Atmos. Chem. Phys. Discuss., 13, C8681–C8685, 2013
www.atmos-chem-phys-discuss.net/13/C8681/2013/

Atmospheric Chemistry and Physics Discussions

ACPD
13, C8681–C8685, 2013

Interactive Comment

Interactive comment on "Simulation of GOES-R ABI aerosol radiances using WRF-CMAQ: a case study approach" *by* S. A. Christopher

M. J. Garay (Referee)

michael.j.garay@jpl.nasa.gov

Received and published: 1 November 2013

General Comments:

The upcoming launch of the Geostationary Operational Environmental Satellite Series R (GOES-S), currently scheduled for 2016 will provide the atmospheric science community a wealth of new data for studying aerosols and air pollution issues in the United States. This paper describes the use of chemical transport model (CTM) data from the Weather Research and Forecasting (WRF) and Community Multiscale Air Quality (CMAQ) models, coupled with the Santa Barbara DISORT Atmospheric Radiative Transfer (SBDART) model to simulate top of atmosphere reflectances for GOES-R Advanced Baseline Imager (ABI). The author discusses the model set up and three cases

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

of simulated data generated for the eastern US. Comparisons are made between simulated particulate matter (PM2.5) – essentially a model input – and ground-based observations to assess model performance. Model reflectances are also compared with data from the MODIS instrument, and a method is described that could be used to synthesize green-band reflectances from the spectral bands available on the GOES-R ABI, which does not itself include a green band.

The paper is nicely laid out, well written, and extremely interesting both for the innovative approach as well as in the context of the GOES-R mission. The color scale of Figure 3 needs to be corrected. Otherwise, I recommend this paper for publication in Atmospheric Chemistry and Physics subject to minor revisions.

Minor Comments

Below I have provided specific comments that I hope will be helpful to the author. Page and line numbers have been included were appropriate.

Page 2, Line 17: It appears that the author is treating "reflectance" as the plural of "reflectance." In this case, it might be clearer simply to say "reflectances."

Page 2, Line 26: See above comment.

Page 3, Line 39: The latest information on the GOES-R website (http://www.goes-r.gov/) gives an early 2016 launch date.

Page 3, Line 40: "A greater number of spectral bands. . ." relative to what?

Page 3, Line 49: Might read better as ". . . capabilities of GOES-R for air quality studies. . ."

Page 3, Line 56: Should probably read, "[SBDART. . .], coupled to the existing. . ."

Page 4, Line 66: To avoid confusion, I would suggest focusing simply stating that "This study examines the reflectance computed. . ."

ACPD
13, C8681–C8685, 2013

Page 4, Lines 66-74: The order of investigations presented in this paragraph (MODIS, PM2.5, green-band synthesis) should be modified to match the order in the paper (PM2.5, MODIS, green-band synthesis).

Page 5, Line 91: Maybe just, "The daily peak Air Quality Index (AQI) was. . ."

Page 6, Line 119: "Developed" is overused in this sentence. Maybe, ". . . highly reliable physical models, which have been developed. . ."

Page 7, Line 129: ". . . spectral response functions. . ." Since everything else is so nicely referenced, it would be good to provide a source for the GOES-R ABI spectral response functions.

Page 7, Lines 137-141: It might be better to motivate this section without reference to the MODIS intercomparison. Instead, checking the PM2.5 is a test of how well the CTM simulation is able to represent "reality."

Page 7, Line 140: ". . .how realistically. . ."

Page 8, Line 151: "quite well" is very subjective. The R2 value is 0.38, indicting that only about 38% of the relationship is described by a linear fit to the data. I would suggest simply eliminating this sentence, especially since the following sentence "the model performance is consistent with previous studies" carries more weight.

Page 9, Line 176: From a more technical standpoint, from this discussion it is unclear what spectral interval is used for the RT calculations. Is a single, central wavelength used (which is typically done), or something more sophisticated?

Page 9, 187: Rather than "attributes" should probably read, "contains contributions. . ." Also, a brief description of what is seen (or not) in the individual band images might be appropriate. For example, the 1.38 μm band does not show many features, as expected. Also, it looks like the reflectances are inverted from the usual way of presenting them (clouds appear as dark features), so maybe a thermal IR scale was used inadvertently. Clearly, the color scale cannot correspond to the displayed reflectances.

ACPD

13, C8681–C8685, 2013

Pages 9-10, Lines 192-193: This sentence ends up having an awkward construction. Might read more cleanly as: "...other band combinations lead to false color images that perhaps highlight certain features of scenes better."

Page 10, Line 197: "SBDART along with..."

Page 10, Lines 201-202: "... seen by human eyes... the ABI and our eyes differ in their spectral response..."

Page 10, Lines 205-206: Should explain what "logarithmic image enhancement" is, or provide a reference.

Page 10, Line 208: "imageries" should be "images"

Page 10, Line 212: Although the shortcoming of the model in reproducing clouds is well known, it would be useful if a reference could be provided.

Page 11, Line 230: Maybe, "... features in the visible..."

Page 11, Lines 235-236: The phrasing is awkward because "separating... from" to me implies separating something from something else. I think the author means something like: "Spectral reflectance provides a valuable tool for differentiating features in images generated by different solar reflectance bands."

Page 11, Line 238: Seems like some references to classification schemes applied to satellite imagery would be appropriate.

Page 12, Line 241: The comma should be inside the quotes for 'simulated truth,'

Page 12, Line 254: "... by water absorption around 1.38..." This might be an appropriate place to cite some of the MODIS cloud work on this spectral band.

Page 13, Line 264: Should provide some references to the NDVI technique or underlying theory here.

Page 13, Lines 280-281: "... between MODIS and ABI."

ACPD

13, C8681–C8685, 2013

Page 14, Line 283: "...between MODIS and ABI because MODIS and ABI have..."

Page 15, Line 316: It might be good to provide a reference to the problem of scene classification in satellite imagery.

Page 16, Line 342: It would be helpful to present this reflectance difference (0.01) as a percentage as well as it is hard to get a handle on the absolute magnitude of the green band reflectance.

Page 17, Line 363: It might be useful to at least include a discussion of how Rayleigh scattering (with strong spectral dependence and weak dependence on height and surface pressure) would be accommodated, or whether that is not a problem.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 18713, 2013.