

ASCENT Project 58



Improving Policy Analysis Tools to Evaluate Higher-Altitude Aircraft Operations

MIT

PI: Steven Barrett and Sebastian Eastham

PM: Daniel Jacob

Cost share partner: NuFuels LLC

Objective:

- Develop the APMT tool to quantify environmental impacts of aircraft operations that cover a **broad range of parameters**, including **higher altitudes**
- Understand how **aviation and non-aviation sources interact** to affect climate and air quality **in the context of different cruise altitudes**

Project Benefits:

- **Rapid evaluation** of environmental impacts of aviation, including **divergence from currently dominant patterns and technologies**
- Quantify the relative role of **non-aviation sources** in **aviation's environmental impacts**

Research Approach:

- **Evaluate and assimilate** changes in scientific understanding of aviation's impacts on **climate and air quality**
- Use **atmospheric modeling** to quantify sensitivity of climate and air quality to emissions up to **65 kft**
- **Re-engineer** APMT to support changes in **spatial distribution of emissions** and aircraft **emissions characteristics**
- **Quantify the evolution** of the climate and air quality impacts of **aviation NO_x** from 1980 onwards in terms of **non-aviation sources**

Major Accomplishments (to date):

- Updated the structure of APMT-IC to accept **gridded emission inputs**
- Developed the framework for **country-level health impact** calculations
- Generated preliminary **radiative forcing, air quality, and ozone column sensitivity arrays**
- Begun developing a **historical inventory** of aviation emissions

Future Work / Schedule:

- Mid-2022: **new version** of APMT
- End of 2022: high resolution **global inventory** of aircraft emissions from **1980-2019**