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research highlights

BIOFUELS

In-flight insights

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Biofuels are potential replacements for the fossil fuels used in the aviation industry. In addition to having the benefit of being derived from renewable resources, biofuels also have the advantage of containing lower amounts of sulfur and aromatic species. As a result of this, ground-based studies have shown that engines running on biofuels emit lower amounts of sulfates and black carbon particulates, suggesting that their use may be less detrimental to air quality than their conventional fuel counterparts. However, in-flight engine and atmospheric conditions at high altitudes can differ significantly from those on the ground meaning that the quantitative effect of using biofuels instead of conventional fuels in aircraft has remained unclear. Now, Richard Moore and colleagues across North America and Europe measure the emissions from a plane flying at cruise conditions, finding reductions of 50–70% in aerosol particle emissions when burning a blend of conventional jet fuel and biofuel relative to a purely conventional jet fuel.

Moore and colleagues used research aircraft to sample the exhaust coming from the engines of a NASA DC-8 aircraft at a distance of 30–150 m. The DC-8 aircraft had four engines that could be fed fuel from different tanks containing either conventional Jet A fuel or a 50:50 (by volume) blend of Jet A fuel and a biojet fuel produced by hydroprocessing esters and fatty acids found in camelina oil. This arrangement allowed the emissions produced from burning both fuels to be sequentially probed during a single flight. The observations suggest that biofuels may indeed have environmental benefits over conventional fuels in terms of reduced aerosol emissions, while the data collected on the microphysical properties of the emissions may prove useful in future studies assessing the impact of biojet fuels on climate change.

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