Brief summary of the topics presented at the ICAO Symposium on Non-$C0_2$ Aviation Emissions

14 de noviembre de 2024

Ricardo Dupont– ANAC Brasil

meioambiente@anac.gov.br

Agenda

Non-CO2 emissions and climate

Uncertainties

Contrails

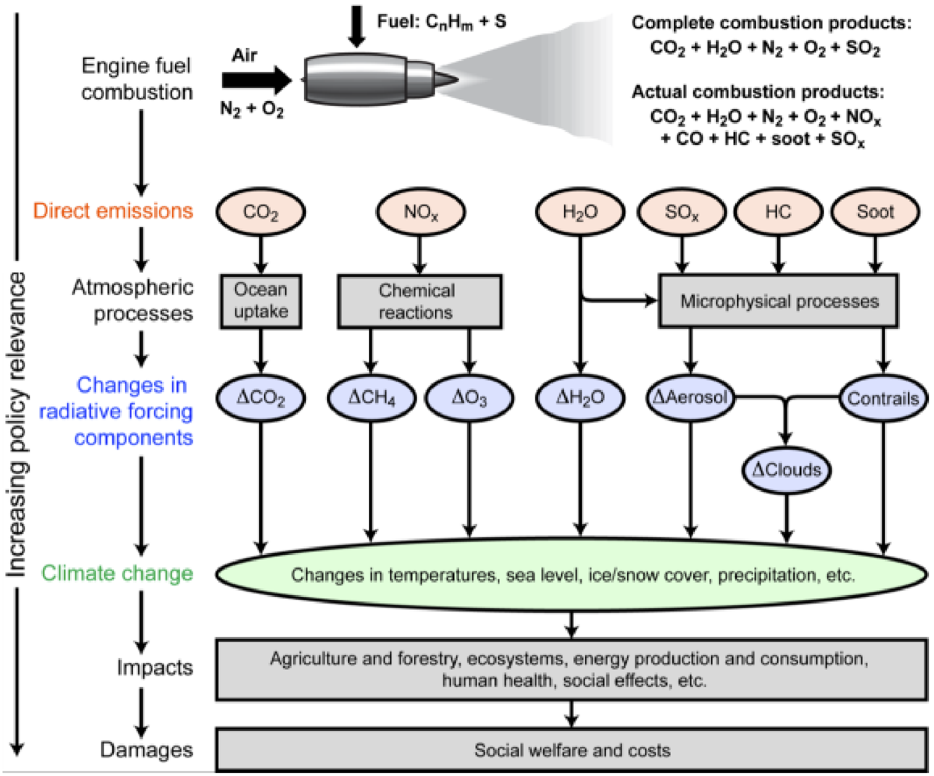
- Potential measures to address the matter

Highlights

Non-CO2 emissions and climate

What are ‘non-CO_2 emissions’? (as distinct from ‘effects’)

