SOME PECULIARITIES OF ASTEROID SIZE DISTRIBUTION. A. M. Kazantsev, Astronomical Obsevatory of Kyiv Taras Shevchenko National University, Observatorna st. 3, Kyiv-53, 04053, ankaz@observ.univ.kiev.ua

Introduction: Usually the asteroid size distribution is presented by expression as a power law

$$dN(D) = kD^{-b}dD \qquad (1)$$

where $dN(D)$ – asteroid quantity in a narrow size site (dD), k and b – certain constant parameters.

We know at present, that the expression (1) can't be used to the full range of the asteroid sizes. And there is no a clear dependence $b(D)$. To obtain of such dependence we used new (additional and revised) catalogue of the IRAS data containing sizes and albedos of 2228 asteroids [1].

Data file preparation: In order to estimate the sizes of asteroids, which aren't included to the IRAS catalogue, the full MPC catalogue of asteroid orbits by January 2008 was used. The size estimations were carried out by the formula connecting the asteroid size D, its geometrical albedo p_v and absolute magnitude H

$$2\lg D = 6.247 - 0.4H - \lg p_v \qquad (2)$$

Asteroid albedos were being determined by dependence p_v on semimajor axis a

$$p_v = 0.342 - 0.085a \qquad (3)$$

Equation (3) represents a linear approximation of dependence $p_v(a)$ at semimajor axes 2.16 – 3.70 AU, which is deduced on the base of the IRAS data. Besides this expression, the average albedos of some large asteroid families (Flora, Koronis, Eos, Phemis and Veritas) were taken into account.

The average albedos of the asteroid families were determined by on asteroid albedos given in the IRAS catalogue. Averages p_v of the mentioned families are represented in Table 1.

Table 1. Averages asteroid albedos for asteroid families

Family	Flora	Koronis	Eos	Phemis	Veritas
p_v	0.192 ± 0.063	0.182 ± 0.061	0.137 ± 0.036	0.077 ± 0.025	0.058 ± 0.020

If asteroid orbit elements (a, e, i) fall within ranges one of the families, the body albedo was equated with average albedo of the family. The asteroid sizes (D), obtained by on formula (2) were compared with the sizes (D_{IRAS}), given in the catalogue. The average relative error is equal 0.25.

Thus, list containing sizes more than 300 thousands asteroids, was made up. There are 2228 sizes in the list, which correspond to IRAS data.

Defining of the dependences *b*(*D*): In order to determine parameters k and b in a single narrow size range, it is enough to divide the range into two sites and to calculate asteroid quantities in each of them. The calculated values of k and b should be corresponded to the range middle (D_s).

The obtained dependence $b(D)$ is clearly divided into two quite different sites: at D < 65km and at D > 80km (Fig.1).

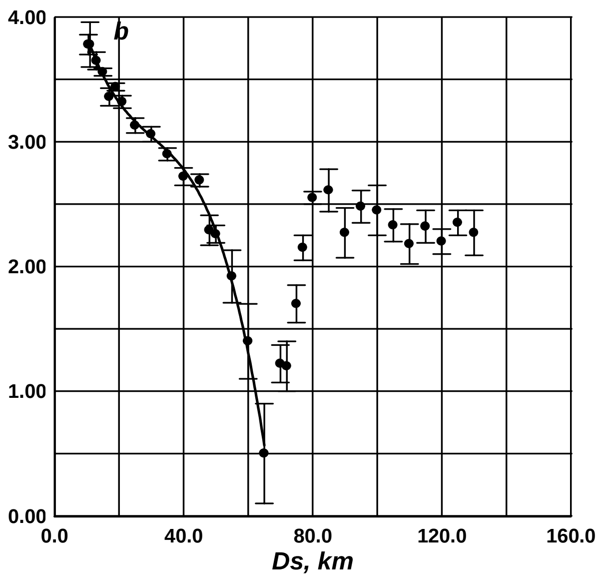

Fig. 1. The dependence $b(D)$ for the MBA

In the first site the exponent b is sharply increasing from 1 to 4 under lessening of D from 65km to 5km and less, and in the second site this parameter remains on average constant within 2.2 – 2.6. There exists a gap in the dependence at D = 65km – 80km. The obtained parameters k and b show that the number of MBAs with D > 1 km is about 1×10^7. It is by an order at magnitude higher than the previous estimations.

Estimation of NEAs quantity: Parameters b and k were calculated for NEAs (q < 1.3 AU) having D from 3 to 12km. There are only 2 NEAs with D > 12km. The average value of b for this sample (63 bodies) makes about 4. It is in a good agreement with the value obtained for MBAs. Parameter k for NEAs shows that the quantity of NEAs with D > 1km should be more than 2000. It is almost twice as much, than the last estimations.

References:.[1] Tedesco E. F. et al. (2002) *The Astronomical Journal 123*, 1056-1085.