National Aeronautics and Space Administration

NASAfacts

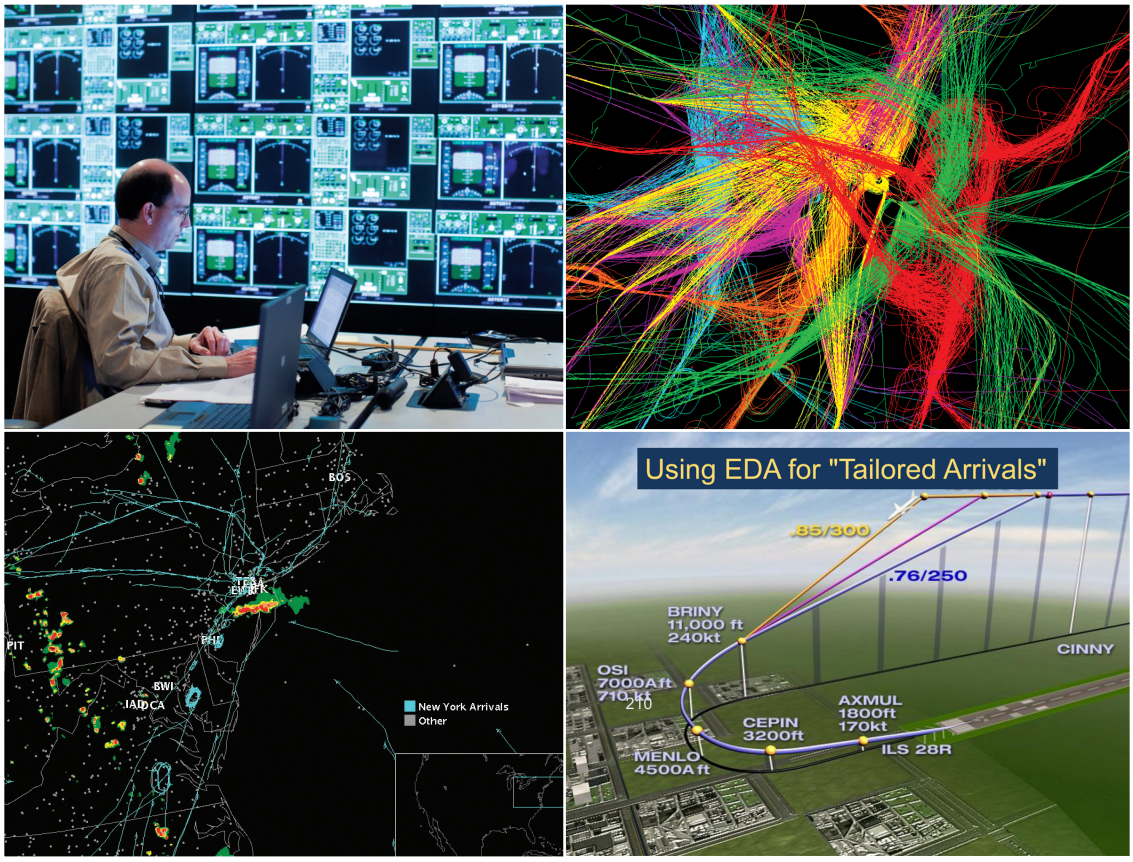
Airspace Systems Program

From doorstep to destination, the Airspace Systems Program (ASP), part of NASA's Aeronautics Research Mission Directorate, works to directly benefit the flying public by moving key concepts and technologies from the laboratory into the field to help make air travel as efficient as possible. Airspace Systems plays a crucial role in helping to plan, develop and implement the Next Generation Air Transportation System, or NextGen.

ASP conducts research mainly at two agency field centers—NASA Ames Research Center and NASA Langley Research Center—and collaborates with industry, academia, and other federal agencies and international partners to share resources and achieve mutually beneficial objectives.

ASP's primary goals are to:

- Reduce aircraft fuel consumption, noise and emissions;
- Accommodate projected growth in air traffic while preserving and enhancing safety;
- Maximize flexibility and effectiveness in the use of airports, airspace and aircraft; and
- Reduce travel times and travel-related delays.



Images (Clockwise, left to right) **Air Traffic Operations Laboratory:** This lab, which also includes human-piloted simulators, supports research into ways to improve aircraft separation and resolve potential aircraft conflicts. **Metroplex Operations:** Simulations of arrivals and departures at airports close to each other, such as in New York City, help find solutions for reducing delays but increasing capacity. **Efficient Descent Advisor:** NASA is working on tools to help air traffic controllers make approaches and descents more efficient while also avoiding conflicts with other aircraft. **Tools for Reducing Weather Delays:** Developing sophisticated computer algorithms that reduce delays and reroutes caused by bad weather, especially approaching busy airports like those near New York City, is a key focus.

ASP RESEARCH PROJECTS

NextGen Concepts and Technology Development Project

By developing gate-to-gate concepts and technologies, this project helps to realize the NextGen goals of enabling significant national-airspace increases in capacity and efficiency. The project studies the key future roles and responsibilities between humans and automation, and between ground-based and airborne systems.

Included in project investigations are methods to optimize flight routes, as well as arrivals and departures, and to better coordinate surface and runway operations. Also under study are ways to mitigate the adverse effects of weather to insure the most advantageous use of the airspace system, and accommodate an expected growth in overall air travel.

Areas of research focus include:

- Separation Assurance: Guaranteeing safe, on-time, fuel-efficient, en route flight while allowing for reduced distance between aircraft, increased air-traffic volumes and varying weather;
- Super Density Operations: Optimizing timely arrivals, departures and surface operations through fuel-saving "continuous descents," arrival/departure-time management, route modification and adaptive speed control;
- Dynamic Airspace Configuration: Increasing system capacity by bringing to bear available resources and capacity to wherever demand is surging;
- Traffic Flow Management: Maximizing national-airspace throughput with new processes to address demand/capacity imbalances from weather effects and systemwide uncertainties; and
- Safe and Efficient Surface Operations: Insuring the most effective pace for such surface operations as taxiing, departures, landings and gate arrivals.

NextGen System Analysis, Integration and Evaluation Project

This project's focus is to ensure that, through systems analysis, NASA concepts, technologies and procedures are matured and tested in laboratory simulations to determine their NextGen viability. A subset will be further demonstrated and evaluated in field tests that integrate both air and ground capabilities.

Ultimately, coordination with other government organizations and industry stakeholders will ensure the appropriate NASA technologies are deployed in relevant flight environments to demonstrate NextGen benefits.

Technical objectives include:

- Defining the operational issues, factors and concerns crucial to a thorough system analysis;
- Incorporating fast-time modeling and simulation and feedback results to validate research concepts and assess their collective technological impact;
- Determining the feasibility of integrated concepts and technologies using human-performance models and human-in-the-loop simulations;
- Conducting field trials to evaluate the impact of integrated concepts and technologies; and
- Assessing the effects of new aircraft types on trajectory-based operations.

We're Working on...

Software that reduces airport runway and surface congestion

New landing techniques that save fuel and time

Software models that more accurately predict the influence of weather on flight paths

Air traffic control solutions that safely allow more aircraft take-offs and landings in the same amount of time

For more information about the Airspace Systems Program and NASA aeronautics research, visit **www.aeronautics.nasa.gov/programs_asp.htm**.

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