

COMET HARTLEY 2 AND THE TWO KINDS OF COMETARY SUB-NUCLEI. Illés-Almár, Erzsébet, Konkoly Observatory of the Hungarian Academy of Sciences, Budapest, Hungary. E-mail: illes@konkoly.hu

Abstract The images of the nucleus of comet Hartley 2 (Fig. 1 and 2) made by the Deep Impact spacecraft strengthens our earlier hypothesis that the sub-nuclei, building up the nucleus of a comet, can be of different hardness.

Introduction and Discussion On 4 November 2010 the Deep Impact spacecraft encountered the nucleus of comet Hartley 2 by about 700 km. The images are of very good quality, and let see very well the surface structure of the nucleus – making possible, for the first time, to investigate the source regions of the jets..

It is peculiar, however, that two parts of the comet, namely, both ends of the elongated nucleus, are very active with a lot of jets. On the contrary, there is not a single jet emanating from the middle part of the nucleus. Furthermore, the dividing line between the two kinds of surfaces is very definite. This dichotomy is suggesting that the nucleus is composed from several primordial bodies, stuck together, which are of different hardness (porosity) or have different light-element composition.

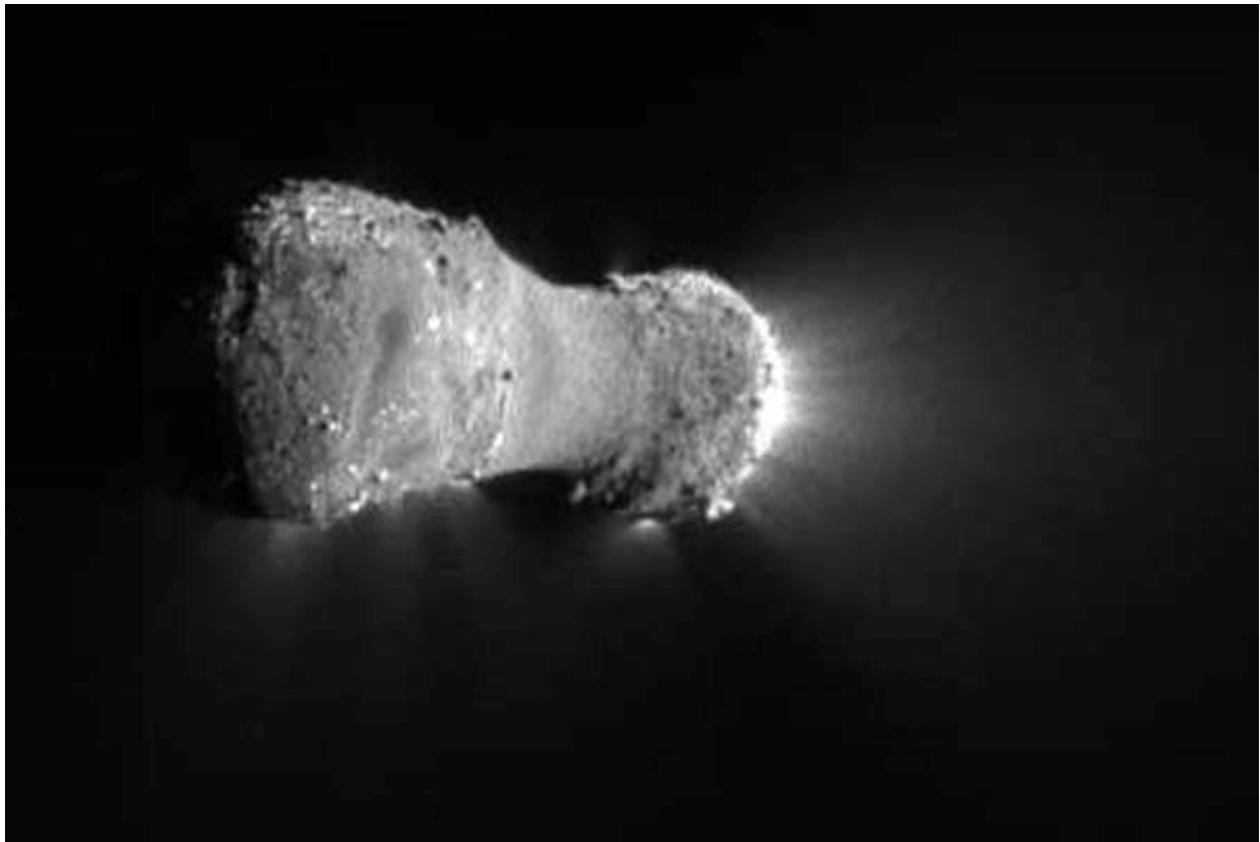


Fig. 1

According to our earlier hypothesis the nuclei of comets may be composed of sub-nuclei – as was suggested by Donn et al. in 1985 and by Weissman in 1986 – but these sub-nuclei may be of different porosity and hardness (Illés-Almár, 1995, 2007).

I suggest that in the case of Hartley-2 one can clearly see the two kinds of sub-nuclei in its dichotomy – being a solid sub-nucleus in the middle, to which at both ends loose and fluffy spherical pieces are joining.

