Geosci. Model Dev. Discuss., 8, C3354–C3357, 2015
www.geosci-model-dev-discuss.net/8/C3354/2015/

Geoscientific Model Development Discussions

Interactive comment on "Evaluation of the Plant–Craig stochastic convection scheme in an ensemble forecasting system" *by* R. J. Keane et al.

Anonymous Referee #1

Received and published: 16 December 2015

Review of "Evaluation of the Plant-Craig stochastic convection scheme in an ensemble forecasting system"

This manuscript introduces the Plant-Craig (PC) parametrisation in the UKMO regional EPS (MOGREPS-R). Forecast skill validation is presented by comparing the default MOGREPS convection parametrisation and the PC parametrisation from 34 ensemble start dates in July 2009. The impact is validated with three metrics, covering the deterministic as well as the probabilistic skill of the system. Analysis of the forecast impacts is also performed by separating the start dates into cases favouring the occurrence of large-scale precipitation and to those with more likely convective activity. The PC scheme is shown to improve ensemble skill for light rain cases especially in cases favouring the formation of convection. However, the PC scheme increases the bias in

producing too many high rainfall events. The impact on the model prognostic variables is discussed to be neutral.

GENERAL COMMENTS

The manuscript is mostly well written, and presents interesting results from the first application of the Plan-Craig parametrisation into a LAM EPS of operational quality. I have, however, some concerns about the results, and the manuscript would benefit from a revision of the text. Mainly because of the former, I am suggesting a "major revision" for this manuscript.

Major concerns:

1. Since the convection fraction in PC is so low, it seems odd to have a good match against observations (Fig 10) for low precipitation thresholds. And even more odd to have a big increase in the high rainfall events even though the occurrence of convection is decreased (I am assuming the large-scale precipitation amount is roughly the same for the two experiments). The former would imply that the good skill is reached by suppressing convection altogether (i.e. the skill originates from large-scale precipitation producing the right amount of rainfall); the latter that the more rare convective events in PC are also producing too much rain. What are the authors thoughts on these points? This could be validated quite easily by producing plots similar to Figures 10-11, but with separating convective and large-scale precipitation instead of using the total precipitation. Redoing Figure 8 for the strongly and weakly forced cases could also shed some further light into the issue.

2. The readability suffers from overly long sentences (e.g. p.10200 L22-26, p.10201 L11-16, p.10213 L16-20, p. 10214 L21-25). Please consider splitting these into two (or even three) sentences.

3. "model variability" is used a lot, but in many (all?) places "model error" would be more appropriate; "model variability" is quite ambiguous and is more often associated

with model's ability to deviate from (its own) climate, however the authors are clearly discussing here the added ensemble variance from representation of model errors.

4. Doesn't the result of upscaling (3.1.1) imply that PC misplaces (in space or time) the precipitation events more than GR? This would explain why taking a bigger area into consideration improves the scores.

SPECIFIC COMMENTS

1. "verification" is used in many places where "validation" would be more proper

2. p.10201 L7: "possible"->"common"?

3. p.10202 L2: "...be a major source of model variability...", the sentence is a bit confusing; are the authors trying to highlight a link from spread in convection to spread in the whole atmospheric state?

4. p.10202 L9-10: "...produced 25-50% of the total variance... on a scale of 35km.", I'm not sure what the authors want to say here.

5. p.10202 L24: "learn"->"teach" (or modify the sentence)?

6. p.10203 L1-4: please rephrase.

7. p.10203 L13-14: "stochastic and spectral generalization"?

8. p.10203 L20: averaged over what?

9. Section 2.2 and/or 2.3: define the forecast length.

10. p.10207 L15: "grid points X", the notation is conflicting with earlier

11. Section 3.1: is FSS calculated for the ensemble mean?

12. p.10214 L16: remove the parenthesis

13. Section 3.4: lead time used in the figures?

Figures 2-5: too small font

Figures 2-4 + 8 + 10-11: ensemble mean?

Figure 4: lead time? Also, add a zero-line for better readability.

Figures 10-11: why are the lowest threshold values missing for GR in Fig 10 and for PC in Fig 11?

Interactive comment on Geosci. Model Dev. Discuss., 8, 10199, 2015.