SOLAR AND GALACTIC COSMIC RAY STUDIES IN FINES AND ROCKS

OF APOLLO 12

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Measurements in about 15 crystals from each of 20 locations in the core show a similar range of track densities from 5×10^6 to $2 \times 10^9/cm^2$ with the exception of the coarse grained layer at ~13 cm which is clearly low. This layer was exposed on the surface for less than 15×10^6 yrs before being covered over. The light trench sample 12033 also gave low track densities and was deposited no longer than 40×10^6 yrs ago. Crystals with a uniform track gradient around the edge exist but are rare. Galactic track densities > 1 cm from rock surfaces are more variable in Apollo 12 rocks than in Apollo 11. Two rocks, 12064 and 12063 are particularly interesting because of their low track densities indicating surface exposure ages $< 1.0 \pm .2 \times 10^6$ yrs and $< 3.2 \pm .3 \times 10^6$ yrs respectively. A vertical section of rock 12063 shows a low track gradient ($\lesssim 20\%$) from 1 to 4 cm indicating that most of the tracks were accumulated while the rock was below the surface. The corrected surface exposure age is $\lesssim 3 \times 10^5$ yrs. The impact pit density evident on 12063 must have been accumulated in a short time. Polished sections of rock have been used to prepare solar flare maps of rocks of 10057 and 12063. Starting at points of highest track density (typically $\sim 10^9/cm^2$ at 10 microns) and proceeding inwards the track density, ρ, varies as $R^{-\beta}$ with $\beta \sim 0.8$. This is a much gentler variation than seen in surveyor glass samples. The results are consistent with a differential energy spectrum of E^{-2} for solar flares and an erosion rate of $\sim 10^{-7}$ cm/yr for lunar rocks.