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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Arctic clouds and surface radiation – a critical comparison of satellite retrievals and the ERA-interim reanalysis" *by* M. Zygmuntowska et al.

K.-G. Karlsson

karl-goran.karlsson@smhi.se

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This manuscript presents a comprehensive overview of the current knowledge on Arctic cloudiness and radiation conditions. Especially, the purpose of the study is nicely described in the Introduction section. However, we have some comments regarding some topics where we see some lacking information:

1. AVHRR-data has been used for many years for cloud studies. Consequently, there are several studies or methodologies proposed and used through the years. We are of the opinion that the current description is not providing enough information for the reader to understand the character of the methodology that has been used here. In-

deed, this information is available indirectly via the reference to the CMSAF paper by Kaspar et al (2009) but we think it would be appropriate to add more relevant references here in order to acknowledge the algorithm development effort being conducted by EUMETSAT under the auspices of the Satellite Application Facility for support to Nowcasting applications (NWCSAF). Especially, it should be mentioned that the underlying algorithm is the NWCSAF PPS (Polar Processing Package) as described by (Dybbroe et al., 2005).

2. A particular weakness of the paper is that it basically reports results that have already been published regarding the performance of the CMSAF scheme in Arctic conditions. A comprehensive study comparing PPS results to CALIPSO observations over the Arctic region was previously published by Karlsson and Dybbroe in ACP in 2010. The results published here (e.g. in Figures 2 and 3) just repeat them. The only new thing here is that a later period is covered (2009) while the study by Karlsson and Dybbroe was made in 2007. So, if retaining this part of the study, the authors should point at the fact that previous results of Karlsson and Dybbroe (2010) are confirmed.

3. Authors rightfully mention the different character of the three investigated cloud datasets. Especially cloud detectability aspects are important as mentioned. However, regarding the ERA-Interim dataset we miss a corresponding discussion about how clouds are defined or described from model data. Especially, we suspect that the high cloud amounts reported by ERA-Interim might be explained by the fact that there are no restrictions at all in how thin clouds may be (i.e., no particular detection limit as for both active and passive instruments). For example, some models may report a finite cloud fraction even if the total cloud condensate is very small. Thus, to compare with satellite or other observational datasets one should consider performing some kind of filtering of the thinnest clouds to avoid comparing apples and pears (see discussion in Karlsson et al, 2009). Furthermore, since the ERA-Interim cloud dataset is basically a forecasted (12 or 24 hour forecasts) dataset and not an observed dataset (i.e., no cloud information is currently directly assimilated by ECMWF data assimilation systems), we

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might also expect somewhat larger discrepancies from true cloud conditions for this reason which could be related to systematic biases in the modelled cloud fields.

We ask the authors to consider these aspects.

A final remark is that the CMSAF dataset used here is only a preliminary cloud climatology dataset. It was produced in near-realtime (i.e., shortly after the end of each month) meaning that appropriate calibration corrections were not applied to AVHRR radiances (since such corrections are not being available until after several years of analysis). In that context, we can mention that a fully consistent global dataset based on historic AVHRR data covering the period 1982-2009 will be released by the CMSAF in the beginning of 2012. We believe that in particular the cloud and surface albedo conditions in the polar summer (where AVHRR results are pretty reliable – as also indicated in the current manuscript) over the Arctic area will be interesting.

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PS. This comment is submitted on behalf of myself (Karl-Göran Karlsson) and my colleagues Adam Dybbroe and Abhay Devasthale at SMHI.

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