**Geoscientific
Model Development
Discussions**

Interactive comment on "Semi-Lagrangian methods in air pollution models" *by* A. B. Hansen et al.

Anonymous Referee #2

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General comments:

This manuscript compared several Semi-Lagrangian schemes in air pollution models and presented detailed test results based on simplified cases with rotating cones and slotted cylinder cases. Such tests provided valuable information in choosing the advection schemes for the chemical transport models. However, some of the technical details and result presentations could be shortened. It would be more beneficial if the authors could provide more focused discussion and insight or explanation on the model performances.

Specific: P2366, 2.2: The limitation of the operator splitting has to be mentioned. P2367, section 2.2.1: It is strange that "Numerical treatment of the advection in DEHM" is a subsection of 2.2 "Mixing ratio versus volume density. P2368, line 25: Can you spell

out POPs? P2370, line 1: Please rewrite "which 58 species is used". "58 species" is inconsistent with what is given on page 2368 (line 24). P2371, line 11, "Section 3.3 " to the end of the paragraph should be deleted. The first paragraph on page 2376 is almost identical to this. P2400, line 1: "the highest Courant number": the "lowest"? P2400, line 18: What does "the second" mean here? The second best performing? P2403, line 6-12: This paragraph is very confusing.

Technical: p2367, equations (1) and (2): There should be a "." in the first term of RHS. P2376, line 24: (Eq. 6.4 of Durran) -> (Eq. 6.4, Durran, 1999) P2389, line 9: In Sect. 3 describes . . . -> Sects 3 describes . . . P2395, line 9: "more wrong" -> "worse" P2399, line 24:"The semi-Lagrangian schemes the LMCSL" -> "Among the semi-Lagrangian schemes the LMCSL" P2400, line 22: Please rewrite "Almost exactly as the non-filtered distribution" to be a complete sentence. P2401, line 22: Remove "third". P2401, line 5: over all -> overall.

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