PECULIARITIES OF DISTRIBUTIONS OF THE COSMIC-RAY EXPOSURE AGES OF H CHONDRITE FALLS AND FINDS. V.A.Alexeev. *V.I.Vernadsky Institute of Geochem. and Analyt. Chemistry, Russian Academy of Sciences, Moscow, Russia*

Well known peak in the distribution of the cosmic-ray exposure ages of H chondrites at 6-7 My can be employed as mark in comparison of different populations of H chondrites. It is found the age corresponding to maximum of peak for non-Antarctic falls is higher by (15+/-5)% of this for non-Antarctic finds. Antarctic H chondrites occupy intermediate position. This effect is probably due to process of weathering.

It is well known the distribution of the cosmic-ray exposure ages of H chondrites have clear-cut peak at 6-7 My. This peak can be employed as mark in comparison of different populations of H chondrites, for example non-Antarctic falls and finds and Antarctic finds. This comparison may give us the information not only about meteorite parent bodies but also about changes of meteorites on the Earth. For such comparison we used the results of our calculations of the cosmic-ray exposure ages of meteorites. Ages were calculated according to contents of cosmogenic isotopes of He-3, Ne-21, and Ar-38. Production rates of isotopes were determined according to Eugster [1] with reduction of Ar-38 production rate by 15% [2].(Such reduction allows to get the best agreement for He-3, Ne-21, and Ar-38 exposure ages [2-4].) Distributions of the average ages (Tav = (T3+T21+T38)/3) are shown in Fig 1.The curves of Gaussian distribution for every hystogram were calculated by the method of successive approximations. Parameters of each curve allow to determined the average value of age corresponding to the maximum of peak (Tm) and the standard deviation of this average value ($\overline{\sigma} = \sigma/\sqrt{N}$, where σ is parameter of Gaussian curve and N is the number of meteorites in the peak).

We can see (Fig 1) the age corresponding to the maximum of peak for non-Antarctic falls (Tm = 6.59+/-0.23 My) is higher by (15+/-5)% of this for non-Antarctic finds (Tm = 5.64+/-0.22 My). Antarctic H chondrites occupy intermediate position (Tm = 6.38+/-0.36 My).

Similar comparison was made for the distribution of ages calculated separately for He-3, Ne-21, and Ar-38. The obtained data are shown on diagram (Fig 2). We can see the same situation.

This effect is possible stipulated by loss of cosmogenic (and not only cosmogenic of course) noble gases in process of weathering of meteorites on the Earth. According to obtained data the weathering is more significant for non-Antarctic finds in spite of relatively small their terrestrial ages (~4000 years in average [5]) in comparison to terrestrial ages of Antarctic H chondrites (~40,000 years in average [6]).

And the last. Fig 2 shows that above mentioned reduction of Ar-38 production rate is probably necessary for conformity of He-3, Ne-21, and Ar-38 ages only of non-Antarctic H chondrites. For Antarctic H chondrites such correction is unnecessary. Why? May be by reason of difference of sizes of H chondrite falls on the Earth in the past (small sizes) and now (big sizes)?

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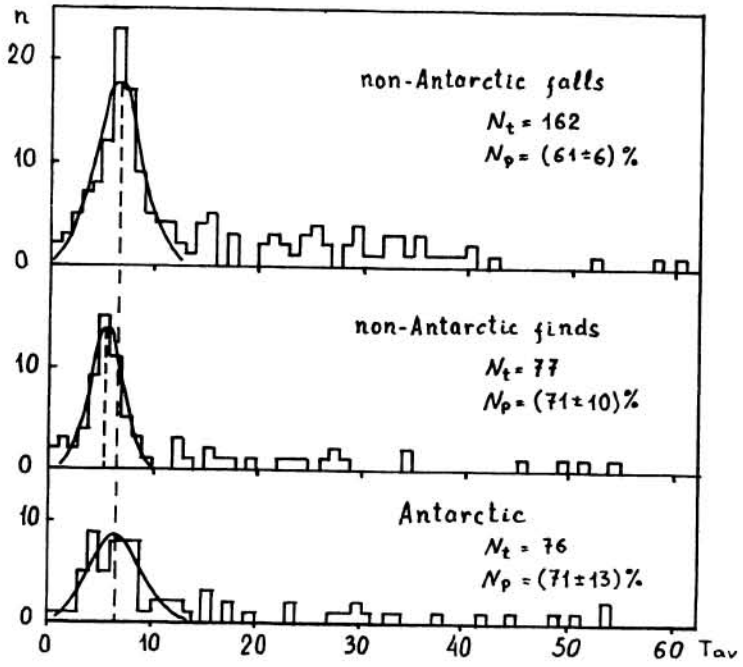

Fig 1

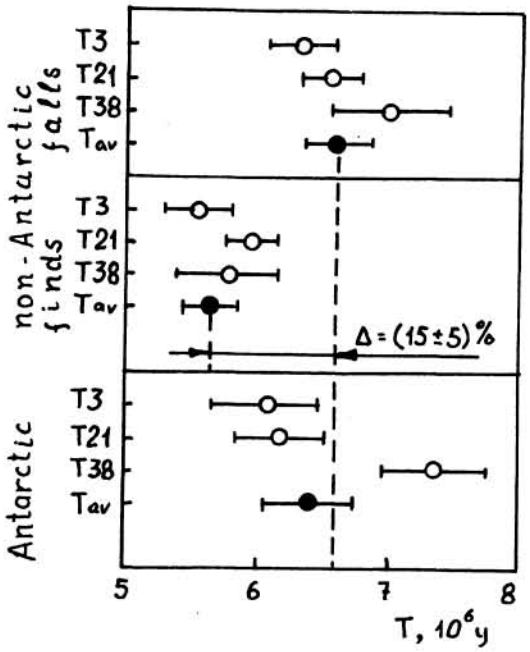

Fig 2

Figure captions

Fig 1 Distributions of the average values of cosmic-ray exposure ages (Tav, My) of H chondrites.
N_t is total number of meteorites; N_p is portion of meteorites in peak. Dashed lines correspond to positions of maxima.

Fig 2 Positions of the peak maxima of cosmic-ray exposure ages calculated for He-3 (T3), Ne-21 (T21), and Ar-38 (T38) for non-Antarctic and Antarctic H chondrites.
Filled symbols correspond to positions of maxima in distributions of the average values of the exposure ages.