A new algorithm improves flight safety and reduce delays

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Credit: Universidad Carlos III de Madrid

The Universidad Carlos III de Madrid (UC3M) has taken part in the European research project TBO-Met, which has developed an algorithm that maximises the predictability of flights and reduces the risk of running into potentially dangerous storms. Thanks to this, safety can be improved, air traffic can be increased and delays can be reduced.

Even with the help of the latest advances in weather forecasting technology, the weather can be difficult to predict. This poses a problem for the management of flights, which requires efficient forecasting in order to be able to guarantee a smooth flow of traffic. The scientists on the TBO-Met project (Meteorological Uncertainty Management for Trajectory Based Operations) have developed an algorithm that is applied to the flight plan and allows air traffic to be predicted and improved by taking into account the uncertainties of the weather forecast. This advance increases the system's ability, to handle a greater number of planes at one time.

"The impact of the weather forecast and the uncertainty associated with aviation is very high. It is estimated that between approximately 20 and 30 per cent of delays in Europe are related to the weather, with estimated losses of around 180-200 million euros a year," explains lecturer Manuel Soler Arnedo, head of the TBO-Met project at the UC3M. In fact, in just 2017, losses of 215 million euros were estimated for the 2.1 million minutes of delay time caused by extreme weather conditions.

TBO-Met's aim is to optimise the trajectories of aircraft in order to avoid problems with flight safety and delays. For this, meteorological uncertainty has been studied—weather conditions that are difficult to predict, such as hail, severe ice build-up and lightning, which can cause considerable damage to aircrafts. The project is focused on understanding, characterising and reducing uncertainty. For this, the researchers focused on the analysis of sector demand in terms of the number of planes that should be operating, and trajectory planning, taking into account the uncertainties of the weather forecast and storm activity.

Provided by Carlos III University of Madrid