

## Asteroid collision confirmed by Rosetta/OSIRIS observations

**J-B. Vincent** (1), C. Snodgrass (1,2), C. Tubiana (1), H. Sierks (1), S. Hviid (1), R. Moissl (1), H. Böhnhardt (1), C. Barbieri (3), D. Koschny (4), P. Lamy (5), H. Rickman (6,7), R. Rodrigo (8), B. Carry (9), S. C. Lowry (10), R. J. M. Laird (10), P. R. Weissman (11), A. Fitzsimmons (12), and the OSIRIS team.

(1) Max-Planck-Institut für Sonnensystemforschung, Max Planck strasse 2, 37191 Katlenburg-Lindau, Germany

(vincent@mps.mpg.de); (2) European Southern Observatory, Santiago, Chile; (3) Universita' di Padova, Vicolo dell'Osservatorio 2, 35131 Padova, Italy; (4) Research and Scientific Support Department, European Space Agency, Keplerlaan 1, Postbus 229, 2201 AZ Noordwijk ZH, Netherlands; (5) Laboratoire d'Astrophysique de Marseille, Site de Chateau-Gombert, 38 rue Frédéric Joliot-Curie, 13388 Marseille Cedex 13, France; (6) Department of Astronomy and Space Physics, Uppsala University, Box 516, 75120 Uppsala, Sweden; (7) PAS Space Research Center, Bartycka 18A, 00-716Warszawa, Poland; (8) Consejo Superior de Investigaciones Científicas, Serrano 117, 28006 Madrid, Spain; (9) LESIA, Observatoire de Paris-Meudon, 5 place Jules Janssen, 92195 Meudon Cedex, France; (10) Centre for Astrophysics and Planetary Science, University of Kent, Canterbury CT2 7NH, UK; (11) Jet Propulsion Laboratory, 4800 Oak Grove Drive, MS 183-301, Pasadena, CA 91101, USA; (12) Astrophysics Research Centre, Queen's University, Belfast BT7 1NN, UK

## Abstract

The discovery of P/2010 A2 by the LINEAR survey in January 2010 [2] revealed an object displaying a large trail of material similar in shape to a cometary tail although no central condensation or coma could be detected. The appearance of this object in an asteroidal orbit in the inner main belt attracted attention as a potential new member of the Main Belt Comets class (MBCs) [4] but the discovery of a nucleus [6], with an estimated diameter of 150-200 m [5], around 1500 km away from the trail implied that the extended object we were seeing could be the debris trail from a recent collision rather than the tail of a comet. Due to the low inclination of its orbit, it is difficult to conclude about the nature of P/2010 A2 from Earth-based data only, as different scenarios lead to the same appearance in the orbital configuration at the times of observations. We present here another set of images, acquired from the unique viewing geometry provided by ESA's Rosetta spacecraft en route to comet 67P/Churyumov-Gerasimenko. Albeit faint (22 magnitude), the object could be observed by the high-resolution camera OSIRIS. We used a Finson- Probstein model [3, 1] to simulate the shape of the trail, and estimate the time of emission and  $\beta$  parameter (ratio between solar radiation pressure and gravity) for the dust grains. Simulations were compared to the OSIRIS images and ground based observations acquired at NTT and Palomar telescopes. Thanks to the different phase angle provided by Rosetta, we could reduce the number of solutions to a unique model, leading to the conclusive demonstration that the trail is due to a single event rather than a period of cometary activity.

## References

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