Interactive comment on "Connecting spatial and temporal scales of tropical precipitation in observations and the MetUM-GA6" *by* Gill M. Martin et al.

Anonymous Referee #2

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General Comments

This paper presents a useful study on the behavior of tropical precipitation in the MetUM-GA6 model and the sensitivity to grid spacing. The introduction does a nice job setting up motivation for the project and includes a concise synthesis of prior work related to precipitation modeling. The methods are outlined clearly; however, more justification for the years chosen for analysis could be included. In the results sections, the figures and accompanying text clearly communicate the results; claims are backed up with reasonable explanations and limitations/caveats are noted throughout. The presentation of different types of analyses helps bring together the results of the paper, the main take-away being that in this model, precipitation characteristics are largely

unaffected by changing resolutions. Recommendation: Minor Revisions

Specific Comments

-Discussion of Table 1 on P4 mentions several different geographical domains – a figure outlining all domains used throughout the study would be useful.

-It is mentioned in the Methods discussion that there is little sensitivity in the year chosen for the time-step analysis (P4, L14-15), but is there any justification for why you chose the years you did? For instance, the simulation years for N512 noted in Table 1 are 1982-1990, but 2007 is used for the time-step analysis.

-The discussion of Fig. 1 talks about consistent intermittency between resolutions – this is qualitatively true, but difference PDFs, possibly between the highest and lowest resolutions, or some statistical significance testing could help show this more quantitatively.

-The end of section 3.4 discusses how the explicit convection results compare best to CMORPH/TRMM – consider mentioning that possible explanations for this are discussed further in section 4.3.

-In the discussion of Fig. 7 in section 4.1, L26 (P9) refers to the consistency between resolutions as "remarkable". It is true that the overall patterns are quite similar, but there are some notable differences in N512, particularly between -15°S–0° off the east coast of Africa. Again, difference fields would be a concise way to highlight similarities and differences.

-From the discussion in section 4.3, it seems the explicit convection experiment is likely getting the right answer for the wrong reasons. The inclusion of this experiment doesn't detract from the main messages of the paper, but I do wonder, what information is to be gained besides motivating future work for repeating this analysis with convective-permitting simulations? Also, consider Molinari and Dudek (1992) "Parameterization of Convective Precipitation in Mesoscale Numerical Models: A Critical Review".

Technical Comments

-P2, L13: Remove "both"

-P2, L14 (and throughout): comma after "e.g."

-P2, L16: Hyphenate "grid-scale" (issue also appears on P13, L14 and L15)

-P3, L10: "MetUM" was defined in the abstract, but has not yet been defined in the main body of text

-P4, L14: "data" should be added between "time-step" and "was"

-P5, L3: Add "(not shown)" between "differences" and "confirming" as this comparison is not included in the paper

-P5, L19: Consider adding "(dashed line)" between "PDFs" and "among" for clarity and reminder for the reader

-P5, L21: Consider adding "strongly" between "not" and "affected" – there are some differences with resolution, albeit not drastic ones

-P6, L8: Consider changing "suggests" to "confirms" as we know N1024 is too coarse for explicit convection

-P6, L19: Is there an extra space before "Switching"?

-P6, L25: It's stated in section 3.1 that differences between resolutions were small, so consider changing the phrasing of this sentence. Maybe "...examine whether the character of grid-box/time-step precipitation discussed in section 3.1 persists..."

-P7, L8: Remove "perhaps" – it is clear that the model show this at a more limited extent than CMORPH

-P10, L29: Add reference to panels "a" and "c" of Fig. 9 to point readers quickly to correct panels

-P13, L24: Add period after "etc"

-Fig. 11, panel (c): should the legend reflect the "N1024e" experiment?

-Overall comment on figures with red and green colored lines: consider changing colors for readers who are red/green colorblind

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