Geosci. Model Dev. Discuss., 7, C3463–C3466, 2015
www.geosci-model-dev-discuss.net/7/C3463/2015/

Geoscientific Model Development Discussions

Interactive comment on "Development and evaluation of the Screening Trajectory Ozone Prediction System (STOPS, version 1.0)" *by* B. H. Czader et al.

B. H. Czader et al.

bczader@rice.edu

Received and published: 1 March 2015

Dear Reviewer,

Thank you for your time and effort put into reviewing the paper and for your helpful comments that would improve the quality of the manuscript. Please find below our response to your comments.

This publication is timely and well done. The STOPS system could be an important tool for scientists' policy makers and consultants alike. The tool uses a moving CMAQ simulation that dynamically interfaces with archived CMAQ simulations. The tool is well described and the basic performance is well described for the no emissions modification

case. I would have liked to see an evaluation of the response to additional emissions, which will stress the boundary assumptions further. I look forward to more application papers (e.g., chemistry updates that would influence boundaries, other emission additions).

— We evaluated STOPS against CMAQ results for the base case showing that it is capable of predicting mixing ratios in close agreement with CMAQ predictions. It is not possible to evaluate STOPS for the countless possibilities of emission perturbations as the response depend on the choice of emitted species, strength of the perturbation and also, since STOPS accounts for horizontal transport through domain boundaries and some material would be transported outside domain, it also depends on domain size. Because of the latest reason we did not use 1x1 grid domain as it is more likely to quickly lose the effect from a perturbation in the domain.

— We do plan to work on STOPS applications and hopefully a paper would result from that.

The model description section is clear and detailed. The author first introduces the two basic approaches which air pollution models are based on: Eulerian and Lagrangian. The author then points out the limitations of modeling with either approach exclusively. The nested-moving approach in STOPS is described as a useful hybrid Eulerian–Lagrangian modeling approach. This paper provides sufficient description of the modifications to CMAQ. Finally, I would not call this Lagrangian. STOPS is actually a series of Eulerian models strung together at the computational time-step. It is more of a pseudo or quasi-Lagrangian approach.

— We used the term "Lagrangian" because of STOPS movement with a local flow. Although not rigorously correct, as there is in- and out-flow through the domain boundaries that is in contrast to Lagrangian ideas, it was "inspired by Lagrangian methods" while taking advantage of the existing simulation machinery in CMAQ and we think it is valid to use the term Lagrangian for descriptive purposes . To indicate that it is

not exactly Lagrangian tool we will replace the wording “Lagrangian-Eulerian tool” with "Lagrangian-Eulerian based tool" or "Lagrangian-Eulerian approach".

The tables used in the paper are not clear and need improvement. In all tables, what are MAXD and MIND?

— The MAXD and MIND will be removed from the caption of tables 2, 3, and 4 as they are not shown in tables.

In Table 2, there are three sets of results with identical “NAME” values. I assume this is related to the domain, but the table is unclear.

— The first set corresponds to results from static simulations for Houston domain (please see figure 2 and table 1 for domains locations and sizes), the second set for industrial domain, and the third for urban domain. Indeed the naming in the table does not show that, we will correct the names to make it clear.

In Table 4, the domain was starting in the industrial domain, but the nomenclature is identical to Table 3 that started in the urban (urb) domain. Why is that appropriate?

— This is a mistake, thank you for pointing it out; all names in table 4 should have ‘ind’ instead of ‘urb’. We will correct that.

Tables 5, 6 and 7 are referenced by number without the word “table”.

— We will add the word table into a text where the tables are referenced.

Minor comments: - Abstract, add units to the bias in the abstract.

— We will add the units.

Page 7631, why not include a 1x1 simulation?

— A 1x1 STOPS domain is possible, but is more likely to quickly lose the effect from a perturbation in the domain, like modified emissions. Thus, it is not likely to be used in practice.

Figure 1, Conceptual model should include multiple columns to be consistent with implementation?

— We will modify the figure to include 3x3 columns in the conceptual model.

Make it clear that you are comparing instantaneous concentrations (not time interval averaged).

— We will add the following at the end of section 3 on page 7627: “where Hi and Si corresponds to instantaneous mixing ratios obtained with CMAQ and STOPS, respectively.”

Overall, this is a good manuscript that needs minor improvements. More discussion of the differences, or potential for differences, between CMAQ and STOPS with emission modifications would improve the manuscript. Table clarifications are necessary before publication.

— The evaluation of STOPS against CMAQ results shown that STOPS is capable of predicting mixing ratios in close agreement with CMAQ predictions. As already mentioned, there are endless possibilities for emission modifications and it is not practical to evaluate them here. The scope of the paper was presentation of the model and its evaluation, the emission modification in section 4 shows just a potential application.

— We will modify the tables according to reviewer suggestions.

Interactive comment on Geosci. Model Dev. Discuss., 7, 7619, 2014.