

## ***Interactive comment on “Using Empirical Orthogonal Teleconnections to evaluate interannual rainfall variability over China in the Met Office Unified Model Global Atmosphere 6.0 and Global Coupled 2.0 configurations” by Claudia Christine Stephan et al.***

### **Anonymous Referee #2**

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This manuscript extends the observational analysis of Stephan et al. (2017a) using Empirical Orthogonal Teleconnections to examine interannual rainfall variability over China as produced by a model (both in atmosphere-only and coupled mode) at varying horizontal grid spacing. The authors conclude, based on their results, that coupling the atmosphere to the ocean produces improved interannual variability in precipitation over China, while changes in grid spacing show no consistent response. The metric for deciding this conclusion is the number of seasonal patterns produced by the model that

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have large-scale meteorological conditions matching the observations. Unfortunately, examining the effect of coupling the system for any individual season does not show a consistent response. Ultimately, the result that the precipitation variability is insensitive to horizontal resolution will help guide simulation choices for the future, making this work a useful contribution to the field.

While I appreciate the authors' very thorough analysis, I found it difficult to follow the discussion of the figures at times owing to the small panel sizes and inconsistent layout of which models were presented (only those with statistically significant responses were shown forcing the selection of models to change from figure to figure, and from EOT pattern to EOT pattern). Perhaps since much of the discussion is based around how the model deviates from observations, difference plots would be more informative than plotting the mean and interannual variability (such as in Fig. 2). Maybe some of the other plots could be simplified somehow?

I have a few other minor comments listed below.

What grid spacing is the model tuning done for? Since the authors suggest C216 performs the best, it would be of interest to know whether this is because the parameterization constants have been optimized for this configuration or not.

Page 6, lines 23-24: Is the “drastic improvement” going from C96 to C216? Also, when it is mentioned the improvement is seen over the South China Sea, is this over ocean only? If so, why are the ocean points not shown in the corresponding figure?

Page 15, line 15: the correlation coefficient is 0.44, “so ENSO explains only ~40% of the variance. . .” Typically explained variance is the square of the correlation coefficient. Can you explain how you compute the variance explained if not from the correlation coefficient here?

Page 13, line 14: “C96 and C512b (C512a) produce seven (eight), five (four) of [the observed patterns] associated with the observed mechanisms;” Figure 13 shows C512a

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produces six, not eight, of observed patterns. Also, C96 and C512b do not both produce seven of the observed patterns (as shown in Fig. 13). This line need to be clarified. Additionally, the sentence ends with a semi-colon as written, was there meant to be more there?

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