Geosci. Model Dev. Discuss., 6, C2225–C2227, 2013
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Geoscientific Model Development Discussions
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Interactive comment on "Non-orthogonal version of the arbitrary polygonal C-grid and a new diamond grid" *by* H. Weller

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Received and published: 18 December 2013

The manuscript presents a variant of the cubed sphere grid that appears to provide greater accuracy than the standard (equiangular) cubed sphere. The results are likely to be of interest to the community developing numerical methods for atmospheric modelling. I found the manuscript generally clear, but I have a few minor comments, detailed below.

P6041 and Table 1. Not only is the ratio Delta x_max / Delta x_min a bit worse for the diamondized grid, it seems to be getting worse (more rapidly) with increasing resolution. So, is the new grid really quasi-uniform? I.e. does this ratio tend to some limit as resolution is refined ? (Maybe the author could do some geometry to check ? Otherwise it might just be worth checking the ratio on one or two finer grids.)

P6045 '...without serious oscillations in pv.' Some ripples are visible in the vorticity field in the Galewsky test, and the author does point them out on p6056.

P6047. The H given by (13) would be diagonal if d_e and d_e' were orthogonal for all the e' in the stencil. So is the point that a grid can tend towards primal and dual edges being orthogonal but without the above property holding?

I got confused on P6054 in the discussion of using the asymmetric H on the orthogonal HR grid. Surely the original Ringer et al H is diagonal on this grid, and any diagonal H is symmetric. This led me back to sections 3.2.9 / 10 / 11 where I realized it was not clear to me, after all, which H's had been used with which grid. Could this be made clearer?

P6051 L13-14. If you take more iterations or reduce the time step does the amplification factor get closer to 1 ? (Just a sanity check.)

P6053 L10. The symmetric H does indeed have better energy conservation, but the non-conservation with the asymmetric H is rather weak.

Editorial stuff, suggested minor re-wording, etc:

A few places you use the phrase 'more orthogonal'. Being pedantic, edges are either orthogonal or not. How about 'more nearly orthogonal'?

P6037 L3. These authors certainly weren't the first to consider a hexagonal C-grid, but what they did was to figure out what to do with the Coriolis terms to get steady geostrophic modes.

P6073 L11. Use \citep instead of \citet to get the parentheses in the right place.

P6043 L18. to calculate

P6049 L4. the we -> then we

P6057 L12-13. The first time I read this it seemed like a non sequitur. Perhaps add half a sentence to say that damping of the computational modes by the advection scheme is what leads to the enstrophy loss.

Fig.4 . Caption: ‘Amplitudes’ here means amplitudes of the amplification factor, not amplitudes of the normal modes.

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Interactive comment on Geosci. Model Dev. Discuss., 6, 6035, 2013.