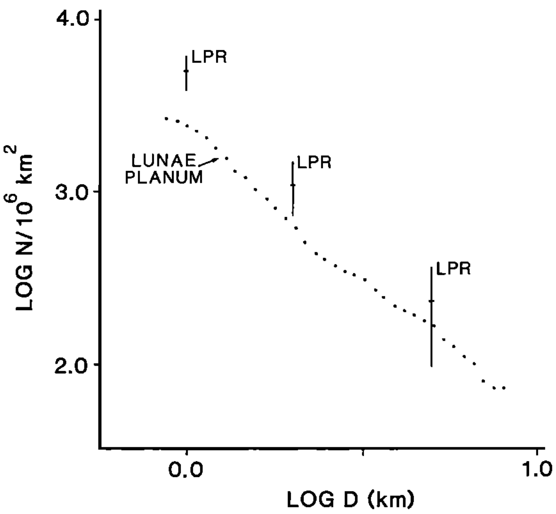

Fig. A1. Comparison of linear crater counts on wrinkle ridges in Lunae Planum (LPR) to the areal crater count on Lunae Planum (dotted curve).

Since the age of a linear feature is seldom equivalent to that of the surface on which it occurs, some criteria to distinguish craters that postdate a feature from those which predate it are needed. Clear crosscutting relations yield obvious superposition relations, however, these may be obscured or absent. In such cases, an offset or broken crater rim on the exterior feature trend is also identified with stratigraphically older craters. For the scarps and fractures addressed in this investigation, linear deformation within a crater on line with the exterior trend also presumably indicates a crater predating feature formation. Crater ejecta does not play a role in these determinations, as ejecta may be emplaced over a scarp or be displaced by the scarp and still exhibit much the same appearance.

Two limitations are imposed on use of this technique. First, there appears to be a lower limit to the size of countable craters. *Tanaka* [1982] determined ages for ridges on Lunae Planum in excess of the surface age and attributed this to flooding of lower elevations by younger, thin basalt flows. Similar counts on Lunae Planum and other ridged plains units confirm Tanaka's results but show a systematic departure in the age values only for reference diameters below 3 km (Figure A1). As ridges are not strictly linear but typically have a ridge crest ~1 km wide, the age values thus become inaccurate for reference diameters on the size scale of the dated feature. A 5:1 ratio of reference diameter to feature width appears sufficient to counteract this and yield accurate values. Most features in this study can be resolved to less than 1 km and can be addressed by the 5-km reference diameter used in this investigation.

The second limitation arises from the relation between the size of a count population and system length and effectively limits application of this technique to relatively old features. As with areal counts, statistically a certain number of craters should overlap a linear feature of unit length for any given age. Due to the decreased cross section of linear features, however, this number is typically very small. For example, the expected distance between two craters of 5 km diameter on a linear feature the age of Lunae Planum is about 1500 km. Because of the lower limit on countable crater diameters discussed above, any attempt to improve a count by increasing the counted crater population requires an increased feature length. Using the same example, a feature 3000-4500 km in length is needed to count three or four craters greater than 5 km. Although individual structures seldom extend more than 400 km, adequate lengths can be derived by combining similar features into a single structure system. Young systems, however, still require tremendous system lengths to generate marginally precise ages; and erroneous system interpretations may enter the data in an effort to extend observed systems. As crater density improves rapidly with increasing system age, the early systems of this study are comfortably populated for lengths on the order of 1000 km. Even so, appreciable errors are attached to the generated dates due to the relatively small number (typically ranging between 4 and 15) of total craters involved.

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