SPATIAL DISTRIBUTION OF RETRIEVED WATER ICE CLOUD PROPERTIES AT MARS USING OMEGA

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Introduction: Water ice clouds in the Martian atmosphere play vital roles in chemical cycles and radiative transfer. Accurate knowledge of the properties of water ice clouds is needed to improve our understanding of, and ability to model, the processes affected by them. The OMEGA (Observatoire pour la Min´eralogie, l'Eau, les Glaces et l'Activit´e) imaging spectrometer on Mars Express is a valuable tool for studying cloud properties. Its spectral range covers several strong water absorption bands and its measurement technique provides the coverage necessary to observe clouds over a wide spatial extent.

Spectral images of Mars recorded by OMEGA can be used to deduce the mean effective radius (r_{eff}) and optical depth (τ_i) of water ice particles in clouds. The inversion method used here, as described in [1], fits a computed spectrum at wavelengths which cover the 1.5 µm, 2 µm, and 3.1 µm water absorption bands. Reflectances are computed using the DISORT radiative transfer code [2] and minimization is done using a Levendberg-Marqhardt least squares routine. An example of an OMEGA spectrum and fitting results is shown in Figure 1. In order to accurately retrieve information about the clouds,we require accurate a priori information about the temperatures of the surface and atmosphere, the quantity of dust suspended in the atmosphere, and the surface reflectance at the retrieval location.

The primary extensions to the work of [1] that we have developed are: an automatic algorithm for selecting good pixels to analyze, that many pixels covering the same cloud formation are analyzed to enable the mapping of retrieved properties and a statistical approach to their interpretation, and the use of *a priori* information that was not available at the time of the publication of [1]. These *a priori* include a collection of precomputed ICI maps for OMEGA observations and a database of cloud coverage fractions and minimum thicknesses [3], a climatological database of dust optical depths [4], a newer version of the LMD/LATMOS Mars general circulation model [5], through the Mars Climate Database V5.2, and a new set of maps of the multispectral albedo of the Martian surface retrieved from cloud-free OMEGA observations [6].

Here we present the spatial distribution of water ice cloud aerosol properties on Mars for a selection of cloud formations over the Tharsis region and in the aphelion cloud belt. These maps were generated as part of the UPWARDS project and the data will be made available through the EGU UPWARDS web portal.

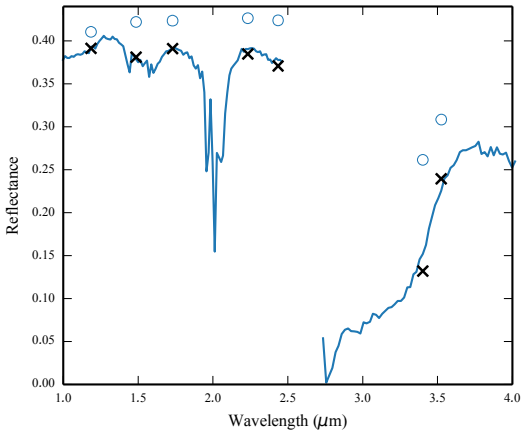

Figure 1: An example of an OMEGA spectrum. Blue circles are values of the *a priori*surface albedo from [2]. The black x markers are the best fit locations of the retrieval.

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