

Interactive comment on “Issues related to the retrieval of stratospheric aerosol particle size information based on optical measurements” by Christian von Savigny and Christoph Hoffmann

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Received and published: 26 September 2019

Dear Christian and Christoph,

In your paper you show very interesting results illustrating that a weaker sensitivity of the solar occultation measurements to smaller particles is expected to lead to the overestimation of the mode radius and underestimation of the particle number density if a coarse mode is present but not considered in the retrieval. However, you tend to over-generalize your conclusions. As shown by Malinina et al. (2019), not mentioned in your paper by the way, the sensitivity of the limb measurements to smaller particles is very different to that of solar occultation. For this reason I disagree with a blind extension

of your findings to the limb geometry as you do, e.g. by writing “Stratospheric aerosol particle size retrievals from satellite limb-scatter measurements can be expected to be affected by similar issues as the occultation and lidar retrievals described here. “ To my opinion this statement is unjustified and should be removed.

Furthermore, with the last sentence of the abstract “The results question the overall significance of stratospheric aerosol size retrievals based on optical satellite or lidar measurements, as long as the actual aerosol particle size distribution is not well known.” you provide a misleading message to the scientific community. First, based on the results of your paper you can only talk about solar occultation measurements and must not generalize your conclusions to all optical satellite methods, second a known bias in the retrieval products is not yet a reason to question the significance of the retrieval/measurements in general.

One more technical issue is in the first paragraph of the “Methodology” section “Aerosol particle size information can in principle be obtained based on measurements of (a) the spectral dependence of the aerosol extinction or scattering coefficients (e.g., Yue and Deepak, 1983; Bingen et al., 2003), (b) the scattering phase function (e.g., Gumbel et al., 2001; Renard et al., 2008), or (c) the polarization of the radiation scattered by aerosols (e.g., McLinden et al., 1999).” Here you seem to forget that in limb retrievals the spectral dependence of the radiance rather than that of the extinction or scattering coefficient is used (Malinina et al., 2018).

Kind regards,

Alexei

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-342, 2019.

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Discussion paper

