

Anonymous referee comments on:

An evaluation of the regional distribution and wet deposition of secondary inorganic aerosols and their gaseous precursors in IFS-COMPO Cycle 49R1

by J.E. Williams et al.

This comment is referee number 2 responses on authors responses after the first evaluation round.

Comments on Referee #2 responses

Authors didn't answer to referee #2 general comment. Could you please do so and especially give details about some important points such as:

- The changes of the wet deposition scheme and analysis. You indicate that the companion paper already describe the changes made to the code. Nevertheless I consider this in not precise enough.
- The naming of the code version (cy48 vs cy49). I understand your point, even if you do not treat the possible interactions between the composition compartment and the other changes in the IFS model between CY48 and Cy49. Also, I would suggest to at least modulate the title to suggest the ambiguity. Also I would recommend to be more precise for future publications. Concerning the use of Cy49r1 in the present publication I will leave it to the editor to decide.
- Did you check conservativity in the budget tables?

Simulation Cy49r1_NOE4C usage is quite under, it might be useful to exploit it more to be able to make the distinction between different impacts, or to remove it completely.

Is there a signification in the colours of the modified manuscript?

Also there are still figure and table references that are not correct...

Specific comments

Authors wrote:

Line 272: Please introduce Table 3 before using it. We have amended the text to : "The associated annual mean statistics are provided in Table 2. To assess the global integrated impact on SO₄= formation, the associated global budget terms are provided in Table 3 in Tg S/year."

I can't find this sentences in the updated text.

Table3: (also valid for other budget table): Maybe you could add a minus sign in front of figure representing a loss for the considered species.

Thank you for the suggestion. However we do not provide the differences in terms of Tg species and cannot use colours (red for increase, blue for decrease) due to the journal protocol.

I asked for a minus sign, not colours.

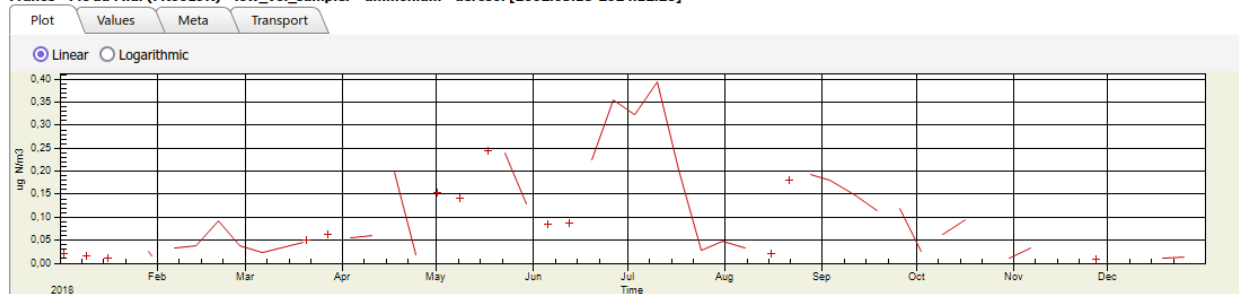
Figure A4: how many stations were used?

Figure A4 is now a part of figure 5, but you didn't answer the question.

