Research towards weather induced uncertainties for contrail persistence and mitigation strategies for contrail impact Better Contrail Mitigation (BeCoM)

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Introduction

•Non-CO_2 effects contribute to ~66% of the total aviation effective radiative forcing (ERF), see figure below[1].

•Contrail cirrus in high-humidity regions is the largest share of aviation's climate effects with a large uncertainty.

•To adequately mitigate the aviation's climate impact from contrail cirrus, the predictability of contrail-cirrus effects needs to be addressed

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

	ERF (mW m^{-2})	RF (mW m^{-2})	ERF/RF	Conf. levels
Contrail cirrus in high-humidity regions	57.4 (17, 98)	111.4 (33, 189)	0.42	Low
Carbon dioxide (CO_2) emissions	34.3 (28, 40)	34.3 (31, 38)	1.0	High

•At the heart of BeCoM stands the enhancement of the physical representation of ice cloud and the treatment of Ice supersaturated regions (ISSRs), which improves the prediction of persistent contrails, hence allowing the integration of contrail schemes in the existing policy framework to enable eco-efficient trajectories.

Goal and Objectives

BeCoM aims to better predict persistent contrails with the strong support of the enhanced routine humidity measurements at the cruise level, enabling reliable mitigation of aviation's climate impact driven by climate-based policy and regulations.

To this end, the following objectives are defined:

•**Objective O1**: enhance the routine measurements of atmospheric humidity at the cruise altitude;

•**Objective O2**: improve the treatment of ice supersaturated regions in numerical weather prediction models;

•**Objective O3**: develop appropriate AI algorithms for data assimilation, contrail detection, contrails classification, and uncertainties of contrail prediction;

•**Objective O4**: Minimize cost impact when implementing climate optimized trajectories;

•**Objective O5**: Develop and evaluate non-CO_2-based measures to be applied for ATM strategies for climate impact mitigation.

Project Concept

BeCoM's goal and objectives will be managed via seven work packages (WPs), including five technical WPs, one on exploitation and dissemination (WP6), and one on management (WP7).

The interactions between the five technical WPs are shown below.
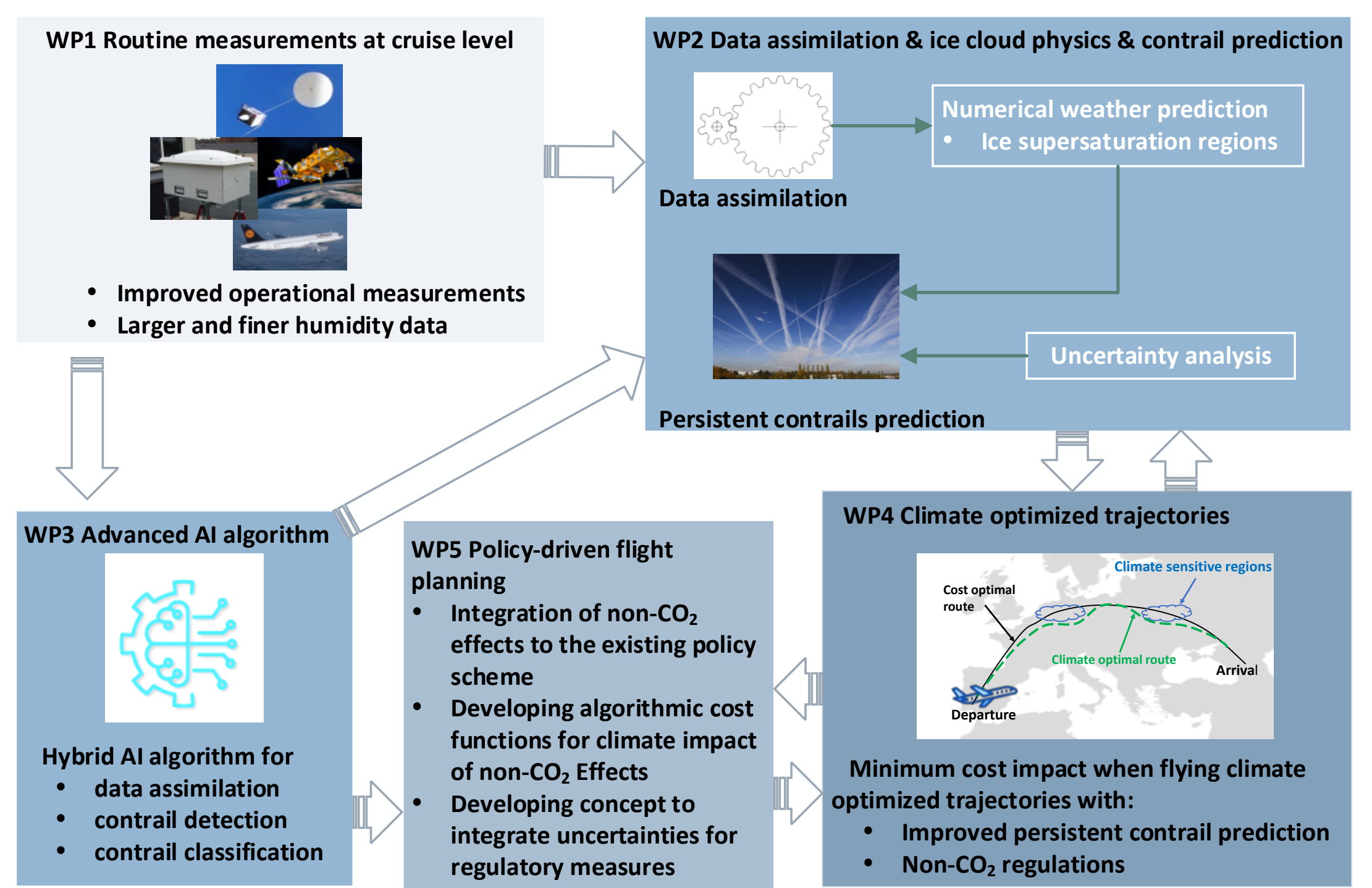
Project information

•Horizon Europe
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•Budget: 4.3 M€

Acknowledgement

Reference

1. Lee, David S., Fahey, D.W., Skowron, A., Allen, M.R., and other 17 authors, The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018, Atmospheric Environment, 244(1), 2021

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