

Answer to the referee
Higher absorption enhancement of black carbon in summer shown by two year measurements
at the high-altitude mountain site of Pic du Midi Observatory in the French Pyrenees
(Preprint egusphere-2023-570)

Please find below the reviewer's comments in black and our responses in blue. The line numbers in the responses refer to the new version of the paper.

The authors have addressed all of my technical comments. The potential biases introduced by using different software for the data treatment of the SP2 data are now adequately explained. The numbering of figures and sections, as well as the nomenclature and the use of units, has been made consistent.

The study on the impact of BL dynamics and wet removal on BC properties is the core of the work, features a unique dataset and, most importantly, represents the outstanding novelty of the present research. However, I find that the general characterization of the aerosol and its seasonality (Sections 3.1, 3.2, and 3.3) dilutes and diminishes the visibility of Section 3.4.

I strongly recommend that the authors summarize and reduce the results and discussion of the general characterization to give more emphasis to Section 3.4. I maintain the opinion that the authors should exercise greater caution in discussing the implications for climate models, given the absence of hygroscopicity measurements or mixing state measurements.

Lastly, I suggest a final check of grammar and language.

Section 3.1 describing the meteorological parameters has been moved in the Supplements together with Fig. S6, according to the suggestion of the reviewer.

Documenting the seasonal variability of aerosol and BC properties relevant to climate studies through long-term measurements suited to users is essential. It is crucial for the modelling community to have access to both intensive and extensive parameters describing aerosol properties in order to evaluate and improve the aerosol representation in models and to better quantify their climate effects. Therefore we believe that parts 3.2 to 3.3 are as important as the discussions in Section 3.4, relating to the identification of atmospheric processes.

A sentence has been added in the conclusion to moderate interpretation of photochemistry: “However, the latter effect could not be rigorously demonstrated in this study.”

A final proofreading by all co-authors was carried out. However, the reviewer must keep in mind that we are not English-native speakers.