

# ASCENT Project 022

## Evaluation of FAA Climate Tools



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### Objective:

- Further enhance the overall understanding of aviation impacts on climate and environment
- Studies exploring regional climate impacts from aircraft emissions.
- Evaluate capabilities, limitations, and uncertainties of climate metrics and simple models (e.g., APMT) to aid policy decisions.

### Research Approach:

#### Analyses of atmospheric composition changes and climate effects from aviation emissions

- State-of-the art climate-chemistry modeling capabilities (we are using the greatly extended Whole Atmosphere Community Climate Model (WACCM) version of NCAR's Community Earth System Model) – ground to 140 km with comprehensive tropospheric and stratospheric chemistry.
- Conduct simulations with different emissions scenarios as well as sensitivity studies for different parameters (e.g., fuel burn, NOx) for supersonic and subsonic aircraft fleets.

#### Consideration of regional analyses concepts (potentially of value for APMT)

- Explore possible ways to derive temperature change for specific regions from subsonic emissions.

### Motivation

- Science-based evaluation of analytical tools used by the FAA;
- Development of ideas and concepts for the next generation treatment of aviation effects on the Earth system;
- Updated evaluation and analyses of the science of aviation effects on atmospheric composition and climate;
- Evaluation of potential environmental effects from assumed fleets of supersonic commercial and business jet aircraft
- Address policy questions and consideration of potential policymaking.

### Project Benefits:

- Science-based evaluation of analytical tools used by the FAA;
- Development of ideas and concepts for the next generation treatment of aviation effects on the Earth system;
- Updated evaluation and analyses of the science of aviation effects on atmospheric composition;
- The evaluation of potential environmental effects from assumed fleets of supersonic commercial and business jet aircraft;
- To address policy questions and consideration of potential policymaking quantifying regional climate impacts.

### Major Accomplishments (to date):

- Two journal papers on SST aviation studies published in 2021
- Completing evaluation of atmospheric chemistry and climate impacts for emissions from fleets of SST aircraft proposed by Ga. Tech and by MIT.
- Lead and participating in writing 3 reports for ICAO through ISG
- Biweekly telecons with FAA; Quarterly and annual reports
- Presentations and participation in CCR and ASCENT meetings, ICAO, AGU and other conferences

### Future Work / Schedule:

- Complete analyses and finish journal papers for the projected supersonic fleets. Perform further sensitivity studies.
- Coordinate with MIT on further development and testing of the Aviation Portfolio Management Tool – Impacts Climate (APMT-IC) for supersonic impacts (ASCENT Project 58).