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Preliminary results of aerosols' optical properties studied with EPF measurements from the SPICAM/UV instrument

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Abstract

Aerosols on Mars have an important impact on the radiative transfer properties of its atmosphere. Today their spectral properties and therefore their interaction with UV radiation are only poorly known. Improving the radiative transfer modeling requires a better knowledge of their characteristics, in particular of their phase function, single scattering albedo and opacity. We will show that such information can be accessed by using EPF observations.

1. Introduction

The SPICAM instrument [1] on board of the Mars-Express satellite is a 2 channel spectrometer. One channel operates in the ultraviolet (118-320 nm) and the second one in the infrared (1.0-1.7µm). SPICAM has been orbiting around the red planet since 2003 and has thus provided a large set of data. The instrument is capable of measuring under different geometries (nadir, limb, occultation) and one of them, called EPF (Emission Phase Function) , illustrated in Figure 1, is a practical tool to study aerosols' optical properties.

2. The method

We have developed a new retrieval algorithm for nadir measurements based on the radiative transfer model LIDORT [2]. This new code performs simulations of spectra taking into account gas absorption, surface reflection and scattering by aerosols and gases. The retrieval method, based on the optimal estimation [3], allows us up to now to deduce the ozone column density, the aerosols' optical depth and the surface albedo (with fixed wavelength dependencies).

We are developing our model further in order to study the aerosols' characteristics using EPF observations, which consist in looking at the same point on the planet while the satellite moves along the orbit (Figure 1).

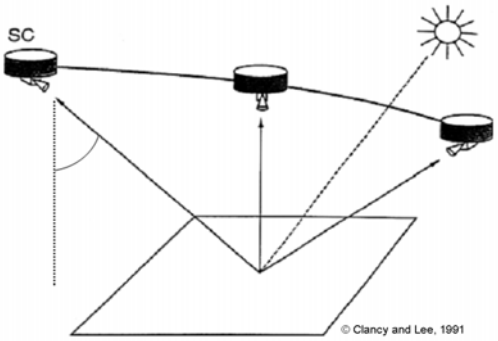

Figure 1: EPF viewing mode

The retrieval of optical properties, such as aerosol's single scattering albedo and phase function, have been recently added to the algorithm, taking into account their wavelength dependencies.

3. Results

We will present preliminary results of our study on aerosols' characteristics and their wavelength dependencies, using EPF data. We will show how information on these parameters is deduced from LIDORT simulations and calculations of Jacobians. The method will be illustrated by investigating SPICAM observations obtained in EPF mode.

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