

Aviation non-CO₂ climate science

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Jet Zero Council Steering Group, 11th April 2023

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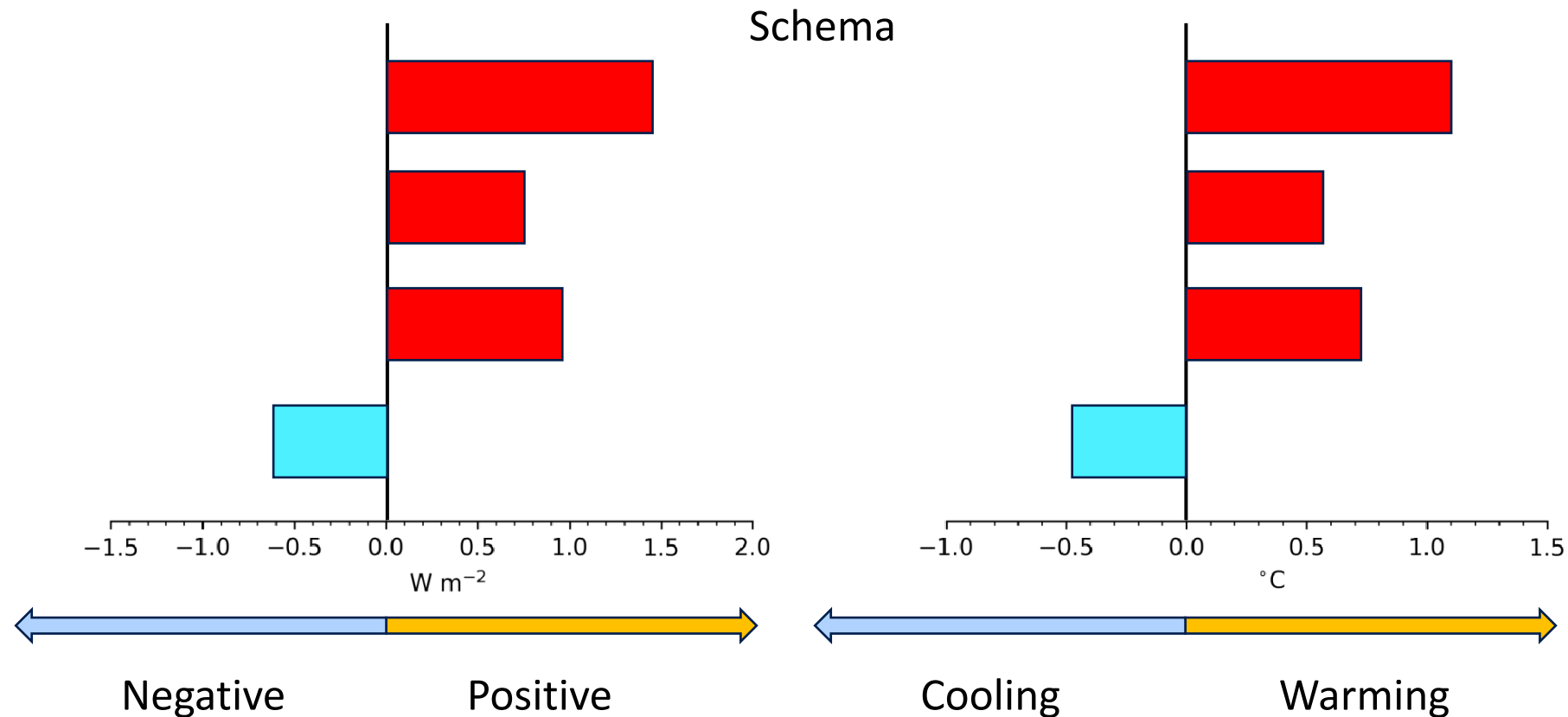




