Prof. Song-You Hong Editor in Chief Asia-Pacific Journal of Atmospheric Sciences

Dear Prof. Hong,

Please find the manuscript, "Propagation of Error and the Reliability of Global Air Temperature Projections," for submission to the Asia-Pacific Journal of Atmospheric Sciences.

General circulation climate models (GCMs) with their embedded physical theory provide the entire basis for evaluating the impact of rising atmospheric CO_2 on future climate.

It is a standard of science to evaluate the predictive reliability of a physical model by propagation of error. However General Circulation Models (GCMs) have never been so evaluated. The submitted manuscript develops a method to propagate GCM error through global air temperature projections. The following new results are presented:

- 1. A simple linear equation is developed showing that GCM air temperature projections are just linear extrapolations of greenhouse gas forcing.
- 2. Simple variants of the same linear equation reproduce all 58 air temperature projections of 21 CMIP3 GCMs used in the 2007 IPCC Special Report on Emissions Scenarios.
- 3. The linearity of output means that the uncertainty in GCM step-wise air temperature projections is just the root-sum-square of physical error.
- 4. The total cloud fractional (TCF) error made by CMIP5 climate models is shown to be systematic, probably reflecting theory-bias.
- 5. Propagation of the $\pm 4 \text{ Wm}^{-2}$ average TCF error of CMIP5 GCMs results in a centennial uncertainty of about $\pm 15 \text{ C}$ in global air temperature projections.

While the error analysis is very straight-forward, these results are clearly controversial. Therefore an Auxiliary Material document is provided, which includes further data that fully demonstrate items 1 & 2 above. The AM is available to be published electronically, should that eventuality arise.

Transparency requires me to inform you that prior versions of this manuscript were twice submitted to the Journal of Geophysical Research – Atmospheres and twice rejected. The rejections followed two reviewer objections.

The first was that an 1850 base-state climate simulation already includes all model errors, and these errors are projected as constants. Errors in projected simulations are then removed by differencing against the 1850 base-state.

The second was that a " \pm " confidence interval is inadmissible because it amounts to an unphysical claim that models rapidly oscillate between extremes of temperature.

These ideas are mistaken. They are addressed in manuscript section 2.4.3 and section 3, respectively. However, somehow the previous reviewers overlooked these manuscript sections.

Therefore, these mistaken ideas are now extensively discussed in AM Section 7 and Section 9, respectively. It is hoped that these new AM sections will fully defray any criticism of the work on such grounds.

To provide full transparency I offer for your viewing, all the JGR-Atmospheres correspondence, including the full reviews and responses. These can be provided as two zip files that have been scanned and verified virus-free by a fully updated Norton Anti-virus.

If you wish to receive these files, please notify me by email: <u>pfrank830@earthlink.net</u>. Please feel entirely free to consult these documents, and to share them with any of your reviewers or editors. I am confident they fully validate the scientific standing of the submitted work.

The manuscript Figures are in color to assist review. Black-and-white versions can be provided as may be needed.

This work has been carried out on my own time and was not funded by any external agency.

Finally, thank-you very much for your consideration, and I await your reply.

Yours sincerely,

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