

**Review of article ‘Global radiative forcing of stratospheric aerosols injected by the 2020 Australian extreme wildfire event’ by Raphael Lebrun, Yevgeny Derimian, Francois Ravetta, Jerome Bureau, and Sergey Khaykin**

This article presents a comprehensive analysis of the global radiative forcing of carbonaceous aerosols in the stratosphere in the aftermath of the 2019-2020 Australian wildfires. Overall, the paper is well written and documented. It should be published after the authors address the mostly minor comments below.

**Comments**

Line 24. Self-lofting across the tropopause was also postulated during the 2017 PNE pyroCb by Torres et al (2020a).

Lines 39-41. As a general statement, the sentence ‘*The remote sensing methods used to observe these stratospheric aerosols are not yet able to precisely quantify their absorption properties*’, is not accurate. If the authors refer to a *specific remote sensing method* used in their analysis, they should mention it. Near UV aerosol optical depth and single scattering albedo for both the PNE and ANYSO events have been retrieved from satellite near UV observations by the DSCOVER-EPIC (Torres et al.2020a) and the Sentinel5-Precursor TROPOMI sensors (Torres et al., 2020b) respectively.

Line 68. TROPOMI retrievals of AOD and SSA over both cloud-free areas and AOD over cloudy scenes were used to produce an estimated 546 kt of injected aerosol mass above 12 km (Torres et al., 2020b).

Line 79. Add the Taha et al. (2021) reference after *extinction profiles*.

Line 103. Specify the spectral range over which refractive indices are assumed constant.

Line 105. Discuss the effect of (or clarify) the apparent inconsistency between the assumed constant refractive indices and the spectrally dependent SSA and asymmetry parameter.

**References**

Taha, G., Loughman, R., Zhu, T., Thomason, L., Kar, J., Rieger, L., and Bourassa, A.: OMPS LP Version 2.0 multi-wavelength aerosol extinction coefficient retrieval algorithm, Atmos. Meas. Tech., 14, 1015–1036, <https://doi.org/10.5194/amt-14-1015-2021>, 2021.

Torres, O., Bhartia, P. K., Taha, G., Jethva, H., Das, S., Colarco, P., Krotkov, N., Omar, A., and Ahn, C.: Stratospheric Injection of Massive Smoke Plume From Canadian Boreal Fires in 2017 as Seen by DSCOVER-EPIC, CALIOP, and OMPS-LP Observations, Journal of Geophysical Research: Atmospheres, 125, e2020JD032, 2020a

Torres, O., Jethva, H., Ahn, C., Jaross, G., and Loyola, D. G.: TROPOMI aerosol products: evaluation and observations of synoptic-scale carbonaceous aerosol plumes during 2018–2020, *Atmos. Meas. Tech.*, 13, 6789–6806, <https://doi.org/10.5194/amt-13-6789-2020>, 2020b.