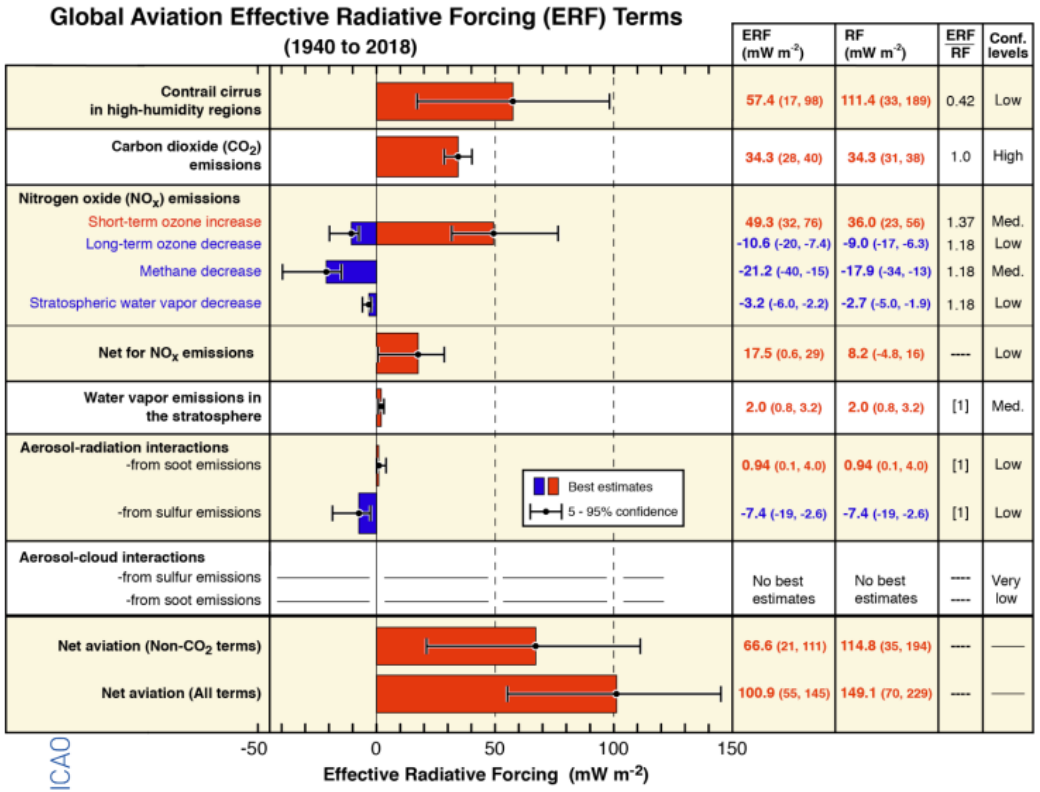
Aircraft emissions and climate change



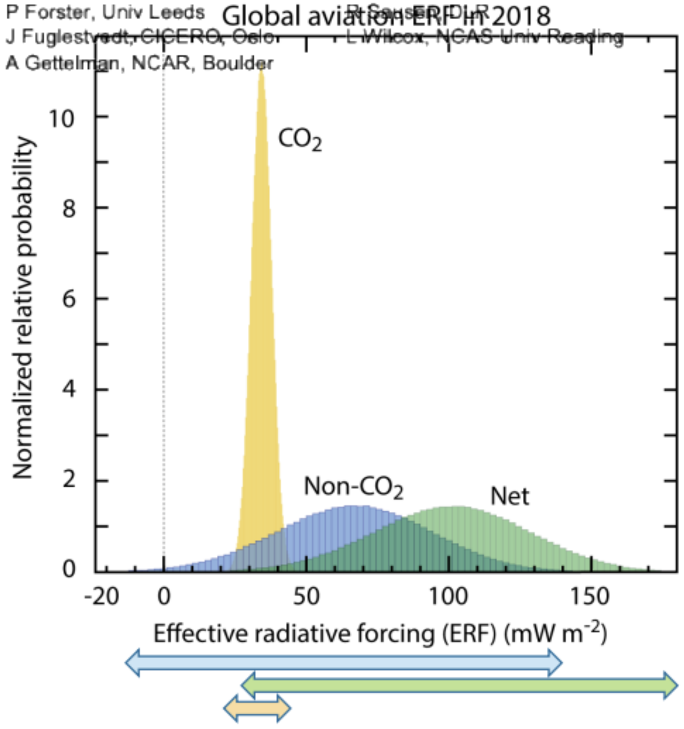
Lee et al. (2009), based on Prather et al. (1999) and Wuebbles et al. (2007)

https://authoring2013.icao.int/Meetings/SymposiumNonCO2AviationEmissions2024/Documents/1-%20David%20Lee%20PPT.pdf

Uncertainties



D S Lee, MMU
D Fahey, NOAA
A Skowron, MMU
M Allen, Univ Oxford
U Burkhardt, DLR
Q Chen, Peking Univ
S Doherty, CIRES, Univ Col
S Freeman, MMU
P Forster, Univ Leeds
J Fuglestvedt, CICERO, Oslo
A Gettelman, NCAR, Boulder
R De Leon, MMU
L Lim, MMU
M. Lund, CICERO, Oslo
R Millar Univ Oxford/CCC
B Owen MMU
J Penner, Univ Michegan
G Pitari, Univ l'Aquila
M Prather, Univ Irvine Cali
R Sausen, DLR
L Wilcox, NCAS Univ Reading

