

New methods for the evaluation of atmospheric models with satellite remote sensing observations.

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An important aspect in numerical weather prediction and climate modelling is the evaluation of modelled cloud fields. Recent progress in the temporal and spatial resolution of satellite remote sensing observations increases the value of such observations for evaluation efforts. We present new methodologies for the comparison of satellite remote sensing observations and output of atmospheric models. We utilised observations of the MODerate resolution Imaging Spectrometer and the Spinning Enhanced Visible and Infrared Imager to evaluate the Lokal Modell Kürzestfrist (LMK). The comparison relies on observations and output from June and July 2004 and on three case studies: a stratiform cloud case, a shallow convection case, and a thunderstorm case.

We newly introduce the patchiness parameter to characterise the horizontal structure of cloud fields. The parameter is well suited to separate different cases and to demonstrate differences between model and satellite. We introduce a new and widely applicable method to spatially aggregate cloud optical thickness. The comparison of cloud optical thickness revealed the inability of LMK to separate between the convective and stratiform cloud case. We propose a specific threshold to mask thin ice clouds in the LMK output to account for the inability of the satellites to observe such clouds.

First results of the long-term evaluation show systematic overestimations of cloud cover, in particular during morning hours. The comparison of brightness temperatures (BT) will not only rely on bias and root mean square error but also considers the probability density function after subdividing the data sets with regard to specific regions in phase space. Furthermore, BT forms the input of a tracking algorithm which allows the analysis of life time, origin, and path of convective cells. The results of the application of the algorithm to both data sets and its comparison will be presented.