Geophysical Research Abstracts
Vol. 16, EGU2014-10201, 2014
EGU General Assembly 2014

Extraction of ice absorptions in comet spectra, and application to VIRTIS/Rosetta

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Detection of ice spectral features can be difficult on comet surfaces, due to the mixing with dark opaque materials, as shown by Deep Impact and Epoxi observations. We study here the possible use of high-level spectral detection techniques in this context.
A method based on wavelet decomposition and a multiscale vision model, partly derived from image analysis techniques, was presented recently (Erard, 2013). It is here used to extract shallow features from spectra in reflected light, up to $\sim$3 μm. The outcome of the analysis is a description of the bands detected, and a quantitative and reliable confidence parameter. The bands can be described either by the most appropriate wavelet scale only (for rapid analyses) or after reconstruction from all scales involved (for more precise measurements). An interesting side effect is the ability to separate even narrow features from random noise, as well as to identify low-frequency variations i.e. wide and shallow bands.
Tests are performed on laboratory analogues spectra and available observational data. The technique is expected to provide detection of ice in the early stages of Rosetta observations of 67P this year, from VIRTIS data (Coradini et al., 2009). Strategies are devised to quickly analyze large datasets, e. g., by applying the extraction technique to components first identified by an ACI (Erard et al., 2011). The exact position of the bands can be diagnostic of surface temperature, in particular at 1.6 μm (e. g., Fink & Larson, 1975) and 3.6 μm (Filacchione et al., 2013), and may complement estimates retrieved from the onset of thermal emission longward of 3.5 μm.

Erard, S. (2013) 8th EPSC EPSC2013-520. Coradini et al (2009), Rosetta book, Schulz et al Eds.
Erard, S. et al (2011) Planet & Space Sc 59, 1842-1852 Fink, U. & Larson, H. (1975) Icarus 24, 411-420
Filacchione et al (2013) AGU Fall Meeting Abstracts A7