



Quantifying increased aircraft take-off distances under climate change at European airports

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Climate change is already having a noticeable effect on various aspects of air travel, such as reduced take-off mass, increased required runway length, and more severe clear-air turbulence. In this work, we present results delivered as part of the European Union-funded AEROPLANE (Advancing Measures to Reduce Aviation Impact on climate and enhance resilience to climate-change) project.

Using bias-corrected future simulations of the period 2035-2065 from an ensemble of climate models from the 6th Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) – as well as historical data from the same models – we will discuss our initial findings on how take-off distance required is projected to change in the future for 30 European airport locations.

This work considers the annual average changes that may occur as well as summer and winter seasonal means. Furthermore, the use of multiple climate models and future emissions scenarios allows a comprehensive exploration of uncertainties in model performance and future greenhouse gas emissions pathways.

The data generation pipeline for the bias correction and downscaling of CMIP6 data will be briefly described, followed by a discussion of the calculation of required take-off distance, and some example results from specific airports representing the limits of expected change.

This work has particular important implications for future runway building schemes and planning for future fuel usage. Moreover, it highlights potential secondary consequences for noise pollution during a flight's take-off phase.