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Dust aerosol optical depth and altitude from AIRS and comparison with other A-Train observations (MODIS, CALIPSO).

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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. In this context, almost five years of the 2nd generation vertical sounder AIRS observations have been processed over the tropical belt (30°N-30°S) for the period January 2003 - November 2007. Our results of the dust optical depth at 10 μm have been compared to the 0.55 μm Aqua/MODIS optical depth product. The detailed study of Atlantic regions shows a very good agreement between the two products, with a VIS/IR ratio around 0.3-0.4 during the dust season. Comparing these two AOD products also allows the separation of different aerosols signals, given that our AIRS retrieval algorithm is specifically designed for dust whereas MODIS retrieves both accumulation and fine aerosol modes. This is particularly interesting for the study of biomass burning aerosols. Also, we establish for the first time a global climatology of the dust optical depth at 10 μm. Mean aerosol layer altitude has also been retrieved from AIRS data and for the first time we show global maps and time series of altitude retrieved from space. In order to validate

our product, we compare our retrievals to the measurements of the space-borne lidar CALIOP onboard Calipso. This comparison, for a region located downwind from the Sahara, again shows a good agreement demonstrating that AIRS effectively retrieves the mean altitude of the dust layer(s).