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Earth System Dynamics Discussions

Interactive comment on "Estimation of the climate feedback parameter by using radiative fluxes from CERES EBAF" *by* P. Björnbom

Anonymous Referee #1

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Review of Björnbom, Estimation of the climate feedback parameter by using radiative fluxes from CERES EBAF

General Overview

The author addresses the important issue of estimating the climate feedback parameter as it relates to forced climate change and explores the vital yet challenging question as to how one can best estimate the surface temperature feedback from the observational record. The problem has been longstanding, in part due to the challenges of observing the energy budget on a global scale, but also due to the fact that observed variability is largely not the result of forcing. Rather, interannual variability in the observed record (such as in CERES) is predominantly the result of internal climate modes such as ENSO and, over longer timescales, decadal variability. In these modes, it is

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possible for clouds themselves to effect surface temperature and thus the attribution of cause and effect is not so simple. Thus a major challenge exists in detangling the forced response of the climate system from the unrelated variations in the observed record. Unfortunately, I do not find the present work to afford much insight into this vexing challenge as it fails to recognize the dynamic and interactive nature of ENSO as an internal unforced mode and the hypothesis that it tacitly assumes can readily be (and has been) falsified in models.

Specific Comments

The authors propose deriving the climate feedback parameter from ENSO-related variability, yet they seem to overlook the obvious challenges in extending co-variability associated with coupled modes (i.e. ENSO) to the forced problem. Their terminology imposes the notion that variations in radiative fluxes are driven by surface temperature variability of "non-radiative forcing connected to the ENSO" but such a perspective is inadequate to characterize either ENSO, its dynamical linkages, and its strong inherent air-sea variations that preclude a commentary on forced climate variability. This issue has been discussed at length in some of the works cited by the author, yet the implications of these discussions seem to have been overlooked in this work. The author has misread the main points of Trenberth et al. and Dessler et al., which are quite explicit in saying that one cannot gain insight into the climate feedback parameter from ENSO. The text also repeats the exposed flaws in earlier works, such as in Spencer's for example, by alluding to clouds, and ENSO itself, as a forcing rather than a feedback. Clearly these do not meet the basic requirements of a forcing as they are tightly coupled to the system through dynamics and other influences. Finally, the author is also willing to pose an hypothesis (that the regression between temperature and radiative fluxes is indicative of the feedback parameters) without carrying out the obvious tests that are readily performed in the realm of models (and have been done in other works). The problem posed by the author is compelling and important yet the insights provided in this work appear to be minimal.

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