

Evaluation of FAA Climate Tools

Project 22

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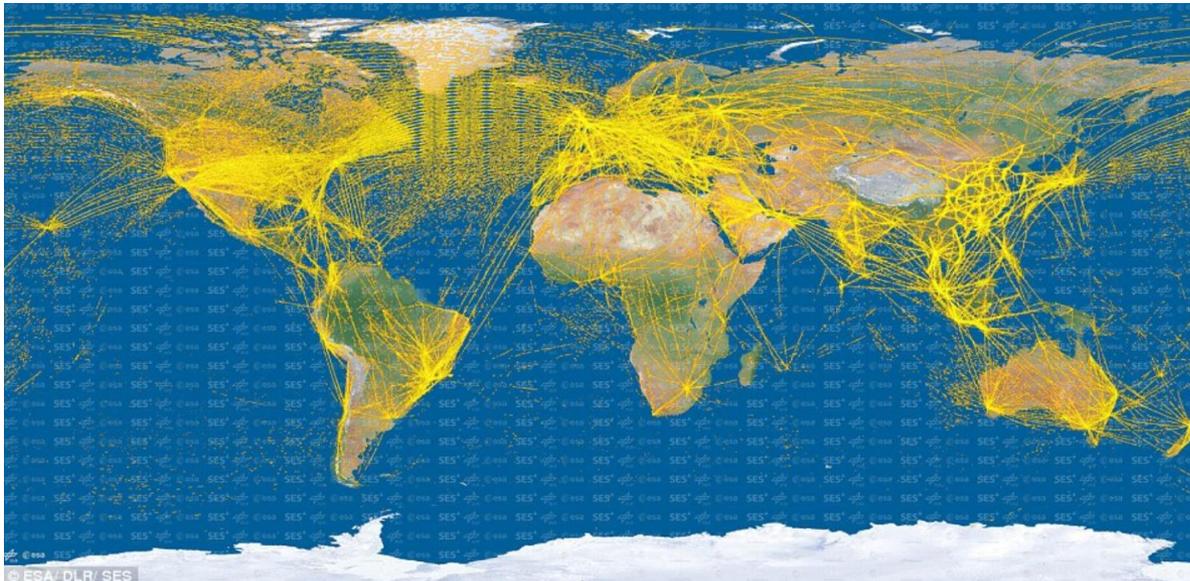
- Science-based evaluation of analytical tools used by the FAA;
- Development of ideas and concepts for the next generation treatment of aviation effects on the Earth system;
- Updated evaluation and analyses of the science of aviation effects on atmospheric composition;
- The evaluation of potential environmental effects from assumed fleets of supersonic commercial and business jet aircraft to compare with their benefits in terms of decreased time for air-travel
- To address policy questions and potential policymaking quantifying regional climate impacts may be useful.

□ Long-term objectives

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

□ Near term objective

- Analyze high altitude emissions scenarios with the latest climate-chemistry model relative to studies from ~20 years ago done under the NASA AESA program and the 1999 IPCC aviation assessment .
- Evaluate effects for changes in atmospheric composition (e.g., ozone) and for radiative forcing on climate.



- **Outcomes**

- Biweekly telecons with FAA
- Quarterly reports to FAA
- Annual report summarizing progress
- Presentations and participation in CCR and ASCENT meetings, ICAO, AGU and other conferences
 - We participated and provided presentations to CAEP Impacts and Science Group meeting at ICAO in Montreal (February 2020)

- **Practical applications**

- Extend the understanding of aviation effects on climate and evaluating a simplified model to address policy questions
- Analyses are useful to the FAA, to ICAO, and to the aviation industry

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 130 km.
- Conduct simulations with different emissions scenarios as well as sensitivity studies for different parameters (e.g., fuel burn, NO_x) 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.

CCR / ASCENT Projects (Mar 2020 to Oct 2020):

- ✓ Complete evaluation of 2020 generation modeling capabilities and findings relative to the studies of SSTs done in the 2000 time period. (ongoing)
- ✓ Begin studies for new SST scenarios being developed for FAA.
- ✓ Evaluate APMT updates as needed.
- ✓ Reestablish where we were two years ago in the regional analyses.

Findings

- Model simulations just starting for the 2000 era SST scenarios.
- Planning of these studies is being coordinated with FAA.
- Initial results (still being analyzed) suggest some differences relative to findings from the 2000-era model results.

Next steps

- Plan studies for the new SST emissions scenarios.
- Plan studies to complete regional modeling analyses for subsonic emissions.

Key challenges/barriers

- Scenarios to be considered for future SST emissions studies.

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