

Review of

“Gas-phase chemistry in the online multiscale NMMB/BSC Chemical Transport Model: Description and evaluation at global scale” by Badia et al.

This is the review of the revised manuscript.

Remarks

The author have provided a comprehensive response to my first review. Although I still think lightning emissions should not be neglected in a global model run, I am OK to accept the authors' justification for this if it is made in clear in the paper. I recommend stating this fact in the abstract.

Please indicate also in the response what you are going to change in the text. Without this information it is difficult for the reviewer to judge how the actual manuscript has been amended.

No tracked changes were indicated in the reference section but I believe that at least some new references appeared. So please mark them in new response.

I found that too few aspects of the response were actually included in the revised paper (or it was perhaps not marked as a track change). I would welcome if some of the discussion would appear also in the paper. So please briefly summarize the references on the impact of lightning NO, aerosol impact on photolysis rates, the performance of the COPYCAT scheme, the meteorological performance of the model and the emission injection profiles.

I asked for a better quantification for statements such as “good agreement”. I found a few examples where this has been done but there are still hardly any quantification in the conclusion. Please include a quantification next to the qualitative statements in the conclusion.

I suggested to use volume mixing ratios rather concentrations (microgram/m³) also for the evaluation with surface data. This was done not only for the reasons of consistency. Concentrations depend on density and therefor on the station height. Differences in the model orography and station height have therefore an impact on the evaluation results (beside the scientific problem of the vertical representativeness). This could be avoided by converting the concentrations in volume mixing ratios using the stations measurements of p and T. I recommend using ppb as unit for the comparison.

The wording and clarity of the paper has been improved a lot.