



## Hyperspectral imaging of CO<sub>2</sub> ice clouds on Mars

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The formation of clouds resulting from the condensation of the main atmospheric component is a phenomenon peculiar to Mars. Here, we report the existence of several regions located near the equator where a particular type of emission at 2.7 and 4.24  $\mu\text{m}$  has been obtained by the visible/near-infrared mapping spectrometer OMEGA on-board Mars Express. This emission cannot be attributed to reflected non-LTE fluorescent emission of gaseous CO<sub>2</sub>. OMEGA imaging capability indicates patchy areas of emission with strong spatial heterogeneities. Consideration of CO<sub>2</sub> ice optical properties in this spectral range reveals the presence of major features which can result in brightness peaks for large enough particles ( $>100$  nm). We have investigated this phenomenon by means of detailed spectroscopic and radiative transfer modelling. We conclude that the apparent emission is the result of photons resonantly scattered back to space by layers of carbon dioxide clouds. The fact that such clouds can be detected at the center of opaque absorption bands of gaseous CO<sub>2</sub> requires clouds lofted above a certain altitude ( $>40$  km) to reduce the optical path.