Geophysical Research Abstracts, Vol. 9, 11171, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-11171

Model-to-data AOT Comparisons between Aeronet measurements and simulations with the Polyphemus system over Europe.

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Numerous 3D aerosol models have been widely validated over Europe and over a long period both for PM_{10} and for chemical composition at ground. The vertical profile of aerosols has also to be considered because it deals with long-range transport, but also radiative budget and interactions with clouds. For that purpose, the Aerosol Optical Thickness (AOT) has been used because it gives information about the concentration, the chemical composition and the number of aerosols along the vertical axis. Global aerosol models have been to a large extent validated with AOT ground-based and satellite measurements. Because aerosols have a regional impact, it is also important for 3D Chemical Transport Models (CTM) to validate their vertical profile.

In our talk, we present a comparison for one year (2005) and over Europe between observed AOT data from several stations of the Aeronet network (http://aeronet.gsfc.nasa.gov/) and AOT simulated with a 3D CTM coupled to a size-resolved aerosol model inside the Polyphemus system (http://www.enpc.fr/cerea/polyphemus). Computation of AOT from model outputs will be detailed, with a particular attention paid to the way hygroscopicity is taken into account. The simulated AOT have a good agreement with measured data. The uncertainties due to parameterizations of the particle wet diameter (Hänel, Gerber, ISORROPIA) and hypothesis about the mixing state of aerosols will be evaluated for that case. Then we will discuss the possible advantages of having a complex aerosol model for that kind of study. To conclude, the perspective of using lidar measurements

at regional scales will be investigated.