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Total and partial cloud amount detection during summer 2005 at Westerland (Sylt, Germany)

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Abstract. The detection of cloudiness is investigated by means of partial and total cloud amount estimations from pyrgeometer radiation measurements and visible all-sky imager observations. The measurements have been performed in Westerland, a seaside resort on the North Sea island of Sylt, Germany, during summer 2005.

An improvement to previous studies on this subject resulting in the first time partial cloud amounts (PCAs), defined as cloud amounts without high clouds calculated from longwave downward radiation (LDR) according to the APCADA algorithm (Dürr and Philipona, 2004), are validated against both human observations from the *National Meteorological Service* DWD at the nearby airport of Sylt and digital all-sky imaging. The aim is to establish the APCADA scheme at a coastal midlatitude site for longterm observations of cloud cover and to quantify errors resulting from the different methods of detecting cloudiness.

Differences between the resulting total cloud amounts (TCAs), defined as cloud amount for all-cloud situations, derived from the camera images and from human observations are within ± 1 octa in 72% and within ± 2 octa in 85% of the cases. Compared to human observations, PCA measurements, according to APCADA, underestimate the observed cloud cover in 47% of all cases and the differences are within ± 1 octa in 60% and ± 2 octa in 74% of all cases. Since high cirrus clouds can not be derived from LDR, separate comparisons for all cases without high clouds have been performed showing an agreement within $\pm 1(2)$ octa in 73(90)% for PCA and also for camera-derived TCA. For this coastal mid-latitude site under investigation, we find similar though slightly smaller agreements to human observations as reported by Dürr and Philipona (2004). Though limited to daytime, the cloud cover retrievals from the sky imager are not really affected by cirrus clouds and provide a more reliable cloud climatology for all-cloud conditions than APCADA.

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