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Looking for minor spectral features on 67P

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Observations of 67P/Churyumov-Gerasimenko carried out by the VIRTIS spectrometer in the pre-landing phase of the Rosetta mission are analyzed to infer composition of the surface and coma [1]. Minerals, dust, ice mixtures and organic materials produce characteristic absorptions at the surface. However, like all dark objects, the surface of 67P displays very reduced spectral contrast.
Two techniques are used here to help characterize spectral features: ICA is used to separate spectral signatures with independent spatial distributions; the main components are then analyzed with a multiscale method to look for features above the noise level. The MULTiScale Unimixing Method for Extraction of Spectral Components (Mulțumesc) has previously been used to confirm marginal detections of ices on TNOs [2], and to derive an upper limit on the abundance of pyroxenes on Mercury [3].
The method is applied to the M–IR (1-5 μm, R$\sim$300) and H (2-5 μm, R$\sim$3000) channels of VIRTIS, in particular in the 3 μm region where the absorptions of organic materials are located [5]. In the case of the H channel, which is an échelle spectrometer, the method is applied to individual grating orders in order to preserve spectral resolution. Spectral features are required to have a minimum spectral and spatial extension in order to filter transient effects in the detector. The noise estimate is derived from the analysis of dark current measurements. Longward of $\sim$3.5 μm, spectra of the surface are first inverted to corrected from thermal emission [4]; this is needed only to study broad features which could be significantly modified by the onset of the thermal emission. Results from the pre-landing phase will be presented at the meeting.
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References
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