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Atmospheric
Measurement
Techniques
Discussions

Interactive comment on "Improved information about the vertical location and extent of cloud layers from POLDER3 measurements in the oxygen A band" *by* M. Desmons et al.

Anonymous Referee #2

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Review of "Improved information about the vertical location and extent of cloud layers from POLDER3 measurements in the oxygen A band" by Desmons et al.

General comments

The paper addresses to relevant scientific questions within the scope of AMT. The paper contains significant original material. The authors parameterize the differences between the POLDER-retrieved cloud pressure and CloudSat/CALIPSO cloud midpoint and top pressures as a function of cloud optical depth and solar zenith angle. The parameterization improves the POLDER retrievals by noticeably reducing biases and slightly reducing RMS. A similar parameterization is proposed to relate the angular

standard deviation of POLDER-retrieved cloud pressure and the cloud vertical extent from CloudSat.

The title is misleading because it can be interpreted as the paper deals with multilayer clouds. Actually, the paper considers single-layer clouds only. The abstract does not summarize the paper properly. The standard of English usage is not satisfactory. Sometimes, it is hard to understand what exactly the authors want to say. Spelling and syntax errors are too many to be listed. The paper should be shortened by reducing a number of figures (see the specific comments).

The authors claim in Section 4 (subsection titles and elsewhere in the text) and Conclusions (Line 510) that they get unbiased estimates of cloud top and midpoint pressures. That is not true. Figures 6 and 8 clearly show the presence of significant biases. For stratocumulus, the cloud midpoint pressure biases can be as large as 264 hPa and the cloud top pressure biases are up to 281 hPa.

Specific comments

Title and elsewhere: A hyphen in the A-band is more common in the literature.

Introduction: Lines 44-45; 74-76. The sentences are hard to be understood.

Section 2.1: Line 103. Does "a perfect reflector" mean a Lambertian surface with albedo of unity? If yes, why surface albedo of unity is assumed? Why not 0.8, as in Koelemeijer et al. (2001).

Section 2.1: Line 123. "cloud pressure value affected to a super-pixel . . .". What does it mean?

Section 2.1: Line 128. "cloud fraction". How is it derived from POLDER measurements?

Section 2.2: Line 145. "its dependence and its angular variation". Dependence on what?

Section 3: Line 180. “at a horizontal resolution of 5 km”. A POLDER pixel size is different from this value of 5 km. Please provide some detail of how the collocation of POLDER pixels to this spatial resolution was performed.

Section 3: Line 196. How was the data filtering carried out to select single layer clouds?

Section 3: Line 202. “Thanks to a deeper sensitivity study, . . .”. Please reference this “deeper study”.

Section 3: Lines 210-215. How do those results compare with data reported by Joiner et al. “Detection of multi-layer and vertically extended clouds using A-train sensors”, AMT, 2010. A reference to this paper should be obviously added.

Section 4: Fist sentence. Please reword to clarify.

Sections 4.1 and 4.2. See the general comments.

Section 4.2: Line 331. “. . . statistically not so far from . . .”. This is quite subjective statement and should be avoided.

Section 5: Line 344. “the scene’s geometrical conditions”. What does it mean?

Section 5.1: Line 353. “in order to optimize the correlation”. In what sense?

Section 5.1: Line 359. The correlation coefficient has been denoted as “ro” (see Fig. 6 & 8).

Section 5.1. Negative and low values of the correlation coefficient in Fig. 10 which are not discussed and explained in the text. Figure 10 can be taken out.

Section 6: Line 431. “Results are syntheized in Table 2”. Maybe “summarized”?

Section 6: Table 2. No values of the mean cloud vertical extent are provided in Table 2. It would be interesting to compare the standard deviation of vertical extent estimates with the mean cloud vertical extent.

Section 6: A general question: how often the POLDER-retrieved cloud bottom pressure

appears to be higher than the surface pressure?

Section 6: Line 461 & 463. “ deltaH = 1365 m . . . standard deviation . . . close to 5000 m”. Do the retrievals with so high biases and standard deviation make sense?

Section 6: Line 483. “As for cloud top pressure estimates, we compute the score obtained by the estimate of H.” Confusing, please reword.

Conclusions: Line 510. “. . . (CMOP) which are unbiased estimates . . .”. See the general comments.

Conclusions: Lines 514 & 517. “results are very interesting” & “estimates are interesting”. Interesting conclusions!

Conclusions: Lines 530 & 531. “. . . ten parameterizations for liquid water clouds over ocean and six over land . . .”. Those parameterizations were never specified in the text. Maybe it is not so important for a potential reader to learn how many parameterizations were proposed.

Conclusions: Fig. 17. Please clarify what exactly this figure adds to the conclusions. Please consider removing this figure.

Figures 4, 6, and 8. The color scale is not specified.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 2533, 2013.