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Jet Activity in Comet 9P/Tempel 1 as Seen by Stardust-NExT

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Abstract

The Stardust-NExT spacecraft encountered comet 9P/Tempel 1 on February 15, 2011, with a closest approach distance of 178 km. During the flyby, the Navigation Camera (NAVCAM) obtained 72 images of the comet's nucleus and coma, as the viewing geometry changed by 170°. Throughout the sequence of images, a number of well-defined jets are detected [2], many of which are highlighted against dark sky as they cross the horizon at the limb of the nucleus (Figure 1).

We are analyzing these jets using a variety of techniques to determine their structure and physical properties. Parallax introduced by the spacecraft motion provides information about the three-dimensional orientation of the jets, and we are using this stereo information, in conjunction with the nucleus shape model, to project the jets back to their origin on the surface of the nucleus. Preliminary results indicate that a prominent group of jets is associated with a terraced region that divides two different types of terrain on the Northern hemisphere. Other jets originate from unilluminated regions that have been in darkness for many hours.

We will present the final results of this analysis, along with related results from images obtained during the Deep Impact mission.

Acknowledgements

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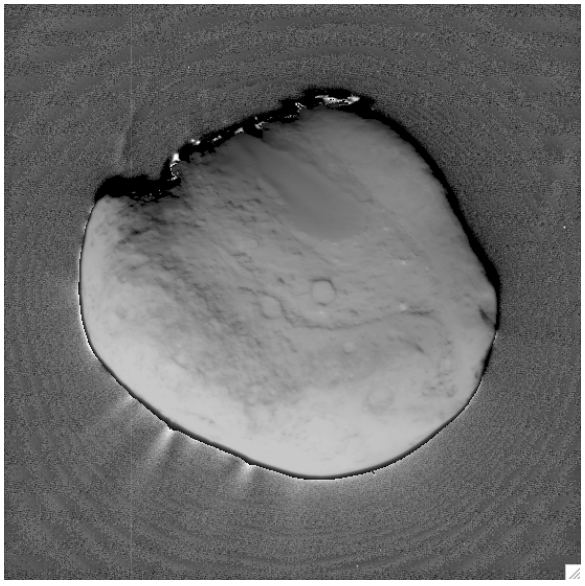

Figure 1: Stardust-NExT image of comet Tempel 1, showing a group of jets at the limb of the nucleus. The coma has been enhanced using a 4° rotationally averaged shift division [1]. The rings in the coma are artifacts resulting from quantization after the bulk coma was removed, and the nucleus is inset at a different contrast for clarity.

References

[1] Schleicher, D.G. and Farnham, T.L.: Photometry and Imaging of the Coma with Narrowband Filters. *Comets II* (Michel Festou, H. Uwe Keller and Harold Weaver, eds.) The University of Arizona Press, Tucson. (2004) pp. 449-469.

[2] Veverka, J., et al.: Return to Comet Tempel 1: Results from Stardust-NExT. Submitted to Science, 2011.