ing in the area of the moat. These faults are interpreted to be major listric slump faults formed during the collapse of the transient cavity rim [*Settle and Head*, 1979]. The distribution of the limestone blocks and associated faulting define an inner diameter for the final crater walls. It is considered that the present form of the annular moat is due to erosion, with glaciation overdeepening of a previously existing fluvial channel at the break in slope at the base of the highly fractured wall rocks. Glacial erosion in the area of the moat was further enhanced by the contrast in competence between the fractured basement of the wall area and the impact melt sheet.

Taking the annular moat and the associated downdropped limestones as defining the interior of the rim wall of the final modified structure, then the concentric valleys with evidence of faulting in the inner fractured zone may well be traces of other slump blocks, which stepped back from the floor to the final rim, and the associated radial valleys may represent the contacts between individual slump blocks [*Murtaugh*, 1976]. The drainage divide between the inner fracture zone and the outer disturbed zone may reflect the erosional remnant of the original rim, giving an estimate of D $\sim$ 100 km for the final diameter at Manicouagan. A final rim diameter of these approximate dimensions is consistent with the relative dimensions of crater floor to rim diameter in complex impact structures on other planets, the onset of the annular residual gravity low, and the estimate for the preerosional volume of melt rocks contained within Manicouagan.

It is believed, therefore, that the various data sets are in keeping with an original structure with D $\sim$ 100 km for the final rim and D $\sim$ 55–65 km for the floor width. The only topographic element which can be correlated with any certainty with fresh impact structures on other planets is Mont de Babel and its associated satellite hills. It is uncertain whether they represent an off-center central peak complex or the remnants of a peak ring [*Hale and Head*, 1979]. On the basis that the southern highlands in the central region are covered by impact melt, the simplest interpretation is that they are a central peak complex. It is important to reemphasize that there are no obvious positive topographic ring features at Manicouagan. Thus the suggestion that Manicouagan was originally morphologically similar to a multi-ring basin, as defined on the moon [*Wood and Head*, 1976], is highly interpretative [*Floran and Dence*, 1976] and not supported directly by the available data. The presence of a complex central peak, but no obvious rings, suggests that, as an analog to lunar structures, the preerosional form of Manicouagan was equivalent to a central peak crater or possibly a peak ring basin [*Wood and Head*, 1976].

The desire for morphological equivalence, when integrating the lunar and terrestrial data sets, stems from the fact that there is a series of complex crater forms. In terms of increasing diameter, they are: central peak craters, central peak basins, peak ring basins, and multi-ring basins [*Hartmann and Wood*, 1971; *Wood and Head*, 1976], with morphological classification dependent on the presence and/or absence of peaks and rings. Although it has been argued that morphological equivalence between lunar and terrestrial impact structures scales as the inverse of planetary gravity, given similar target properties [*Dence*, 1977; *Pike*, 1980], a simple linear dependence on gravity is less obvious when the morphologies of impact structures on Mars and Mercury are also considered [*Cintala et al.*, 1977; *Pike*, 1980; *Wood and Head*, 1976]. The potential for confusion exists in that lunar impact structures are classified on the basis of their topographic expression or surface morphology, whereas terrestrial structures are more commonly classified on the basis of structural information at a level of exposure well below the original ground surface at the time of impact. It is apparent from the present analysis of Manicouagan and the appearance of terrestrial complex structures which are partially filled by lakes that, if the impact melt rocks and breccias removed by erosion were restored so that the structure had its original topographic form, some terrestrial structures would be classified differently.

In making interplanetary comparisons, the effect of planetary gravity on energy-diameter scaling relationships must also be considered, i.e., energetic equivalence. Most workers agree, however, that there is a relatively small dependence on planetary gravity (g), with the g term in scaling relationships of the type $D \propto g^a (KE)^b$ having an exponent estimated at between -0.25 to -0.12 [*Gault et al.*, 1975; *Gault and Wedekind*, 1977; *Grieve and Dence*, 1979; *Schmidt*, 1980; and others]. Thus a lunar crater energetically equivalent to Manicouagan would have comparable final dimensions. The lunar crater Copernicus has a diameter of 96 km and an estimated transient cavity diameter of 65–70 km [*Shoemaker*, 1962; *Gault et al.*, 1975]. Furthermore, if the present analysis is correct, the two structures may have had similar pre-erosional forms. This being the case, the geologic information obtained from Manicouagan may be applicable to Copernicus. Conversely, the detailed surface observations from Copernicus can be applied to Manicouagan and the lunar and terrestrial data sets and can be used in concert to constrain models of complex crater formation. The mode of formation of complex impact structures is an area of considerable discussion and interest [*Schultz and Merrill*, 1981] and has bearing on many current hypotheses regarding the history of the lunar highland crust and the significance of the returned lunar samples. It is intended, therefore, to undertake a combined analysis of the data from Copernicus and Manicouagan in order to construct a more comprehensive model of complex crater formation.

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