Atmos. Meas. Tech. Discuss., 7, C3554–C3556, 2014
www.atmos-meas-tech-discuss.net/7/C3554/2014/

Atmospheric Measurement Techniques Discussions
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7, C3554–C3556, 2014

Interactive Comment

Interactive comment on "Next-generation angular distribution models for top-of-atmosphere radiative flux calculation from the CERES instruments: methodology" *by* W. Su et al.

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Received and published: 5 November 2014

——————— General comments: ———————

The manuscript describes the methodology employed to derive the current angular distribution models (ADMs) for the CERES instruments, i.e. the radiance-to-flux conversion algorithms for CERES thermal and solar measurements. This paper is necessary to document the new CERES product Ed4SSF, which improves the retrieval of cloud parameters and TOA flux with respect to previous versions. The enhancement of the cloud retrieval algorithms is briefly mentioned here, since the manuscript's main ob-

jective is to update the algorithms discussed in Loeb et al. (2005) and Kato and Loeb (2005).

In my opinion, the manuscript is of a great interest for the ERB community. This paper, once published, will be cited in all new papers using CERES derived fluxes. It would be desirable, however, to evaluate this paper together with its second part. There is no results section in this paper, it just shows the proposed methodology. Only the "validation" part will totally justify the selection of the new methods. I would rather prefer to split the current manuscript in two parts: one describing the SW algorithms and the second to discuss the LW approach, but including the corresponding evaluation of results. In any case, the current manuscript is already significantly long. Thus, the current distribution of papers could be the right choice.

In general, I would recommend to publish the manuscript. However I would like to raise some general comments.

Section 7 is very interesting. The comparison of the new developments against the previous results from Loeb et al. (2005), which are currently the reference models for empirical flux retrieval, shows a significant improvement for certain regions. This part should be enlarged and emphasized. The summary of the conclusions does not provide any extra details, however a better discussion of the importance of the flux results improvement and its implications regarding the ERB would be very welcome.

I would also like to see more information on the "new" scene ID. According to Fig. 18, the impact in the retrieved flux due to changes in the cloud algorithms is larger than the flux differences caused by the use of new ADMs. However, there is only information concerning changes in the cloud algorithms in the introduction.

Figures 2 and 7 show clearly the differences between the two flux datasets (Ed2 and Ed4) under certain regions. I consider interesting to see the results for the rest of scene types.

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It is not clear to me how the sea ice and fresh snow presence is detected. There are two different sources to detect the fresh snow and sea ice: a combination of NSIDC and NESDIS data, and MODIS radiance's thresholds (cloud mask snow/ice fraction). But, then, I do not see those parameters being use when reading sections 4.3 and 4.5.

——————— Specific comments: ———————

Subsection 4.1.1. How sensitive is the broad-band radiance field to changes in the aerosol burden/type? Which is the flux difference using the theoretical adjustment from Loeb et al. (2005) and actual AOD?

Subsection 4.2.1. Have you tried to use a non-linear model like RPV instead of a kernel-based BRF model?

Subsection 4.2.2. Which is the reduction in relative RMS errors compared to Loeb et al. (2005) due to the new ADM?

Section 4.3. Why do you treat differently the fresh snow over clear sky and the fresh snow of clear parts in cloudy scenes?

Section 5.2. In case of mixed surfaces you use the predominant surface type. However, over ocean, land and desert the anisotropy is calculated by averaging among the different surface types. Is there any reason not to do it here?

————————- Technical corrections: ————————-

There is a typo in page 8819, 1st sentence.

Figure 11 and 15. Could you please include the legends?

Figure 18 and 19. Please define the error metric employed.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 8817, 2014.