Outline

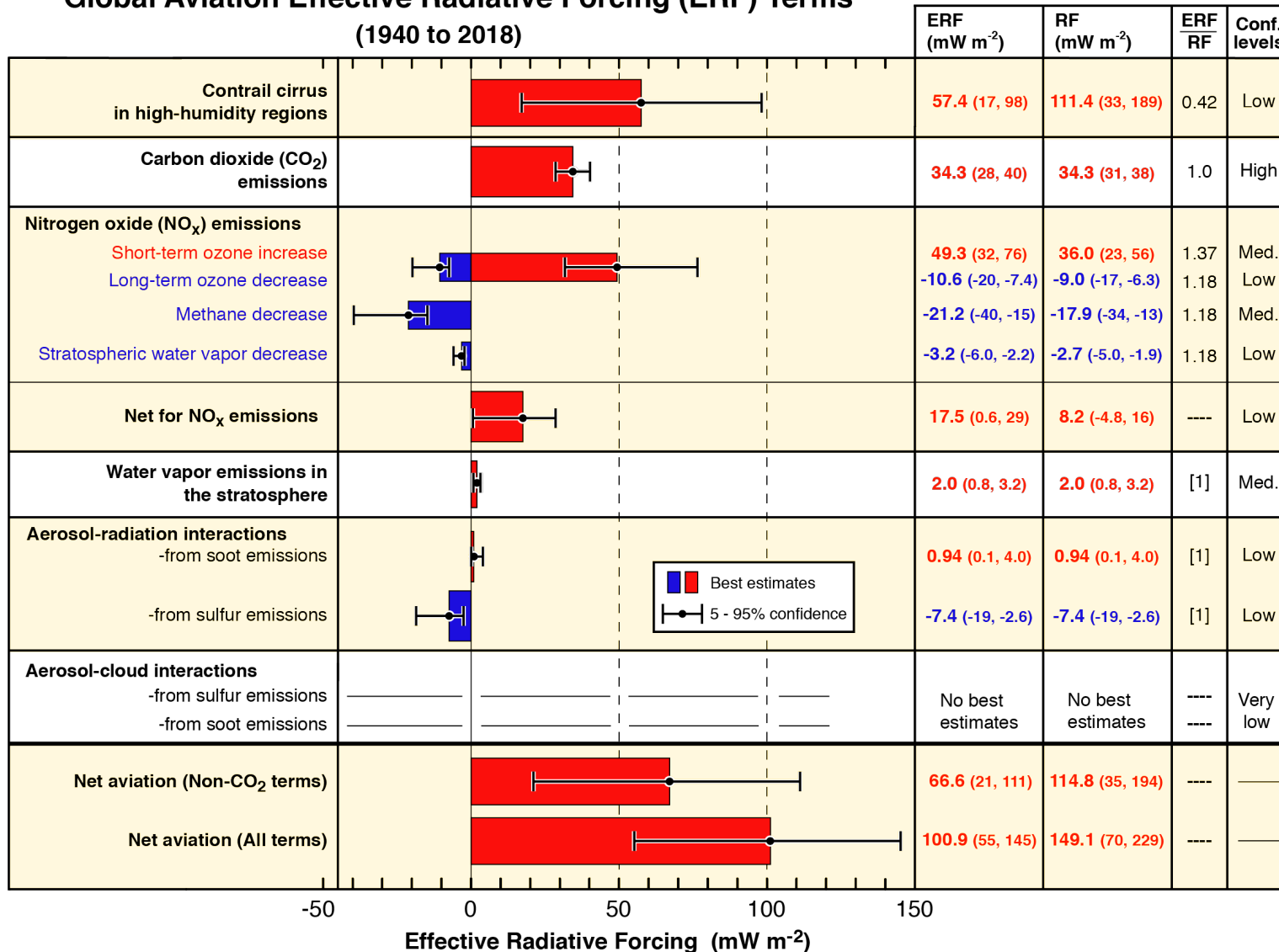
What we are talking about
The largest (present day) non-CO₂ effects
The science requirements for mitigation

What we are talking about: 'radiative forcing' – the metric of climate change in watts per square metre ($W m^{-2}$)



The latest aviation climate science assessment

Global Aviation Effective Radiative Forcing (ERF) Terms
(1940 to 2018)

