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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Estimations of climate sensitivity based on top-of-atmosphere radiation imbalance" *by* B. Lin et al.

Anonymous Referee #1

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Estimations of climate sensitivity based on top-of-atmosphere radiation imbalance by B. Lin, L. Chambers, P. Stackhouse Jr., B. Wielicki, Y. Hu, P. Minnis, N. Loeb, W. Sun, G. Potter, Q. Min, G. Schuster, and T.-F. Fan

I. Overall Comments.

The manuscript tries to estimate climate sensitivity, which is specifically expressed by "heat transport coefficient for deep ocean" and "system memory". The method seems sound and the development seems correct. It may be potentially important on this subject after some important details are clarified. In addition, some expressions need to be improved so the readers can more easily understand the methodology and appropriately appraise the results.

II. Specific Comments.

1. P. 24734, l. 2. Since you have used "time constant", clarify "climate response time scale": is it just time constant, or you have different meaning here? If it is the latter, give a clear scientific definition.

2. P. 24735, l. 22. Through the text, F is TOA net radiative flux so it is better to define F more specifically when you first introduce it here: either TOA net flux or radaitive forcing for the whole atmosphere-earth system, etc.

3. P. 24736. (1) l. 3. Give the reference for "any small temperature perturbation would cause at least -3.3 W/mˆ2/K...". (2) l. 11. Please quantify "short-time scale", which is important in understanding your development. (3) l. 20. Give the reference for -6 W/mˆ2/K. (4) l. 21. Scientifically defining "fast radiative heat release processes".

4. P. 24738, ll. 5-7. You assume that O is proportional to F, but Eq. (3) is not precisely so. Please more clearly define O. This is also important in your method development.

5. P. 24739, ll. 1-10. Your development here implies that Cp' = constant. It needs supporting materials.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24731, 2009.