

Performance  
through  
Innovation



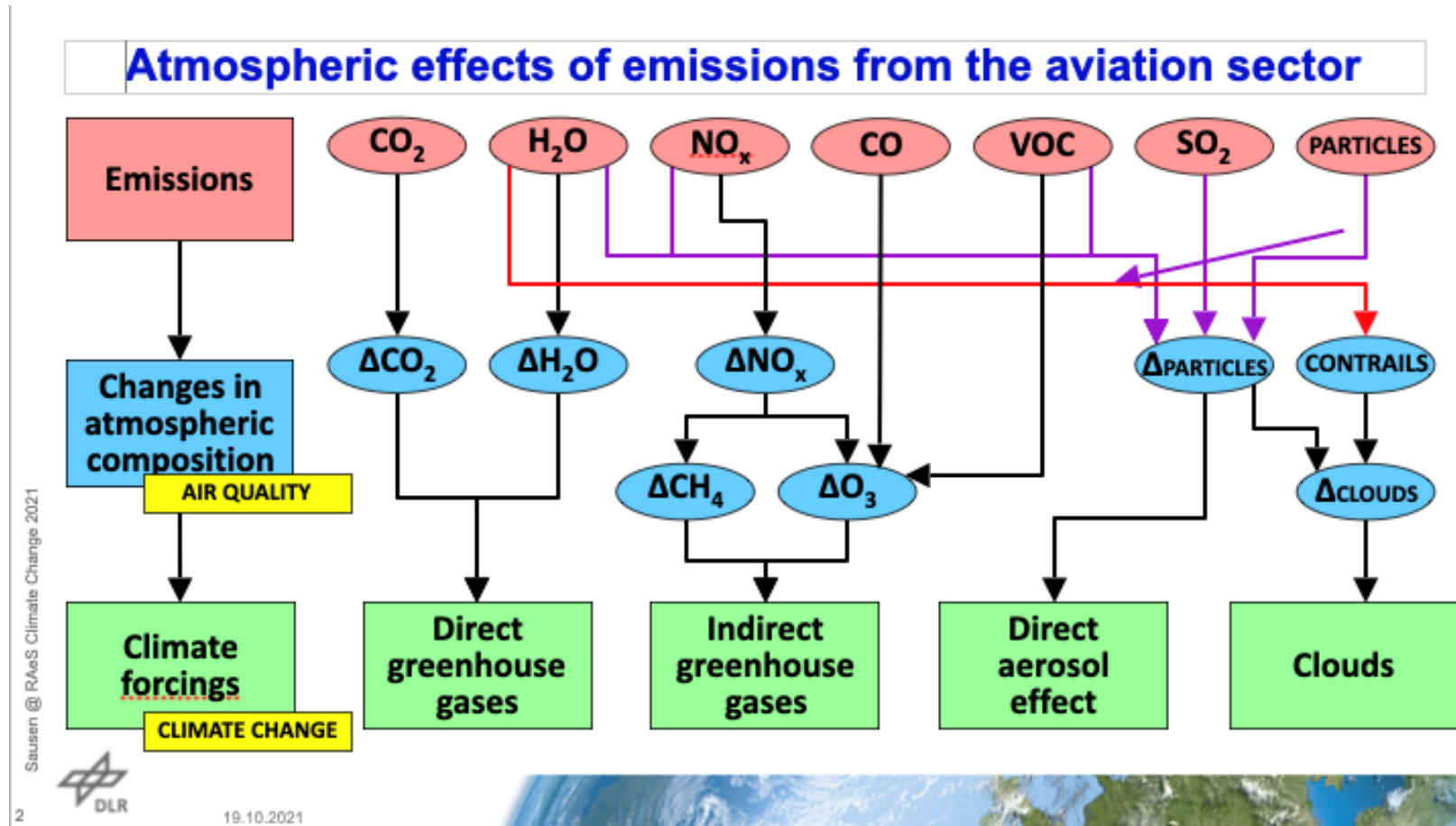
# Contrail Prevention Trial 2021: FABEC Vertical Flight Efficiency Workshop

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- Why contrail prevention?



Project contributed to the mitigation of the non-CO<sub>2</sub> effects of aviation

- To establish and test a procedure that avoids persistent contrails in the MUAC area of responsibility

Required answering the following questions

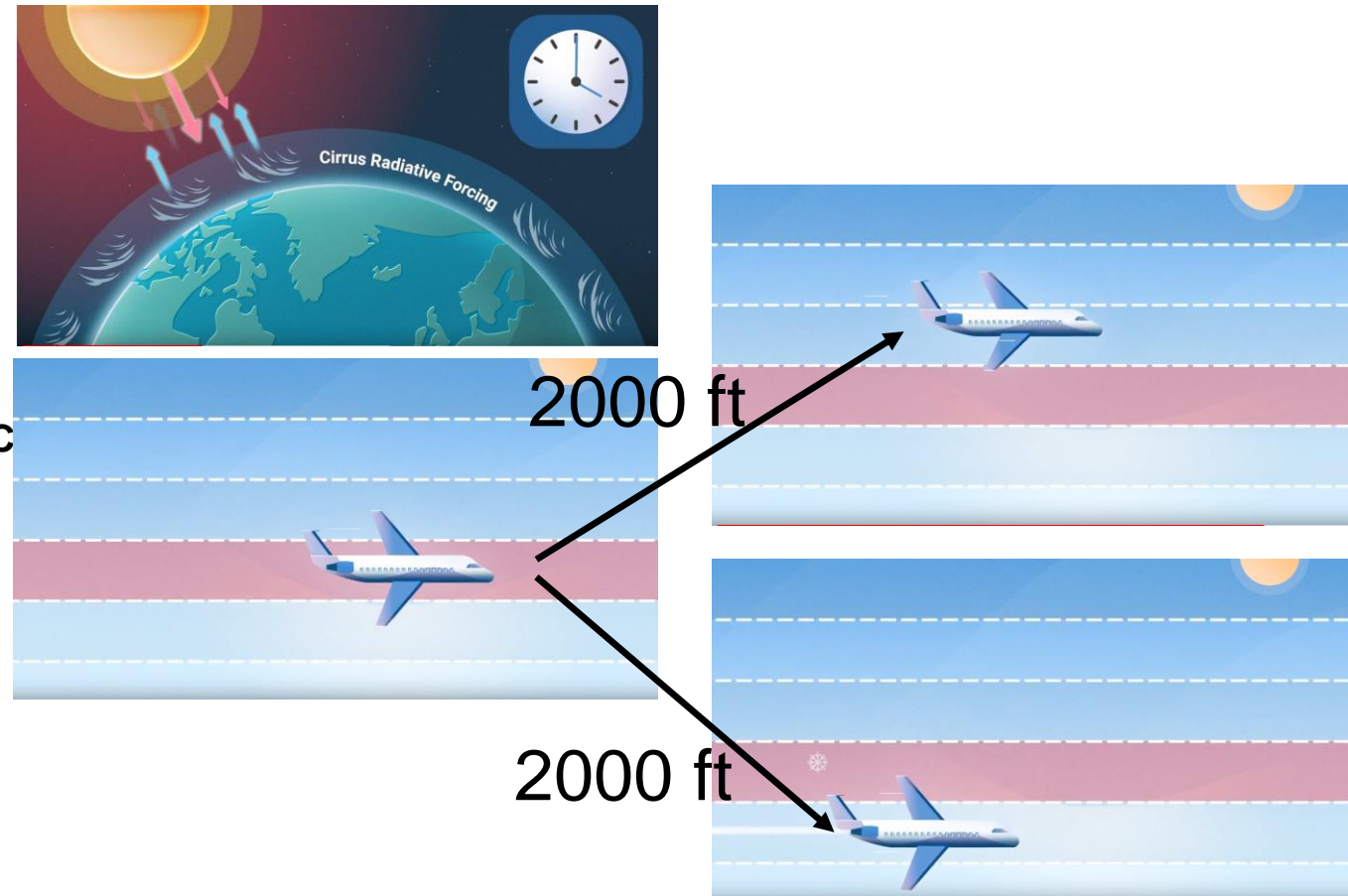
- Can we predict contrails with reasonable skill?
  - Can we **predict** persistent contrails with sufficient skill for deviating air traffic?
  - Can we **detect** ice super-saturated regions and avoid them in real-time?
- Can we have a performing operational procedure?
- Can we operate contrail prevention under normal demand?
  - Opportunity of pandemic traffic levels
  - Traffic increase

