

Interactive comment on “Pan-spectral observing system simulation experiments of shortwave reflectance and longwave radiance for climate model evaluation” by D. R. Feldman and W. D. Collins

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Response to Reviewers:

We are pleased that the reviewer finds the paper interesting and well-written. With regards to the statement concerning the amount of new science in the paper, we respectfully submit that this paper presents several novel findings in relationship to previously published work:

1. The paper formally presents the pan-spectral OSSE, which has not been covered in

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other manuscripts. The Feldman et al, 2011 presentation of the SW OSSE discussed the formulation of the SW OSSE in detail and the Feldman et al 2013 paper only briefly discussed the LW calculations, but the pan-spectral capability was not central to that latter paper.

2. The paper presents a discussion of radiometric validation of the OSSE for the infrared calculations and how such validation is straightforward for clear-sky conditions but challenging for all-sky conditions due to whether the radiative transfer is formulated with layers or levels.

3. The paper broaches the complementarity of the SW and LW signals in describing the processes that may change the top-of-atmosphere spectrum of the planet. The numerous signals in the SW and LW spectra provide a potentially large number of constraints for model performance beyond OLR and albedo.

4. The paper discusses prospect for, and provides initial results of, OSSE calculations based on the fields from the Climate Model Output Rewriter (CMOR) for two models spanning the range of climate model sensitivities in the CMIP5 archive. This presents a path towards developing hyperspectral diagnostics for models based on their climate sensitivities and ultimately confronting those models with decadal-length satellite records. Such confrontation will be critical to reduce the range of model results for prescribed forcings in a defensible fashion in CMIP6.

We would welcome further comments from this reviewer on how to improve the manuscript.

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