

## PARTICLE TRACK RECORD OF THE SEA OF PLENTY, G.M.

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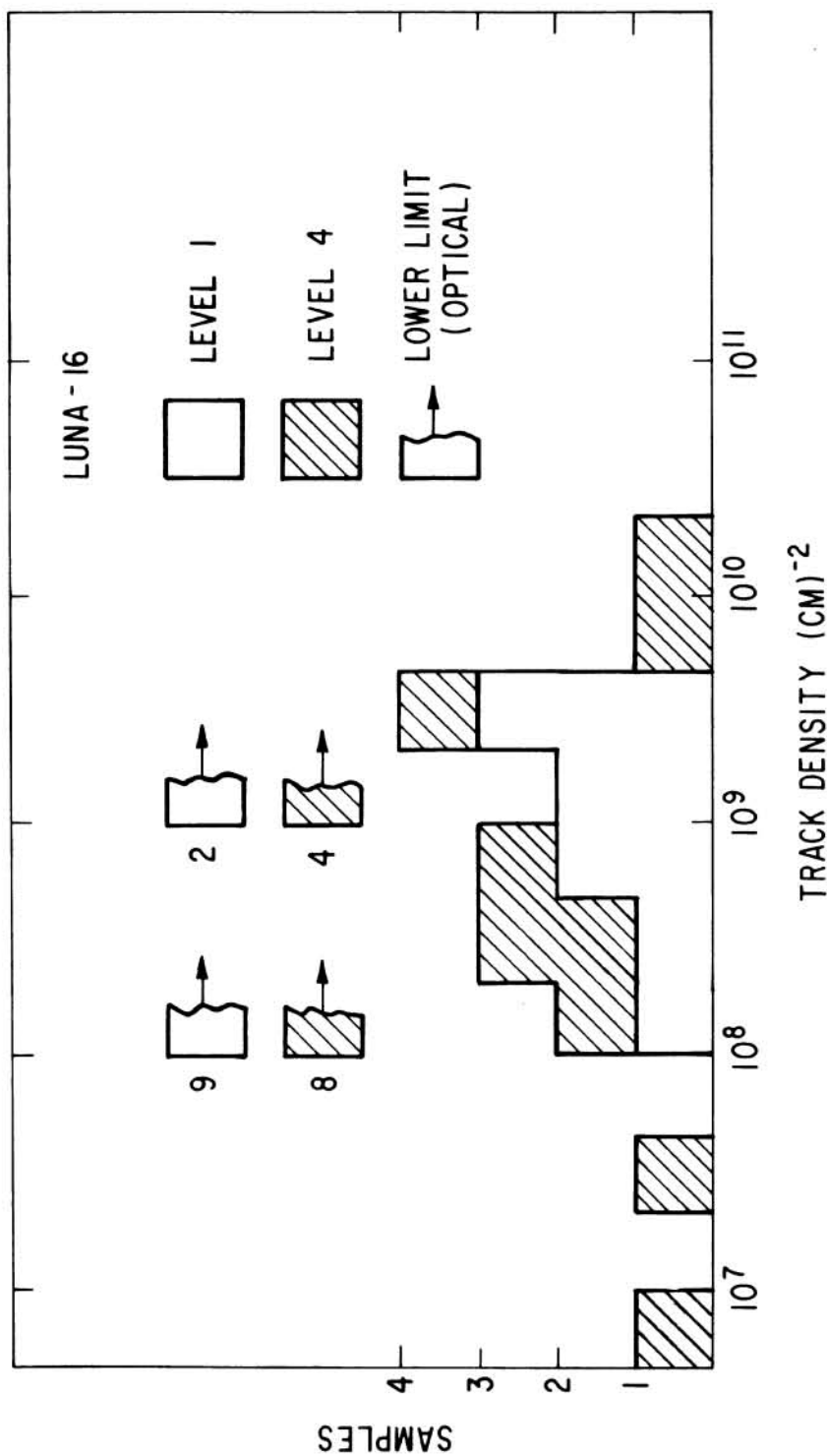
Particle track counts in 41 crystals taken from layers 1 and 4 of the Luna 16 core sample reveal only slight differences between the two levels. The high track densities we observe indicate that virtually all of the grains have been highly irradiated, on or near the surface for a great length of time (in contrast to Apollo 11 and 12 soils which include many grains with  $<10^8$  tracks/cm<sup>2</sup>). Grains could have acquired the observed median density of  $1-2 \times 10^9$ /cm<sup>2</sup> in  $\sim 10^6$  years on the very surface (for  $\sim 100$ - $\mu$  diameter grains) or in  $\sim 3 \times 10^9$  years at a depth of 1 cm. Since there are 3000  $100$ - $\mu$  layers in 30 cm (the depth to level 4), the total time required for each of them to have spent  $\sim 10^6$  years on the surface is also  $\sim 3 \times 10^9$  years, comparable to the age of the maria surfaces. Not only have nearly all of the Luna 16 grains been very close to the surface, but there has also been little "recent" admixture of previously shielded and therefore low track density material from below 30 cm. Further there is no time available in the "exposure budget" for material much below 30 cm at the Luna 16 site to have been exposed near the surface. We conclude that the regolith is unusually thin at

the Luna 16 site. This is consistent with the observation that the Luna 16 core coarsens near the bottom.

The slight decrease in median track density observed in going from layer 1 to layer 4 is consistent with the results of Kashkarov on olivines from layers 1 through 5. Our cumulative track density distribution is given in Table I and the detailed distributions in Figure 1.

Table I: Cumulative Track Density Distribution

<u>DENSITY[cm<sup>-2</sup>]</u>	<u>LEVEL 1</u>	<u>LEVEL 4</u>
>4 x 10 <sup>7</sup>	100%(20)	95%(20)
>10 <sup>8</sup>	100%(20)	90%(19)
>10 <sup>9</sup>	>35%(7)	>33%(7)



Distribution of track densities from Level 1 (0-8 cm) and Level 4 (28-32 cm). All definite values were measured using a transmission electron microscope. In addition, the numbers to the left of the broken bars with arrows indicate the numbers of crystals for which lower limits have been estimated optically.