

Dear Author,

I have reviewed your responses to both the second round of reviews and to my comments. At this stage I now have the following comments:

- thank you for a number of improvements in the paper that respond to the reviews
- you indicate that :

”We have now changed the title to that given by the Topical Editor. However, we do note that GMD has a strict policy with respect to model versions and this introduces some inconsistency between studies performed with the same model version.”

Thank you for your comment, but I remain convinced that the new title and the new simulation names help clarify things for the scientific community.
- I have noticed a number of inaccuracies in your responses in the file with your responses dated 8 August. You claim to have made certain modifications to the text, but these changes are not necessarily reflected in the new version of the text. This indicates a certain lack of thoroughness. This is somehow frustrating and annoying. Here are below my points:
 - I had indicated: ” please indicate whether meteorology can differ across simulations, depending on whether aerosol–radiation interactions are activated or not.
You respond: ”The meteorological component is the same between simulations and corresponds to Cy48r1.”
I’m sorry, but your answer is not sufficient: are there or are there not interactions between the gaseous species and/or aerosols with the radiative scheme? If there are, then the meteorology, even if reinitialized every day, is not identical across all simulations, and this should be clearly stated in the text. The meteorological component and the meteorological conditions are two different things.
 - I had indicated: line 29: I propose to change: ”There is also a shift in the size of particles towards the fine mode nitrate away from the coarse mode. ” into ”There is also a shift in particle size distribution, with nitrate moving from the coarse mode toward the fine mode.”
You respond: ”The sentence has now been updated.”
I’m sorry, but the sentence has not been updated
 - I had indicated: Line 53: change ”and the concentrations” into ”and concentrations”
You respond: ”We have now modified this sentence.”
I’m sorry, but the sentence has not been updated
 - I had indicated: line 54: no capital letter to sulphur dioxide, ammonia, nitric acid, particulate matter . And add a ”,” before ammonia.
You respond: ”We have now removed all capitals before the definition of the chemical species and the grammar has been corrected.”
Not done in the abstract, and ”comma ” not added
 - I had indicated ”line 111: please reformulate : ’In that, acidic deposition and N-loading can also be output from the model means such that improving the deposition term via an improved distribution in PM will foster the development of this IFS-COMPO future product.”
You respond: We now use the sentence : “Acidic deposition and nitrogen loading can also be future products from IFS-COMPO which will benefit from the improved simulation and distribution of PM.”
OK, but you’ve added a sentence while keeping the original one, which results in a redundancy.
 - I had indicated ”line 121: please clarify what you mean by ’upgrades to EQSAM4Clim’
You respond: ”We now modify the sentence to “... application of EQSAM4Clim (Metzger et al., 2024) ...” where the details of the recent modifications can be found in this recent publication.
I don’t see this sentence in the text