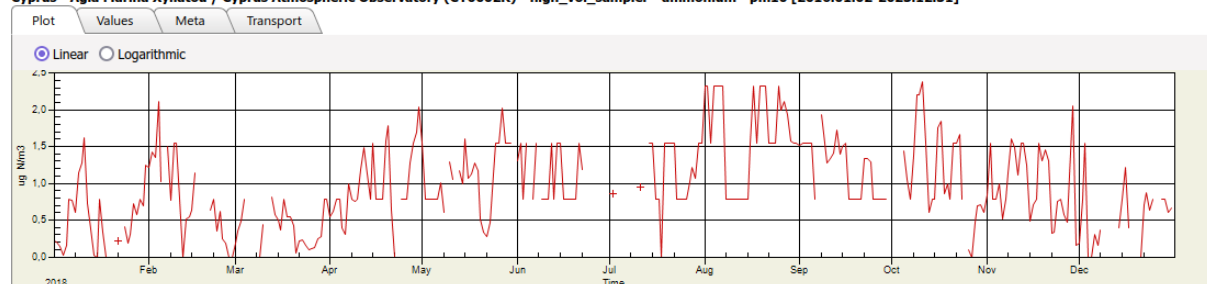
Additional or new specific comments

- Line 349: "No filtering has been applied to these measurements" Does it mean you applied filtering to the other datasets?
- Line 443: "The global budget" You forgot to introduce Table 2.
- Line 793: "Europe, US and SE Asia"
- Lines 995+ and 1080+ are developing the same point.
- Line 1095: Maybe also say that AMON data are used for top right panel.
- Line 1107: significant decreases → Significant decrease
- Line 1121: "Unfortunately the lack [...] can be shown." maybe you should add a paragraph on how selected stations or data, because on the EBAS website when selecting 2018 and ammonium data from the EMEP "Framework" there is a station in South France at Pic du Midi which has data for the aerosol matrix and a few stations including Cyprus and Italy in the pm10 matrix as shown in figure below.

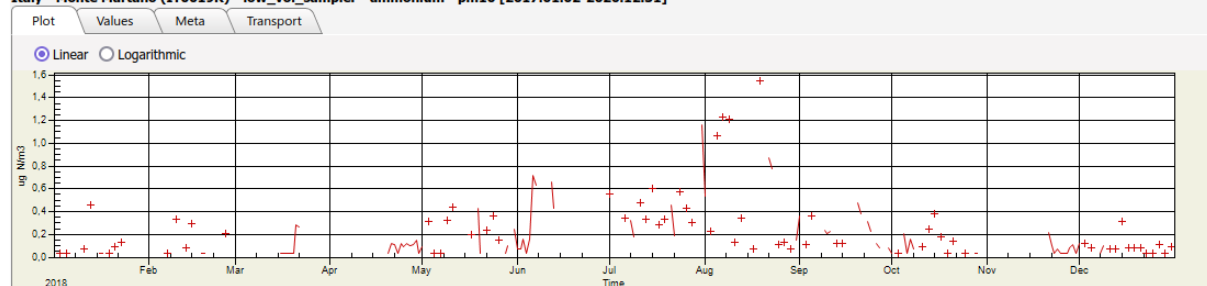
France - Pic du Midi (FR0019R) - low_vol_sampler - ammonium - aerosol [2002.03.18-2024.12.28]



Cyprus - Agia Marina Xyliatou / Cyprus Atmospheric Observatory (CY0002R) - high_vol_sampler - ammonium - pm10 [2016.01.02-2023.12.31]



Italy - Monte Martano (IT0019R) - low_vol_sampler - ammonium - pm10 [2017.01.02-2020.12.31]



- Line 1334: “Table 8” not sure which table you are referencing here.
- Line 1346: IFS-COMPO: which version?
- Line 1457: “Comparison surface comparison”
- Line 1478: “panel”
- Line 1230: Figure 5 has been referred to instead of figure 4.
- Line 1260+: “This can lead to [...] dynamically limited.” This sentence suggests that Cy48r1 uses EQSACM4Clim while it is not the case.
- Line 1268: “with a strong seasonal cycle in maximal values peaking in July” It is quite hazardous to assert this based on two monthly plots.
- Line 1597: Table 2?
- Line 1664: I guess you mean figure 4 or 5.
- Line 1665: Do you mean Benelux instead of Balkans?
- Line 1806 and 2124: CNEMC data are not used any more.

Comments on Referee #1 responses

The numbers corresponds to the number of Referee#1 comments.

2- You said you added a figure in the Appendix showing the location of all the station used for evaluation. This would have been indeed a good idea, nevertheless you only showed stations used for SO₂ surface concentrations. If the stations are the same for all gaseous measurements please change the legend otherwise please change the figure. You could use a colour code to make the distinction between stations.

4. You indeed discuss the reason for biases being still present, but you don't discuss on possible way to improve these biases.