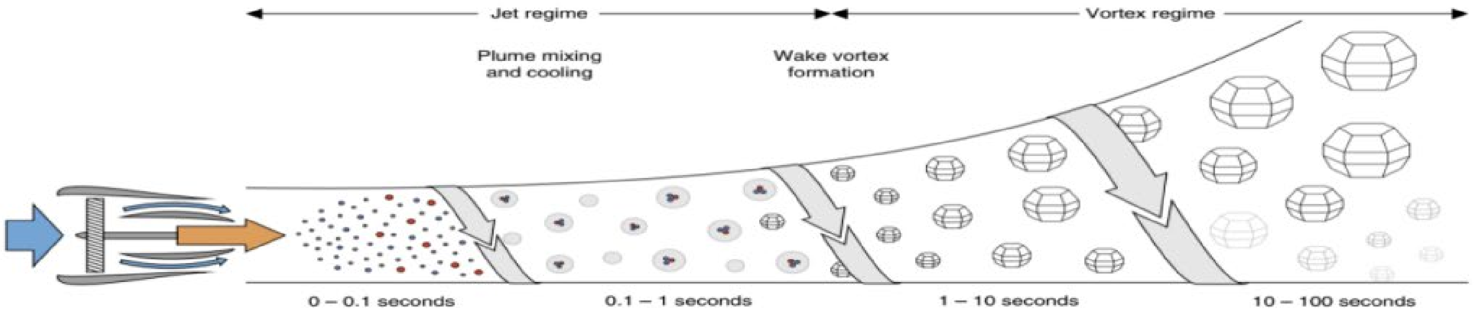


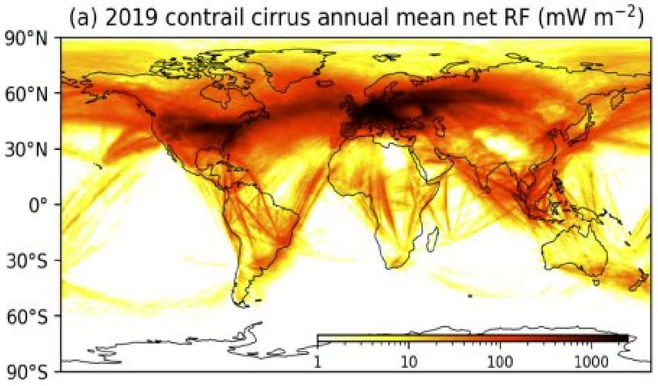
Lee et al. (2021) *Atmospheric Environment*

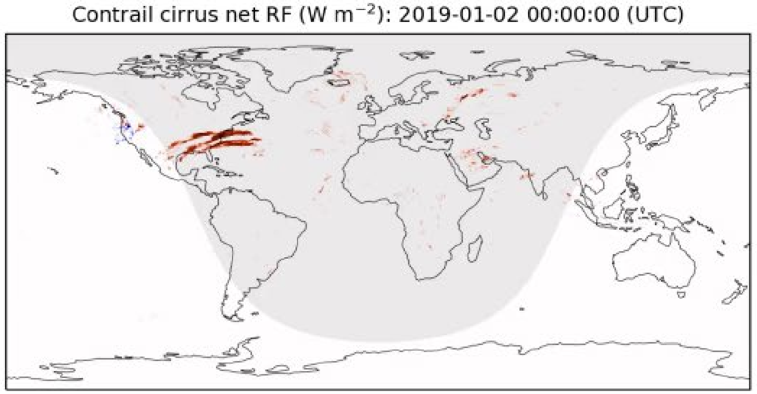
https://authoring2013.icao.int/Meetings/SymposiumNonCO2AviationEmissions2024/Documents/1-%20David%20Lee%20PPT.pdf

