The Global Voice of Pilots
IFALPA

POSITION PAPER

22POS04
1 September 2022

Operational Opportunities to Reduce the Impact of Contrails and Aircraft-Induced Cirrus

INTRODUCTION

Growing scientific evidence indicates that contrails, and especially aircraft-induced cirrus, have a significant overall warming effect. Chemical and physical processes can lead to contrail plumes and cirrus, depending on local atmospheric conditions (humidity and temperature), and on engine emissions (particulate matter – nvPM and water).

The net warming or cooling effect, expressed in effective radiative forcing, depends on the time of day, seasonal changes in meteorology and radiation, and on background cloud fields. They will be in general warming across the day, especially during wintertime, close to the tropopause.

The key difference between CO_2 and contrails is that while CO_2 will have an impact in the atmosphere for hundreds of years, the impact of contrails is short-lived and could therefore be reduced quickly.

Emission standards do not take contrail formation into account. Operational measures, such as tactical (real time) and strategic (planning) avoidance of these critical locations and timing, may prove beneficial. A relatively small change in altitude may reduce the contrails significantly. Interdependencies on fuel use, flight time diversion, and airspace capacity must be assessed.

ICAO

The Impact and science Group (ISG) of ICAO's Committee of Aviation Environmental Protection (CAEP) is compiling research data and evidence on the contrail effective radiative forcing and is assessing the impact of new engine and fuel certification criteria and SAF implementation on the likelihood of persistent contrails.

Another group, the ICAO CAEP Working Group Operations, will assess the operational opportunities to avoid these impacts and the possible interdependencies with flight time, fuel use, and airspace capacity.

ISSUES

- Uncertainties of the overall effective radiative forcing of contrails
- Uncertainties of contrail formation, and on the likelihood of persistent aircraft-induced cirrus
- Insufficient modeling and forecasting
- Impact of intervention on fuel use, flight diversion time, and airspace capacity
- Impact on flight operations
- Tactical vs strategic interventions
- Impact of future use of cleaner SAF

HIGH LEVEL PRINCIPLE

IFALPA will contribute to the industry's efforts to minimize the environmental impact of commercial aviation. IFALPA believes that the aviation industry, while continuing to pursue the highest level of aviation safety worldwide, should be environmentally, economically, and socially sustainable.

Measures to reduce the environmental impact of commercial aviation must balance technological and operational feasibility, fair economic principles, and environmental benefits, while ensuring that safety is not compromised.

IFALPA POSITION ON CONTRAILS

- IFALPA calls for more research and trial data to confirm and deepen the scientific understanding of the net radiative force and the appearance of contrails and persistent aircraft-induced cirrus, without delay.

- IFALPA calls for better modeling to predict the formation of contrails and persistent aircraft-induced cirrus with more reliability and precision.

- The critical areas and time of day should be identified with the highest degree of precision to minimize the impact on flights. The few flights that cause most of the contrails and warming effect should be targeted.

- IFALPA aims at strategic avoidance, in the planning phase, of these Ice Super-saturated Regions (ISSR) in preference to in-flight tactical interventions.

- The impact on flight efficiency, flight time, fuel use, and airspace capacity should be assessed.

- Promotion and/or compensation via equivalent CO_2 offsetting should be investigated.

- Future fuels and sustainable aviation fuels may produce fewer particulates which will likely reduce the formation of contrails.

REFERENCES

1. The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018, Lee a.o. 2020
2. FRAeS reports from the RaeS, Mitigating the climate impact of non-CO_2 – Aviation's low-hanging fruit, virtual conference, March 2021, J. Green
3. Tackling the non-CO2 cloud on the horizon, Jarlath Molly, 2021
4. Aviation contrail climate effects in the North Atlantic from 2016-2021, Teoh a.o. 2022
5. Air traffic and contrail changes over Europe during COVID-19: a model study, Schumann a.o. 2021
6. ICAO CAEP WG2/1 TG 7 Operational Opportunities to Reduce Contrails
7. EASA report on aviation's non-CO2 climate impacts, 2020