Detection of clouds and aerosols over land and sea by day and night from hyperspectral measurements in the thermal infrared

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Introduction

The determination of clear/cloud status is a prerequisite for many applications related to the interpretation of radiances measured by infrared sounders in terms of geometrical variables through inverse radiative transfer models. Here, we present a detection scheme specifically dedicated to high-spectral-resolution infrared sounders such as the IASI instrument that aims at detecting both clouds and aerosol contamination in radiances.

Methodology

The detection scheme discriminates between 5 situations: high clouds (cirrus), middle clouds, low clouds, aerosols and clean-sky. It is based on nine tests for which histograms of BT differences of selected channels having different response to clouds and aerosols are first derived from the observations; then threshold tests values are applied.

Results and validation

For low clouds and aerosols, use is made of difference between IASI channels located at 10, 8 and 4 µm, which implies taking into account the surface characteristics over land. This is achieved by using the surface emissivity derived from IASI observations (Capelle et al., 2012) and by computing histograms according to the emissivity.