Geosci. Model Dev. Discuss., 7, C1239–C1240, 2014
www.geosci-model-dev-discuss.net/7/C1239/2014/

Geoscientific Model Development Discussions

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

D. R. Feldman

drfeldman@lbl.gov

Received and published: 25 July 2014

We appreciate the reviewer's noting of the previously-published results and hope that the centralized presentation of the OSSE method in GMD could focus the modeling community on the potential benefits of hyperspectral simulations.

Regarding the paper's goals, we look forward to clarifying them for the readers and reviewers in a revised manuscript. Briefly, however, with the effort, we seek to build a bridge between previous OSSE work and a comprehensive analysis of multi-model

archives in order to understand if spectral signatures provide unique ways to differentiate models according to their climate sensitivity and ultimately how if existing hyperspectral measurements can provide that constraint. This would then help the modeling community to understand the value of spectrally-resolved measurements.

With respect to the appropriateness of this paper for this journal, we respectfully submit that the enabling of model comparisons between both longwave and shortwave datasets is straightforward in principle, but the implementation, validation, and managing of the extreme computational expense are highly non-trivial exercises. Nevertheless, it is necessary to do so if the existing and future information in hyperspectral datasets is to be brought to bear to constrain climate models.

As we noted in a response to Referee 2, the issue that the reviewer raises of simulations based on monthly mean values is extremely well-taken, because the integration of the equation of radiative transfer is generally non-linear. There are several challenges here, however: (1) the fields necessary in the CMIP5 archive to perform competent radiative transfer are archived at monthly resolution and (2) Currently, the OSSE radiometric validation performed with CCSM3 was based on offline calculations to the CAM radiation code and to MODTRAN. Validation against online radiation calculations has not been performed. In order to address the reviewer's comment, limited numbers of CFMIP calculations may be necessary to ensure that the radiometric validation against online results are not biased. This may satisfy the reviewer's suggestion to perform instantaneous radiation calculation comparisons.

The use of CCSM3 was for demonstration purposes. This model of course is considerably less complex than CESM1 (CAM5), but the utilization of CMOR-ized variables to compare reported results MIROC5 and HADGEM2-ES also enables the comparison to CESM1.

Interactive comment on Geosci. Model Dev. Discuss., 7, 3647, 2014.