MAXIMUM THICKNESS OF MATERIALS IN THE WESTERN MARE BASINS. R. A. De Hon[1], Department of Physical Science, University of Arkansas at Monticello, Monticello, AR 71655.

Mare basalts flood a large portion of the western half of the visible lunar hemisphere. Unlike the eastern maria, individual basin outlines are largely masked by basalts which fill the basins and flood adjacent low-lying terrains. The basalt contact at basin edges of the eastern maria provides a valuable constraint to models of basalt thickness. In the absence of such constraints in the west, a preliminary isopach map was constructed for the entire flooded portion of the western lunar surface. The resulting map (Fig. 1) provides insights into the larger elements which comprise the basement beneath the mare materials. This preliminary map is assembled from estimates of the maximum thickness of the combined mare basalts and subjacent mantling materials.

As a first step in gaining an overview of Procellarum basement morphology, a preliminary isopach map was constructed without regard to the type of material within the basin. The thickness estimates are derived from the exposed rim heights of the largest identifiable partly-buried craters (De Hon and Waskom, 1975). The western lunar surface was subdivided by a 5° grid (90°W-15°E and 40°S-45°N). The resulting grid consisted of 375 bins (17 x 21 matrix). The greatest thickness measured in each 5° square was assigned to the center of the bin. Basin edge points and terra materials outside the maria (148 points) were assigned zero thickness values. Interior points (116) were assigned the maximum thickness measurement within the bin. There were 93 bins for which no data could be collected. Nevertheless, the distribution of data points was reasonably uniform except for the central Mare Imbrium and northern Oceanus Procellarum. The grid was contoured using a computer program with a four-grid point search radius around each point to interpolate missing grid values.

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The resulting isopach map (Fig. 1) is a gross generalization of the thickness distribution. Thickness estimates may have been displaced as much as 2.5° from their actual positions in constructing the grid. Centers of maximum thickness derived by contouring may be projected 5° to 10° from their correct positions. The edge of the basin has been displaced 2° to 3° beyond its true location. The inclusion of non-selective crater data results in thickness values which include materials other than mare basalts. Any pre-mare mantling unit, such as the Fra Mauro Formation, Vitello Formation, etc., may be included in the data. Similarly, local and regional prominences projecting through the basalts are not included in the data set. Hence, Montes Riphaeus, Montes Carpatus and similar topographic highs do not appear on the map.

The map provides a means of visualizing the topography of the western flooded lowlands with the effects of the basin-filling material and ejecta removed from the surface. The major features of the map include the obvious thickening of materials in the basins of Mare Humorum (25°S; 40°W), Mare Nubium (25°S; 15°W), Mare Cognitum (10°S; 20°W), and Mare Imbrium (35°N; 20°W). Important features include the thick lenses of material in western Oceanus Procellarum (10°S; 40°W to 30°N; 75°W), a thick lens of material in the Stadius region (10°N; 10°W), and the possible thinning of materials in north-central Procellarum (20°N; 60°W). The zone of maximum thickness in Oceanus Procellarum corresponds to the trend of the weak, positive gravity anamolies in this region. The individual centers of thickening may represent filling of contiguous or overlapping impact basins which have been modified by later events and flooded to the point of almost total obliteration by mare basalt. The thinning of basalts in northcentral Procellarum may be associated with positive relief on the basement in the region of the Marius Hills and Aristarchus Plateau volcanics.

References: De Hon, R. A. and Waskom, J. D. (1976) Proc. Lunar Sci. Conf. 7th, 2729.

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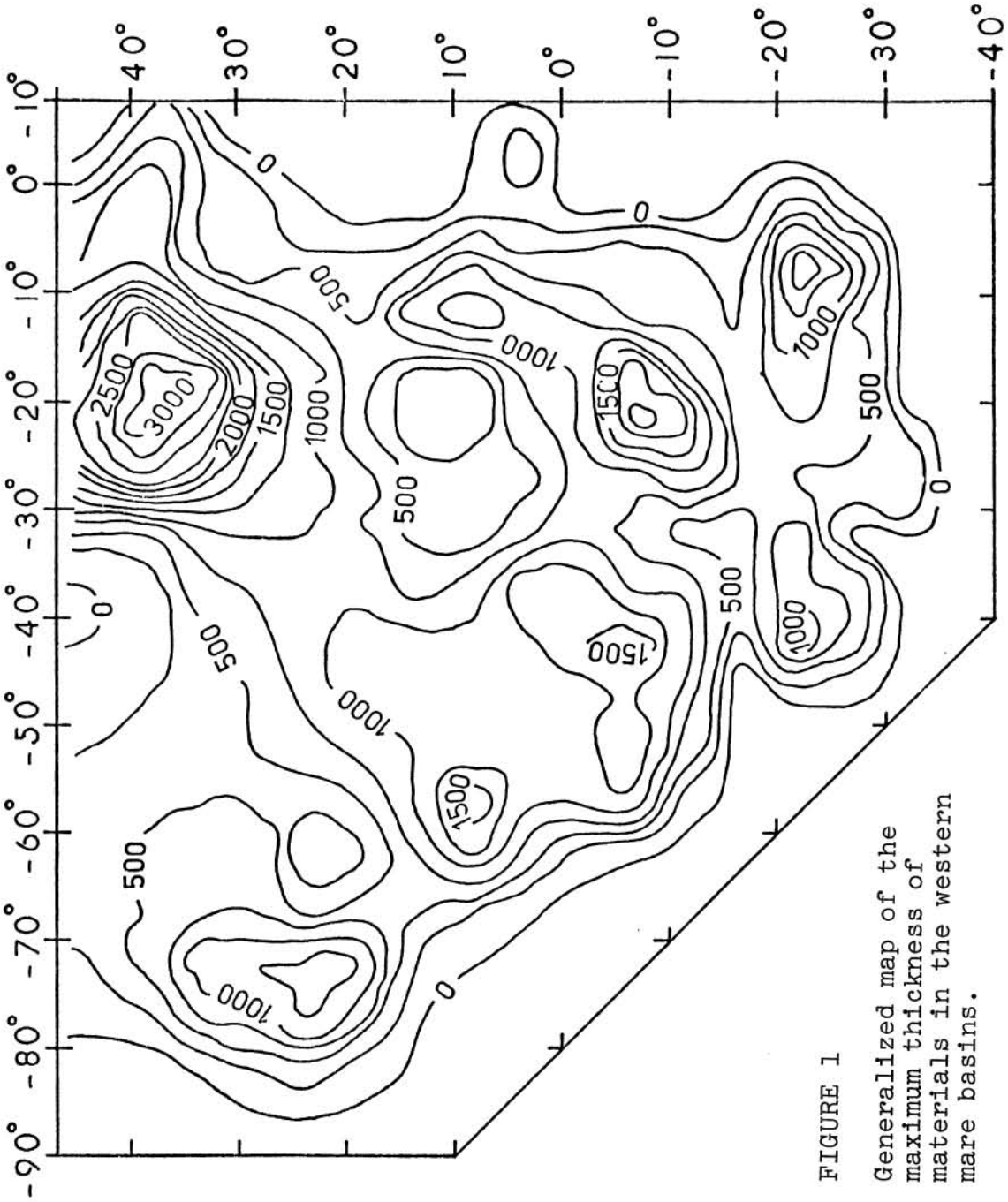

FIGURE 1

Generalized map of the maximum thickness of materials in the western mare basins.