(<https://youtu.be/oz4OyEFrD4Q>)

## CONTRAIL PREVENTION TRIAL - MAASTRICHT UAC (EDYY) AIRSPACE

IN AN EFFORT TO MINIMISE THE IMPACT OF AVIATION ON THE ENVIRONMENT, MUAC WAS RUNNING A CONTRAIL PREVENTION TRIAL FROM 25<sup>TH</sup> JANUARY 2021 UNTIL 22<sup>ND</sup> OCTOBER 2021 BETWEEN 1500-0500UTC WINTER (1400-0400UTC SUMMER). FLIGHTS WERE TACTICALLY REQUESTED TO DEVIATE FROM THEIR PLANNED/REQUESTED FLIGHT LEVEL BY THE SECTOR CONTROLLER.

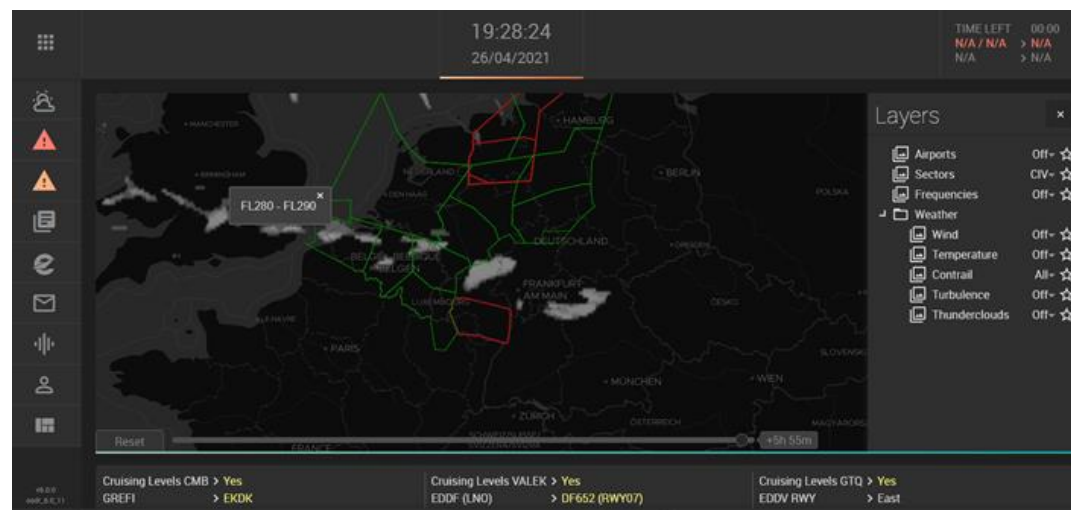
ANY FLIGHT FLYING VIA MAASTRICHT UAC SECTORS BETWEEN THESE TIMES WAS CHOSEN.



- Very high visibility of project outside MUAC
- Unusual bad weather with unusual low frequency of ice super-saturation which is a prerequisite for persistent contrails and contrail cirrus.
- Very low traffic counts due to the COVID pandemic, hence small numbers that were flying through ice super-saturated regions. Therefore, not many ATCOs were exposed to the new procedures and we cannot give a statement on capacity.
- Issue: ISSR **prediction** was more complicated than expected
  - Prediction of formation of persistent contrails with a skill that is sufficient for deviating air traffic
  - Currently with human interpretation, needs to be automated
  - Climate effect contrail vs. additional CO<sub>2</sub> emissions to be calculated

Prediction of ice super-saturation regions (lateral and vertical)