If comet Shoemaker Levy 9 would have been made of similar pieces of different hardness, then some phenomena are understandable in connection with the cometary impacts to Jupiter. On the one hand the loose sub-nuclei with jets could easily become the off-train members because of rocket-acceleration. On the other hand having a fluffy structure they did explode higher in the atmosphere, producing no visible traces. On the

contrary the harder sub-nuclei remained members of the train and left spectacular traces in the Jovian atmosphere.

References: Donn, B., Daniels, P.A., Hughes, D.V.: On the structure of the cometary nucleus. (Abstract) Bull. Am. Astron. Soc. 17, 520, 1985., Illés-Almár, E.: On two different populations of cometary sub-nuclei. Antarctic Meteorites XX. June 6-8, 1995, Tokyo. Abstracts pp. 93-94, 1995., Illés-Almár, E.: Comet Borrelly and the two kinds of cometary sub-nuclei. Adv. Space Res. 39, 468-471, 2007., Weissman, P.R. Are cometary nuclei primordial rubble piles? Nature 320, 242-244, 1986., Weissman, P.R., Lowry, S.C.: Structure and density of cometary nuclei. Meteoritics and Planetary Sciences 43, 6, 1033-1047, 2008.

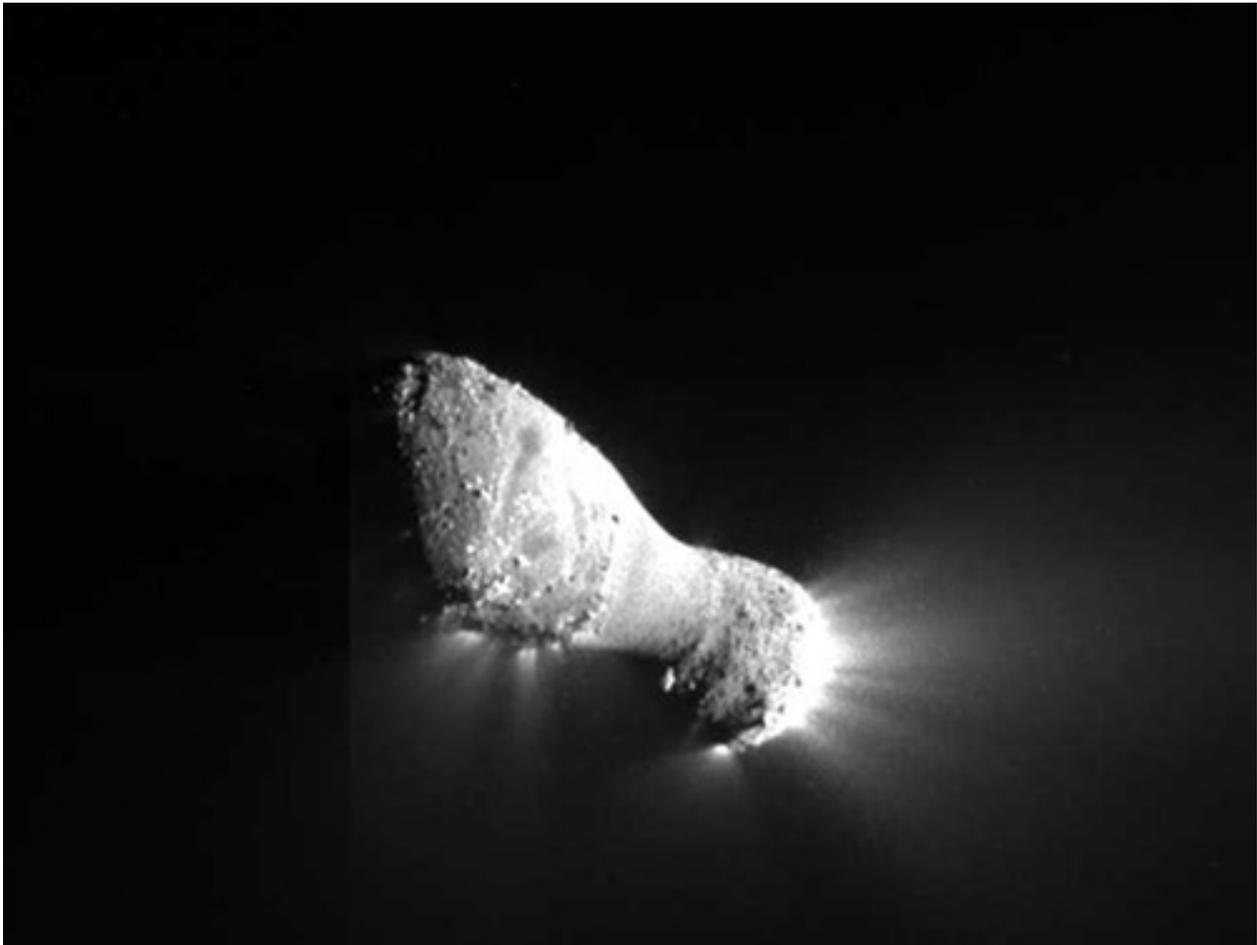


Fig. 2.