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Interactive comment on "Pangolin v1.0, a conservative 2-D transport model for large scale parallel calculation" *by* A. Praga et al.

Anonymous Referee #2

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In this paper Pangolin, a conservative 2-D transport model for large scale parallel calculation is presented. The authors assert that a chemical scheme is under development and that when finished the model will perform faster that existing CTMs in real world applications. In the current state, there is not sufficient material in the manuscript to substantiate such claims. The authors should provide comparisons of Pangolin with other models running on a parallel cluster at comparable level of accuracy. In any case, rather than a transport model in the usual sense in the atmospheric sciences community the authors are documenting an advection scheme. There is no mention to any emissions scheme or on how to make the transition to a 3D world. The treatment limited to incompressible cases limits strongly the application to the real atmosphere. On the presentation side, the figures do not follow the order in which they are presented in the text. I therefore recommend substantial revisions before the manuscript can be

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considered for publication in GMD.

Specific comments:

4532 l1: Considering just 2D non divergent flows limits severely the applicability of any transport model to the real atmosphere case. You should at least discuss future work.

4532 l7: Precise the meaning of monotonic in this case

4532 l14: Precise the meaning of 'stencil' in this case

4533 l15: Analytically? Rather algebraically. There is not a Taylor series development involved here.

4532 l19: The gradients are discussed before the grid is presented.

4532 l25: Precise the meaning of 'second order accurate' in this case

4533 l15 21: This paragraph is confusing. Consider clarifying it. Also l22 - 27.

4537 l5: Again, algebraically rather than analytically.

4537 l9: It is not a D-grid strictly speaking.

4537 l13 25: What are your plans for the 3D case? Again, the limitation to the 2D incompressible case is useful to test the advection scheme, but decreases the relevance for realistic 3D models where most interesting applications are.

4539 l18:What do you mean expand initial range? Of tracer concentrations?

4540 l1: Again, limited applicability to real cases.

4543 l1 2: Maybe in the same range, but you should show explicitly how performance can be improved in a calculation in a more operational setting.

4543 l4: Not just 'can', but certainly will in all useful applications.

4543 l12: Definition: in which case is valid each of the conditions?

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4543 l18: Please, order the figures in a monotonically increasing order. It would help the reader to follow the ideas much better.

4544 l15: I can agree in principle with such a strategy, but you have to substantiate your claims with more results.

4542 l22: What about sub grid turbulence?

4545 l3: Which curve? Eq. 12? What is the physical relevance of the range in this example?

4545 l6: Order figures appropriately.

4545 l13: It is more than a clear contender. You have to be more explicit about the conditions under which using Pangolin is preferable.

4545 l27: Again, algebraically rather than analytically.

4547 l1: What is pre-fetching and how would it apply to this case?

4547: You need to show how with the parallel implementation there is an improvement with respect to other models.

4547 l20: Figure 9 shown after posterior figures. Order logically.

4547 l23: Clarify 'Non blocking communications'.

4548 l16: Send/receive what? Instructions?

4550 l9: How mach better is Pangolin respect to other available models.

4550 l12: Be more quantitative about how many grid points are needed.

4550 l16: Additional information on the actual geophysical model would be welcome even in the current paper.

Technical corrections:

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4530 l23: describe “in detail” not details.

4532 l8: Format citation

4532 l27: ’Notation’, not ’notations’

4533 l1: Broken line?

4536 l1: A sound approximation of what?

4538 l8: Reference to Courant-Friedrichs-Levy or clarification.

4539 l2: Table 1 is referred to after Table 3.

4539 l10: NCAR and USICOM are inverted with respect to the table positions.

4541 l20: Define convergence rate explicitely.

4543 l9: Threshold τ?

4545 l10: Define CN. “accuray”

4545 l17: “Partial Differential Equations”? Define all acronyms.

4549 l10: “Left hand side”?

4549 l19: “Right hand side”?

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