

Reply to Referee 1

Paper: **Operational and Probabilistic Evaluation of AQMEII-4 Regional Scale Ozone Dry Deposition. Time to Harmonise Our LULC Masks**, by Ioannis Kioutsioukis et al., 2025, ACP

We are grateful to the reviewer for the thorough analysis of the manuscript and the careful reading and suggestions. They all greatly improved its quality.

Reply to the specific **comments**:

Line 23: The abstract is missing information on why evaluation of ozone deposition is important for models/air quality.

Thank you for your suggestion the text has been modified accordingly.

Lines 48 – 52: The introduction would benefit from a brief description of the AQMEII4 activity and importance of deposition evaluation for this study.

Thank you for your suggestion the text has been modified accordingly.

Line 71: LULC acronym is introduced here without being defined.

Corrected thanks

Line 80: It is not clear why the NA and EU models are chosen for the years 2016 and 2010 for the evaluation. The text should make clearer why these years are considered for the analyses.

Table 1: Missing specifics on the model resolutions. NA and EU are described as regional scale models covering general domains but the specifics on model domain and resolution could be including here and within the text as well. Adding the model versions here might be helpful as well since this distinction is mentioned later in the text (i.e., Line 187).

Lines 83-88: It is not clear in the text which emissions are using for anthropogenic, fire, etc. missing relevant citations here.

This paper is part of an ACP special issues that contains several studies using the AQMEII4 model results and data. In order to avoid repeating for every other paper the description of the motivations of the activity and the specifications of the multi model exercise, all such information has been condensed in the Technical note: AQMEII4 Activity 1: evaluation of wet and dry deposition schemes as an integral part of regional-scale air quality models, by Galmarini et al. published with reference: ACP, 21, 15663–15697, 2021, <https://doi.org/10.5194/acp-21-15663-2021>. This editorial choice has been

made to avoid repetitions that would have reduced the publishing space for actual results. Therefore, all the answers to the above comments can be found in Galmarini et al. (2021) with a great level of detail. The note is cited in this paper whenever a reference to the case set up or a model's specifications is present. We understand that the early date of publication of the technical note (2021) may look like an independent publication totally disconnected from the current one, but as a matter of fact it is an integral part of the special issue. For further clarity this sentences has been added in the paper: "Details on the choice of years, model resolution and domains, model versions and choice of emissions input data may be found in Galmarini et al (2021)." and "Details on the model deposition parameterizations for ozone are found in Clifton et al (2024), and a discussion on the details of deposition for acidifying species can be found in Makar et al. (2025)"

Line 135: As this section is long, it may be useful to split this section into further subsections that discuss the results from the NA models, EU models, and comparisons.

Thank you, the section has been broken down into sub thematic sub-sections.

Lines 206-210: Reference?

Unfortunately it is not clear what reference is required here since the text relates to the finding of this study.

Line 250: It might be useful to discuss the seasonal and diurnal cycles underneath a separate subsection for clarity.

Done.

Line 320 – 324: The conclusions could be more clearly stated here. This section should be broken up into multiple sentences.

Done.

Lines 383 – 386: The phrasing here is unclear and should be restructured accordingly.

Done.

Line 688 – 692: Please reword for clarity.

Done.

Technical Corrections:

Figure 1: Images are blurry. The color bar is missing units to denote differences between the numerical amounts shown. Regions (i.e., R1, R2, R3) should be defined in the figure caption.

Units were added in the title of each subplot and the figure was exported in 300dpi. Moreover, the following sentence was introduced in the figure caption: “The rectangular areas represent the four selected sub-regions (R1, R2, R3, R4)”.

Figure 2: The figure should have a title or color bar label indicating that RMSE is what is being shown. The image resolution is poor.

A title was inserted and the figure was exported in 300dpi.

Figure 3: Same as above, labeling the figure as MB or adding a color bar label.

A title was inserted and the figure was exported in 300dpi.

Figure 4/5: Same as above. Images have poor resolution.

A title was inserted and the figures were exported in 300dpi.

Figure 6: Resolution is low quality. Titles for (a) and (b) would help make this figure more readable.

A title was inserted and the figure was exported in 300dpi.

Figure 7/Figure 8: Image key should be placed outside of the figure for readability.

Titles were inserted, legend was placed outside and the figures were exported in 300dpi.

Figure 14/15: In the caption, the corresponding figure labels for wind speed, PBL height, solar radiation, and deposition velocity are missing.

The missing legends were inserted and the figures were exported in 300dpi.

Figure 17: Figure labels could be larger and /or boldened

The Figure labels here and in Figure S10 were updated to use bold font.