Dimension Splitting and a Long Time-Step Multi-Dimensional Scheme for Atmospheric Transport

by

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We present test cases which are simple to implement, mimic the challenges of a cubed-sphere and which are designed to challenge a dimensionally split advection scheme. We also present a new multi-dimensional method of lines advection scheme which is stable for very large Courant numbers by using implicit time-stepping. Despite attempting to demonstrate the problems with dimension splitting, we find that the dimensionally split scheme performs better than the genuinely multi-dimensional scheme in all test cases.