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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.

Anonymous Referee #1

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GENERAL COMMENTS

This paper is a part of an enormous work of collaboration and comparison between several different groups working on global aerosol models. Moreover the synthesis between the different satellite data is one other important aspect. The paper present an exhaustive comparison between models and the measurements (from satellite and ground) at different space scale: global, regional and local.

After a rapid description of the project AeroCom they present a detailed comparison between global models vs. satellite and ground base data. In this way they show the

major accordance and especially discrepancies in aerosol optical properties.

As the authors show, it is amazing the agreement between global annual aerosol optical thickness (AOT) on different models and measurements. Otherwise this agreement is not present on regional scale and on others optical properties. The authors show that aerosol in remote regions and absorption present the greatest uncertainties. The differences between models is expected. In fact, due to the complexity of the problem, many factor have an influence in aerosol optical properties (and then in aerosol radiative forcing) like aerosol composition, spectral refractive index and size distribution. Otherwise it is not possible to say if the disagreements between models and measurements are due to model or to aerosol retrieval errors. So a big uncertainty on aerosol forcing still persist.

However comparisons and discussions presented by this work are fundamental for the scientific community especially for the future work aim to reduce the uncertainty on aerosol effects on earth energy balance. This paper is of great interest for the aerosol science community and it is appropriate for publication in ACP.

However there are some part that can be more clarified.

———————— SPECIFIC COMMENTS

1) Session -1 Introduction- "Common approach is 5 aerosol components ..." It is not so much obvious the use of these 5 components. Aerosol retrieval algorithms from satellite frequently use several different components and aerosol classes. Maybe this choice is explained in [Dentener et al 2005], but this work at present is not available (in preparation), please add available references.

2) Session -3.1 Global annual average- "Since all remote sensing data are incomplete, a correction was applied based on the bias" It is unclear the correction applied to the measurements. The experimental data is a crucial point. It is not straightforward the extrapolation used to obtain S* data over zone, without experimental data, like at high

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latitude (polar zones). (Also because the Fig 5 don't cover all the +/- 90 lat. deg, so I deduced that there are not high quality data available)

3) Session -3.3 comparison with observation data- The comparison between models and measurements, is one of the most important parts of the paper but it is not sufficiently clear how these measurements were obtained, spatial sampling correction and biases used need to be clarified. I suggest to add a paragraph or section on observation data, before the comparison. Otherwise indicate opportune references if this work is already documented. In particular, the satellite composite data S* and the spatial sampling correction applied on data marked with * on Table 6 are not adequately explained. It is also unclear how the data in polar region are obtained (same as previous comment (2)). In fact, on Fig 5 the plots dont range up to +/- 90 lat. deg., so one supposes that the measurements close to polar region are full of gap.

———————— TECHNICAL CORRECTIONS

On session -3 result- there are write: 'aerosol absorption (aab)', modify this with 'aerosol absorption optical thickness (aab)'. Adding these two words (optical thickness) at the first time that the aab is introduced can help the compression. Otherwise I suggest move, on the first time in which aab is mentioned, the successive definition of aab (at present on paragraph 3.2.1 and 3.3).

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