**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Reduction of radiation biases by incorporating the missing cloud variability via downscaling techniques: a study using the 3-D MoCaRT model" *by* S. Gimeno García et al.

Anonymous Referee #1

Received and published: 13 April 2012

The paper introduces a new 3D radiative transfer model, and validates it through the publicly available I3RC cases. I only have a few suggestions and recommend publication with minor revisions.

Major comments (3):

(1) Since the main purpose of the paper seems to be the introduction of the new model to the atmospheric community, publication in AMT is entirely appropriate. The combination of the 3D-RT model with, e.g., a stochastic cloud model (in this case a downscaling

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

algorithm) is certainly something worthwhile, but not very new; the conclusions that the PP and IPA biases can be reduced by using 3D radiative transfer (no matter what the input cloud field may have been), is a well-established fact in literature. I would therefore recommend to weigh the two parts of the manuscript (a: MOCART description and introduction; b: applications) accordingly (i.e., de-emphasize the applications). If, however, the authors decide to give equal weight to (a) and (b), it will be necessary to provide a more thorough overview of the literature than currently given; currently, only one relevant reference is given (Hinkelman et al., 2005).

(2) Although this was addressed in the response to the access review, there is still an issue with Figures 6 and 7; as clarified in the response, the "reflectance difference" shown on the y-axis is, in fact the *relative*, not the absolute difference. This needs to be made clear in the revised manuscript - I would recommend to show the defining formula provided in the response: $Delta\_R = (R\_coarse - R\_ref) / R\_ref$. These figures are excellent ways of visualizing 3D effects, but should be explained better.

(3) Considerable Grammar and English issues. I provided examples below, but I am sure I didn't cover everything.

Minor comments (3):

p1547,l7: Mie theory can only be applied to spherical particles (or be extended to a few non-spherical particles). Mie theory can therefore not be applied to ice crystals and many aerosol types.

p1547,l8: . . . as mentioned above, the *spherical* in this statement contradicts the previous statement. The authors can probably assume that the reader is familiar with this fact and can delete this sentence.

p1551,l1: "a method similar to Barker". This being a mainly technical paper, the description of the techniques is rather slim. Barker, for instances, describes various methods in this paper, and at the very least, it needs to be explained what the "guts" of

MOCART are - possibly in the form of a table. Yes, when going into detail, this would be a paper on its own, but some detail is adequate here.

Conclusion: I can't really see how solutions to handling 3D effects in, e.g., gas retrievals are offered in this manuscript, at least for operational retrievals. Avoid over-promising. How would, for example, MOCART help in the calamity that only 2-5% of, let's say, GOSAT retrievals are useable?

Technical/language comments:

p1544,l2: "To handle" −> "Handling"

p1544,l3: "is in practice unfeasible" −> "is unfeasible in practice"

p1544,l6: "esp." −> "especially" (do not use unknown abbreviations)

p1544,l10/11: "transfer. In turn," −> "whereas"

p1544,l14: fix "fine-resolved" (English incorrect)

p1545,l6: "skys" −> "skies"

p1545,l7: "what leads" −> ", which leads"

p1545,l7: "alternate" −> "alternating"

p1545,l7: revise "shadowed" and "extra-illuminated"

p1545,l9: either "cover" or "fraction", not both

p1545,l14: "most climate and weather" −> "climate and weather most"

p1545,l20: "To handle" −> "Handling"

p1546,l3-4: Incorrect English/Grammar: "at the cost of renouncing to the desirable exact mathematical solution and considerably increasing the calculation time"

p1549,l5: "go into detail"−>"going into detail"

p1549,l12: "as if it would be" –>"as if it were"

p1550,l3: "a bunch of photons" – rewrite without using slang

p1550,l14: "appropriated" –> "appropriate"

p1551,l4: Revise word order (this sentence doesn't work)

p1551,l12: What is an "academic step cloud field"? Just call it "simplified 1D cloud field"

p1552,l19: "for the seek of validation" is incorrect

p1553,l22: "seem to be twins" sounds poetic, but probably shouldn't be used in a scientific paper - because its a very qualitative statement

p1554,l4: "in a fully 3D fashion" sounds wrong

p1555,l12: "not always is possible" – revise word order

p1559,l25: "abscissas axis" – correct (just say "abscissa")

p1558,l9: "convenience" not the right word here

p1562,l3: "The neglect of" does not work (multiple occurrences throughout the manuscript)

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 1543, 2012.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper