

TWO POPULATIONS OF COMET HALLEY DUST PARTICLES; L.M.Mukhin, E.N.Evlanov,  
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An attempt of more or less detailed classification of comet Halley dust particles was made in (1), using only compressed mode spectra from dust-impact time-of-flight mass-spectrometer PUMA-2. In this work data from both instruments PUMA-1 and PUMA-2 are considered.

The dust grains of comet Halley are classified as CHON, mineral (ROCK) and mixed, the relationship between number of ions of light elements  $H^+$ ,  $C^+$ ,  $N^+$ ,  $O^-$  and of rock-forming elements  $Mg^+$ ,  $Si^+$ ,  $Fe^+$  in the spectrum being used as criterium of its classification. If the ion ratio of every rock-forming element to the most abundant light element is less than  $T$ , then this particle is assigned to CHON. If, on the contrary, the ion ratio of every light element to the most abundant rock-forming element is less than  $T$ , then the particle of that kind is attributed as ROCK. All the other particles are included in the mixed group.

Dependence of quantitative classification results on the threshold value  $T$  is shown in Table.

Table. Particles classification as dependent on the threshold.

		$T = 0.01$		$T = 0.05$		$T = 0.1$	
		number of spectra	%	number of spectra	%	number of spectra	%
PUMA-1 2031	CHON	158	7.8	354	17.4	508	25.0
	mixed	1573	77.4	1235	60.8	1008	49.6
	ROCK	300	14.8	442	21.8	515	25.4
PUMA-2 517	CHON	41	7.9	51	9.9	67	13.0
	mixed	387	74.9	354	68.4	316	61.1
	ROCK	89	17.2	112	21.7	134	25.9

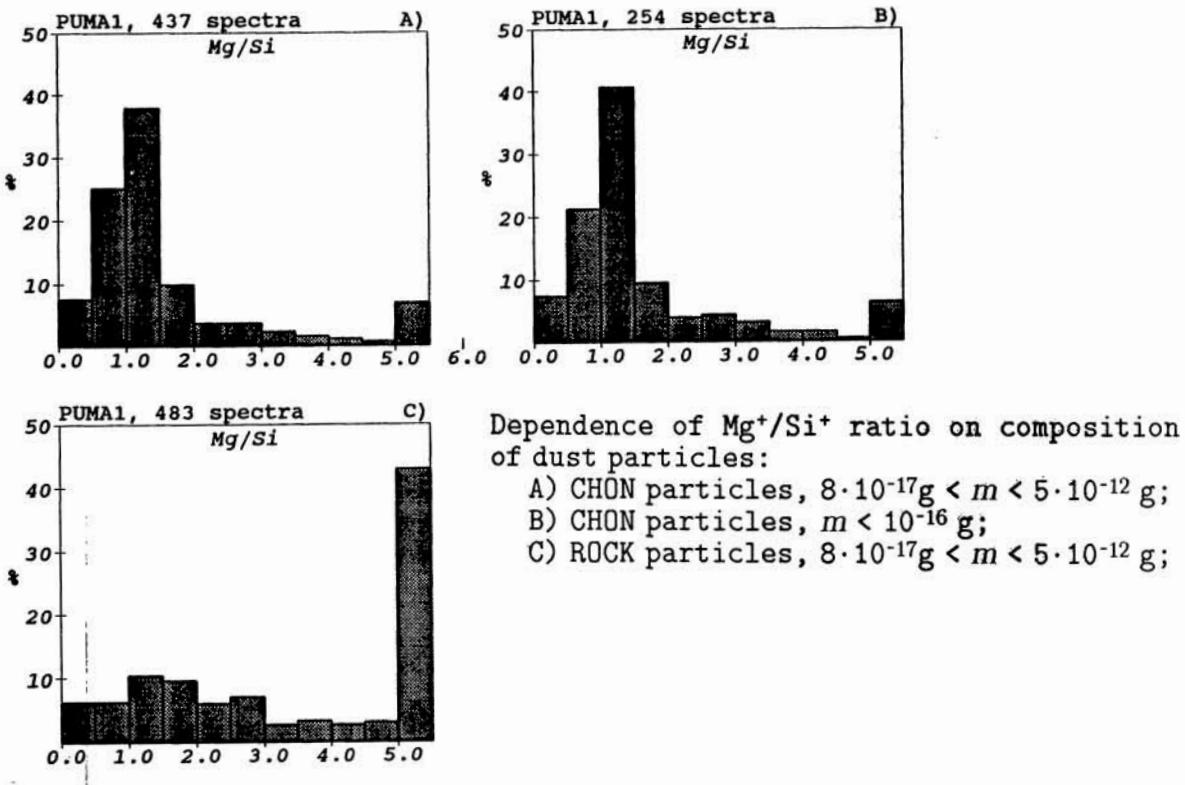
PUMA-1 and PUMA-2 results are quite similar. Below groups for  $T = 0.1$  are considered.

It turned out, that mass distribution of dust particles depends on their composition. So, in all totality of spectra of PUMA-1 there is 23% of the smallest particles with mass  $m < 2 \cdot 10^{-16}$  g and 18.4% of the largest particles with  $m > 5 \cdot 10^{-12}$  g. In CHON group these quantities are 24% and 25%, in ROCK group - 40.2% and 6% correspondingly. Data from PUMA-2 display the same tendency.

We have also evaluated mineral part of CHON and ROCK particles in terms of their  $Mg^+/Si^+$  ratios. The results are shown at figure. Comparison of A) and C) histograms points out the drastic difference of silicate component distribution in CHON and ROCK particles. From A) and B) histograms it is seen, that for CHON particles  $Mg^+/Si^+$  ratio is practically independent on mass of particles (see also (2) about mass dependence of silicate component distribution for all totality of spectra).

An important point is that not only absolute values, but first of all the  $Mg^+/Si^+$  ratio distributions themselves are different in CHON and ROCK groups and these differences will remain after conversion from the ion ratio to the elemental one. Thus, we conclude, that there are two different populations of grains in the comet Halley dust envelope with different composition and properties which, possibly, have different origin and nature.

## TWO POPULATIONS OF DUST PARTICLES: Mukhin L.M. et al.



## REFERENCES

1. Dikov Yu.P. et al.: 1989, *Adv. Space Res.* 9, (3)253–(3)258
2. Mukhin L.M. et al., this volume