RECENT COSMIC RAY EXPOSURE HISTORY OF ALHA 81005. C. Tuniz[1], D.K. Pal, R.K. Moniot[2], W. Savin[3], T. Kruse, G.F. Herzog, Depts. Physics and Chemistry, Rutgers Univ., New Brunswick, NJ 08903, and J.C. Evans, Geosciences Research and Engineering Dept., Battelle, Pacific Northwest Laboratories, Richland, WA 99352. ([1]Ist. Fisica, Univ. Studi, Trieste, Italy; [2]Dept. Phys., Fordham Univ., New York, NY 10023; [3]Dept. Phys., N.J. Inst. Tech., Newark, NJ 07100)

Score and Mason (1) note the similarities between certain lunar anorthositic breccias and the Antarctic achondrite, ALHA 81005. The recent history of this interesting object can be illuminated by a consideration of its cosmogenic radionuclide contents. We have measured the ^{10}Be content of a 25 mg sample to be 4.1±0.5 dpm/kg by using the tandem Van de Graaff of the Rutgers Nuclear Physics Laboratory as a high-energy mass spectrometer (2). Evans and Reeves (3) report an ^{26}Al content of 46±3 dpm/kg for the meteorite.

Table 1 shows the steady-state or saturation values of ^{26}Al and ^{10}Be estimated for four different sets of exposure conditions. It also gives the exposure and terrestrial ages calculated for various one-stage irradiation models, i.e., a single exposure under each of the four sets of conditions specified in Table 1 followed by terrestrial decay. The results are consistent with either a lunar or 'asteroidal' origin with certain restrictions.

1) ALHA 81005 evidently spent less than 1.1 Myr and probably less than 0.4 Myr in space as a small body. As a rule, the exposure ages of achondrites are considerably older (4); fewer than 5% of the chondrites have ages under 1 Myr (5) although the fraction is higher among carbonaceous stones (6).

2) ALHA 81005 could have accumulated its ^{26}Al and ^{10}Be entirely on the moon, somewhere within the topmost 100 cm. If so, its time in space was less than 0.1 Myr and its time in the Antarctic less than 0.6 Myr. Both these limits conform to expectations based on other studies. First, Monte Carlo calculations show that roughly 70% of the objects ejected from the moon and captured by the earth would have ages less than 2 Myr (7). Second, the average terrestrial age of Antarctic stones appars to be about 2-3x10^5 y (8), consistent with our result of t_{terr}<0.6 Myr.

3) More complex, n-stage irradiation histories beginning on the moon could also explain the ^{10}Be and ^{26}Al results subject to restriction (1) above. Measurements of ^{53}Mn and ^{36}Cl may be helpful in defining more closely the irradiation and decay history of ALHA 81005.

RECENT HISTORY OF ALHA 81005

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Table 1. One-stage exposure and terrestrial ages (Myr) for ALHA 81005.

Location	$^{26}Al_o$ dpm/kg	$^{10}Be_o$ dpm/kg	t_{exp}	t_{terr}
Lunar regolith (0 g/cm^2)	123[10]	13[13]	1.2	0.6
Lunar regolith (180 g/cm^2)	46[3]	6.5[14]	1.9	<0
Meteorite (avg.)	127[11]	24[15]	0.4	≤0
Meteorite (~50 cm)	57[11,12]	10[15,16]	1.1	<0

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