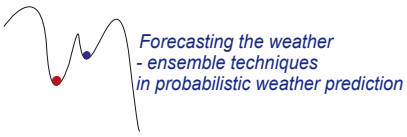
EMS Annual Meeting Abstracts
Vol. 8, EMS2011-609, 2011
11th EMS / 10th ECAM



COSMO-FOG: numerical short range fog forecast and low clouds with a three-dimensional fog forecast model

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The presence of fog and low clouds in the lower atmosphere can have a critical impact on both airborne and ground transports and is often connected with serious accidents. An improvement of localisation, duration and variations in visibility therefore holds an immense operational value for the field of transportation in conditions of low visibility. However, fog is generally a small scale phenomenon which is mostly affected by local advective transport, radiation, turbulent mixing at the surface as well as its microphysical structure. Therefore, a detailed description of the microphysical processes as well as adapted turbulence parameterisation within the three-dimensional dynamical core of the forecast model is necessary.
For this purpose, the three-dimensional fog forecast model, COSMO-FOG, with a high vertical resolution with different microphysical complexity has been developed. COSMO-FOG includes a microphysical parameterisation based on the one-dimensional fog forecast model. The implementation of the cloud water droplets as a new prognostic variable allows a detailed definition of the sedimentation processes and the variations in visibility. Moreover, the turbulence scheme, based on a Mellor-Yamada 2.5 order and a closure of a 2nd order has been modified to improve the model behaviour in case of a stable atmosphere structure, occurring typically during night radiative fog episodes.

In some realistic fog situations the potential of COSMO-FOG will be presented. The fog spatial extension will be compared with MSG satellite products for fog and low cloud. It will be shown that the initialisation and the interaction between the earth's surface and the atmosphere is one of the most important issues for reliable fog forecasts.