SOLAR WIND AS SOURCE OF NITROGEN IN LUNAR FINES : P.S. Goel, P.N.Shukla, B.K.Kothari and A.N.Garg, Department of Chemistry, Indian Institute of Technology, Kanpur, India.

New data on total nitrogen contents of some fines obtained by neutron activation analysis (1,2) are presented in Table 1. Sieve analyses of a number of soils have also been done (Table 2).

Table 1. Total nitrogen contents of some soils

Sample	Nitrogen (ppm)	Sample	Nitrogen(ppm)
72501	92	Luna -16	
75081	65	20-28cm, bulk	242
78501	130	28-33cm, 0-8 μm	240
79221	120		
79241	120	Luna -20	
79261	80	bulk	102
		120-200 μm	111

Table 2. Sieve analysis data on total nitrogen (ppm)

Soil	Grain size and mean diameters (μm)				
	38 (18)	38-75 (56)	75-151 (113)	151-270 (210)	270 (610)
15012	110	56	57	56	34
15013	140	75	50	60	57
64801	150	75	60	49	38
65501	110	55	43	42	11
69941	166	110	65	50	36
78501	172	115	112	81	60

It had been noted earlier (1) that the plots of nitrogen contents versus 1/d are linear as expected for a surface correlated nitrogen. More analyes do not give a linear correlation (3). A large apparent"volume component" of nitrogen is noted. It is suggested that this is due to agglutination process. Taking the published agglutinate data on Apollo 16 soils (4,5) we see that total nitrogen contents (2,3,6) increase linearly with agglutinate contents (Fig.1). A similar relation is seen for carbon contents also (7).

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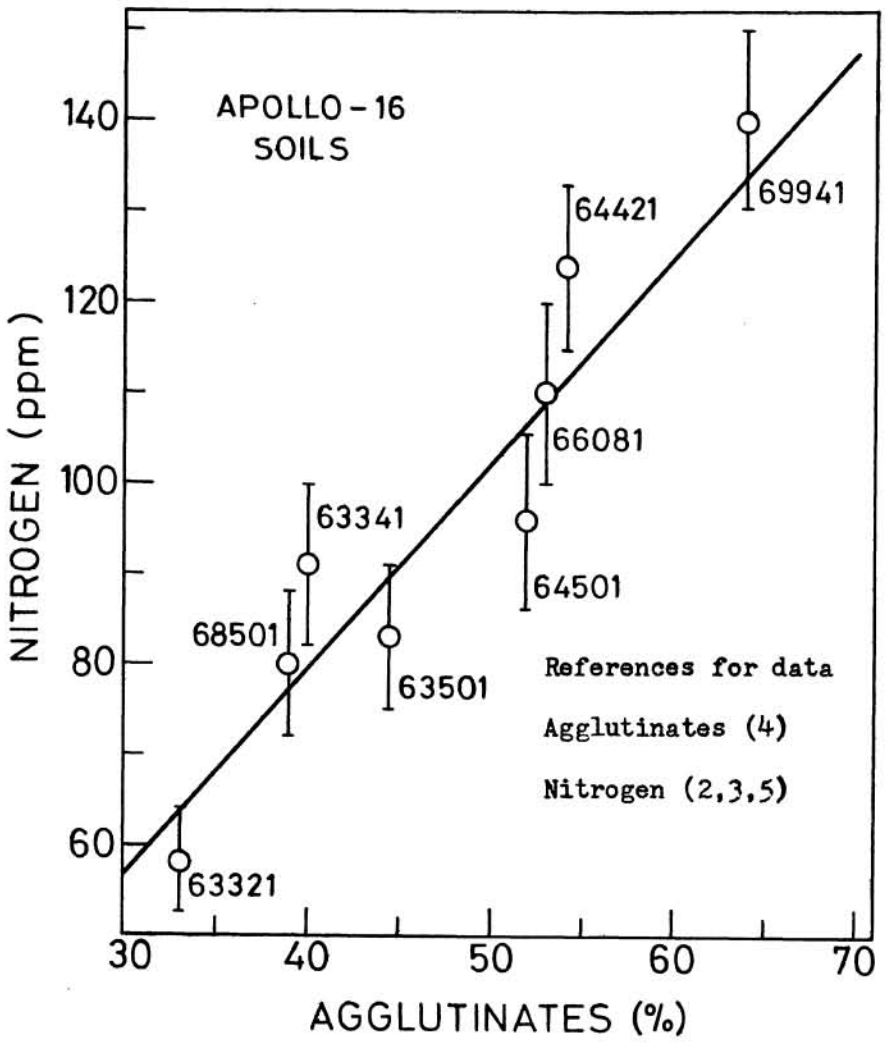

Figure 1. Total nitrogen and agglutinate contents in Apollo 16 soils.

The maxmum surface concentration of nitrogen in soil grains is found to be about 20×10^{-8} g cm^{-2} (1). This is more than an order of magnitude lower than the saturation concentration value of 10^{17} atom cm^{-2} suggested for the case of He^4 (8). The solar wind nitrogen (and carbon) is not saturated. Assuming a solar wind nitrogen influx rate of 2×10^4 atoms cm^{-2} sec^{-1}, at the moon as suggested by Banks (9) we calculate the maximum exposure the grains have experienced to be about 2×10^4 years. The same surface exposure time is obtained from an examination of particle track data (10,11) and also from the consideration of regolith thickness, its total age and the average soil grain diameter.

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Since the soils are almost certainly not saturated with solar wind nitrogen and carbon, it is reasonable to take the C/N ratio in the soils indicative of the solar wind relative abundances (1,3). Moreover, most of the nitrogen (and carbon) is accountable from a single source viz. solar wind. The C/N ratio in fines is almost constant (1 to 1.7) and is unlike any meteoritic value, indicating an absence of appreciable meteoritic contribution.

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