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Interactive comment on "An AeroCom initial assessment – optical properties in aerosol component modules of global models" *by* S. Kinne et al.

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The very favorable assessment of this paper is appreciated.

The reviewer asked for more clarifications regarding particular sections which lead to the following changes in manuscript:

explain why there is a 'common' stratification into 5 aerosol types:

now in Section 1:

"Common to most of these approaches is a discrimination of aerosol in at least five aerosol components: sulfate, organic carbon, black carbon, mineral dust and sea-salt.

This stratification is desirable for a better characterization of aerosol absorption and size. Aerosol sizes that primarily impact radiative energy budgets of the atmosphere are those of the coarse mode (diameters $>$ 1um) and of the accumulation mode (diameters between 0.1and 1.0 um) Sea-salt and dust contributions dominate the coarse size mode, while the accumulation size mode is characterized by sulfate and carbonaceous aerosol. Hereby it is common practice to stratify carbon contributions into strong absorbing soot (black carbon) and into predominantly scattering organic matter (with sulfate similar optical properties). The separate processing of these aerosol types added complexity and required new assumptions."

explain comparability between complete data and data samples:

now in section 3.1:

"Since all remote sensing data are spatially incomplete adjustments needed to be applied to make global averages comparable. These adjustments involved the spatially and temporally complete median field from modeling. A correction factor for each remote sensing data set was applied from the ratio of the model median average over the model median subset average, sub-sampled at data locations only."

say a bit more a bout the measurement references:

now in section 3.3:

"The first data (local) reference is provided by quality assured data of sun-/sky-photometer robots distributed all over the world as part of the AERONET network (Holben et al. 1998). Direct solar attenuation samples provide highly accurate data for aot, while aab estimates, relying on less frequent sky-radiance samples, are only reliable at larger aot values (Dubovik et al., 2002). The association to a specific location, however, can introduce biases when used as references in global modeling, with its coarse gridded horizontal resolution (e.g. 200*200km). In particularly, sites dominated by local pollution or sites near mountains are expected to introduce unwanted

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biases with respect to the regional average. Thus, comparisons were limited to 12 sites, where local biases are believed to be small. Site details in Table 5 indicate that the selected 12 sites cover a variety of aerosol types and regions. The second (regional) data reference is established by a satellite aot retrieval composite (S*). It combines individual retrieval strength, giving regional preferences separately over land and ocean surfaces. Over land MISR is preferred over TOMS, except in the central tropics, where MODIS is preferred over MISR. Over tropical oceans MODIS is preferred over AVHRR (1channel), while at mid-(to high) latitudes AVHRR (1 channel) is preferred over POLDER. The basis for the preferred regional retrieval choice and its next best substitute is provided in Table 6. In Table 6 regional annual retrieval averages are compared to AERONET based averages for several meridional sections associated with land, coastal and ocean surfaces. To allow comparisons (on a regional basis), spatial sub-sampling of any data set was overcome by using the complete coverage of the median model. For each data-set, the regional model average was data-modified by multiplying the average ratio of data and model at points in that region only at which data were available. Among all satellite retrievals that with the minimum difference to the regional AERONET average defined the preferred regional choice. " .

Technical correction:

use " aerosol absorption optical thickness" instead of "aerosol absorption"

now in section 3.2:

"A comparison of the panels in the upper corners of Figure 4 between aerosol optical depth (label 'a') and its fraction associated with absorption (label 'ab') illustrates that diversity for aerosol absorption is significantly larger than diversity for aerosol optical thickness." now in section 3.3.: "Subsequent comparisons focus on two properties that are critical in the context of aerosol radiative forcing: mid-visible values for aerosol optical thickness (aot) and its fraction linked absorption, the aerosol absorption optical thickness (aab). Two references based on year 2000 data were developed."

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 8285, 2005.