General assessment

Now, I have assessed the current revised manuscript (ATC4) together with the earlier manuscript versions and the authors' response documents. The paper has actually already experienced two substantive rounds of assessment: an initial review by two referees and a subsequent editorial review. The authors have responded carefully and constructively throughout this process. At its current state, the work is scientifically meaningful, the retrieval framework is reasonable, and the resulting ultraviolet-visible absorption constraints and plume-age parameterization should be useful to the atmospheric-aerosol community. In my opinion, the manuscript can be accepted after the following focused minor revisions.

Minor revisions

1) Equation (1) defines the weighted least-squares cost using the inverse measurement covariance, C_γ^{-1}, but Eq. (9) currently shows C_γ without the inverse in both weighting factors. The standard weighted generalized inverse corresponding to Eq. (1) would be:

$$\bar{J}_x = (J_x^T C_y^{-1} J_x)^{-1} J_x^T C_y^{-1}.$$

I ask the authors to verify Eq. (9) against the actual retrieval implementation. If the code uses C_γ^{-1}, the printed equation should be corrected. If the code uses the expression currently printed, the authors should make clear whether it affects the reported retrievals and uncertainties.

2) I find Several headline quantities are not stated consistently. Please check the consistency between the fitted measurement range, any displayed/derived range, and the recommended parameterization range: the abstract gives 310-440 nm, Sect. 3.4 lists measurement wavelengths from 308 to 440 nm, Sect. 4.6 recommends 300-450 nm, and the conclusions state 310-477 nm. Likewise, the imaginary-RI half-life is 13 ± 3 h in the abstract and Sect. 4.4 but 15 ± 4 h in the conclusions. Meanwhile the statement that the uncertainty in α_k is <10% should be reconciled with $\alpha_k = 4 \pm 1$ and 3.5 ± 0.5, with an explicit indication of what each uncertainty represents (such as retrieval uncertainty, between-transect variability, or fit/parameterization uncertainty).

3) As the authors described, SAEB involves aircraft filter collection followed by offline solvent extraction and spectrophotometric analysis; it is therefore not strictly an in situ technique as in situ PAS. The authors should address this issue appropriately.

4) A careful proofread is still needed for the correctness or accuracy. Representative examples in ATC4 include 'dependece' (line 134), 'a values' (line 159), 'observations where complemented' (line 163), 'volume fracions' (line 239), 'these comparison' (line 440), 'half-

live times' (line 470), 'the plotted data has' (Fig. 9 caption), repeated 'the the' (lines 530 and 533), 'remote sending' (line 535), and 'have consolidate' (line 544). Please also correct the CAFS actinic-flux unit at lines 157-159 to photons s^{-1} cm^{-2} nm^{-1} and standardize spelling and hyphenation (e.g., ultraviolet/visible, in situ, filter-based, and core-shell) throughout.