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Atmos. Chem. Phys., 4, 1813-1822, 2004

www.atmos-chem-phys.net/4/1813/2004/

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Dust altitude and infrared optical depth from AIRS

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Abstract. We show that mineral dust optical depth and altitude can be retrieved from the Aqua - Advanced Infrared Radiation Sounder (AIRS) measurements. Sensitivity studies performed with a high spectral resolution radiative transfer code show that dust effect on brightness temperatures may reach about 10 Kelvins for some channels. Using a Look-Up-Table approach, we retrieve not only the 10 μm optical depth but also the altitude of Saharan dust layer, above the Atlantic Ocean, from April to September 2003. A key point of our method is its ability to retrieve dust altitude from satellite observations. The time and space distribution of the optical depth is in good agreement with the Moderate resolution Imaging Spectroradiometer (MODIS) products. Comparing MODIS and AIRS aerosol optical depths, we find that the ratio between infrared and visible optical depths decreases during transport from 0.35 to 0.22, revealing a loss in coarse particles caused by gravitational settling. The evolution of dust altitude from spring to summer is in agreement with current knowledge on transport seasonality.

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Citation: Pierangelo, C., Chédin, A., Heilliette, S., Jacquinet-Husson, N., and Armante, R.: Dust altitude and infrared optical depth from AIRS, Atmos. Chem. Phys., 4, 1813-1822, 2004. ▣ [Bibtex](#) ▣ [EndNote](#) [Reference Manager](#)

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