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Atmospheric Measurement Techniques Discussions

Interactive comment on "Global stratospheric aerosol extinction profile retrievals from SCIAMACHY limb-scatter observations" *by* F. Ernst et al.

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Reply to comments by reviewer #2:

We thank the reviewer for her/his encouraging comments and included essentially all points suggested by the reviewer.

Reviewer comment: This is a good introduction to SCIAMACHY results covering the whole mission time. The scientific community awaits the final papers about SCIAMACHY data. Unfortunately, from the prospective of a user of aerosol data, this work is perceived as quite technical, with a limited description of the actual aerosol results,

save the sole exception of Figure 13 and the relevant brief discussion. Clearly, this study is the first in a series of articles. Thus, it may be assigned number I; besides, the authors should add few words about the upcoming papers.

Reply: Yes, that's true. We amended the title with the suffix "algorithm and first results" to make clear that more user-related results will be published in near future. We added the Section "Outlook" to give an overview of the next projects.

Reviewer comment 1: The main problem of the described algorithm is in the current lack of ability to evaluate the Angstrom coefficient, although the multi-wavelengths nature of the data calls for it. The Angstrom coefficient is at least as valuable aerosol characteristic as the extinction coefficient. Since the multi-wavelengths data are relatively rare, the potential of the SCIAMACHY data should be used completely. I'm sure that the authors have a plan for evaluation of the Angstrom coefficient and, again, it would be nice to mention such plans in the paper.

Reply: Yes, retrieving the aerosol extinction at more - longer - wavelengths would give us the opportunity to gain information about the particle size distribution and relating microphysical aerosol parameters like the Angstrom coefficient. This information gets lost in the wavelength pairing step of the algorithm. As this is one of the greatest benefits of SCIAMACHY broadband radiance measurements, it will be implemented and published as future work. This paper shows the first version of the retrieval algorithm using wavelengths "approved" for aerosol retrieval. The section "Outlook" also contains this topic.

Reviewer comment 2: Figure 13 shows that SCIAMACHY can retrieve the zonal means of the aerosol extinction coefficient for each month (or two months? - this is not clear from the text) of observations. This is really informative, considering the long mission lifetime. However, in order to study dynamic structuring (e.g., Junge layer) of the stratospheric aerosols, one should map the latitudinal and longitudinal distributions of aerosols at a week- or a month-timescale. Note that OSIRIS routinely generates

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daily maps of the stratospheric aerosols. Also, the Langley (NASA) team produces CALIPSO zonal means for the extinction of stratospheric aerosol in a latitude-height frame of reference. It may benefit the article, if authors describe the capability of SCIAMACHY to generate similar plots/data in a “latitude vs longitude” and “latitude-height” grid, in order to be compared with data of other sensors.

Reply: The mentioned Figure 13 is included in the paper as a "first look" on the SCIAMACHY aerosol extinction climatology, to show that the retrieval works in general. Detailed analysis - for example in form of latitude-longitude- and latitude-height-plots - is already taking place and will be in the focus of future papers. This topic is added in the new section "Outlook".

Reviewer comment 3: The Australian, February 2009, fire is marked on Figure 13. Is there any supporting evidence that this fire was the cause of a massive aerosol’ loading into the stratosphere?

Reply: Yes, see for example Siddaway et al., JGR 2011: "Transport and evolution of the 2009 Australian Black Saturday bushfire smoke in the lower stratosphere observed by OSIRIS on Odin", doi:10.1029/2010JD015162. Now cited in the paper, section 8 "Sample results".

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 5993, 2012.