Calibration of lidar signals at 1064 nm from the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) onboard the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) satellite depends on the prior calibration of the primary 532 nm channel. The 1064 nm calibration procedure also requires knowledge of the ratio of stratospheric signal attenuations at 1064 nm and 532 nm. Since this ratio is not available a priori, it is typically assumed to be unity.

This manuscript evaluates the impact of that assumption on the 1064 nm calibration using observations from the Stratospheric Aerosol and Gas Experiment (SAGE III) on the International Space Station (ISS) for the period 2017 onward, and the GLObal Space-based Stratospheric Aerosol Climatology (GloSSAC) to provide historical context during the SAGE II era (1984–2005). The study shows that the unity assumption introduces a potential bias in the computed 1064 nm calibration coefficients of less than 1–2% within the tropics under background stratospheric conditions, but recent biases can be as large as 5% when volcanic perturbations and/or pyro-cumulonimbus (pyroCb) injections dominate stratospheric aerosol loading.

The manuscript further explores the implications of this bias on CALIOP's level-2 science retrievals by assessing the expected perturbations in cloud-aerosol discrimination (CAD) performance and quantifying the non-linear propagation of errors in CALIOP's 1064 nm extinction coefficients.

Overall, this evaluation and global characterization of spectral attenuation differences provide valuable guidance for potential corrections to CALIOP level 1 data products and for the development of data processing algorithms for future spaceborne elastic lidars operating at 1064 nm. This work represents an important contribution to space lidar data processing and should be published after minor revision.

My comments are all minor and provided in below:

1. Section 2. Motivation: In this section, Equations (1) and (2) appear to provide the basis for transferring the calibration from 532 nm to 1064 nm. If so, the authors should state this explicitly and describe how the two-way transmittance ratio is determined in the CALIOP 1064-nm calibration. The authors could also briefly explain how the calibration cirrus cloud is selected. For example, is the presence of an overlying layer acceptable if it can be detected by CALIOP, or is only background aerosol in the stratosphere permitted when it is below CALIOP's detection limit?
2. Lines 75–77: The manuscript states: "While smoke plumes occur intermittently, the aerosol loading in the stratosphere is always present either as background or as volcanic ash or sulfate. Here we shall assess the potential bias from the stratospheric loading only." My question here relates to the previous comment: is a cirrus cloud beneath a smoke layer permitted as a calibration target, or is this only acceptable when the smoke layer is undetectable by CALIOP? It would be good to clarify this.
3. Fig. 8: use the same vertical span for all three panels.
4. Figure 9 presents a useful illustration of the possible impact of calibration error in the overlying cirrus cloud on the retrieval of the boundary layer aerosol. However, the illustration is based on an assumed cirrus cloud from another location in Figure 8. Would it be more straightforward to analyze the boundary aerosol layer directly beneath the cirrus cloud layer shown in Figure 8? If the aerosol layer directly beneath the cirrus cloud is not suitable for this illustration, the authors could explain the reason in the manuscript.
5. Lines 281–283 state: "For multi-layer retrievals, the solution for any one layer requires that the attenuated backscatter coefficient in that layer be renormalized to account for the

signal attenuation due to overlying layers.” What happens if there is clear air between the two layers? In that case, would the solution renormalize the underlying layer to the clear air, such that the retrieval of the aerosol layer may not be impacted by the overlying cirrus cloud?

6. Lines 315–316 state: “The empirically derived estimate of γ'_{1064} is derived by integrating the 1064 nm attenuated backscatter profile between layer top and layer base.” Why is γ'_{1064} referred to as empirically derived? Isn’t γ'_{1064} simply defined as the integral of the 1064 nm attenuated backscatter profile between the layer top and base?