



## **Introducing a nudging system for the one dimensional fog model PAFOG**

Christina Thoma and Andreas Bott

Meteorological Institute, University of Bonn, Germany (thoma@uni-bonn.de)

Reduced visibility due to heavy fog is a hazard for land, sea, and air traffic. Especially for air transportation systems, reduced visibility may lead to significant expenses. Therefore, it is of particular importance to accurately predict low visibility fog events at airports.

In the research project iPort-VIS, part of an aviation research program funded by the German Ministry for economy and technology, a site specific fog forecast system for Munich airport will be developed in cooperation between the German Meteorological Service (DWD), the Deutsche Flugsicherung GmbH (DFS) and the University of Bonn. The principal component of this forecast system is the one dimensional fog forecast model PAFOG (parameterized fog) that will be upgraded for operational use.

Since fog is a complex small-scale phenomenon with high spatial and temporal variability, detailed knowledge of the atmospheric boundary layer structure is fundamental to obtain a realistic fog forecast. For this purpose, a time nudging scheme has been developed that integrates local atmospheric information periodically during the forecast by pushing the model profiles into the direction of the actual local profiles. For one dimensional fog models, this kind of data assimilation is a new approach. Several case studies have shown that significant better results can be achieved with the nudging system. The scheme can run in two different modes: if direct observations from a measurement tower at the airport site are available, a very detailed description of the lowest atmospheric layers is achieved, however nudging can only be applied to the recent past. In order to perform nudging during the whole forecast time, PAFOG uses the profile information from the operational weather forecast model COSMO-DE of the DWD. In this case, a special check of the corresponding COSMO forecast is applied in order to guarantee a high quality of the PAFOG forecast with nudging.

In this talk, the nudging scheme will be introduced and results of PAFOG simulations with the new model feature will be presented. Special emphasis will be laid on the different characteristics of nudging with direct observations and nudging with profile data from the COSMO-DE model.