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Interactive comment on "A standard test case suite for two-dimensional linear transport on the sphere: results from a collection of state-of-the-art schemes" *by* P. H. Lauritzen et al.

Anonymous Referee #2

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This is a well written and detailed paper which evaluates 19 state-of-the-art transport schemes belonging to different well known families of methods using the standard test set by Lauritzen et al (Geosci. Model Dev., 2012). A concise review is given for the transport scheme types considered and there are plenty of references for further studying. Each test is adequately described and overall there is sufficient information for a reader who is either developer or modeller to understand the implications of different choices for numerical transport schemes. For this reason I find this paper a very useful addition to the literature.

This paper can be accepted as it is with few minor corrections (typos). One general comment is that although there is a clear value on these 2D tests, since the paper

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deals with global atmospheric/oceanic modelling, I would have preferred to see a three-dimensional version of this evaluation study. Not only because in these areas we are dealing with 3D transport but also because in practice operational models at very early stages of development start as 2D models and after being coded in 3D they evolve significantly. It happens that, in practice, not much effort can be spent maintaining their 2D counterparts up-to-date, especially when a model matures. So it is not always easy to go back and test the same things.

My minor corrections are:

1. Abstract: comma (,) at the end of first paragraph should become full-stop (.)
2. Page 4987 last paragraph 2nd line: change "as as" to "as".
3. Page 4989, 1st paragraph of section 2: I think "scaler" should change to "scalar".
4. Page 4990, equation (4): for consistency with (1), (2) I think that **v** should change to upper-case **V**.
5. Page 4999, first sentence section 2.2.1: Semi-LAgrangian to semi-Lagrangian
6. Page 5002, section 2.2.4, 4th line: change $D\phi/dt$ to $D\phi/Dt$
7. Page 5014, section 3.3, 1st paragraph, 6th line: correct the time interval in parenthesis, it is typed wrongly.
8. Page 5018, 2nd paragraph, 3rd line: change "scheme" to "schemes".
9. Page 5019, 6th line: The sentence starting as "A purely Lagrangian ..." needs a preposition e.g. "In a purely Lagrangian ..."
10. The term (Semi-) Lagrangian is used in different parts of the manuscript. Why not semi-Lagrangian which is the standard name and also used in some other parts of the text?

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