Evaluation of ice clouds in COSMO-DE with satellite observations

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Ice clouds have a large impact on the Earth´s climate system due to their effects on the global radiation budget. A good description of ice clouds is therefore a major challenge for both climate and numerical weather prediction (NWP) models. Meteosat Second Generation (MSG) Spinning Enhanced Visible and InfraRed Imager (SEVIRI) observed brightness temperatures (BTs) at 10.8 µm are a good indicator for clouds at a spatial and temporal coverage suitable for assimilation in NWP. The regional NWP model COSMO-DE of the Deutscher Wetterdienst (DWD) is known to produce a bias concerning the occurrence of low BTs at this frequency (e.g., *Böhme et al., 2011*). The question is, whether this bias is due to deficiencies in the model's representation of high clouds, or rather an effect introduced by coupling with the radiative transfer model RTTOV with which the model's BTs are computed. In order to solve this issue, we make use of CloudSat Cloud Profiling Radar (CPR) and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) Cloud-Aerosol LIdar with Orthogonal Polarization (CALIOP) observations, which offer the so far unique opportunity to vertically resolve clouds from space. We evaluate the model's performance concerning the representation of ice clouds in general and cloud top in particular, with the overall goal of improving the microphysical parameterization of the model. To this end, the performance of different microphysical schemes (one-moment, two-moment) is compared.