Atmos. Chem. Phys. Discuss., 7, S7030–S7034, 2007
www.atmos-chem-phys-discuss.net/7/S7030/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Cloud thermodynamic phase inferred from merged POLDER and MODIS data" *by* J. Riedi et al.

Anonymous Referee #1

Received and published: 21 November 2007

General Comments

The paper presents a good start in combining the features of the three different approaches to phase discrimination using two different satellite instruments. The authors appear to have a solid methodology in combining the separate techniques and exploiting the strengths of each, but the presentation of the combination scheme is weak. Additionally, other than the last sentence of the paper, the relevance of the resultant algorithm to current and/or future retrieval needs is not mentioned, hence a discussion of why this issue should be addressed is needed up front. The authors provide a coherent introduction to the phase retrieval topic and discuss the strengths and weaknesses of the component algorithms, but the pragmatic motivation for combining POLDER and MODIS and how that stride forward can be or needs to be utilized on current or future

platforms would clarify the study's purpose.

Specific Comments

The algorithm description should include more detailed information about how the final phase decision is made and how the phase confidence index is computed. This should be addressed. The necessary background in the development of a phase decision (water or ice) is presented, but in a haphazard fashion that makes it very difficult to follow. Conversely, almost no solid discussion is devoted to the construction of the phase confidence itself. In section 3.2, the vague presentation of the index computation should include a logic tree figure or flow chart that indicates how the confidence is computed. Table 1, mysteriously mentioned in Section 4.4. does summarize much of the relevance of the component algorithms, but much more explanation is needed. Additionally, an example of the index computation for some small portion of the case study would lend credence to its validity. At this point, the confidence index seems quite subjective so it is difficult to imagine exactly how it could be used in the future.

You should address the impact of thin cirrus over snow/sea ice surfaces on each retrieval, if any, and whether or not it can impact the combined logic.

Generally, the paper also needs some careful attention to organization and detail. There are too many distracting organizational errors and a lack of attention to assuring that figures, references and related matters are properly ordered, sited and utilized.

Technical Corrections

14107.7: Keep the mention of the case study, but remove reference to Fig. 1 here as it is not discussed until later in the paper.

14107-23: Reference needed here - "Calculations have shown..." perhaps Goloub et al. (2000)?

14107-24: "is" should be "are"

ACPD

7, S7030–S7034, 2007

14108-23: duplicate "the"

14110-18: "Recent studies..." need references here

14111-09: "While there are limitations..." could make your point better if you said "Despite these limitations..."

14111-14: Here you discuss the fact that a SWIR/TIR/mask product is 1-km and TIR is 5-km. Is the SWIR/TIR/mask product the same as the SWIR product you are using from MODIS? Also, how do you average MODIS products, e.g., phase, when placing them onto the sinusoidal grid?

14112-7: You use "Fig. 4" here, but have not yet mentioned Fig. 3. Figure 3 is appropriately mentioned at 14115-13, so all figures need to be renumbered.

14114-21: typo "invidually".

14114-21: remove "for instance".

14114:25: should "lower" be "raise"?

14115-13: Figure 3 discussion should include discussion of how this figure was produced, e.g., what type of ice crystal and water spheres were used. You give some of these details later in Section 4.3 for the simulations, but I found myself wanting to know what you did when looking at Figure 3.

14116-4: "provide" should be "provides"

14116-5: an optical thickness of 3 is not the same as the very top of the cloud. This sentence is confusing.

14116-16: Why do you mention the recent works on multi-layer detection here?

14117-28: I do not understand the reasoning for the "variations" or departures from the mean values you are considering. Are you referring to variations in the cloud properties or the previously mentioned variation "one would expect from a set of realistic cloud

ACPD

7, S7030–S7034, 2007

conditions" or the angular variations?

14117-29: You start using 0.1 (0.2) and 0.2 (0.5) here. I assume these to indicate the solar angle?

14120-1: You use "TIR" here for the first time. Shouldn't that be defined in Section 2.3?

14122-7: "Fig. 9" should be Fig. 4c, correct?

14122-8: "Fig. 9b" should be Fig. 4b, correct?

14125-15: couldn't find mention of this reference

14125-29: couldn't find mention of this reference

14126-4: couldn't find mention of this reference

14126-26: couldn't find mention of this reference

14126-28: couldn't find mention of this reference

14126-29: couldn't find mention of this reference

14126-32: couldn't find mention of this reference

14127-2: couldn't find mention of this reference

Fig. 1: This figure caption could use better indication of what MODIS sees and what POLDER sees. Additionally, a latitude-longitude label would help provide location information.

Fig. 2: For those that are not familiar with MODIS and/or POLDER, you could reiterate in these captions which comes from MODIS and which comes from POLDER. Additionally, the 4 plots should be ordered in the way they are discussed in the text, i.e, you discuss POLDER first so perhaps it should be (a)

Fig. 3: Other than previously mentioned problem with figure ordering, could change "solar" to "solar and viewing"

ACPD

7, S7030–S7034, 2007

Fig. 4: Good! You keep a, b and c ordered in the same way they are presented in the text.

Fig. 8: Caption reference should be "Fig. 7" rather than "Fig. 8", correct?

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14103, 2007.