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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 #3

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The calculation of atmospheric chemistry constitutes an essential fraction of the computational expense in chemistry transport applications. Therefore, the development and test of efficient time integration schemes is very important especially for simulations with complex chemical mechanisms. One widely used and highly flexible tool in this context is the kinetic pre-processor KPP. The present paper describes an implementation of GEOS-Chem gas-phase chemistry using this pre-processor and compares the numerical performance of the KPP solvers with the SMVGEARII approach previously used in the code.

The paper is sound, informative and of special interest for the GEOS-Chem users. However, it seems to me that the generalizability of the results and, in consequence, the scientific output is not really clear. Nevertheless, the paper should be published after a

revision. I agree with the second referee in main points of critics and recommend also a reorganization of the paper in separate sections for the technical implementation and the scientific evaluation. Especially, the evaluation part has to be clarified. The choice of the selected runs and observed differences in the performance of the solvers should be discussed more in detail.

Furthermore, the coupling between chemistry and the other processes have to be described for a better understanding of the whole algorithm as well as for a fair evaluation of the test results. Is the usual operator splitting approach applied in GEOS-Chem? In this case, the authors should give more information about the choice of the step sizes, the influence of the used splitting sequence and the expected splitting error.

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

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Interactive Comment