Geophysical Research Abstracts
Vol. 13, EGU2011-6197, 2011
EGU General Assembly 2011

Daily observation of dust aerosols infrared optical depth and altitude from IASI and AIRS and comparison with other satellite instruments

Christoforos Tsamalis, Alain Chédin, and Sophie Peyridieu

Laboratoire de Météorologie Dynamique, CNRS/IPSL, Ecole Polytechnique, Palaiseau, France
(christoforos.tsamalis@lmd.polytechnique.fr / 0033169335108)

Dust aerosols affect the earth's radiative budget with participation in both the direct and indirect effects, they also influence the hydrological cycle by acting as cloud condensation and ice nuclei, furthermore they modify the oxidizing capacity of the atmosphere and thus the concentration of some tropospheric trace gases and finally they participate in the fertilization with iron of the ocean.
Observation from space, being global and quasi-continuous, is a first importance tool for aerosol studies. Remote sensing in the visible domain has been widely used to obtain better characterization of these particles and their effect on solar radiation. On the opposite, remote sensing of aerosols in the infrared domain still remains marginal. Yet, not only the knowledge of the effect of aerosols on terrestrial radiation is needed for the evaluation of their total radiative forcing, but also infrared remote sensing provides a way to retrieve other aerosol characteristics, including their mean altitude. Moreover, observations are possible at night and day, over land and sea.
At LMD, a method has been specifically designed to retrieve simultaneously coarse mode dust aerosol 10 μm optical depth (AOD) and mean layer altitude from high spectral resolution infrared sounders observations and applied to 7 years of AIRS observations and 3 years of IASI observations with results being obtained at a space-time resolution of 1 degree-1 month.
The method has recently been upgraded to a daily resolution opening the way to (i) a more acute view of dust aerosols variability in time, something very important due to their relatively small lifetime of about one week in the troposphere; this should in turn permit a better study of dust aerosols implication in the atmospheric processes, (ii) a validation against daily products from either MODIS or CALIPSO, allowing a better and more direct comparison between the products leading to a better estimate of their accuracy and (iii) the use of dust infrared optical depth and altitude in data assimilation into numerical models, in order to further improve their performances. It should be noted that, especially for the altitude this is important, as, although CALIPSO is certainly more adequate to provide this information, its space coverage remains quite limited. First comparisons between dust aerosol properties retrieved from AIRS and IASI for July 2007 (one of the most important period of the year for dust activity above the tropical Atlantic Ocean) with MODIS for the optical depth and CALIPSO for the altitude are shown and compared. These preliminary results indicate that, most of the time, the infrared daily products compare well with these two instruments observations.