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THE COMPOSITION OF LUNAR NOBLE GASES TRAPPED 2.5 AE AND 3.6 AE AGO.

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The times when the soils 74001 and 73261 were exposed on the lunar surface were determined using the ^{235}U-^{136}Xe dating method. As these soils were excavated by the Shorty Crater impact only 17 m.y. ago, they most probably acquired their surface correlated trapped gases during their pre-exposure period 3.6 AE and 2.5 AE ago, respectively. The isotopic composition of the trapped noble gases in these two soils is compared with that of the surface correlated noble gases in the "young" soils 12001 and in the present day solar wind.

A strong time dependency is observed for the ratio $^{40}Ar/^{36}Ar$, which decreases from a value of 10.8 for soil 74001 to 0.37 for 12001. Less pronounced decreases are observed for the ratios $^{4}He/^{3}He$, $^{22}Ne/^{20}Ne$, $^{38}Ar/^{36}Ar$, $^{80}Kr/^{86}Kr$, $^{82}Kr/^{86}Kr$, $^{134}Xe/^{132}Xe$, and $^{136}Xe/^{132}Xe$ ratios.

The surface correlated trapped gases are a mixture of implanted solar wind particles and retrapped lunar atmospheric gases. We interpret the observed changes as a result of decreasing outgassing of radiogenic ^{40}Ar and perhaps ^{4}He and of fissiogenic Xe from the lunar crust. The old soils probably also contain surface correlated ^{80}Kr and ^{82}Kr produced by secondary cosmic ray neutron capture of adsorbed or retrapped bromine. To some extent the isotopic composition of the trapped gases in old lunar soil may also have been altered due to diffusion loss from material of low retentivity. When substantiated by further data points, the ratios which show a time dependency, e.g. the $^{40}Ar/^{36}Ar$ ratio, may be a useful indicator of the implantation time of trapped gases or of the time of compaction of regolith breccias.

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