

New low-cost aircraft observations for improving weather forecasts

Summary

This collaborative research investigated a novel source of atmospheric measurements, determined from reports automatically exchanged between aircraft and air-traffic control, providing low-level information close to airports to improve forecasts of local conditions, such as fog and low-level turbulence.

Why?

Agreements with commercial airlines already provide useful but infrequent data. This innovative work expands on aircraft as a data source by using existing air traffic management communications to determine the ambient temperature and wind at the aircraft's location. To add new and frequent observations from this system could improve computer simulations and help meteorologists provide more accurate localised short-term predictions.

How?

Analysis of the air-traffic communications provided the ambient wind and temperature at the aircraft's position. The new data source was trialled in the kilometre-scale UK Met Office model after a thorough evaluation of the errors, essential for using the measurements correctly. Additionally, reports from many aircraft were aggregated to construct vertical profiles of temperature for use by forecasters.

What now?

This research improves our ability to forecast the weather by efficiently exploiting existing technologies and establishing the error ranges on the new data to ensure best use alongside other sources. The aircraft wind observations have been used for the Met Office hourly weather forecasts since March 2019.

Reference

Mirza AK, Ballard SP, Dance SL, Rooney GG, Stone EK. Towards operational use of aircraft-derived observations: a case study at London Heathrow airport. *Meteorol Appl.* 2019; 1– 14. [doi:10.1002/met.1782](https://doi.org/10.1002/met.1782)



Photo: aircraft over London

The DARE project aims to produce a step-change in the skill of forecasts of urban natural hazards by combining novel observations with data from state-of-the-art computer models. Our work allows us to understand uncertainties of new observational data for inclusion in the forecasting process.



Further information

More on using aircraft winds:
[see this Met Office article.](#)

Contact

Sarah Dance

s.l.dance@reading.ac.uk

