



## **Title: Aviation turbulence in a warmer world**

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Clear-air turbulence is a major meteorological hazard to the aviation sector. Previous research at the University of Reading has revealed how climate change is increasing this turbulence. We know that severe clear-air turbulence has increased substantially since satellites started observing the atmosphere in 1979 with, for example, a 55% increase over the North Atlantic. This increase is projected to continue into the future, with a doubling or trebling expected by the period 2050-2080.

The increase in turbulence has consequences for aircraft design. The lifecycle of aircraft models is such that the aircraft that will be flying in 2050-2080 are currently in the design stage. Aircraft manufacturers (such as project co-sponsor Airbus) require that future aircraft can withstand the more turbulent atmosphere they will be flying through. Aircraft are currently designed and certified using a gust excitation intensity model derived from atmospheric measurements made in the 1960s and 1970s. Due to climate change, the gust perturbation is projected to intensify. The impacts of the turbulence increase from climate change on the gust model have not previously been investigated, however.

This project will combine aircraft gust data from Airbus with atmospheric models to build an updated gust event statistics model that captures atmospheric behaviour today and how it will change in the future. The new model will be used by aircraft designers and manufacturers to protect future aircraft design and improve aircraft fatigue maintenance. It could also be used by aviation safety regulators to modify aircraft certification envelopes.

### **Training opportunities:**

This project is a new collaboration between the University of Reading and Airbus. It is envisaged that the student will undertake one annual visit to Airbus in Toulouse. The visits will each be of up to one week in duration. During the visits, the student will liaise directly with their Airbus supervisors to focus on the applied aspects of their project. These visits present an excellent opportunity for the student to gain experience in working in an industrial setting.

### **Funding particulars:**

This project is co-funded by Airbus.