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New methods for the evaluation of low-level clouds in atmospheric models using ground-based remote sensing applied to the BALTEX Bridge Campaign cases

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In recent years, new remote sensing observations have become available for the evaluation of atmospheric models. At observational sites (e.g. the Atmospheric Radiation Measurement (ARM) site, Cabauw, Lindenberg) a large number of advanced active (e.g. radar, lidar) and passive (radiances from visible to microwave) sensors are continously operated. These instruments provide detailed information on the vertical distribution of hydrometeors. In this presentation we illustrate how these new ground based remote sensing data can be used for evaluation of Numerical Weather Prediction models, using data from the BALTEX Bridge Campaigns (BBC). We show results for two cases, with shallow low-level clouds having a substantial amount of liquid water. These cases were selected for the World Meteorological Organization (WMO) cloud-modeling workshop 2004. Measurements from the Cabauw Experimental Site for Atmospheric Research (CESAR, located in the Netherlands) are compared with the 36-hour forecasts of six regional atmospheric models, namely Méso-NH, MM5, Lokal-Modell, (non-hydrostatic models); RACMO1, RACMO2 and RCA (hydrostatic climate models). The analysis indicates that Méso-NH and MM5 represent the vertical extent of the shallow clouds well, but that the Lokal-Modell and to a lesser extent Méso-NH underestimate the lifetime of clouds. In the climate models, the vertical extent of the clouds and the liquid water path are found to be overestimated for these two cases.