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Interactive comment on "The Palaeoclimate and Terrestrial Exoplanet Radiative Transfer Model Intercomparison Project (PALAEOTRIP): experimental design and protocols" *by* Colin Goldblatt and Lucas Kavenagh

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We thank Reviewer 1 for a helpful review of our experimental protocol. We provide a full response to the reviewers comments (reproduced in italics) below, together with revisions to the manuscript.

This is a well written paper describing the protocol for an intercomparison between radiation codes which will be useful for the Palaeoclimate and Terrestrial Exoplanet modelling communities. The paper addresses a relevant scientific modelling question

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Discussion paper

within the scope of GMD ; namely how to assess the skill of radiation codes used for a wide range of conditions which may be outside of those for which they were originally developed. It presents a modelling protocol that is suitable for addressing this question, involving the submission of outputs from radiative transfer codes run with standardised inputs covering a range of conditions. These results will be compared with reference calculations from 'line-by-line' codes and published in a subsequent paper. The concepts involved are not particularly novel, being an extension of the approach used in previous studies; nonetheless they are useful because they will be applied to a wider range of radiation codes and conditions than previously. The results from this intercomparison will help modellers in the community to select the radiation codes best suited to their purposes, and to improve others, and so will be likely to result in substantial advances in modelling science. The methods and assumptions are valid and clearly outlined, but unfortunately the description is not sufficiently complete and precise to allow the protocol to be executed by a modelling group. I think the paper would be suitable for publication once the major issues below are addressed. I also list some minor issues which would be good to address.

We address specific issues discussed raised here below.

Major issues:

1/ Page 9 I think that your timetable is very unrealistic. The amount of time you're giving people to send in their results is so small that there is a real risk of not getting sufficient participation to maximise value of this activity to the community. I would recommend seeking advice from other similar projects and coming up with something more realistic. I would have thought the modellers would need at least 6 months to send their data, and it would be a good idea to allow additional time for you to spot any errors in the data or its formatting and to allow them to resubmit.

Sober reflection and plain passage of time has us agree on this point. We have relaxed the timescale very substantially, with the goal of a summer 2018 completion, not summer 2017.

2/ The supplementary information needs to be improved. The text of the paper reads "We have provided MATLAB and Python codes which will write them automatically from your output. These scripts, and sample output files, are available at www.palaeotrip.org and included in the supplementary information for this paper." In spite of what the text says, the SI does not contain any sample output files. These are needed because the text doesn't explain the full naming convention. These aren't available on the website either at the time of writing, but even if they were, the protocol is supposed to be fully described by the paper. Also, the list of input files in incomplete; for example there is no specification for the Stellar Spectra in the SI or on the website. Please also list the files individually in the readme file and say what each of them are. For example palaeotrip_profiles.mat file seems to be a binary and I have no idea what it is.

The SI is revised, completed, and fully described in a readme file.

Minor issues:

1/ The abstract provides a concise and complete summary. A minor point however is that I found the aim to "constrain the ranges of far-from-modern atmospheric compositions in which the codes perform well" a bit unclear. Why would you want to constrain the ranges over which the codes perform well? I can understand why you would want to identify those ranges, and subsequently to allow to community to expand those ranges. Constraining them makes little sense to me.

We have changed "constrain" to "identify".

2/ The overall presentation well generally well structured and clear. I did however find the list of experiments on page 5 somewhat redundant given the more informative and detailed list which appears on Page 6. I would recommend merging the list on Page 6 into the list on Page 5. If you want an ?at a glance? summary of the experiments then I would add a table.

The descriptions have been merged into a new table, Table 1.

3/ Page 1 Line 1 time on the order of
Fixed.

4/ Page 3 Line 25. It might be nice to explain why a single global mean profile is considered sufficient. Previous intercomparisons have used profiles from different regimes/seasons, e.g. McClatchey Mid-Latitude Summer/Winter etc.

We now say "For simplicity, all experiments use a Global Annual Mean (GAM) profile". Others would be nice, but this simple approach is probably sufficient. There isn't much more to say!

5/ Page 3 Line 31 number/name, a brief
6/ Page 5 Line 9 is expected
7/ Page 6. Please be consistent - i.e. Experiment 1 / Experiments 11.
9/ Page 7 Line 2 which is best done
10/ Page 7 Line 8 with a
11/ Page 7 Line 9 consisting of the
12/ Table 1 diffuse

All fixed.

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