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Evaluation of Arctic cloud products from the EUMETSAT Climate Monitoring Satellite Application Facility based on CALIPSO-CALIOP observations

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Abstract. The performance of the three cloud products cloud fractional cover, cloud type and cloud top height, derived from NOAA AVHRR data and produced by the EUMETSAT Climate Monitoring Satellite Application Facility, has been evaluated in detail over the Arctic region for four months in 2007 using CALIPSO-CALIOP observations. The evaluation was based on 142 selected NOAA/Metop overpasses allowing almost 400 000 individual matchups between AVHRR pixels and CALIOP measurements distributed approximately equally over the studied months (June, July, August and December 2007). Results suggest that estimations of cloud amounts are very accurate during the polar summer season while a substantial loss of detected clouds occurs in the polar winter. Evaluation results for cloud type and cloud top products point at specific problems related to the existence of near isothermal conditions in the lower troposphere in the polar summer and the use of reference vertical temperature profiles from Numerical Weather Prediction model analyses. The latter are currently not detailed enough in describing true conditions relevant on the pixel scale. This concerns especially the description of near-surface temperature inversions which are often too weak leading to large errors in interpreted cloud top heights.

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