

Geosci. Model Dev. Discuss., referee comment RC1  
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## Comment on gmd-2021-31

Anonymous Referee #1

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Referee comment on "Model intercomparison of COSMO 5.0 and IFS 45r1 at kilometer-scale grid spacing" by Christian Zeman et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-31-RC1>, 2021

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Review of "model intercomparison of COSMO and IFS by Zeman et al

This paper studies the behavior of two popular NWP models on the kilometer type scale, and explores the effects of hydrostaticity, time step, and spatial resolution. A somewhat confounding issue is that the two models are quite different in set up, and the results remain therefore somewhat anecdotal. However, I still think that the paper would be an interesting addition to the literature. I only have a few simple points that I would ask the authors to look at:

Fig1: Eyeballing, one could argue that IFS 9/450 did the best, at least in terms of cluster size and location. A lot is also dominated by the differences between IFS and COSMO. Is there any simple metric that could quantify this?

L95: While numerically stable, there is no guarantee that the model would produce reasonable results at a CFL of 4. Some foreshadowing would be good here.

L320: If that were the reason, a timestep effect would quickly saturate out and not show up for the higher res IFS simulations, right? Would a smaller timestep in the subgrid model help as well?

Fig 10 shows some gravitational waves initiated by the convection. The differences between the diff=0 and 4 versions are stark; are these waves (not just the convection cells!) physical?

Smaller points:

L33: Are these essentially poorly resolved gridpoint storms? That's relevant here, because a 1.5km simulation would still not resolve the deep convection, so still result in grid point storms/grid zone issues.

L219: "by" default; "the" deep convection parameterization on

L227: How does this work as a source term? I'm having difficulties with the units. Writing it out explicitly might be helpful.

Fig5: The spaghetti plots are hard to decipher, and most of what I want to get out of it is a peak intensity and its time for each simulation. Perhaps a scatter plot (with abbreviations instead of dots) may make more sense?