Editor :
One reviewer found the responses to earlier comments satisfactory. Another reviewer elected not to review the paper a second time, and so I reviewed your changes in response to that reviewer and found the responses satisfactory. A third reviewer followed up with minor comments upon reviewing the paper a second time. Please respond to those minor comments.

Anonymous Referee #1
Thanks to the authors for mostly addressing all the suggested changes to the manuscript. I recommend publication after addressing the minor substantive and technical corrections listed below.

• Line 160: Please be specific about the number of AirCore profiles in the extension. You list them in Figure 4, but it is also needed here to be explicit that there are MORE in the global extension. There are even more over Boulder than in the French dataset (84 vs. 80).
We have added in the text a sentence to explicit the total number of profiles and added the information about the Boulder samples

• Line 187: "depending on the s," is certainly a typo. I think you meant depending on the atmospheric layer? Please fix however you think appropriate.
Indeed. We are very sorry for making this typo at a late state of the manuscript correction. The reviewer interpreted correctly and we reverted to the original sentence that mentioned "atmospheric layers"

• Line 207: add "over France" to make clear that these 80 AirCores are the French ones, since in section 2.3 you describe a global extension.
Done

• All fonts embedded within your IDL-generated figures: Please use a bolded font. Especially on figure 4, it is nearly impossible to read the "Australia" label (similarly for all cyan colors, e.g. Figure 6).
We have corrected Figures 2, 4 and 6 as suggested by the reviewer

• Figure 4: Please break into two figures; left : bias, right : Stddev. I think if the cause of the Park Falls is bias vs. stddev would be telling (i.e., likely a bias in the underlying CAMS model – and you could test this directly, even if you don't plot it like you did in Figure 3 with solid vs. dashed lines).
We have broken Figure 4 into two figures as suggested by the reviewer

• Section 3.4 : Be clear if this is fitted seasonal cycle amplitude. I assume it is, but it's best to be clear. Thus it represents the mean CAMS 2010-2022 seasonal cycle amplitude, correct? Please make this clear in this section.
The text says explicitly "The amplitude of the cycle is computed directly from the four Ai coefficients" so that there is no ambiguity, we feel, that it is based on the fit of the CAMS 2010-2022 time series.

• Line 323: "Figure 7 shows a global map of the amplitude of the seasonal cycle."

Done

• Line 334: Please change “RMS deviation of the fit” ◊ “RMS deviation of the XCO2 fit”.

Corrected

• Section 3.6: This completely ignores the 145 additional AirCore profiles at six different sites, and chooses to focus entirely on the 80 in France, with no mention of why, or even the fact that you are focusing on the 80 in France. I.e., the updated paper is not updated throughout to reflect the expanded AirCore scope. Please fix this, and consider repeating the covariance analysis at Boulder (84 profiles) or Lamont (30 profiles).

We agree that section 3.6 did not propery account for the added AirCore observations. We have corrected thisissue and we have added a figure in the supplementary to show the variance-covariance and the correlations at Boulder, similar to Figure 9. We have complemented section 3.6 accordingly

• Line 452, delete second instance of the word “described”

We have corrected the sentence to “…the seasonal cycle described by our method is smoother”.