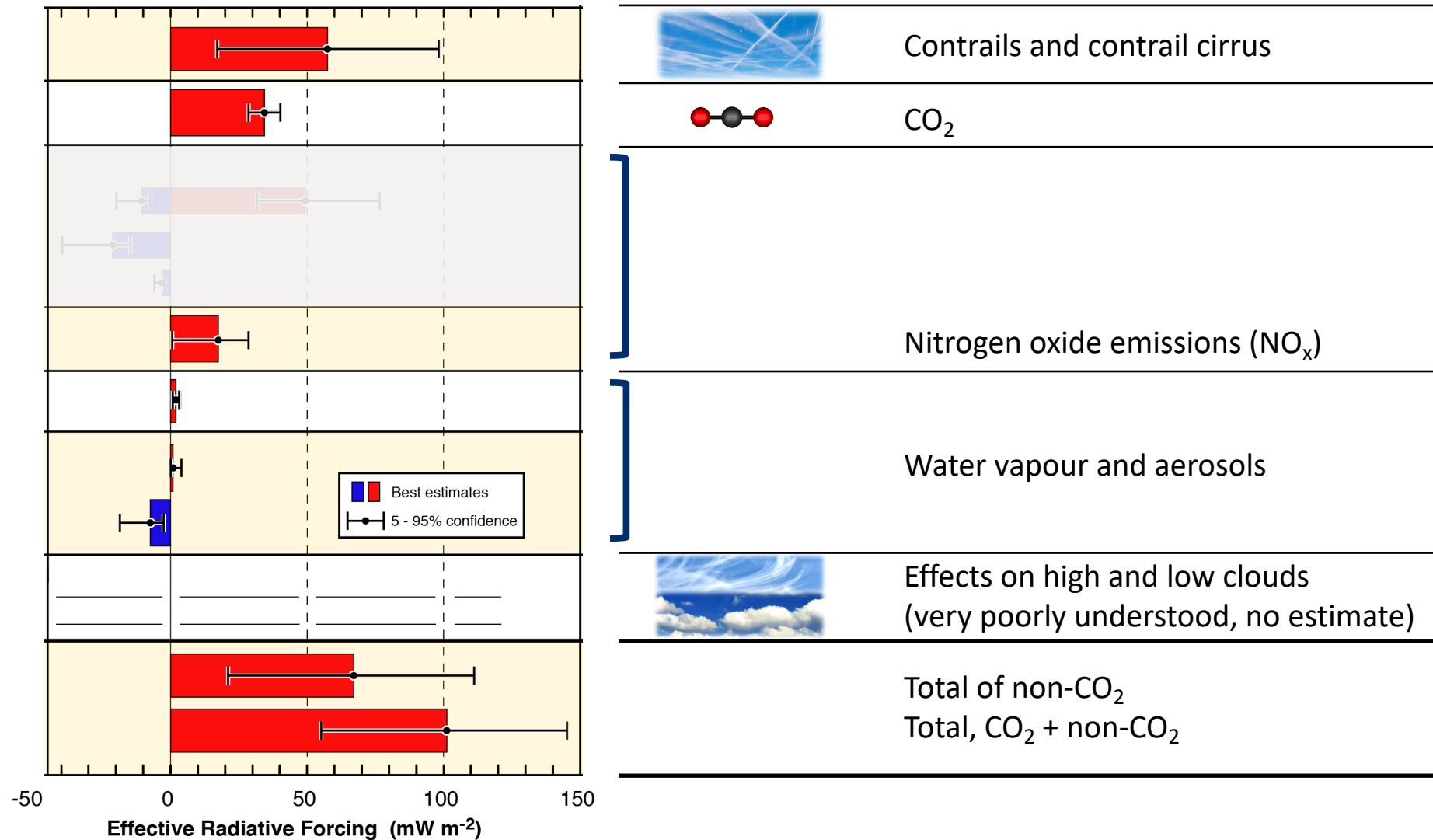


Lee et al. (2021) Atmos. Environment

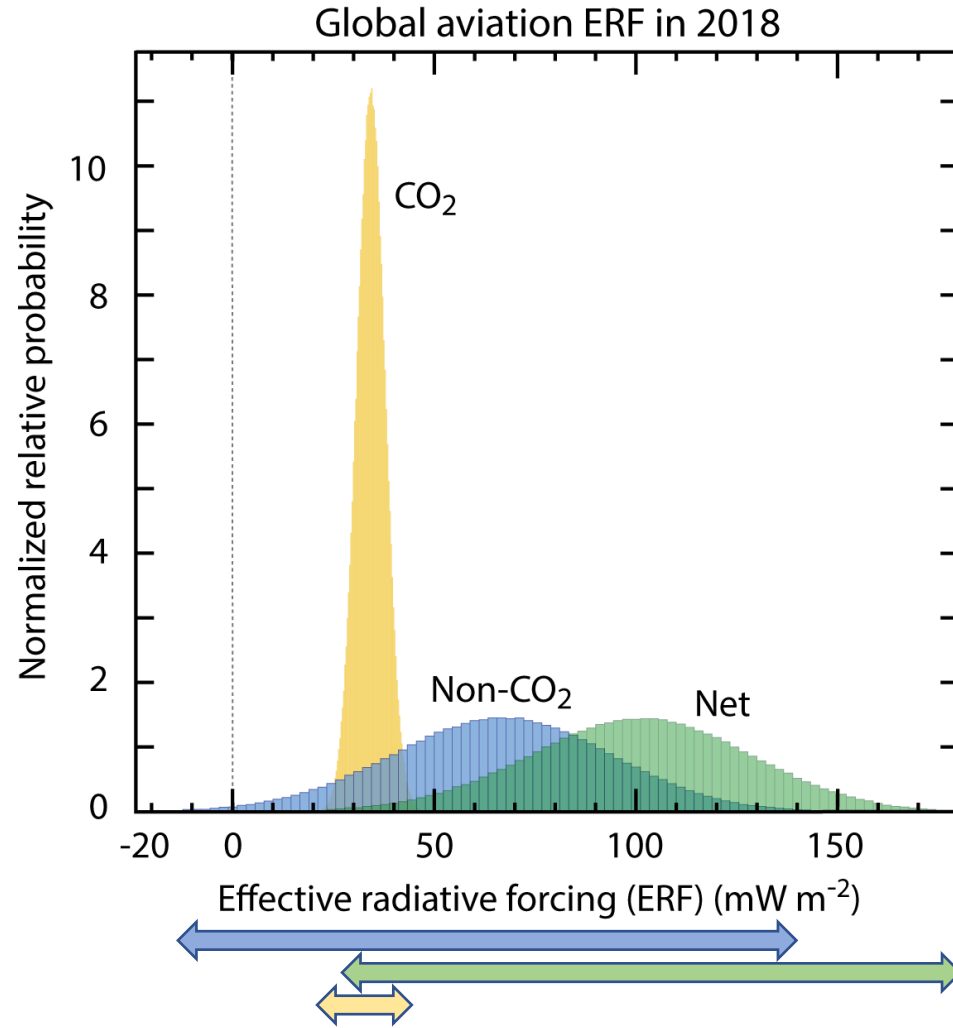
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A simplified view of the science assessment

Global Aviation Effective Radiative Forcing (ERF) Terms
(1940 to 2018)



Non-CO₂ uncertainties are large: CO₂ uncertainties are small



Uncertainty spreads...

Most mitigation options involve 'tradeoffs' between non-CO₂ and CO₂, or non-CO₂ effects

'Tradeoffs' require CO₂-equivalence metrics: these are under scientific development and discussion

Contrails: we cannot currently reliably avoid them and there is the potential for perverse outcomes (extra CO₂)

(Animation of a 'young' linear contrail)



We do not fully understand the non-CO₂ effects of SAF

The effects on high-level clouds *could* be a large negative forcing (very low confidence) and like contrails, are associated with soot emissions

The effects of NO_x can switch from positive ERF to negative ERF, depending on other surface emissions (high dependency)

Better understanding of the science behind aviation's non-CO₂ effects is the critical bottleneck

Acknowledgements: this work was informed by ongoing projects for the DFT, the EU (ACACIA) [DSL], and UKRI (ZEST1, TOZCA) [DSL, PF] but does not represent views of funding agencies



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This work has received funding from the European Union's Horizon 2020 innovation programme under grant agreement 875036