EPSC Abstracts
Vol. 6, EPSC-DPS2011-1210, 2011
EPSC-DPS Joint Meeting 2011

Ground Based Observations of Comet 103P/Hartley 2 at the time of EPOXI fly-by

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Abstract

In the context of the EPOXI mission, at the beginning of November 2010 the comet 103P/Hartley 2 was visited by the Deep-Impact spacecraft, that passed at only 700 km from its nucleus. To connect spatial small scales, as seen from the spacecraft, to large ones, the comet was the target of a wide campaign of remote observations involving many observatories around the world and from space. In this framework we observed the comet at the beginning of September 2010 with the Italian Telecopio Nazionale Galileo (TNG), at the beginning of November 2010, and January 2011 with the ESO NTT telescope. Here we will report the results obtained in November, during the spacecraft fly-by.

1. Observations and data reduction

The observations started on November 1st and ended on the morning of the 6th. The main goal of the observations was the characterization of the coma solid component. Most of the observations were image of the comet in the visible, using two cometary filters centered in regions free of gas emission, in the blue and in the red (Bc filter: $\lambda_c = 4430$ Å and FWHM = 33 Å; Rc filter: $\lambda_c = 6840$ Å and FWHM = 74 Å). However observations of the gas component, with cometary filters centered in the emission of CN, C_2 and C_3 (CN filter: $\lambda_c = 3854$ Å and FWHM = 50 Å; C_2 filter: $\lambda_c = 5118$ Å and FWHM = 107 Å; C_3 filter: $\lambda_c = 4062$ Å and FWHM = 73 Å) were also done. One night observations in the near-IR were also performed to check the color of the solid component in the 0.44 to 2.16 μm range. Long slit spectroscopy was performed in the visible.

2. Results

As pointed out by the spacecraft observations (reff) the comet was very active, changing its gas and solid component production during its rotation (period 18.8 h, as measured by Samarasinha et al., 2011). We observed as well a strong change of the production of the solid component. By checking the ΣAf profile vs the projected nucleocentric distance ρ (Tozzi et al., 2007) we identified the time of minimum activity of the comet in two images: those recorded on Nov. 5 at UT 5:34 and 5:58, in the filters Bc and Rc, respectively. By assuming that those two images represent the comet at its lowest emission ("quiet comet"), we obtained the maps of the ejected solid component by subtracting them from each respective image recorder during the run. The results show that the ejecta are emitted mainly at two angles with PA≈90 deg. and PA≈120, surely due to the nucleus rotation. By analyzing the temporal variation of those ejecta will show that them are probably partially composed by ice, as observed by the spacecraft. Indeed the ejecta seems to disappear moving very little, without going out the field of view.

Acknowledgments

Based on observations collected at the European Organization for Astronomical Research in the Southern Hemisphere, Chile (program 086.C-0375)

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