Geoscientific
Model Development
Discussions

Interactive
Comment

Interactive comment on "A standard test case suite for two-dimensional linear transport on the sphere" *by* P. H. Lauritzen et al.

Anonymous Referee #1

Received and published: 21 March 2012

The authors in this paper propose a new benchmark deformational flow test cases for the two-dimensional transport problems on the sphere. The test-cases are easy to be implemented on any type of spherical grid. They are specified in terms of analytical expressions for the wind fields and the initial conditions. The test cases include smooth and non-smooth initial conditions with non-divergent or divergent flows. The divergent flow is specifically aimed for transport schemes to test for mass conservation, consistency and monotonicity of filters in a challenging flow environment. The scalar field follows complex trajectories and undergoes severe deformation during the simulation; furthermore the flow reverses its course at half-time period and field return to its initial position and shape. This makes the exact solution available at the end of the simulation, and facilitates a quantification of the transport scheme accuracy in terms of the standard error norms. In this article the authors propose also mixing diagnostics that

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

do not require knowledge of true solution, designed to asses how transport schemes introduce mixing and perturb preexisting functional relations between tracers. Test cases based on one, two and three tracers as well as associated mixing diagnostics are proposed. The transport processes are of great importance in atmospheric numerical modeling. And the transport schemes on the sphere are becoming more and more complex. The comprehensives test-cases like those in this article would be a very useful tool, for atmospheric models developers, for testing new transport schemes.

Interactive comment on Geosci. Model Dev. Discuss., 5, 189, 2012.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper