

## ASCENT Project 78

# Contrail Avoidance Decision Support and Evaluation

MIT

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### Objective:

- **Decision support tool** for aircraft routing to avoid formation of warming contrails by evaluating the **likely costs and benefits** of a contrail avoidance action.
- Evaluate the decision support tool under real-world conditions.



### Project Benefits:

- **Rapid evaluation** of contrail formation and impacts for different strategies
- Demonstration of **practicality of contrail avoidance** to relevant stakeholders
- Directly advance **sustainable aviation**

### Research Approach:

- Develop **software modules** as follows:
  - **Contrail forecasting** to predict contrail-forming conditions prior to and during flight
  - Real-time **contrail identification** in satellite images based on existing deep learning approaches
  - **Contrail radiative forcing** estimation based on recent work at MIT
  - **Trajectory planning** to forecast fuel burn and emissions for a spectrum of flight paths

#### *Future work*

- Combine into a **cost-benefit evaluation** tool designed for use on a flight-by-flight basis
- Develop and run **tests** for the tool

### Major Accomplishments (to date):

- Instantaneous contrail identification module completed
- Development of an empirical, probabilistic, near real-time estimate of upper atmospheric humidity based on satellite data and flight tracks
- Preliminary trajectory optimization approach developed using aircraft performance modeling
- Filtering algorithm developed to improve tool robustness

### Future Work / Schedule:

- Ongoing tool development through 2023
- Trials now planned through 2023 and 2024