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Authors	MIGLIORINI, Alessandra, Filacchione, G., CAPACCIONI, FABRIZIO, PICCIONI, GIUSEPPE, Bockelee-Morvan, D., Erard, S., Leyrat, C., Combi, M., Fougere, N.
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CN and OH emissions in the 67P/Churyumov-Gerasimenko coma with Rosetta/VIRTIS-M spectrometer

Migliorini A.⁽¹⁾, Filacchione G.⁽¹⁾, Capaccioni F.⁽¹⁾, Piccioni G.⁽¹⁾, Bockelée-Morvan D.⁽²⁾, Erard S.⁽²⁾, Leyrat C.⁽²⁾, Combi M.⁽³⁾, Fougere N.⁽³⁾ and the Rosetta/VIRTIS Team

⁽¹⁾ *INAF-IAPS, Istituto di Astrofisica e Planetologia Spaziali,*

via del fosso del Cavaliere, 100, 00133, Rome, Italy

EMail: Alessandra.Migliorini@iaps.inaf.it

⁽²⁾ *LESIA, Observatoire de Paris, PSL Research University, CNRS, Sorbonne Universités, UPMC Univ. Paris 06, Univ. Paris-Diderot, Sorbonne Paris Cité*

5 place Jules Janssen, 92195 Meudon, France

⁽³⁾ *Department of Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI, USA*

Abstract

Observations with the visible channel of the Visible and InfraRed Thermal Imaging Spectrometer (VIRTIS) on board Rosetta taken when the spacecraft was at a distance of 80-140 km from 67P/Churyumov-Gerasimenko (67P/C-G) allowed the detection of daughter gaseous species in its inner coma.

The detection of the violet doublet emission of CN at 388.3 nm has occurred during the coma monitoring campaign in November-December 2015, when the instrument has operated with long integration times (50 s) necessary to boost the instrumental SNR and detect these faint emissions. Other features, like the C₃ and C₂ signatures around 420-480 nm, might possibly be visible in few cases but with a very low intensity. For this reason, we concentrate our analysis in the spectral region from 250 to 450 nm, where the detector sensitivity allows the positive detection of the above-mentioned CN violet line at 388.3 nm, and the OH doublet emission at 309 nm. The CN emission at 388.3 nm is observed on both the day and night sides of 67P/C-G with a higher intensity on the dayside. In addition, at a preliminary analysis, the hydroxyl doublet emission intensity seems to be comparable to the violet CN line.

The same emissions were also identified in spectra acquired using ground-based facilities, when the comet had just passed the perihelion (Fitzsimmons et al., 2016).

These gaseous species emissions appear well contrasted with respect to the dust broad continuum, preferentially observed on the dayside.

Distribution and variability of the OH and CN band intensities will be discussed with respect to observation parameters.