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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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I really appreciated the profound analyses of the very comprehensive paper. At least to my knowledge, nobody before had made such a synoptic analysis of the diverse grid staggerings for the nonhydrostatic equations. In this respect I learned how the nonhydrostatic wave dispersion properties differ from the gravity-wave dispersion properties with respect to the chosen grid staggering, an issue which I never thought about before.

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Discussion paper

When developing dynamical cores, the choice of grid staggering or – in newer cores – the choice of base functions (e.g. which order of spectral elements) stands at the begin of the work. The sequence of such choices goes – like in many philosophical questions – from simple to complicated. For the dynamical core development the question of the linear regime must be answered first, before posing questions about nonlinearity and energy cascades in a second step. In that regard I feel that the other online comment of Harris and Chen is inadequate and only focused on the direct defense of their work. As I read the manuscript, I can see that the authors aim very much on scientific neutrality – as is a must for a honest author. They do not conceal that a Z-grid needs 10-20\% overhead due to the required inversions and they try several different versions of the CD-grid with the goal finding the most appropriate. If I was the other reviewer and I would see that the authors have not programmed what I know, I would simply write down the scheme and require the analysis in a revision.

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