Meteorological Case Studies of In-Flight Icing Forecast by ADWICE over the Eastern US

European Conference on Applications of Meteorology, EMS Annual Meeting, 11th EMS / 10th ECAM, Session AM6 Maren Weismüller, Jakob Tendel, Institut für Meteorologie und Klimatologie, Leibniz Universität Hannover Herrenhäuser Strasse 2, 30419 Hannover, Email: weismueller@muk.uni-hannover.de, Telefon: 0511-762-4101

Purpose: Evaluation of the originally Europe based forecast system ADWICE with Pilot Reports over the Eastern US.

Methods: The German forecast system ADWICE, which uses model data from the weather forecast model COSMO-EU to produce a forecast, was run over the Eastern US. The forecast, which discriminates between four scenarios about the formation of supercooled liquid water, was compared to pilot reports (PIREPs) over the same area to evaluate the forecast made by ADWICE for three days. On those days different synoptic situations occurred and the mechanisms of the forming of supercooled water were different. The intention was to compare how ADWICE and COSMO-EU handled the different situations.

January 6th, 2010

to forecast icing.

Definition: Aircraft Icing

Weather is a risk factor for aircrafts. One of the dangers is aircraft icing. Supercooled liquid water

in the atmosphere can freeze on the surface of the

aircraft and thus change the aerodynamical shape.

This leads to disturbance of the airflow around the

aircraft and reduces the lift. To reduce the risk and

avoid delays and the resulting costs, it is necessary

On the 6th of January, stratiform icing prevailed, which was forecast correctly by ADWICE. The forecast soundings were close to the observation, but the inversion was forecast too low, so there were stratus clouds and therefore icing in heights where no icing was predicted. The medium to severe icing in the area of the Great Lakes was not observed at the locations where it was predicted, but there was light icing forecast over the whole area, so at least some icing was predicted. The ROC-curve does not show a good result for this day. It proves that the forecast is not better than a random forecast.





Calculated by DWD



ROC-Kurve 20100106

Surface Weather Map of 06.01.2010





ADWICE max. Intensity of 06.01.2010



February 05th, 2010

On the 5th of February, the forecast by ADWICE was mostly correct. An area, where the forecast was wrong, was the Great Lakes. There, ADWICE predicted a wide area, in which freezing rain occurs. This Was proven wrong by the PIREPs and the soundings. The temperature in the soundings was slightly lower than the forecast temperature, so there was no melting layer and snow occurred instead of freezing rain. This is an example how small variations in temperature can have great influence on the quality of the forecast. Nevertheless, the ROC-curve shows a relatively good result for this day



February 15th, 2010 On the 15th of February, the ROC-curve shows the best results of the three days. The icing, which occured in connection with the low ROC-Curve of pressure system over Ohio 15.02.2010. 06-18 UTC and the corresponding front Surface Weather Map of 15.02.2010 systems, was forecast correctly. North of the front, problems occured. In the vicinity of the Great Lakes, a humid layer was not recognized, therefore observed icing was not forecast. ADWICE max. Intensity of 15.02.2010 Distribution of PIREPs of 15.02.2010 Conclusion

It was found that the forecast of the sounding is extremely important for the correct forecast of icing. Where the soundings are forecast correctly, the forecast of icing is correct too. Where the soundings are forecast incorrectly, it is not possible for ADWICE to forecast icing correctly. The areas, in which ADWICE forecast no icing were usually ice-free. There are many areas though, where icing was forecast but not observed. It was not examined whether the negative reports were at the same height as the forecast icing, therefore it was not possible in this study to determine if ADWICE tends to overforecast.

References:

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Acknowledgment:

- German Weather Service for the
- sponsorship of the project
- National Center for Atmospheric Research
 - for the workstation and the PIREP Data

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