Review of GMD-2023-1055 « **Impacts of spatial heterogeneity of anthropogenic aerosol emissions in a regionally-refined global aerosol-climate model"**

In this article, the authors update the pre processing and in particular the remapping of emission datasets from the original resolution to the model resolution. This is a problem faced by all atmospheric composition systems and as such, there is a possible interest from the community in such aspects. The paper is well written and organized and the plots are nicely done. However, I feel that the comparison made in the paper is unfair: it is not a surprise that gradients are better represented with emissions at a resolution corresponding to ~42km grid than with emissions at 1.9x2.5° resolution. It is very possible that I misunderstood something, but why didn't the authors use the original CEDS or CMIP6 emissions at 0.25x0.25° or 0.5x0.5° as an input to the original emissions treatment (left side of Figure 2b) instead of the 1.9x2.5° resolution? Comparing simulations with the old emissions treatment and this high resolution input with simulations with the new emissions treatment using the same input would be more meaningful, and more interesting for the reader. As such, I would recommend a major revision, and suggest to the authors that they rewrite their manuscript in order to show the added value of their new approach but using the **same** emission datasets as input for the two simulations. Otherwise it is hard to discriminate between the added value of the new emissions treatment and that of using higher resolution emissions (which is well known). A side topic of the paper could be the mass conservative aspect of their revised treatment of aerosol emissions – how much does it change emissions as compared to the (I suppose) non mass conservative remapping/interpolation used before? With what impacts on simulated aerosol burden/surface concentration? I think also more detail should be given as to how/with which method is mass conserved in the revised treatment.