

Long-term evaluation of NWP water vapor and cloud forecasts:  
How does the COPS period relate to the GOP data set?

Selbach, Christoph, Thorsten Reinhardt, and Susanne Crewell  
Institute for Geophysics and Meteorology, University of Cologne  
email: [treinhar@meteo.uni-koeln.de](mailto:treinhar@meteo.uni-koeln.de)

In addition to the COPS field experiment a second experimental effort, the General Observation Period (GOP; <http://gop.meteo.uni-koeln.de>), took place in 2007/2008 as part of the German priority program on Quantitative Precipitation Forecasting. In contrast to COPS the GOP focused on larger domains (central Europe) and on instrumentation (satellites, micro rain radar, ceilometer, GPS, ground-based supersites) that can provide long-term continuous observations allowing statistical robust model evaluation.

Here we will focus on a long-term evaluation of integrated water vapour (IWV) and cloud base heights derived from the output of DWD's regional NWP models COSMO-DE (2.8 km mesh size, convection-permitting) and COSMO-EU (7 km mesh size, parameterized convection). Observations include the GPS network for IWV and ceilometer observations at about 80 stations in Germany. For the latter, the model output has to be carefully matched with the observations. The evaluation is restricted to cloud base heights < 3000 m to exclude dubious observations of high-altitude and ice clouds.

The evaluation fully exploits the lagged forecast ensemble of model runs started every three hours with 21 hours forecast time. Dependences on region, time of the day, season, lead time of the forecast, and model starttime are shown. The results include e.g. that (i) both models in winter and COSMO-EU also in summer underestimate cloud base height slightly, while COSMO-DE in summer overestimates cloud base height by 100-150 m, that (ii) on average cloud base height is higher in COSMO-DE than in COSMO-EU, and that (iii) sites near the North Sea show in all seasons a much higher bias than other sites. A further comparison with IWV reveals a negative correlation of IWV bias and cloud base height bias in winter while in summer no correlation is found.

In this presentation we will specifically address the question how the model forecasts within the COPS period and region relate to the broader GOP perspective. In this context we will also analyse the performance of the COSMO models during COPS Intensive Observation Campaigns (IOPs) relative to the whole data set.