Reviewer #4 Evaluations:
Recommendation: Reject
Grammar improvements needed: No
Commentary: No
Willing to review a revision: No
Do you have a potential conflict of interest?(Required): No
Annotated: No

Reviewer #4 (Comments to Author):

This manuscript seeks to establish the reliability of global air temperature projections from GCMs as a function of fractional greenhouse gas forcing using a statistical approach. It uses error propagation analysis to determine that there is a 15C uncertainty in air temperature for centennial-scale projections, among other findings regarding RF uncertainty. While the author does use a unique approach to looking at the predictability of the climate system, the manuscript in its present form has too many issues to be acceptable for publication, and this reviewer must therefore recommend its rejection.

First, the manuscript makes truly extraordinary claims, including, most strikingly, that detection and attribution are impossible, based on a small number of calculations which contradict and flat-out ignore entire disciplines of geoscience. For example, the statements that models alone are necessary to make warnings related to increasing atmospheric CO2 concentrations are false: the paleoclimate and historical records alone provides a constraint on climate sensitivity that points to an ECS closer to 4 C/2xCO2, with an upper bound of approximately 6. There are numerous other lines of evidence as well.

Second, the manuscript lays its foundation with a discussion about CO2 radiative forcing. What is presented represents an elaborate reinvention of the wheel of radiative transfer theory, but one that again ignores decades of radiative transfer and spectroscopic research, based on laboratory data, quantum mechanics, and more recently, field observations. There are well-established databases (HITRAN, GEISA) that translate this information into tables that radiative transfer codes use. Correlated-k methods, though less accurate than line-by-line, are used within climate models, but what they do is far more rigorous than what is presented here. Moreover, the approach makes subtle but important errors in the scaling of CO2 forcing with rising CO2, issues of diffusivity approximation, and how to go from a few radiative transfer calculations to a global average. The formulae from Myhre et al, 1998 cover how to do this properly. The calculations and results presented in Figure 1, which forms the basis for the rest of the discussion, are completely unacceptable for publication.

Third, it is very unclear to this reviewer why the author chose only LWCF, when numerous other factors also contribute to surface air temperatures. For example, numerous researchers continue to point to shortwave-cloud effects as the primary source of model feedback uncertainty.

Finally, there are a number of other serious issues with this paper, including, but not limited to, the discussion of error bars (lines 117-125) which ignores all of the work performed by literally hundreds of researchers to quantify uncertainty in models, and the discussion in the introduction which seems to approach climate change as an initial-value problem (lines 104-108), when it is, in fact, a boundary-value problem.

In summary, the manuscript needs to build off of the large amount of research on model projections, especially that based on very well-established theory and observations (i.e., the radiative transfer) already performed in this field, if it seeks to provide an acceptable, statistically-based estimate of uncertainty in model projections. Furthermore, the manuscript is very far from being acceptable for publication, especially since it makes extraordinary statements based on the limited findings that selectively ignore large bodies of established research.