Contrails

Contrail formation and climate effect







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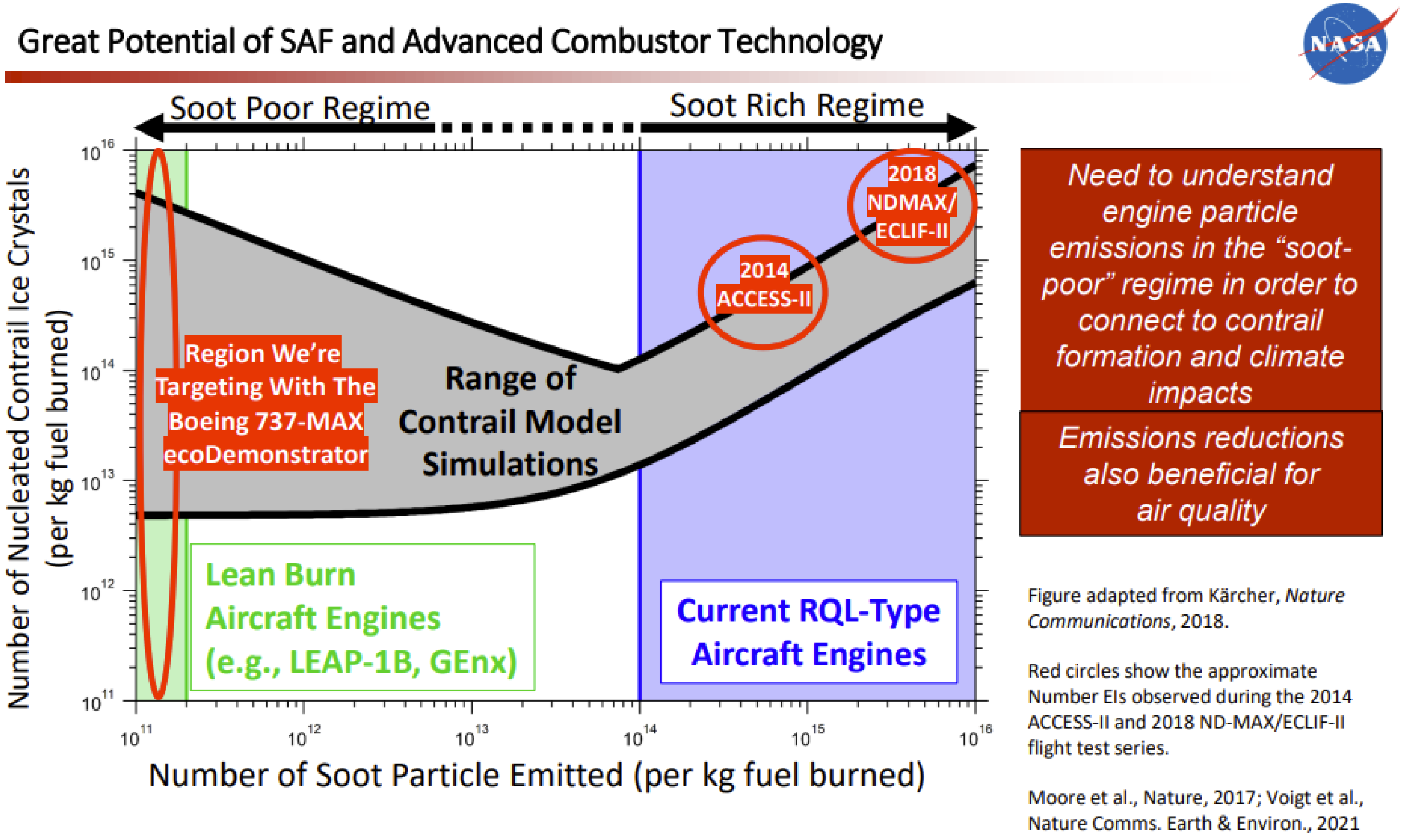
Kärcher et al., Nat Comm, 2018; Teoh et al., ACP, 2024

https://authoring2013.icao.int/Meetings/SymposiumNonCO2AviationEmissions2024/Documents/DLR_Christiane%20Voigt_NonCO2%20Symposium_2024_Panel1.pdf

Contrails

vPM role in contrail formation?



