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Gas emission investigation in small bodies: case of P67/Churyumov-Gerasimenko and Ceres

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Abstract.

In the first close up to the comet P67/Churyumov-Gerasimenko at a heliocentric distance of about 3 AU, the Visible and Infrared Thermal Imaging spectrometer (VIRTIS) on board Rosetta observed the first jet emissions from the comet's surface. The emission intensity was quite weak, as the comet was still far from the Sun. However, we expect the comet's activity to increase very fast in the incoming months. Some images of the comets nucleus show activity, which could be ascribed to volatiles sublimation, dust upwarding or instrumental stray light. We focused on those data showing possible jet emissions from the comet?s nucleus, observed both in limb and nadir viewing geometries. In this work, we propose a method to correct for the stray light, and investigate the possible emission intensity radially distributed from the point of emission. We focus in particular on the gas wavelength regions where water vapor, hydroxyl and carbon monoxide species are expected. Data are also discussed in comparison with a simple model, able to describe how the hydroxyl emission intensities vary with the heliocentric distance. A lower limit to the hydroxyl detection with VIRTIS can be inferred at the moment, while a deeper analysis is expected on the data acquired when the comet will be closer to the Sun.

Similarly, Ceres has showed hydroxyl emissions in the thermal IR observed from space. The present analysis can be extended to the case of this peculiar body, which is one of the targets of the Dawn mission.

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