

PRE-TRAILS—Predictive Real-time Emissions Technologies Reducing Aircraft Induced Lines in the Sky

PROJECT DESCRIPTIONS

GE Research – Niskayuna, NY

Engine-informed Prediction of Aviation Induced Cirrus Trails-EPIC-Trails - \$1,500,000

GE Research is developing a real-time, in-flight prediction system for aircraft-induced cirrus formed from contrails for commercial aircraft operators, who typically have little to no information on which flights cause long-lived cirrus clouds. In partnership with Southwest Airlines, GE's system would combine detailed engine operational data, a hybrid physics and machine learning model, on-airplane data, and real-time satellite observations to predict aviation-induced cirrus that last more than 5 hours.

RTX Technologies Research Center – East Hartford, CT

CONFIRMMS: CONtrail Forecasting through In-situ Reliable Multisourced Modeling and Sensing - \$2,500,000

RTX Technologies Research Center will develop a platform for a physics-informed forecast of aircraft induced cirrus potential 100 kilometers ahead of the aircraft (up to 10 minutes ahead of time). The platform would include a novel on-board lidar sensor for water vapor that would be installed on a small fraction of a fleet's aircraft to furnish data and predictions for the entire fleet.

The Boeing Company – Everett, WA

Contrail INFORMATION for Collaborative Operations (CINCO) - \$2,497,451

The Boeing Company will develop a comprehensive approach for mitigating aircraft induced cirrus that would leverage satellite observations, deep learning, new developments in onboard humidity sensors, and a numerical weather prediction model. Useful for flight planning, Boeing's approach could improve observational datasets, forward scientific understanding of humidity in the upper troposphere, and advance weather forecasting capabilities for the general public.

Universities Space Research Association – Mountain View, CA

Physics & Machine Learning Based Aviation Contrails Prediction and Observation System - \$1,000,000

Universities Space Research Association is developing a real-time, cloud-based aviation contrail prediction and observation system that would improve airspace operations through new atmospheric data services and ensemble modeling approaches. The system would advance an existing cutting-edge contrail computer model with a novel machine learning approach to produce forecasts of persistent contrail-forming regions.

Northrop Grumman Systems Corporation – Redondo Beach, CA

Contrail Avoidance System - \$2,490,000

Northrop Grumman is developing a contrail prediction and avoidance system to scout optimal altitudes for flight crew that would feature a predictive algorithm and new airborne instrumentation. Northrop Grumman's radiometric temperature and humidity sensor would measure the environmental conditions above, below, and in front of an aircraft to enable flight crew to proactively respond to regions conducive to long-lived cirrus formation minutes before entering the area.