**Geoscientific
Model Development
Discussions**

Interactive comment on "The hybrid Eulerian Lagrangian numerical scheme tested with Chemistry" *by* A. B. Hansen et al.

Anonymous Referee #2

Though the title indicates that this article is about a proposed numerical scheme, it actually focuses on some test results on comparison between the HEL scheme, developed and reported in the authors' unpublished paper (Kaas 2012), and two existing traditional advection schemes. The results would be impressive if shortened and added into the unpublished paper as a section. But as a standalone paper, this paper needs to be improved in the following aspects in my opinion:

1. The title should be revised. 2. It is not clear if SL and ASL are the state-of-art. If not, the merit of applying HEL in air pollution modeling may be not sufficiently apparent. More background on these two schemes should be given in the introduction. 3. The comparison of the three schemes was made based on errors while the computational cost of each scheme is not addressed. To show HEL is superior to the other

two schemes, it is also important to consider efficiency. 4. The authors performed 12 methods with different resolutions and CFL conditions for individual tests, and the results implied that the performance of tested schemes was related to resolutions or CFL conditions. I would suggest the authors to discuss the relation in detail, followed by a possible guide on how to choose resolutions for a given application. 5. It would be more convincing if the authors can provide the values of error norms instead of ranking in Sec 4.2. There could be a possibility that high-ranked schemes may have insignificant advantage in terms of accuracy. 6. It would be more insightful if the authors can explain why HEL can outperform the other two schemes.

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