Rich Moore (NASA) TAC-5 talk 2022

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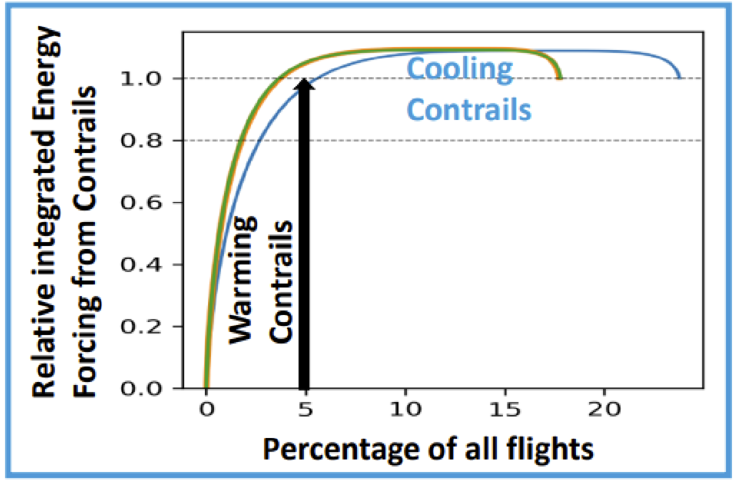
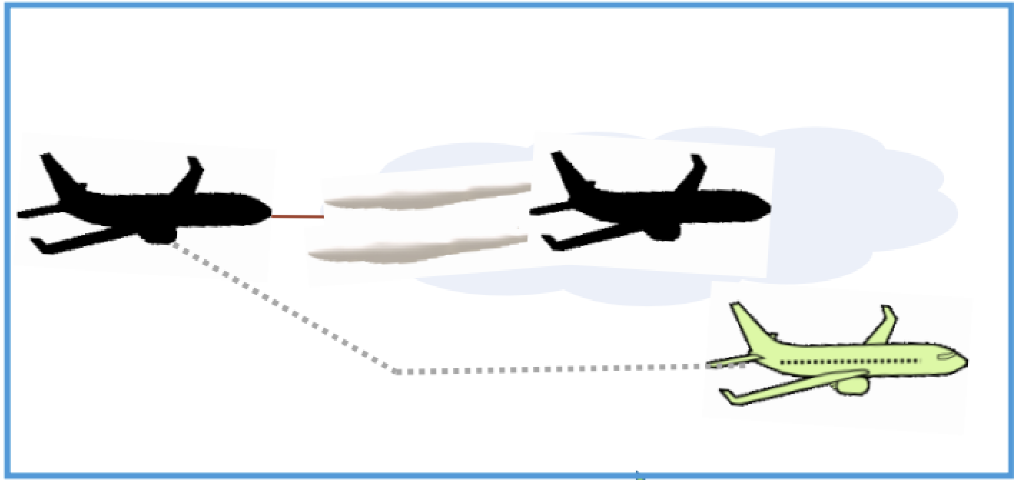
https://authoring2013.icao.int/Meetings/SymposiumNonCO2AviationEmissions2024/Documents/2-%20Miake-Lye%20vPM%20non%20CO2%20.1.pdf

Potential measures to address contrails

Potential for contrail reduction

(1) Short to mid term: Climate optimized flight routes to avoid contrails





More demonstration trails, weather and contrail model developments needed, satellite evaluation, CO2 offset needs to be calculated requires support from ATM, Airlines, stakeholders

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Teoh et al., ACP, 2022; 2023; 2024; Martin-Frias et al., 2024; Bourassa et al., 2024; Niklass et al., 2023; Grewe et al., 2019

