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Geoscientific
Model Development
Discussions

Interactive comment on "A pre-processor of trace gases and aerosols emission fields for regional and global atmospheric chemistry models" *by* S. R. Freitas et al.

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Anonymous Referee #2

We thank the reviewer for his/her insightful and helpful comments. The paper is now much improved by his/her comments and corrections.

Q)General: The authors present an interface to combine sources of emission data to obtain a full emission inventory for the use in CTM/CCM simulations. The work is relevant for modelling groups and should be published in GMD after major revisions. Clarify what is PREP-CHEM-SRC and what is done outside (e.g. emission preparation). The tool is quite complicated. Sometimes data are combined, somtimes just

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Interactive Discussion

Discussion Paper

read and interpolated. It would behelpful to have one section summarizing this. E.g. by a graphic, which clearly states for each source category what is the input, what is PREP-CHEM-SRC doing. This has to be very clear to understand the potential of the tool. Examples: 2.3 Eq. (1) is included in the tool, right? page 860 l 5: the combination of the three products is not included in the tool? I am really not sure what is included and what has been taken from other sources as an Input.

The text was rewritten in order to clearly reflect whenever there is use of a database or model product in PREP-CHEM-SRC. The conclusions section now summarizes several aspects described above.

Q) Grid-scales Nothing is said on how the data are transformed to other grids. (see e.g. Jöckel, 2006, www.atmos-chem-phys.net/6/3557/2006/) How is it done? Is it strictly mass conserving? Are there choices between intensive and extensive variables?) Please include a section on this.

We have a simple approach compared to the reference above. We use either nearest-neighbor interpolation (when the model grid spacing is finer than the database grid spacing) or box averaging (when the model resolution is coarser). Although this is a simple approach compared to the one in Joeckel (2006), it is approximately mass conservative. The following sentence is now included in Section 4.1: "The interpolation routines to create the emissions fields on the model grid can use either nearest-neighbor interpolation (when the model grid spacing is finer than the database grid spacing) or box averaging (when the model resolution is coarser). Both methods are approximately mass conservative."

Q). Check english and math - E.g. look for the use of adverbs: p 865 mostly-> most, directed-> directly, and other Places

A grammar and linguistic style revision was done by a native English speaker/writer.

Q) E.g. Eq. (4) E∼_ should be E∼_(k)

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Done.

Q)Eq. (7) Acvtually I do not understand this eq. I think It should be like: E(k) = lamba * (top term) + of (1-lambda) *Sum(over k)(bottom term)

The quantity 'lambda' is the fraction (between 0 and 1) of the total smoke mass released to the atmosphere during the smoldering phase. In this phase, the smoke buoyancy isnot too strong and it remains close to the surface. So, the contribution of E(k) is lambda*(bottom term) for the smoldering phase. The flaming phase (with much stronger buoyancy) is represented by the expression (1- lambda)*(top term).

Q)versioning Please include a version number (Name of tool + version also in the title). Otherwise it is not possible to differentiate between this paper and possible upcoming papers, including updates.

Thanks. Done.

Q) Limitations Please include a discussion on the possibilities to add new features, aircraft emissions, lightning, or new approaches for emissions. How modular is the code. What is required if someone wants to combine this code with own routines. State clearly that it does not calculate emission in a top-down or bottom up approach like the SMOKE model (e.g. GMDD Bieser et al.)

A short discussion on the possibility of adding new features and/or databases is now included. Actually, the biomass burning emission calculated by the 3BEM model does follow the bottom up approach. Vide answer to question 1.

Q)Output How is the output structured? Is it possible to get individual categories (biomass burning, road traffic) as individual data to calculate the impact of such emissions?

The typical output of this preprocessor is one binary or text file for each grid domain (more than one in case of nested grids) containing all the emissions files, currently with up to 4 emission fields (urban, biomass burning, biogenic and volcanic processes) per

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chemical specie.

Q)Other things: P 856 l 9-10: Please rephrase: e.g. "also detailed"-> "presented"

Done.

Q)Abstract: Clearly state what is included in the tool and what kind of data are Input.

The following sentences are now in the Abstract : " The considered emissions are from the most recent databases of urban/industrial, biogenic, biomass burning, volcanic, biofuel use and burning from agricultural waste sources. For biomass burning, emissions can be also estimated directly from satellite fire detections using a fire emission model included in the tool."

Q)P 856 l20 can you include a reference or list to whom or to what data you are referring?

Done.

Q)P857 change "have been used by CCATT.." "were included in the models CCATT.. "

Done.

Q)P858: Would it be possible to include an overview table showing which species are included for which emission output?

Besides the tables describing the available anthropogenic and biogenic species, we now included a table listing the species emitted by the biomass burning process.

Q)P860 I do not understand the sentence "... 8-day and 1 month timesteps." Please rephrase

It now reads: “This dataset, called the Global Fire Emissions Database (GFEDv2), has a 1°x1° spatial resolution and a 8-day or one-month temporal resolution.”

Q)P863 l6 please includ "mass" mixing.

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Done.

Q)P867/8 please include references to the previous section, whenever possible.

Done.

Q)868 Please clarify: RETRO update is part of PREP-CHEM-SRC

The expression now reads: “RETRO revised with local sources of information according to Alonso et al. (2010).”

Q) (Very minor: Is PREP-CHEM-SRC really the tool abbreviation of your choice? What’s about PREMIS (Preparation of emissions) or PREPEMIS1.0, etc. Just a suggestion.)

Thanks for the suggestion. However, we will keep PREP-CHEM-SRC because several users already know it by this abbreviation.

Q)Appendix A Please revise table: List of subroutine + short description what it is doing

We decided to remove this list. It will be included in the README file distributed to the users with the code and datasets.

Q)Figures Fig. 2: Please include units at the axis h and 1/s? You also could include the function for no diurnal cycle as an illustrative example =1.5e-5?

Done. The unit 1/s is included. The following sentence is now included in the text: “In case of a daily constant emission, r(t) is simply given by 1/86400.” Q)Fig4 Please include units and numbers in B

Done.

Q)Fig. 8 what id G5? Please revise the plot, the numbers cannot be read! perhaps 2 lat x long plots would be more appropriate?

G5 is the resolution level ($\sim$250 km) of the FIM model. The plot was revised.

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