

## ***Interactive comment on “Evaluation of Arctic cloud products from the EUMETSAT Climate Monitoring Satellite Application Facility based on CALIPSO-CALIOP observations” by K.-G. Karlsson and A. Dybbroe***

**Anonymous Referee #1**

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### General Comments

The authors present the results of a validation exercise comparing cloud products from the EUMETSAT Climate Monitoring Satellite Application Facility and CALIPSO-CALIOP. The products compared are cloud fraction, cloud type, and cloud top height in the Arctic region for the months of June – August, 2007 and December 2007. Though somewhat lengthy, the text is generally very thorough and easily understandable, with very complete introduction and summary sections. The figures and table are clear and concise. Except for a few criticisms concerning emphasis placed on a particular aspect

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of the study (outlined below) and a few editing oversights, the paper is largely ready for publication in my opinion. I am recommending publication with minor revisions.

### Specific Comments

My only major criticism of the paper concerns remarks made in Section 4.1, “Results for CFC”. Here the authors discuss the comparison of clear sky vs. cloudy sky discrimination between PPS, CALIPSO-CALIOP, and MODIS Collection 5. It seems to me that in several cases, the PPS vs. MODIS results are emphasized to a greater extent than PPS vs. CALIOP, where the latter is actually the topic of the paper. In the discussion of Table 8, the authors make much of the small differences between MODIS and PPS agreement with CALIOP, particularly for December, but fail to mention that the clear-sky false alarm rate for PPS is over 51%! This is larger than either the MODIS clear-sky false alarm rate (about 32%) or the MODIS cloudy-sky false alarm rate (about 29%). They argue that the advantage of MODIS over PPS is “small” based on the 0.08 and 0.05 differences in hit rate and Kuiper skill scores, respectively. In Table 9, the “remarkable” feature (an entire paragraph is devoted) seems to be that the MODIS bias-corrected RMS is about 6% higher than PPS. In discussing Table 10, the “most interesting feature” is that although the MODIS bias is small, its larger bias-corrected RMS (by 5%) indicates that the MODIS algorithm is not yet “working optimally”. My opinion is that the most salient aspect of this table is that PPS consistently underestimates clouds over land surfaces, by as much as 29% in December. It is certainly germane to the subject that the MODIS algorithm apparently overestimates cloudiness, but it is also important to explicitly state that the PPS consistently underestimates the amount of clear-sky (leaves some clouds undetected). Specifically, I would remove the last sentence from the first full paragraph of page 23. It should be clear to all that cloud detection in the Arctic is difficult at best and that there is room for improvement in all such algorithms. Similarly, the words on page 25, “it is clear that the MODIS cloud masking is still not working optimally” should be removed. In fact, from there to the end of the paragraph is essentially a repeat of what is stated previously in the discussion of

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Table 8 and is not needed here.

#### Technical Corrections

Page 4, line 7: "Aqua-train" should be "A-train" Page 4, line 19: "e.g." is repeated Page 6, lines 12-15: This sentence is very confusing – please rewrite. Page 9, line 15: "is using" should be "uses" Page 9, line 18: What are the "larger segments"? I think this section should have one or two more sentences describing this procedure. It is unclear at this point. Page 14, line 1: The last sentence of the paragraph is not necessary. Page 15, line 2: The sentence beginning here is too long and confusing – please rewrite. Page 15, line 11: The 3-5 minute time difference contradicts the statement on page 14. Page 18, line 3: "shall" should be "to" Page 19, line 10: Is the reference to Karlsson 2008a or 2008b? Page 21, line 10: VFM should be expanded here (Vertical Feature Mask) Page 23, line 23: polar is misspelled Page 30, lines 17-20: The last sentence should be eliminated. Page 32, line 14: the 2-minute difference again; is it 2 or 3-5? Page 33, line 1: Is this reference missing or do you mean Karlsson et al., 2008b? Page 34, line 7: I think you want to eliminate the word "slightly". Page 35, lines 1-11: This is a repeat of ideas stated earlier in the text.

Table 16: These values are not %.

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