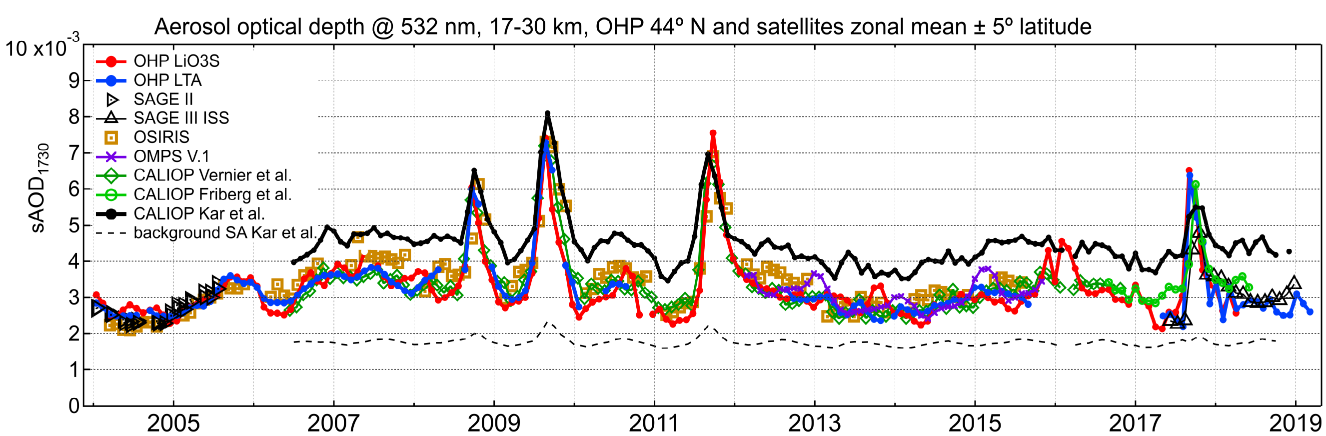
**Interactive comment on "CALIPSO Level 3 Stratospheric Aerosol Product: Version 1.00 Algorithm Description and Initial Assessment" by Jayanta Kar et al.**

The article by Jayanta Car and coauthors presents the new stratospheric aerosol (SA) product based on CALIOP measurements, describes the data handling procedure and provides an initial assessment of the data quality through intercomparison with ISS SAGE III measurements of aerosol extinction. With nearly 12 years of continuous operation, CALIOP measurement record represents a valuable source of near-global information on the stratospheric aerosol variability at seasonal to decadal time scales. An obvious advantage of CALIOP measurements is their higher vertical resolution compared to other space-based aerosol sensors (e.g. SAGE, OSIRIS, OMPS etc.) exploiting passive remote sensing techniques. This is why an official release of CALIOP SA data product has been long awaited by stratospheric community and thus the article represents a valuable contribution. The manuscript is well organized and easy to follow, the data retrieval is comprehensively described and the procedure of cloud screening together with the choice of assumption are well discussed. A novel and valuable result is the latitude-height distribution of extinction to backscatter (lidar) ratio inferred by coupling zonally-averaged CALIOP and SAGE III observations.

That said, I have a major concern on the data product as such. The very day I found out about the release of L3 CALIOP stratospheric aerosol product, I incorporated the data into the intercomparison of stratospheric AOD series at NH midlatitudes from various satellites and Haute Provence (OHP) lidars in a way we did it in (Khaykin et al., ACP, 2017). The result came quite surprising to me as the new L3 series were remarkably high-biased with respect to all other data sets, including CALIOP SA data product by Vernier et al. I actually thought that I somehow mistreat these data. However, having read this article I realized that this bias is real and amounts to 30-40% at 45 N (Fig. 12), which is consistent with my estimates.

A figure below shows time series of AOD of the 17-30 km layer within a 5 deg. latitude belt centered at 44 N as obtained from OHP lidars and various satellite sensors. It includes the CALIOP SA data product by Vernier et al. as well as a more recent one by Friberg et al., (ACP, 2018). While all the data series - independently of the measurement technique (lidar, solar occultation, limb scattering), data handling and the principal measurand (backscatter or extinction) - are in a good agreement, the new L3 CALIOP series stands out high-biased. With that, the background AOD appears low-biased with respect to the well identified clean periods, e.g. 2013-2014.



**General remarks.**

The article reports the observed bias with respect to SAGE III in an honest and comprehensive way, however the discussion of its possible reasons is not satisfying. Basically, it appeals to inaccurate knowledge of the lidar ratio, cloud screening issues and potential errors in the early version of SAGE III extinction product. However, this can in no way explain the discrepancy with other versions of CALIOP SA products by Vernier et al and Friberg et al., nor with OHP lidar operating at the same wavelength.

Obviously, there are other reasons for the positive bias beside the error in lidar ratio or that of SAGE III extinction product. These reasons are neither identified nor hypothesized upon, leaving one wonder about the credibility of the L3 SA product as a whole and strongly limiting its scientific value, particularly for radiative forcing studies. Another missing item is the discussion on the quality of the "background aerosol" product.

I suggest that the authors attempt to investigate the possible reasons for the latitude and altitude dependent bias and try to eliminate it if possible or at least sketch the envisaged changes/improvements in the future version of CALIOP L3 SA product, other than refinement of lidar ratios. In order to isolate the lidar ratio issue, the validation of the L3 data product could be done on integrated backscatter available from NDACC ground-based lidars at various latitudes.

**Specific remarks**

Figure 4. A strong signal above southern high latitudes is certainly due to PSC and I believe these are type Ib PSC (supercooled ternary solution, STS), which are non depolarizing and thus may be aliased as stratospheric aerosol. The interpretation in p.12 l.5-7 (signature of particles in the process of becoming PSCS) is thus incorrect. I wonder, why the PSCs could not be screened out using temperature threshold for PSC formation, which are relatively well known.

Figure 8 and 9, both showing latitude-height sections. Is there a particular reason why the former reports the attenuated scattering ratio, whereas the latter reports extinction coefficient? It would be easier to compare them had they presented the same units.

Figure 9. What causes the strong signal around the tropopause at midlatitudes? If this is cloud contamination, this should be carefully discussed.