



Ultra-high resolution color images of the surface of comet 67P acquired by ROLIS

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On Nov 12, 2014, the Rosetta Philae lander descended towards comet 67P/Churyumov-Gerasimenko. The onboard ROLIS camera successfully acquired high resolution images of the surface looking down from its vantage point on the instrument platform. ROLIS is a compact CCD imager with a 1024×1024 pixel sensor and a 57° field of view (Mottola et al., 2007, SSR 128, 241). It is equipped with an infinity lens (IFL), without which the camera focus is 30 cm. At Philae's final landing site, ROLIS removed the IFL and initiated an imaging sequence that shows the surface at the highest resolution ever obtained for a cometary surface (~ 0.5 mm per pixel). Illumination of the scene was provided by an onboard array of LEDs in four different colors: red, green, blue, and near-IR. ROLIS acquired one image for each color and a single dark exposure. The images show a unique, almost fractal morphology for the surface below the landing site that defies easy interpretation. However, there are similarities with some structures seen by the CIVA camera. Color and albedo variations over the surface are minor, and individual grains cannot be distinguished. The images are out-of-focus, indicating the surface was further away than the nominal 30 cm. The location of the illumination spot and the change of focus over the image are consistent with an inclined surface, indicating that Philae's final resting position is strongly tilted. In fact, it was inclined so much that we see the local horizon, even though ROLIS is downward-looking. Remarkably, the scene beyond the horizon is illuminated by the Sun, and out-of-focus particles can be seen to travel in the sky. The images suggest the environment of the lander is laden with fine dust, but a final assessment requires careful consideration of possible sources of stray light. Just before Philae went to sleep, ROLIS acquired an additional exposure with the IFL and the red LED. The resulting image is fully in focus. Because Philae had rotated and lifted prior to acquisition, the last image allows us to reconstruct the scene below the lander in 3D. In case Philae wakes up from its slumber in the spring of this year, ROLIS should be able to resume operation. It may acquire additional well-focused images in all colors to better characterize the cometary environment and search for changes.