



Photometry of the Nucleus of Comet 103P/Hartley 2

Jian-Yang Li (1), **Sebastien Besse** (1), P.C. Thomas (2), J.M. Sunshine (1), M.F. A'Hearn (1), and DIXI Science Team
(1) University of Maryland, College Park, MD 20742, USA
(2) Cornell University, Ithaca, NY, USA

Abstract

We report a detailed study of the photometric properties of the nucleus of Comet 103P/Hartley 2 from data collected by the Deep Impact spacecraft during its flyby in November 2010 in its extended mission, EPOXI [1]. The close encounter images have pixel scales down to 7 m/pixel from the Medium Resolution Instrument, and cover a small range of phase angle from 70° to 93°. Images were collected through all color filters from 309 nm to 950 nm. The local scattering geometry on the nucleus is calculated with the shape model derived from flyby images [2]. Despite being a hyperactive comet, Hartley 2's nucleus shows typical photometric properties of other Jupiter Family cometary nuclei that have been imaged from close distances by spacecraft. Its single-scattering albedo is ~4%; the phase slope is 0.047 mag/deg; the asymmetry factor of a single-term Henyey-Greenstein phase function is ~-0.47; and the roughness ~20°. The modeled geometric albedo is ~5.4%. The nucleus displays an albedo variation of about 25%, which is comparable with that of Tempel 1 observed during Deep Impact [3]. Color data suggest a linear red slope in the visible wavelengths with ~8%/100 nm slope, bluer than that of Tempel 1's nucleus [3]. The apparently rough area on the large end of the nucleus near the terminator that is visible in inbound images shows a 3x or higher albedo and much bluer color than the average surface. There is no such variation in any other area on the surface including the small end that appears to be most active at the time of encounter.

Acknowledgements

This work was supported by NASA through the Discovery Program contract for the EPOXI mission, NNM07AA99C, to the University of Maryland.

References

[1] A'Hearn, M.F., et al., 2011. EPOXI at Comet Hartley 2. *Science*, in press.

[2] Thomas, P.C., et al., 2011. Shape model of Hartley 2. This meeting

[3] Li, J.-Y., et al., 2007. Deep Impact photometry of Comet 9P/Tempel 1. *Icarus* 187, 41-55.