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comment

Interactive comment on "Impacts of the Horizontal and Vertical Grids on the Numerical Solutions of the Dynamical Equations. Part I: Nonhydrostatic Inertia-Gravity Modes" *by* Celal S. Konor and David A. Randall

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Sorry, I pushed the submit button before I was finishing.

I only have a few comments on the manuscript, which are not difficult to discuss.

- What would change if the stratification is not isothermal? The isothermal state is not representative to the real atmosphere.

- I wonder how the well known fact that vertical and horizontal grid spacing must

be in a way consistent for an atmospheric model as found by Lindzen and Fox-Rabinovitz (1989) might be seen by such a 3-dimensional analysis.

- The mentioning of the hexagonal C-grid in lines 17 at page 10 is perhaps not adequate at this place because you discuss the quadrilateral C-grid. The hexagonal C-grid problems are due to the overspecification of the horizontal wind components. This issue occurs additionally to the inspection of usual wave dispersion relations, and has no direct relation to the C-grid staggering philosophy. When guaranteeing the linear dependence of all forcing terms in the momentum equations, the dispersion relation on the hexagonal C-grid is very similar to that on the quadrilateral grid. The problem with the triangular C-grid is that the linear dependence can never be achieved, whereas on the hexagonal C-grid, the linear dependence can be achieved. Therefore the triangular C-grid needs diffusion or divergence averaging for numerical reasons, whereas the the diffusion on the hexagonal C-grid might be more interpreted in a context of the description of the physically consistent energy cascade.

I like the paper very much, I think it is suitable for educational purposes.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2017-234, 2017.