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THE PARTICLE TRACK RECORD OF FRA MAURO, H.R. Hart, Jr., G.M. Comstock, and R.L. Fleischer, General Electric Research and Development Center, Schenectady, New York 12301.

Apollo 14 breccias, igneous rocks, and soils and two Apollo 15 soils have been analyzed by means of cosmic ray tracks. The most abundant Apollo 14 rocks, the breccias, have a mixture of high and low track densities at most positions in their interior. The observed track abundances make it clear that most of the tracks are inherited from the parent ingredients of the breccias. Measurement of the minimum track density at a known depth allows a maximum surface exposure time at that depth to be calculated. Since shock - the probable agent for producing these breccias - does erase tracks in some of the crystals, it is likely that in most cases the minimum densities are in fact true values for the number of tracks created since formation of the breccias. The observed maximum surface residence times (see Table I), 0.05 to 8.2 m.y. with a median of 1.35 m.y., are typically a factor of ten less than those observed for Apollo 11 and 12 igneous rocks. The low surface exposures appear to be the natural result of the friable nature of these rocks, which allows more rapid large scale erosion and more catastrophic break-up from impacts.

The only igneous Apollo 14 rock of interest is 14310. Our data on a section extending from the center of the rock to the bottom would be compatible with 1 m.y. surface exposure of the bottom followed by a 20 m.y. exposure in the upright position. Data from other members of the 14310 consortium, however, make it clear that a more complicated history must have obtained. One possibility is that the major surface exposure occurred over a longer time with the present rock 14310 as the interior of a considerably larger rock (at least 20 cm in radius, for at least 400 m.y.). Three igneous rocks in the size range 2-4 mm give surface ages of 3, 3, and 5 m.y.

Examination of gradients in a group of soil samples reveals variable slopes, most of which are artificially low because the samples were cut at random - i.e., without knowledge of the direction of the original nearest, space-exposed surface. The steepest slope is consistent with the spectrum inferred from the Surveyor III filter glass, and yields a surface resistance time of 4500 years ($\pm$35%).

Soils are extremely variable - median track densities ranging over at least a factor of 200. Soil from the bottom of the trench at site G (Apollo 14) has track densities typically a factor of 20 to 60 less that of nearby surface soils 14259 and 14163. The youngest soil we have examined is 15401, which is rich in clear, defect-free green glass spherules and ellipsoids.

Median track densities in the green glass and pyroxenes suggest that most of this soil is unusually young. Assuming it was scooped from depths ranging from 0 to 3 cm, we infer a deposition not more than 10^6 years ago.

SURFACE AGES OF BRECCIAS

ROCK NUMBER	MIN. TRACK DENSITY [$\times 10^6/cm^2$]	MAXIMUM DEPTH [cm]	MAXIMUM SURFACE AGE [$\times 10^6$ YR]
14047, 42	1.1	0.5	3.4
14055, 1	0.07	0.6	0.05
14066, 22	0.47	0.7	0.49
14301, 33	0.27	0.5	0.34
14311, 36	0.73	3.5	3.1
		0.5	1.1
14321, 270	0.39	10.8	8.2
15233, 5, 3	14	0.15	7.4
15233, 5, 14	1.6	0.08	0.3
15233, 5, 16	7.0	0.09	1.4
15233, 5, 17	3.5	0.13	1.3
		MEDIAN	1.35
		MEDIAN FOR APOLLO 11 AND 12	13