Potential measures to address contrails

(2) SAF and engine technologies reduce CO_2 footprint and contrails

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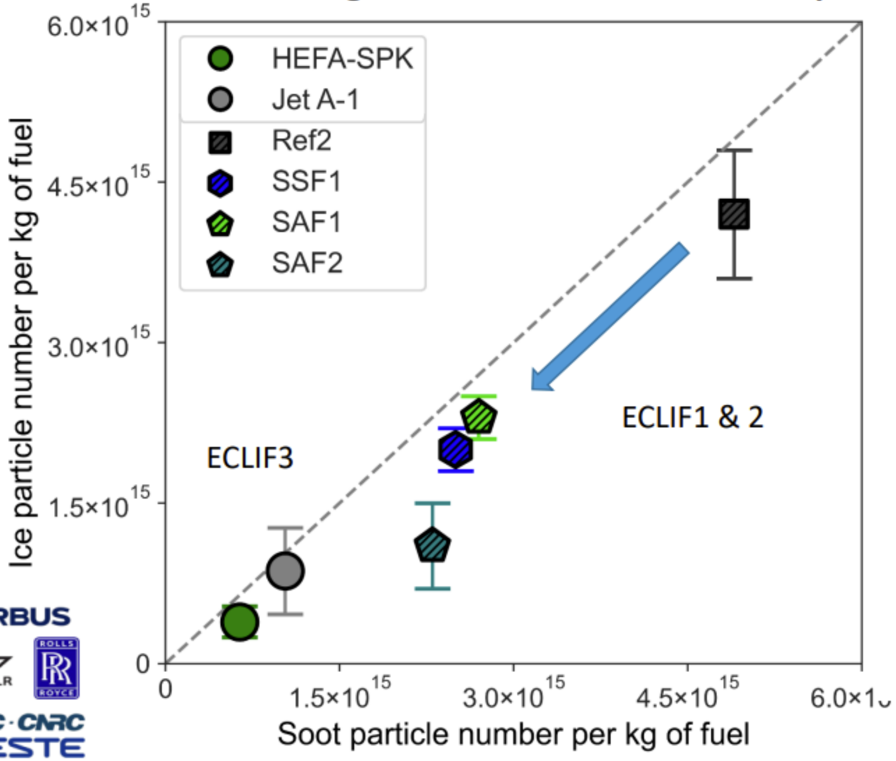
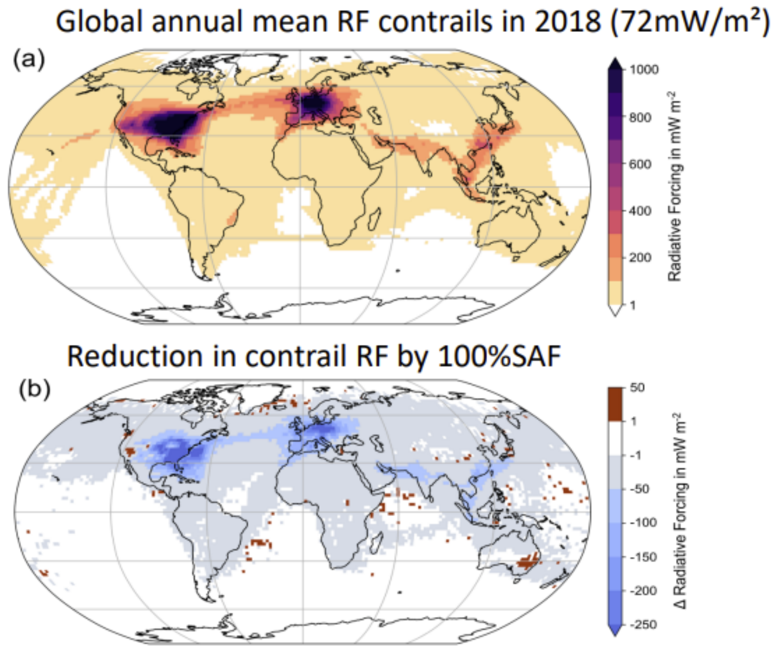
Low aromatic, high H fuels reduce soot and ice particles and the radiative forcing from contrails





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Moore et al., Nat., 2017; Voigt et al., Comm EE, 2021; Märkl et al., ACP, 2024, Dischl et al., Harlass et al., acc. ACP, 2024

Highlights

- Need for further research on cause and effect (e.g., vPM)
- Need to reduce uncertainties
- Potential opportunity on opperational measures, with associated consequences
- Regulations already put in place

Gracias
Thank you
Obrigado

meioambiente@anac.gov.br