The thick accumulation of early lava fill in the basin interior as indicated by observations and the Orientale flooding model causes loading of the lithosphere resulting in flexure and deformation of the newly emplaced deposit (Solomon and Head, 1979; 1980). This downwarping may exceed one to two km in the central part of the basin.

4.3. VERTICAL MIXING

Efficient vertical mixing of sub-mare material requires lava thicknesses of less than one km (Hörz, 1978). On the basis of this analysis, vertical mixing would be precluded in virtually all regions of Stage I flooding and in any areas of extensive Stage II flooding of basins, such as the southern part of Mare Imbrium. Vertical mixing is not precluded in very shallow parts of basins (< 1 km thick) and in other shallow areas outside basins.

4.4. ISOPACH MAPS COMPILED ON THE BASIS OF EXTERIOR RIM HEIGHTS OF FLOODED CRATERS

Several lines of evidence are developed that show that standard techniques of isopach map compilation may introduce errors which seriously underestimate and overestimate lava thicknesses. Overestimates can be caused by crater degradation, whereas underestimates can be caused by normal variations in crater rim crest topography and by the use of craters that postdate the beginning of mare fill. These problems are exacerbated when only a small number of data points is available. On the basis of these considerations, previous estimates for lava thicknesses in Imbrium (DeHon, 1979) are believed to underestimate true thicknesses by more than a factor of two.

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Appendix A

Data reduction is accomplished in four steps: digitization, derotation, matrix assignment and area-volume calculations. The equipment used is a Talos Cybergraph digitizing board, Tektronix 4051 microprocessor, and IBM 370/138 computer.

The digitizing procedure is as follows: First, the contour intervals on each map were color coded in increments of 300 m. The maps were then fastened to the digitizing board; the corners, scale and contour lines were digitized. As each position value came in from the board, it was derotated (i.e., the tilt of the map with respect to the board coordinate system was removed) and the data points were recorded on tape. The rate of data sampling