Geosci. Model Dev. Discuss., 2, S34–S37, 2009
www.geosci-model-dev-discuss.net/2/S34/2009/

Geoscientific
Model Development
Discussions

Interactive comment on "Implementation and evaluation of an array of chemical solvers in a global chemical transport model" *by* P. Eller et al.

Anonymous Referee #2

Received and published: 19 April 2009

Eller et al. presented an implementation of additional numerical solvers into the GEOS-Chem model and compared their performance with the solvers previously available and used in GEOS-Chem.

The manuscript would require major revisions and corrections before this reviewer can recommend it for publication in GMD.

General comments:

Although the overall quality of the manuscript is poor I recognize that a considerable effort was already invested. Also, the issue of solver performance and code portability is very important. Therefore, I would like the authors to reorganize the paper and address several additional issues.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

There should be separate sections for technical implementation and scientific evaluation. The Implementation section should deal with all the technical aspects of KPP, GEOS-Chem, specific instruction formats and Perl. The Evaluation section should clearly describe the methods and measures. Specifically, in which chemical regimes the implemented solvers were evaluated and why a given chemical regime was selected. In addition, evaluation of the new solvers against the SMVGEARII should address issues that relate to the computer hardware. As acknowledged in the manuscript, SMVGEARII is a vectorized solver. Thus, I would like to know to what extent the vectorization of the Gear method resulted in the perceived 'underperformance' of the SMVGEARII code. In order to address this issue I would like the authors to elaborate on the processor architecture (disclosing the name and make of the processor) including the size of all levels of cache, inter-processor connectivity (motherboard, switch if any, name and make), compiler name, version and options used. Also, the size of the domain and memory requirements of GEOS-Chem have to be clearly stated so the reader can have a clear understanding of how the model relates to the hardware used for testing.

And finally, the authors should state whether their methods and findings would apply to other models and different computer architectures and configurations.

Specific comments:

The tile should be more specific and reflect which chemical transport model was used. Also, please include the version number of the model in question.

There is no clear statement why the work was undertaken. If the GEOS-Chem model is already "state-of-the-science" (page 186 line 16) or as stated later "state of the art" (page 197 line 14) there should not be any need for improvements, should there? Also, please decide whether you are writing about the art or the science.

The Abstract is almost identical to the Conclusions section. One would expect more from the later section.

GMDD

2, S34–S37, 2009

A large part (page 195, starting at line 6) of the Results section is taken (with very minor changes) from the paper by Henze et al., 2007. It has been noted that the paragraphs are taken from a paper of one of the co-authors; however, please remove or rewrite.

It is the opinion of this reviewer that scientifically meaningful and technically accurate statements should be used. Please address the following colloquial phrases:

The present paper presents (page 187, line 19)

Extreme flexibility (page197, line24)

Immediate access (page 197, line 27)

Etc. (page 188, line 23, and 3 more places)

Chemically meaningful values (page 195, line 14)

Chemical Jacobian and Hessian (page 188, line 25)

The results are visually identical (page 194, line 18)

Practically identical (page 194, line 26).

It is a general impression that figures are of poor quality and do not communicate with the reader. Specifically, please correct and modify the following figures:

Fig. 2. One cannot see any differences. Please replace with a difference of the presented fields. Also, the scale is not readable, units are not defined, Ox is not defined.

Fig. 3. The value of this figure is questionable. Units in the caption do not match the scale. These are NOT concentrations, are they?

Fig. 5. Solution methods are in a different order in the caption and on the legend. Also, the caption is hard to understand "Speedup plot for..."

Fig. 6. Units are not defined, the caption is hard to understand, the scale is not

GMDD

2, S34–S37, 2009

Interactive Comment

readable.

Interactive comment on Geosci. Model Dev. Discuss., 2, 185, 2009.

GMDD

2, S34–S37, 2009

Interactive Comment