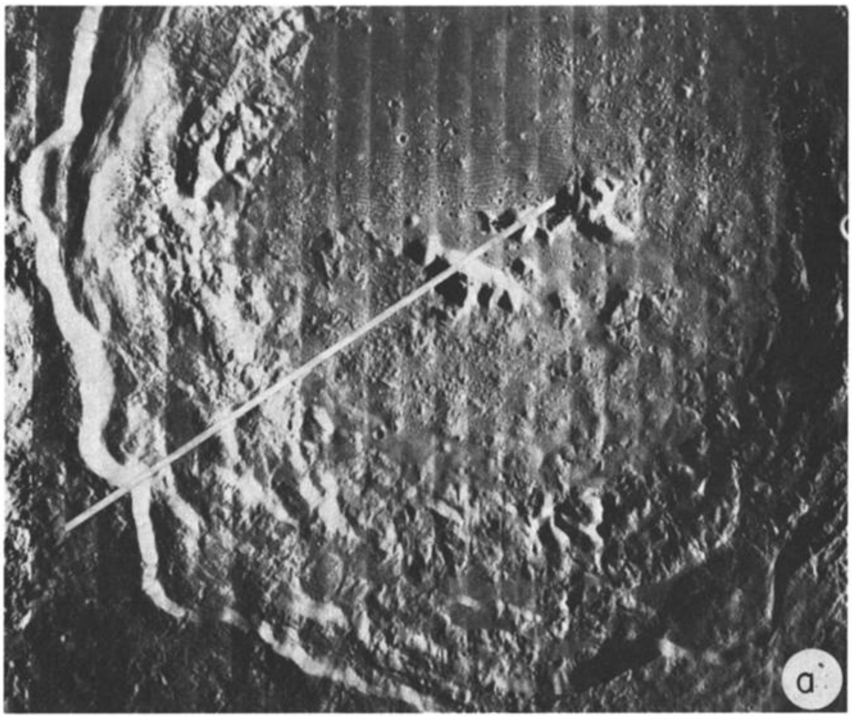

Fig. 6. (*a*) Lunar Orbiter photograph of the 96 km diameter lunar crater Copernicus. Relatively smooth deposits on the floor of Copernicus and locally behind terraces along the wall are impact melt deposits similar to the melt sheet covering the inner plateau at Manicouagan.

cavity rim during collapse [*Floran and Dence*, 1976]. Alternatively, it may represent the downfaulting of the transient cavity rim onto the final crater floor [*Murtaugh*, 1976] or a combination of rim slumping and uplift of the inner plateau by post-impact intrusive activity [*Orphal and Schultz*, 1978]. The structural evidence from Manicouagan alone is equivocal with respect to these interpretations. The distribution of shock effects in the basement rocks of the inner plateau, however, casts doubt on the first hypothesis, as it requires a relatively small transient cavity with unusually high pressures recorded on the transient cavity rim. If, as suggested, the Ordovocian limestones represent slump blocks from the transient cavity rim, then the concentric valleys in the inner fracture zone may also represent the traces of slump blocks, which extended back from the crater floor to the final rim. There is no major lithological evidence of faulting, but slickensides and minor offsets are ubiquitous [*Murtaugh*, 1976]. The preservation of limestones only in the annular moat may be a function of the fact that they have been downdropped the furthest from their original elevation and possibly further protected from erosion by the extension of the original preerosional impact melt sheet to a greater radial distance.

GEOPHYSICS

The Bouguer gravity field associated with the Manicouagan structure has been discussed in detail by *Sweeney* [1978]. The residual Bouguer anomaly, constructed by removing the regional field, has an outer negative ring, with lows of −4 to −10 mGal in the general area of the annular moat, which grades across the inner plateau to a value of 0 mGal at the center (Figure 5 in *Sweeney* [1978]). The annular low is modeled as due to increased porosity from impact-related fracturing, modified in the central region by the uplift of more dense or less fractured rocks from depth [*Sweeney*, 1978]. Observations of the gravity field over other complex terrestrial craters [*Barlow*, 1979; *Dence et al.*, 1965; *Pohl et al.*, 1977], as well as lunar complex craters [*Dvorak and Phillips*, 1977], indicate a similar peripheral low, the beginning of which is correlated with the rim of the structure. According to the analysis of *Sweeney* [1978], the residual peripheral low begins some 10–15 km outside the annular moat on the west side of the structure (Figure 7). By analogy with other terrestrial and lunar structures, this suggests a final rim diameter of 85–95 km for Manicouagan. This is a minimum as the effect of the removal of rim rocks by erosion will be to reduce the radial extent of fracturing and thus the diameter of the gravity low. The peripheral low may be accentuated by the presence of glacial drift in the annular trough, which on the basis of the preflooding depths of Lac Manicouagan and Lac Moughalagane may be ≳ 200 m thick.

Seismic refraction studies indicate some variation in velocity with depth but reveal no clear evidence of specific structures which can be spatially related to Manicouagan [*Willmore*, 1963]. There is a prominent magnetic anomaly (2000 nT) over the center of the structure. It has a steep bounding gradient,

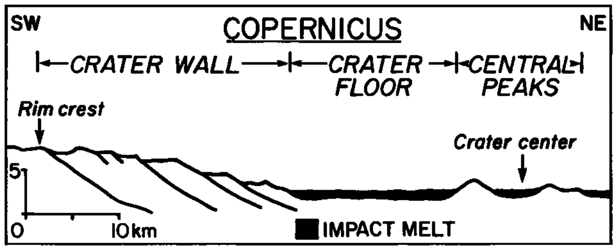

Fig. 6. (*b*) Topographic profile across Copernicus, showing distribution of impact melt deposits on crater floor. Melt veneer and pools on rim and wall do not show at this scale. No vertical exaggeration. Location of profile is shown in Figure 6*a*.