3 July 2013

Dr. L. Anthony Cox, Jr. Cox Associates and University of Colorado 503 Franklin Street Denver, CO 80218

Dear Dr. Cox,

Please find the manuscript, "Propagation of Error and the Reliability of Global Air Temperature Projections," for submission to Risk Analysis.

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.

A commonplace of physical science is to evaluate predictive reliability by propagation of model error. However GCMs have never been so evaluated. The submitted manuscript rectifies this oversight and presents the following new results:

- 1. A simple linear equation is developed that accurately models the global air temperature projections made using state-of-the-art climate models.
- 2. Simple variants of the same linear equation reproduce the temperature projections of all 21 advanced GCMs used in the 2007 IPCC Special Report on Emissions Scenarios.
- 3. The linearity of temperature output means that the uncertainty in GCM stepwise projections is just the root-sum-square of physical error.
- 4. The total cloud fractional error made by the most advanced CMIP5-level climate models is found to be $\pm 12\%$, which is equivalent to an annual average error of ± 5 Wm⁻² in atmospheric energy flux ($\pm 140\times$ the annual increase in GHG forcing).
- 5. Propagation of $\pm 5 \text{ Wm}^{-2}$ uncertainty through global air temperature projections results in a centennial uncertainty of about $\pm 20 \text{ C}$.
- 6. Items 1 through 5 indicate that climate model air temperature projections are not reliable.

These results are clearly controversial. A Supporting Information document which fully demonstrates items 1 & 2 above is provided for yourself and for the reviewers. The SI is available to be published electronically, should that eventuality arise. Personal identification has been removed from the SI pdf, including within the security window.

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

The manuscript strictly concerns error analysis, and thus training in climate science is not needed for review. However, possible climate physicist reviewers include Prof. Carl Wunsch, MIT, <u>cwunsch@mit.edu</u>, Prof. Roger Pielke, Sr., University of Colorado, <u>pielkesr@cires.colorado.edu</u>, and Prof. Murry Salby, Macquarie University,

<u>murry.salby@mq.edu.au</u>. For error analysis of numerical models, an expert is Prof. Victor Vasquez, University of Nevada, Reno, <u>victor.vasquez@unr.edu</u>.

I am a Ph.D.-level research scientist, however 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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