Al-26 AND Mn-53 IN ANTARCTIC AND NON-ANTARCTIC METEORITES.

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This investigation is continuation of the earlier one (1). We have analysed the distributions of long-lived cosmogenic radionuclides Al-26 ($T_{1/2}$=0.705 Ma) and Mn-53 ($T_{1/2}$=3.7 Ma) in Antarctic and non-Antarctic ordinary chondrites. The data were taken from a number of sources (e.g.2,3).

The distributions of the Al-26 contents in more than 700 chondrites have been analysed. To eliminate the difference of the Al-26 production rates in H and L or LL chondrites the contents of Al-26 in H chondrites were multiplied by 1.08. Histograms of the Al-26 distributions are similar to those in (1). In order to obtain the more validity of conclusions there were studied distributions of Al-26 for meteorites of different groups. We calculated the curves of Gaussian distribution for every histogram by the method of successive approximations. Parameters of the curves are the average value of radioactivity (A) and standard deviation of average value (σ). Obtained values of the average radioactivities of Al-26 for different sets of meteorites are given in the Table 1 and Fig.1.

These data allow us to do the next conclusions:

1) Average contents of Al-26 in the different groups of the non-Antarctic H chondrites (lines 2 to 5 in the Table 1) are in close agreement (within $\leq 2\sigma$) with the average content of Al-26 in all non-Antarctic H chondrites (1st line in the Table 1). The same we can see for non-Antarctic L and LL chondrites also. In this case average contents of Al-26 in H chondrites are close to those in L and LL chondrites;

2) Average contents of Al-26 in the all groups of the Antarctic H chondrites were found higher than those in the Antarctic L and LL chondrites on an average by (16±3)%;

3) Average content of Al-26 in Antarctic L and LL chondrites was found considerably less than those in non-Antarctic L and LL chondrites. This decreasing correspond to average terrestrial age of Antarctic L and LL chondrites of ~230 thousand years.

The higher average content of Al-26 in Antarctic H chondrites in comparison with Antarctic L and LL chondrites may results from either the higher contents of Al-26 in H chondrites which fell on the Earth ~n$\times 10^5$ years ago (by ~20%) or the less terrestrial ages of Antarctic H chondrites (on an average ~40 thousand years).

We have also analysed the distributions of the Mn-53 contents in more than 300 Antarctic and non-Antarctic ordinary chondrites. The average contents of Mn-53 and the standard deviations were calculated by the same way as those of Al-26 and are given in the Table 2 and Fig.2. It can be seen that the average contents of Mn-53 in Antarctic and non-Antarctic chondrites agree within $\leq 2\sigma$.

Table 1. Average contents of Al-26 in the different groups of Antarctic and non-Antarctic meteorites. (In the parenthesis the numbers of meteorites are given.)

Group	Non-Antarctic		Antarctic			
	H(119)	L,LL(149)	H		L,LL	
			A(278)	B(240)	A(221)	B(154)
1	59,0±1,0	60,7±0,7	56,6±0,7	55,9±0,9	48,6±0,8	48,7±0,9
2	59,3±1,3	59,8±0,9				
3	58,8±1,5	62,4±1,3				
4	60,8±1,3	59,1±0,9	57,1±0,9	56,8±1,0	50,8±1,0	49,0±1,0
5	57,4±1,3	63,6±1,2	55,8±1,1	54,4±1,4	45,1±1,1	47,8±1,6
6			57,1±0,7	56,5±0,9	48,4±0,8	48,5±0,9

Note. Numbers of groups denote: 1-all meteorites; 2 - falls; 3 - finds; 4 - 5th petrological type for H chondrites and 6th petrological type for L and LL chondrites (the most abundent types); 5 - 3rd, 4th, and 6th petrological types for H chondrites and 3rd, 4th, and 5th petrological types for L and LL chondrites; 6 - Victoria Land meteorites. A - pairing is considered; B - pairing is ignored.

The obtained data may be explained by the higher average terrestrial ages of Antarctic L and LL chondrites in comparison with Antarctic H chondrites (4). That is the ratio (L+LL)/H about nx10^5 years ago was higher than contemporary one. The obtained data can be also explained by the temporal variations of the galactic cosmic ray intensity, but this model is too complex and other effects probably dominate.

Table 2. Average contents of Mn-53 in the different groups of Antarctic and non-Antarctic meteorites. (In the parenthesis the numbers of meteorites are given.)

Group	Non-Antarctic		Antarctic			
	H(99)	L,LL(93)	H		L,LL	
			A(72)	B(67)	A(97)	B(84)
1	316±11	352±12	325±10	328±10	362±12	364±12
2	325±14	344±15				
3	306±17	362±21				
4			332±14	340±15	366±18	363±18
5			318±18		369±15	

Note. Numbers of groups 1,2, and 3, A and B denote the same as in the Table 1. 4 - Victoria Land meteorites; 5 - Yamato meteorites.

References: (1) Alexeev V.A. (1988) LPS XIX, p.8-9; p.10-11. (2) Nishiizumi K. (1987) Nucl. Tracks Radiat. Meas., 13, No.4, p.209-273. (3) Wacker J.F. (1989) Abstracts for the 52nd Ann. Meeting of the Meteoritical Society (Vienna, Austria, July 31 - August 4, 1989), p.253 and supplement. (4) Nishiizumi K. et al. (1989) Earth Planet. Sci. Letts, 93, No.3/4, p.299-313.

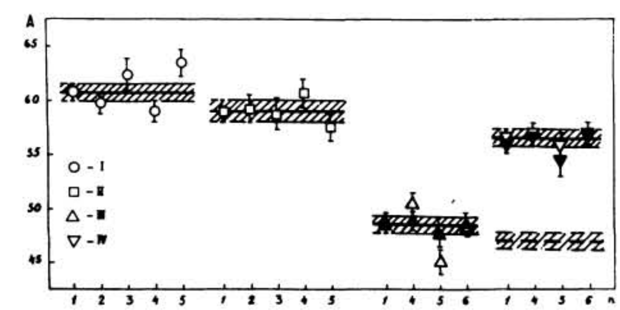

Fig. 1. Average contents of Al-26 (A, dpm/kg) in the different groups (n) of Antarctic and non-Antarctic meteorites. I - non-Antarctic L and LL chondrites; II - non-Antarctic H chondrites; III - Antarctic L and LL chondrites; IV - Antarctic H chondrites. Numbers of groups (n) denote the same as in the Table 1. Solid triangles - pairing is considered; open triangles - pairing is ignored. Uncertainties are 1σ. Hutched areas with symbols are average measured activities; hutched area without symbols is average waiting content of Al-26 in Antarctic H chondrites.

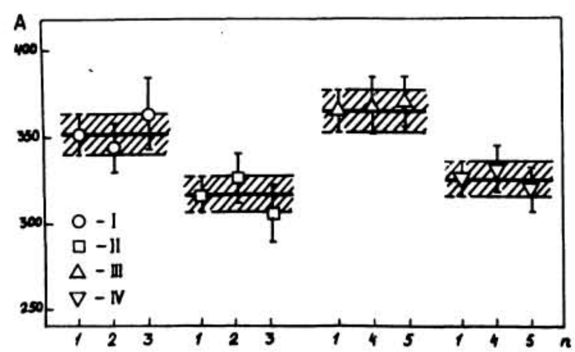

Fig. 2. Average contents of Mn-53, A dpm/kg (Fe+1/3Ni), in the different groups (n) of Antarctic and non-Antarctic meteorites. I, II, III, and IV are the same as in the Fig. 1. Numbers of groups (n) denote the same as in the Table 2.