# Detection of organic material on the nucleus of comet 67P: insight into their origin from IR spectral features.

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We revised the in-flight calibration of the VIRTIS-M-IR instrument onboard Rosetta spacecraft with the aim to improve: a) the detection of low-contrast spectral features and b) the radiometric accuracy. Furthermore, we have modeled the thermal emission to remove the nucleus contribution at wavelengths in excess of 3.0 μm and we have also modeled and removed, by means of the Hapke [1] model, the contribution of water ice absorption to isolate the organic features within the spectral region 2.9 – 3.5 μm. We identified small features centered at: 3.28 μm, which are consistent with aromatic C-H stretching; 3.38, 3.42, 3.48 μm which can be attributed to aliphatic ($CH_3$ asymmetric, $CH_2$ asymmetric, and $CH_3$ symmetric stretching, respectively) [2]; other small features are present at 2.85, 3.0, 3.1 μm. They can be attributed to C-H overtones, OH-stretches, and/or N-H stretching, according to spectral comparison with analog materials. Finally, the organic features on the spectrum of the comet present similarities with observations of interstellar diffuse material [3], and protoplanetary nebulae [4]. Their significance in the framework of the comet origin and evolution will be discussed.

**References.** [1] Hapke B., 2012, Theory of Reflectance and Emittance Spectroscopy, 2nd edn. Cambridge Univ. Press, Cambridge; [2] L. V. Moroz et al. Icarus, 134, pp. 253; [3] Dartois E. et al., 2004, A&A, 423, 549; [4] Sandford S. A. et al., 2013, ApJS, 205.

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