Answer from the authors to referee #1 comments on the revised version of the manuscript: *"Absorption enhancement of BC particles in a Mediterranean city and countryside: effect of PM chemistry, aging and trend analysis" by Jesús Yus-Díez et al., Atmos. Chem. Phys. Discuss.*

Hereafter we will answer and resolve the comments by Referee #1.

1. **Please clarify the cut-off sizes of MAAP and AE33 which were used to derive the C factor.**

   The cut-off sizes used for deriving the C factor were the same as the ones used through-out this study: a PM2.5 inlet cut-off for the AE33 and a PM10 inlet cut-off for the MAAP. This experimental configuration was used to determine and characterize the C correction factor in Yus-Díez et al. (2021) where we assumed that most of the BC is contained in the PM2.5 fraction.

   We have clarified this in the manuscripts in lines 143-149:

   "*For the AE33, the larger uncertainty is introduced by the multiple scattering parameter, C (δC = ±0.57 at BCN Yus-Díez et al., 2021), which depends on the physical properties of the particles collected on the filter tape. In Yus-Díez et al. (2021) the C,* ***obtained with the same instruments (i.e. MAAP and AE33) and inlets cut-off as in the present work****, was found to have an average value of 2.44, and it did not present a marked dependence with the single scattering albedo (SSA) of the particles collected on the filter-tape. In fact, Yus-Díez et al. (2021) showed that the C values can considerably increase when SSA is high (> 0.95). However, these high SSA are rarely measured in the city of Barcelona. Moreover, it was reported that the C is wavelength independent in Barcelona (cf. Fig. 1 Yus-Díez et al., 2021). Therefore, we used here the average C value of 2.44 for the deriving the absorption measurements*."

2. **Clarify the cut-off sizes for the on-line and off-line results, and when necessary, clearly state that the on-line and off-line results could not be directly compared, e.g., for the MAC values in Table 1.**

   We have modified the manuscript so that this is stated more clearly. Hereafter we provide a list of the lines where we have included this comment.

   In the methodology section, in lines 139-142:

   "MAAP measurements were obtained with a 1 min time resolution at a flow rate of 5 l/min and with a **PM10 inlet cut-off**. The AE33 b_{abs} coefficients in BCN were derived with the same time resolution and flow rate as the MAAP and with **a PM2.5 inlet cut-off**. The aethalometer filter loading effect was corrected online by the dual-spot manufacturer correction (Drinovec et al., 2015), and the multiple scattering correction parameter, C, was set to 2.44, as obtained for the station by Yus-Díez et al. (2021)."

   With regards to the results section, in lines 260-263:

   "The difference between the offline and online measurements at BCN, although the mean values fall within the standard deviation of the measurements, was mainly associated to the difference in the length of the measurement periods, and especially the **different inlet cut-offs sizes, which prevents direct comparison** (Fig. S1)."

Additionally, Table 1 caption has been modified to:

"**Table 1**. Observed MAC (m2g−1) values obtained using online techniques via AE33 and Sunset online EC measurements at BCN for a PM2.5 inlet cut-off, and offline at BCN and MSY via MAAP and offline EC measurements on 24-hour filters for a PM10 inlet cut-off."

In Section 3.2, when comparing both the online-offline methods, it is stated the importance of the difference in the inlet cut-off size in lines 355-357:

"The higher E_{abs} in BCN at 637 nm compared to E_{abs} at 370 nm was mostly associated to the different inlets size cut-offs and, to a lesser extent, to the different periods used for the online and offline measurements."

And in lines 362-366:

"These different trends between online and offline E_{abs} versus RNR−PM were probably due to two main factors: first, the offline measurements were made with a PM10 inlet vs the PM2.5 inlet of the online method (Fig. S1), hence coarse nitrates and other coarse particles could have influenced E_{abs}, and, second, the large annual variability observed for the offline E_{abs} measurements (see Fig. S12) could have also contributed to the observed difference."