The BC absorption enhancement due to the mixing is still unclear. This study reports the long-term measurements of E_{abs} in Spain, which is valuable for better understanding the global distribution of BC absorption. Overall, it is well organized and professionally written. Therefore, I recommend this manuscript for publication after minor revisions.

In general, AE33 and MAAP are filter-based measurements. Several studies imply the corrections are needed for filter-based light absorption measurements, including multiple light scattering within the filter, filter loading, and particle scattering corrections (Lack et al., 2014; Moosmueller et al., 2009). Could you add the related description how the correction is down in this study? Moreover, OC/EC is a widely used instrument. But previous study shows there are several limitations associated with OC/EC measurement that complicate the interpretation of the results and introduce uncertainties that cannot be completely minimized (Lack et al., 2014). How do you think it affects your results?

It is very interesting to attribute E_{abs} to different species. However, I wonder if the effects could be well estimated by using multiple linear regression due to the limitations of the method. Could you add discussion on the applicability of this method on this attribution?

Line 483: This study mentioned increase of E_{abs} at the near-ultraviolet wavelengths during the cold period and we related the observed increase to the presence of brown carbon particles externally mixed with BC particles. Several studies estimate the impact of brown carbon internally mixed (brown carbon coating) with BC (Lack and Cappa, 2010; Feng et al., 2021). Is it different if brown carbon is internally mixed with BC particles?

Line 237: Table 2 occurs earlier than Table 1.

References

Feng, X., Wang, J., Teng, S., Xu, X., Zhu, B., Wang, J., Zhu, X., Yurkin, M. A., and Liu, C.: Can light absorption of black carbon still be enhanced by mixing with absorbing materials?, 253, 118358, https://doi.org/10.1016/j.atmosenv.2021.118358, 2021.

Lack, D. A. and Cappa, C. D.: Impact of brown and clear carbon on light absorption enhancement, single scatter albedo and absorption wavelength dependence of black carbon, 10, 4207–4220, https://doi.org/10.5194/acp-10-4207-2010, 2010.

Lack, D. A., Moosmueller, H., McMeeking, G. R., Chakrabarty, R. K., and Baumgardner, D.: Characterizing elemental, equivalent black, and refractory black carbon aerosol

particles: a review of techniques, their limitations and uncertainties, 406, 99–122, https://doi.org/10.1007/s00216-013-7402-3, 2014.

Moosmueller, H., Chakrabarty, R. K., and Arnott, W. P.: Aerosol light absorption and its measurement: A review, 110, 844–878, https://doi.org/10.1016/j.jqsrt.2009.02.035, 2009.