What is the E-CONTRAIL project?

Contrails and aviation-induced cloudiness significantly impact climate change, but their effects are uncertain due to meteorological, regional, and seasonal variations. Under certain conditions, aircraft can even produce anthropogenic cirrus that leads to cooling. Thus, researching these effects and their uncertainties is crucial for effective aviation climate mitigation.

The E-CONTRAIL project is blending advanced AI techniques, specifically deep learning, with climate science to enhance the understanding of aviation's climate impact. It aims to develop artificial neural networks that utilize remote sensing data to predict the climate effects of contrails and aviation-induced cloudiness. This work is essential for reducing uncertainties and advancing green aviation.

Project consortium

uc3m | Universidad Carlos III de Madrid

(Project coordinator)

BIRA•IASB

KTH VETENSKAP OCH KONST

RMI

SUPPORTED BY sesar JOINT UNDERTAKING

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E-CONTRAIL

Artificial Neural Networks for the Prediction of Contrails and Aviation Induced Cloudiness

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Vision

There is global political consensus, including the Paris Agreement, that limiting global warming to 1.5°C above pre-industrial levels is essential to avoid dangerous climate change, with urgent mitigation needed across sectors, including aviation. However, aviation's contribution to climate change, particularly through non-CO2 emissions, complicates efforts. While airlines have focused on reducing CO2 emissions by cutting fuel use, the significant impact of non-CO2 emissions like contrails and nitrogen oxides has been largely overlooked due to high uncertainties. These non-CO2 effects, which account for about two-thirds of aviation's overall climate impact, require further research.

The E-CONTRAIL project is researching to address this gap by applying deep learning algorithms, to improve understanding and prediction of aviation-induced climate effects, contributing to more effective mitigation strategies.

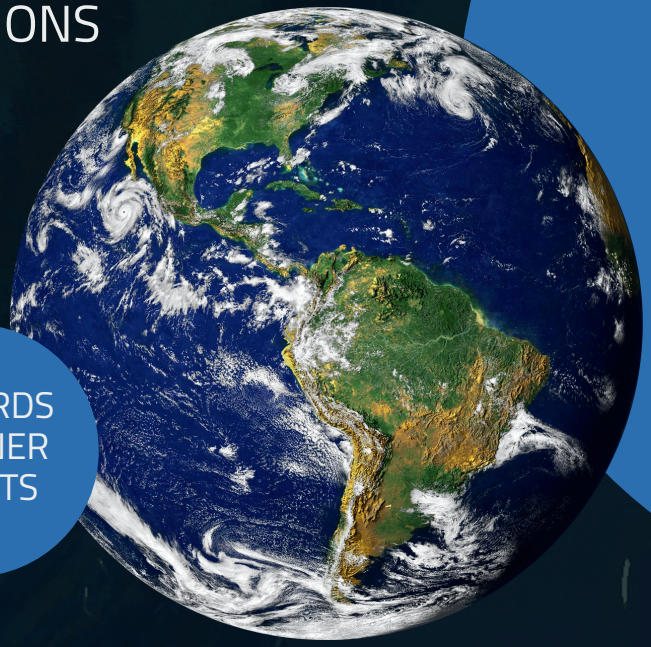
E-CONTRAIL

SUSTAINABLE ATM

The E-CONTRAIL project aligns with the European Green Deal's goal of making Europe the first climate-neutral continent by 2050, addressing the urgent need for transformation in the aviation sector to reduce its climate footprint.

4 Project AMBITIONS

TOWARDS GREENER FLIGHTS



Contrail detection

Develop a multispectral algorithm to detect contrails and aviation-induced cloudiness.

Ice cloud radiative forcing quantification

Integrate cutting-edge multispectral geostationary imagery and radiative transfer models to accurately quantify the radiative forcing (RF) and effective radiative forcing (ERF) of ice clouds throughout the diurnal cycle.

Contrail radiative forcing prediction

Create for the first time deep-learning algorithms to identify and predict the mechanisms and relevant sources of data for the forcing of contrails and aviation-induced cloudiness

Visualisation dashboard

Show the quantitative climate impact of contrails and aviation-induced cloudiness and employ AI to predict regions of airspace with significant climate impact caused by these factors.