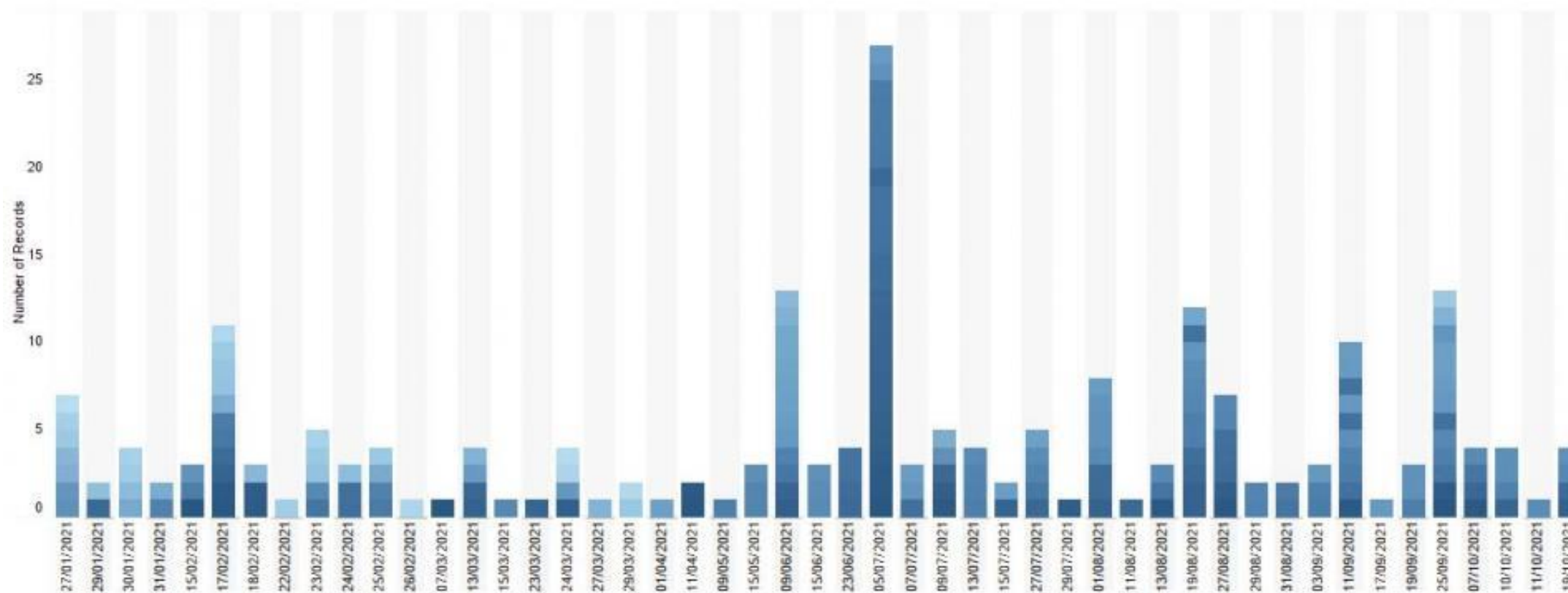
- Working on improved algorithms in OSDR
- Development was not foreseen, but needs high priority



# MUAC Live Trial 2021

in numbers – based on WX inputs on avoidance days

Number of aircraft deviated during the trial



- Project partner DLR unable to deliver reliable results for the time being due to low traffic numbers.
- There is a trend detected that contrail prevention has positive climate effects, but numbers are too low to give a sufficient reliable certainty on the accuracy of the results. More data would be needed to fulfil statistical criteria on the reliability.
- ISSR analysis is not automated. A lot of working time is needed to get ISSR forecast and communicate this to the ATCO.
- ISSR prediction is not reliable and we cannot be sure that we are avoiding the correct levels.
- Climate effects contrail prevention versus CO<sub>2</sub> emissions could not be calculated yet due to lack of time.



# MUAC Live Trials 2021

## Mitigation suggestions

- Further evaluation of the experiment and continuation of the project in close cooperation with DLR.
- Extend the project with more partners, namely D-KULT, MMU, NASA, MIT, Lufthansa, google, etc.
- Automation of ISSR analysis. Additional information received from independent systems such as real time camera systems, datalink information about humidity in the atmosphere from aircraft equipped with high quality humidity sensors, etc
- ISSR prediction is not reliable and we cannot be sure that we are avoiding the correct levels.