Small changes to airline routes could have big climate impact

By Rich Haridy March 3rd, 2017 newatlas.com

Simply altering our flight routes could reduce the airline industry's impact on climate change by up to 10 percent

An international research team has published a study claiming that airlines could significantly reduce their impact on the climate through implementing minor changes to some flight routes. Although the proposed changes would only increase airline operating costs by around 1 percent, their impact on the climate could be reduced by up to 10 percent.

Since high-altitude airliners release emissions near or in the stratosphere, researchers have long concluded that their effects on anthropogenic climate change are more significant than if the same emissions were released on the ground.
Generally, emissions weighting factors calculate that aviation CO2 emissions are around twice as damaging as equivalent land-based emissions. In addition to CO2 emissions, the aviation industry emits several other greenhouse gases that result in higher climate impacts due to their high-altitude releases.

A new study, conducted by a team with members from the University of Reading's Meteorology Department, the DLR Institute of Atmospheric Physics in Germany, Eurocontrol in Brussels, and the Center for International Climate and Environmental Research (CICERO) in Oslo, shows that by dynamically examining flight routes and identifying where emissions are having the greatest effect, the overall impact of aviation on climate change could be reduced by up to 10 percent.

"Aviation is different from many other sectors, since its climate impact is largely caused by non-CO2 effects, such as contrails and ozone formation," lead author in the study, Volker Grewe explains. "These non-CO2 effects vary regionally, and, by taking advantage of that, a reduction of aviation's climate impact is feasible. Our study looked at how feasible such a routing strategy is. We took into account a representative set of weather situations for winter and summer, as well as safety issues, and optimized all trans-Atlantic air traffic on those days."

The team used emission calculations and air traffic simulations spanning 400 flights across 85 routes over the North Atlantic to show that across all-weather conditions, flight paths could be optimized to result in reduced impact of emissions, while altered flight paths would only result in additional operating costs of 1 percent to the airlines.

There are undeniably several uncertainties that would need to be overcome before any pragmatic implementation of climate-optimal routing could be enacted. The research team, fully aware of the hurdles admitted, "The concept of climate-optimal routing is not mature enough to be directly implemented in the real world."

They noted issues surrounding air traffic management, costs for airlines, and the need for greater scientific certainty in their estimations, as major hurdles to overcome in the coming years. Professor Grewe explained that before any movement towards realistically implementing these ideas, "the calculation of the climate-change functions must be robust, and fast enough to become operational, and we must have high confidence in the forecast weather conditions."

If these issues can be resolved, the research points to a relatively simple and low-cost way to reduce the climate impact of an industry that is only getting bigger from year to year.

The team's study appears in the journal Environmental Research Letters.

Source: University of Reading