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Atmospheric Measurement Techniques Discussions

Interactive comment on "Calibration of the DSCOVR EPIC visible and NIR channels using MODIS and EPIC lunar observations" *by* Igor V. Geogdzhayev and Alexander Marshak

Anonymous Referee #1

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Summary This study calibrates the EPIC imager channels with corresponding MODIS band calibration using two different methods, that were found to agree. The application of the SBAF and accounting for stray light show that the regression offsets are closer to the true instrument offset of zero in version 2 EPIC. The EPIC absorbing channels were calibrated using lunar targets after adjusting for a small spectral shift. The absorbing channel calibrations using this method were compared to ROLO and was found to be within 10%. This paper is ready for review after the following issues have been addressed.

I agree with the other reviewer. What is the mission of DSCOVR? Why is the calibration

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needed? What is being retrieved from DSCOVR? Why are the channel spectra so narrow? Must be for trace gas retrieval, such as ozone. I can't believe that there are no DSCOVR publications that can be cited in this paper.

Page 1 line 30. Can you also provide the range of the scattering angle for a sun-synch satellite such as NPP as a reference? A large scattering angle increases the uncertainty of a retrieval, for example clouds, since it is nearly in direct backscatter. Can you state what retrieval would benefit from such a large scattering angle? Can you also state that a satellite in L1 would have to orbit L1 in order to be in the L1 orbit. Why is the range of SEV decreasing over time? Is the orbit about L1 maintained?

Page 2 line 16: The MODIS channel reflectances are not truly reflectances, that is dependent on the solar zenith, but a scaled radiance, that is divided by the solar constant of the channel. The reader needs to be aware of this in Fig. 4

Page 4 line 5: The pixel-level homogeneity threshold was set as a function of channel. Can the range of the spatial homogeneity threshold be given as a percentage of the mean pixel value? Was the spatial homogeneity threshold the greatest limiting factor of the number of EPIC and MODIS pairs?

Fig. 4: Can the authors identify the 3 groups of reflectance pairs. Is it clear-sky ocean, clear-sky Saharan desert, and bright clouds. Is the strict pixel-level standard deviation threshold, screening out more bright deep convective clouds or maritime stratus clouds? Each of these scene-types would require differing spectral band adjustment factors.

Table 2: Do the calibration coefficients that are published assume a zero offset? When comparing M/E ratio, does this represent calibration approach one with a zero-offset?

Table 2: can both approach 1 and 2 calibration coefficients also be added to Table 2.

Fig. 5: Why do you believe that there is a dependency of the EPIC gain with the MODIS/EPIC ratio standard deviation? In order to justify a linear regression based on

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the ratio standard deviation to find the true ratio. Why do believe this is systematic rather than random?

Fig 5: Does the EPIC instrument angular configuration allow for sunglint? I guess since sun-glint is only a forward scatter feature, this would not be the case. Bright sunglint can also exceed 0.6 reflectance.

Page 6 line 10. How confident are the authors that the bright clouds are deep convective, rather than maritime stratus, which have differing SBAFs.

Page 6 line 18. Intermediate brightness scenes. Since there are so few EPIC MODIS reflectance pairs, could not the authors identify the actual scene. It is likely that these scenes are clear-sky deserts, since the deserts are more spectrally red than clouds, have a very different SBAF as shown in Fig. 4, than bright clouds.

Figure 7. Its good to see the SBAF correction changes the linear regression offset closer to the true space offset of 0.

Where are tables 3 and 4?

Table 5. Could the authors add to table 5, the actual EPIC gain factors from both methods and a recommendation of which EPIC calibration gains to use?

Page 7 line 1: are you trying to find seasonal dependence of the calibration method or EPIC sensor seasonal dependency. Can this be more clearly stated.

First of all do you expect any sensor degradation of EPIC? The sensor is at L1 where there is so little reflected solar exposure to the optics.

Evaluating a seasonal cycle, with one seasonal cycle is difficult. After 2-years than the actual seasonal dependence can be determined with more certainty. It is also interesting that the larger ratio disparities have a seasonal cycle.

Page 7 line 18. Regarding, the 0.688 and 0.680μm lunar reflectance difference of 1.6%. Is that the bright portions of the moon or the dark portions? I guess what I

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am asking do you use the complete lunar disc to get the ratio between the 0.688 and 0.680μm channels. Do you account for lunar phase and libration?

ROLO section. Did Tom Stone offer guidance to prepare the EPIC data to be compared with the ROLO model?

Conclusions, Page 9, line 8. Can you provide the EPIC calibration gains for the 0.764μm and 0.688μm here and some text why you recommend it?

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