Ice cloud, dust and ozone nadir retrieval using SPICAM/UV and influence of dust properties on the retrieved quantities

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Introduction: The SPICAM instrument on board Mars-Express (MEX) provides valuable data to investigate the Martian atmosphere since 2004. The UV channel, a spectrometer operating in the spectral interval between 110-320 nm, has been in activity during 11 years. The nadir viewing mode records the solar radiation that has been scattered and reflected by the planet and its atmosphere. From these measurements, we can deduce the amounts of several atmospheric species such as dust, ice clouds [1, 2] and ozone [3] but also the surface albedo.

Retrieval: We have developed an improved retrieval algorithm using a more recent and up-to-date parametrisation of the atmosphere and surface characteristics than in previous SPICAM works [4]. The purpose is to deduce simultaneously the following parameters: the ozone column, the dust optical depth (OD), the cloud OD and the surface reflectance. In order to keep independent parameters, the retrieval was limited to 3 parameters. The choice of the non retrieved parameter is made between the cloud OD and the surface albedo for each measurement and depends on the cloud presence.

Cloud detection: We have therefore developed a cloud detection algorithm based on the principle that clouds appear very bright in the UV compared to the "dark" regolith surface and the absorbing airborn dust. More than 4 Martian years (MY27-30) of SPICAM data have been analysed with our method and were used to produce an ice cloud climatology (cf fig 1). We will present the results obtained for ice clouds and illustrate their spatial and seasonal distributions.

Dust properties' influence: Climatologies of dust and ozone have also been obtained and will be presented (cf. fig 1). The important influence on the retrieval of using different dust properties was introduced in [4]. We have reprocessed the retrieval on the 4 MYs using other phase functions. We will show the impact of these changes on the retrieved quantities. The influences of a different dust altitude profile was also tested (i.e. a comparison between the use of a priori from MCD v5.0 and v5.2) and will be presented, showing that it improves the retrieval.

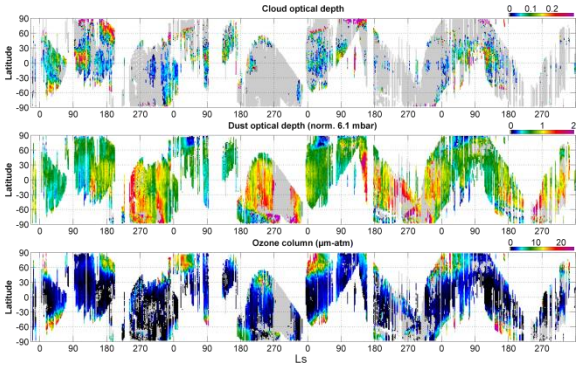

Figure 1: Ice cloud OD (top), dust OD (middle) and ozone column (bottom) climatologies derived from SPICAM/UV measurements between MY27 and 30 [4].

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