

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2021-241

Anonymous Referee #2

Referee comment on "A description of the first open source community release of MISTRA-v9.0: a 0D/1D atmospheric boundary layer chemistry model" by Josué Bock et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-241-RC2>, 2021

This paper documents the open-source release of a well-established 0D/1D atmospheric chemistry model. It includes a detailed description of model physics, a technical overview of its configuration and a pretty extensive evaluation, demonstrating the consistency of this released version of the model with its predecessor (unreleased) versions.

Leaving aside the issues with co-authorship and licensing raised in the other comments, open-source releases and documentation of scientific code are practices that should be encouraged, hence I think this paper is suitable for publication in GMD.

I have however a few remarks and corrections that should be considered before publication.

Remarks

Title: I find the term "chemistry" in the title a bit reductive, as the model can also represent some aerosol processes, like particle nucleation. You might consider extending the title.

L13: you might cite also Bellouin et al. (Rev. Geophys. 2020, doi:10.1029/2019rg000660), for a more recent assessment.

L17: please add some references for these two other effects you mention.

L46: *In this work*, do you mean Bott (1997)? I would be more specific, since "this work" could mean the present manuscript.

L76: can you provide some example of the strict coding rules mentioned here?

L77: how would you ensure future maintainability if the Forcheck tool is no longer distributed?

L79: please provide a reference to KPP (I think this is Sandu and Sanders, 2006, doi:10.5194/acp-6-187-2006).

L92: *all model layers*: how many? Is this configurable? Please clarify.

L94: *Fluxes of seasalt... are included*, I would add `` (see Sect. 2.3.6)".

L95: could you elaborate a bit more on the nucleation module? How is this process parametrized?

L126-127: What about nucleation? Newly nucleated particles can have size below 5 nm, hence outside this range.

L295-296: *Note that default values are for all of them, however they should be systematically redefined by the user to match the simulated atmosphere*. I am not sure I understand this sentence, could you be more explicit?

L297: still, it would be interesting to know the temporal coverage of a typical run.

Sect. 3.1: I would not use subsections here, they are too short anyway.

Conclusions: this is quite short. You could extend it, for example, by summarizing again the main capabilities/scope of the model and by adding a few sentences about current plans for model extension/improvement.

Corrections

L15: *large area* --> *large surface area*.

L23: *limited area* --> *limited domain*.

L28: *physic* --> *physics*.

L28: *is* --> *are*.

L60: *box mode* --> *box model*.

L124: *water is present* --> *water were present*.

L125: *minimum aerosol radius* --> *minimum aerosol dry radius* (I guess).

L137: better "time integration"?

L138: I think you mean "see also Bott (1996)".

L163: it is actually "on aerosol" and "in cloud particles".

L166: DMS acronym not defined.

L203: I would use the term "coagulation" instead of "collisions".

L315: *mandatory* --> *required*.

L319: please add the references or the links for ferret and NCL.

L385: please append "(Fig. 6a)" at the end of the sentence.

Figure 2 caption: *as function --> as a function*.

Figure 3: please use the same contour levels for top and bottom panel (as you do in Fig. 4, for example).

Figure 6 caption: please add that the MISTRA-v9.0 is also "without collision-coalescence".

Figure 8: *Scales are identical for both*, actually the top right scale goes to 60 instead of 59. Not a big difference, but I would fix it.

Eq. (12): the "lg" notation for the logarithm could be ambiguous, please specify the base or use "ln" if natural log.