- Referee 2 indicated: "Did you check conservativity in the budget tables?"
You respond: "Yes the global budget terms are closed and comparable across runs." So please indicate that in the text of the paper as well.
- I had already previously made a large number of comments regarding syntax, which in my opinion made the article easier to read. At this stage, I believe that even though the author indicates that they used Microsoft tools with regard to the use of English, many sentences or parts of sentences in the text could be written more correctly, regardless of writing style. I am once again making a few comments regarding the syntax/grammar in this new round of feedback. However, at this stage, I feel it is no longer my responsibility to point out all the remaining imperfections throughout the article.
- I noticed that the line numbering is different in the ATC2 file and in manuscript-version3. I use below the line numbering in the ATC2 file for the following additional comments:
 - line 18: add "(IFS-COMPO)" after Integrated Forecast System-COMPOsition
 - line 20: add ',' after "cycle 49R1"
 - lines 165 and 169: change "CY49R1" into "pre-CY49R1"
 - line 390: remove ',' between "particles" and "are"
 - line 420: I propose to remove ' which is used operationally'.
 - line 437: : you indicate that "update includes adjustments to the below-cloud scavenging parameters" and then "Additionally, a below-cloud scavenging model has been implemented.". Do you mean that there is now in "pre-CY49R1" a separate routine for below-cloud scavenging? Please clarify
 - line 480: please replace "The details of the sensitivity experiments" by "The details of the experiments"
 - line 492: please replace "The emissions adopted" by "Anthropogenic emissions"
 - line 493: remove "with"
 - line 500: remove ',' after « based »
 - line 549: you write ' Unfortunately for S. E. Asia measurements of both precursors and SIA at a weekly time frequency ...'. Please rather indicate : "Unfortunately, conducting a similar analysis in Southeast Asia was not possible owing to the unavailability of both precursor and SIA weekly measurements."
 - line 549: '.' after study
 - line 578: the sentence "A direct link...": this last sentence of the paragraph does not logically follow from the previous ones
 - line 586: you write: 'The maps for December show higher mixing ratios towards the East, with a significant contribution from shipping.'. Is indeed shipping responsible for these higher mixing ratios?
 - line 678: "by 1.5%" or by "by 1.4%" as indicated in Table 2?
 - line 699: please clarify 'The yearly mean bias (MB) value decreases by around 25%, with a moderate correlation.'
 - line 791 : legend of Fig. 2: please specify what the grey band means, and provide details on the variability criteria used (the latter comment applies also to Fig. 5 and Fig. 8)
 - line 801 : "Although some smaller differences" : smaller than what?
 - line 854: "which would then lower the negative bias" : don't you mean the positive bias?
 - line 856: "means of surface [SO₂(g)]": I don't see any SO₂(g) presented in Fig. 3; please correct the sentence
 - line 944: "in Fig 4": isn't it rather Fig 3?

- line 931: legend of Fig. 3, and in the legends of all equivalent Figures in the paper, change: "The site locations used are shown in each pane and taken from the EMEP, CASTNET and EANET networks, respectively." into "Site locations and corresponding observed values, taken from the EMEP, CASTNET and EANET networks respectively, are shown in circles".
- all throughout the paper, please remove capital letter for northern, southern, southeast, etc... when they are adjectives, and when they don't refer to an official region
- line 1354 : please indicate in a couple of words what an aerosol dynamical model is
- line 1356 : please clarify: "imposed in pre-CY49R1 occurs"
- line 1363: please clarify: "In contrast to Europe no seasonal decreases occur for any location."
- line 1364: what do you mean by: "are the high across all regions"?
- line 1433: change "op" to "top"
- line 1444: please move the reference (Metzger et al., 2018) when first mentioning "aerosol dynamical model"
- line 1752: "(bottom right panel of Fig. 8)": is this the correct figure?
- line 2321: "towards Iowa are not seen in the measurements", it's not clear to me what you are pointing here
- line 2324: please reformulate "yearly a result of the large positive MB towards the east being moderated by negative in other parts of the U.S"
- line 2328: "This provides " : what does "This" refers to?
- line 2673: "show"
- line 2698 "do reveal"
- line 2704: high values in the observations are not due to missing sources. Please reformulate the sentence.
- line 2724: "and has little effect on the forecasts itself": please explicit what has little effect
- line 2739 "an quantify"?
- line 3033 : please remove 'that have'
- line 3040: in the sentence "For surface [SO₂(g)], no significant impact has occurred with respect to the MB for Europe or the U.S. and with little correlation. ": please be more precise for "MB" and what you mean by "and with little correlation."
More generally, all through the conclusions, precise when you provide numbers what they refer to, that they are for yearly means or for ...
- line 3044: "For the yearly wet deposition of oxidized S, results are mixed with reductions in the MB for Europe and China but increasing markedly for the U. S.". Please correct the grammar
- line 3052: please reformulate "from a reduction in the efficacy of particle"
- line 3061: "persistent" in what sense?
- line 3159 : I understood you did not get weekly observations from EANET. Please correct the legend of the figure

Looking forward to an improved paper.

Regards, Martine Michou