

## MARE BASALT THICKNESS

CONTOUR INTERVAL = 1 km

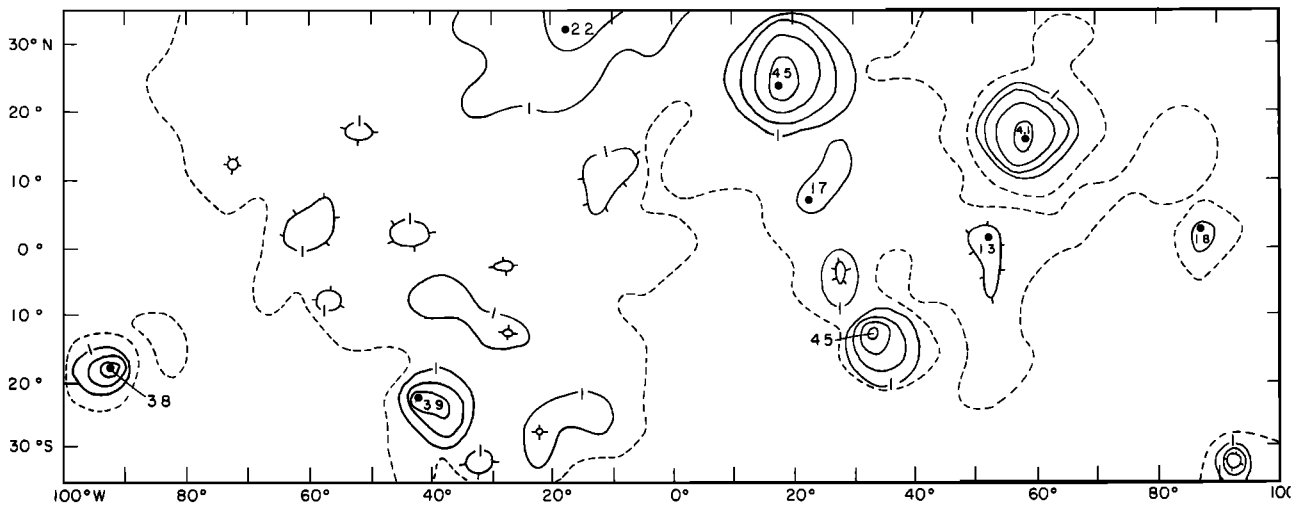


Fig. 8. Mare basalt thickness on the lunar nearside. See Figure 7 (and text) for model assumptions. The dashed line indicates the boundary of mare regions. Contour interval is 1 km.

where  $s_k$  is the distance from the observation point (100 km elevation) to a point located at the centroid of the block of nonmare crustal material. We use  $s_k = 127.5$  km for all  $k$ . The estimated uncertainties in the values of  $t_c$  shown in Figure 7 are displayed in map form in Figure 9. The estimated error in  $t_c$  over most of the nearside ranges from about 2 to 3 km in areas beneath the tracks of Apollo spacecraft (between 15°S and 40°N latitude) to about 5 km at high latitudes. Errors in  $t_c$  derived for the western limb, including the Orientale basin, are generally larger (up to 12 km) because of the uncertainty in the correct baseline for the local topography. Near the edges of the grid area, additional errors may arise from neglect of structural variations beyond the grid and from the assumption of a uniform topographic datum. We repeated the inversion using Bouguer anomaly data obtained with  $D_T$  larger by up to 3 km than the value assumed above and found the

resulting structure similar to that of Figures 7 and 8; even in blocks at the edge of the grid the crustal thicknesses differ by only a few percent for different values of  $D_T$ . Another source of error in the computed structure is the uncertainty ( $\pm 0.1$  g/cm<sup>3</sup>) in the assigned densities. An underestimate of the density contrast between crustal and mare or mantle material of 20%, for instance, results in an overestimate of both the Moho relief and mare basalt thickness by about the same percentage.

It is important to recognize that relaxation of the premare isostasy constraint would not alter significantly the values of crustal thickness depicted in Figure 7. If isostatic compensation of the premare basin topography was less than complete or if some percentage of the mare fill has been compensated, the actual thickness of mare basalt would be greater than in our model by some amount. Because mantle material and mare basalt are similar in density, however, the Moho relief

## UNCERTAINTY IN CRUSTAL THICKNESS

CONTOUR INTERVAL = 2 km

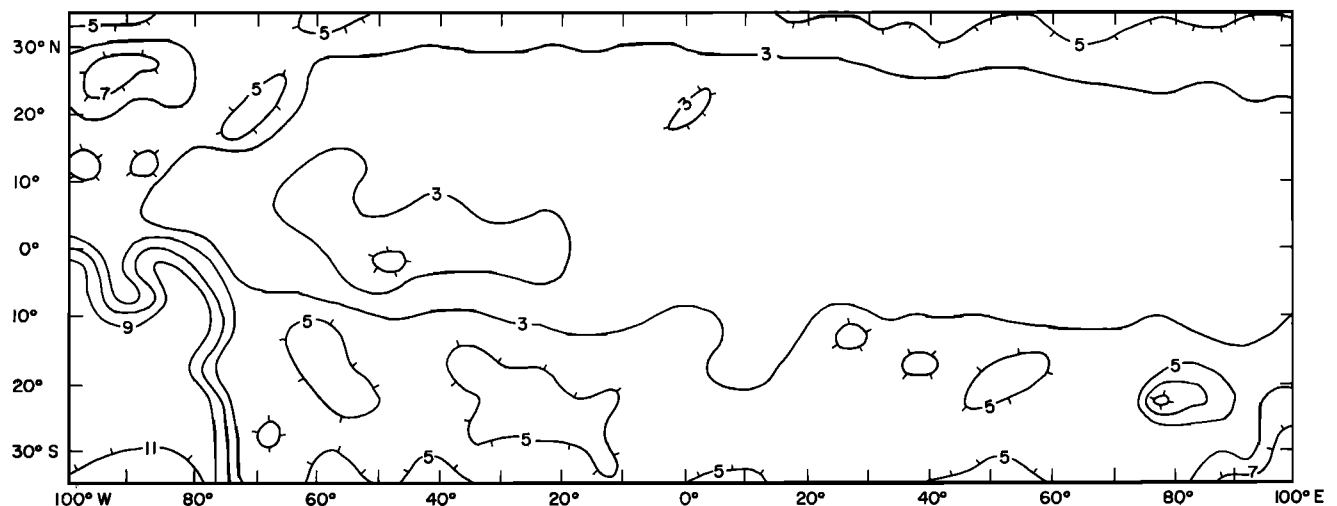


Fig. 9. Estimated error in crustal thickness (exclusive of mare basalt fill) resulting from uncertainties in gravity and topographic data as calculated using equation (12). The contour interval is 2 km.