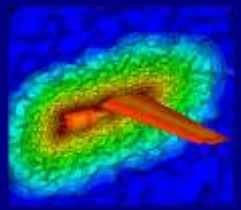
NASA Airspace Systems Environmentally Focused Research

Green Aviation Summit
Integrated Systems Research Program
NASA Ames Research Center
September 8-9, 2010

Dr. John Cavolowsky
Program Director
Airspace Systems Program
Aeronautics Research Mission Directorate

ARMD Programs

Vehicle



Fundamental Aeronautics ($228M)

Integrated Systems Research ($113M)

Operations

Airspace Systems ($82M)

Supporting

Aviation Safety ($79M)

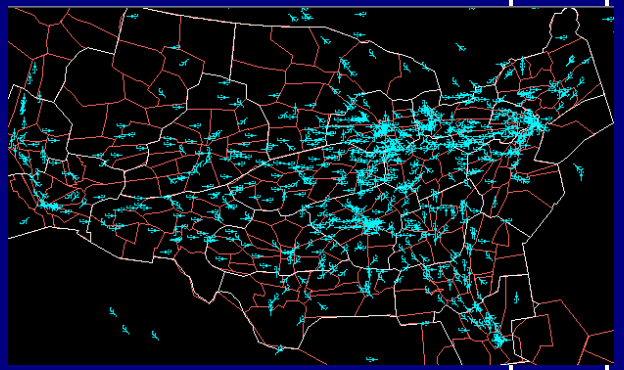
Aeronautics Test ($76M)

Airspace Systems Program Focus

Perform the foundational research to enable the development of revolutionary improvements to, and modernization of, the National Airspace System, as well as the introduction of new systems for vehicles whose operation can take advantage of the improved, modern air traffic management system.

Program Organization

Concepts and Technology Development (CTD): Develops and explores fundamental concepts, algorithms, and technologies to increase throughput of the National Airspace System (NAS) and achieve high efficiency in the use of resources such as airports, en route and terminal airspace.



Systems Analysis, Integration and Evaluation (SAIE): Matures integrated concepts through evaluation, provides integrated solutions, characterizes airspace system problem spaces, defines innovative approaches, and assesses potential system impacts and design ramifications.

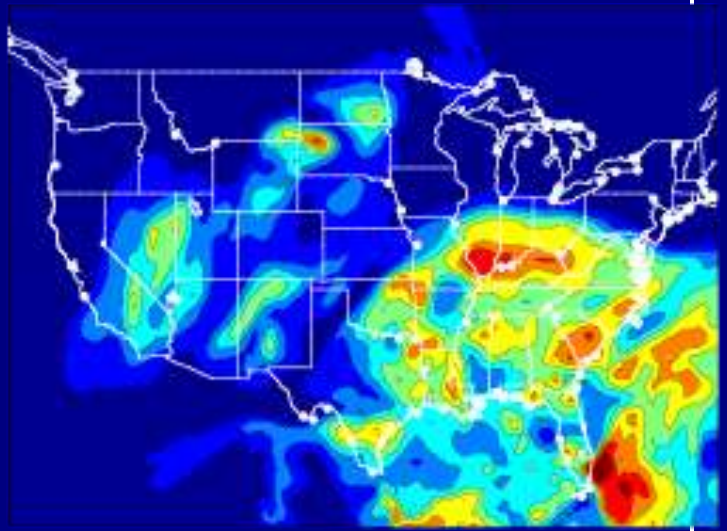
The National Policy and Plan

- "Advance technologies and operations to enable significant increases in the energy efficiency of the aviation system…"
- "and operational procedures to decrease the significant environmental impacts of the aviation system..."

NextGen: Reduce noise, emissions, and fuel consumption and balance aviation's environmental impacts with other societal objectives

Airspace Environmental Challenges

Contrails lead to increased earth temperature, but can be avoided.

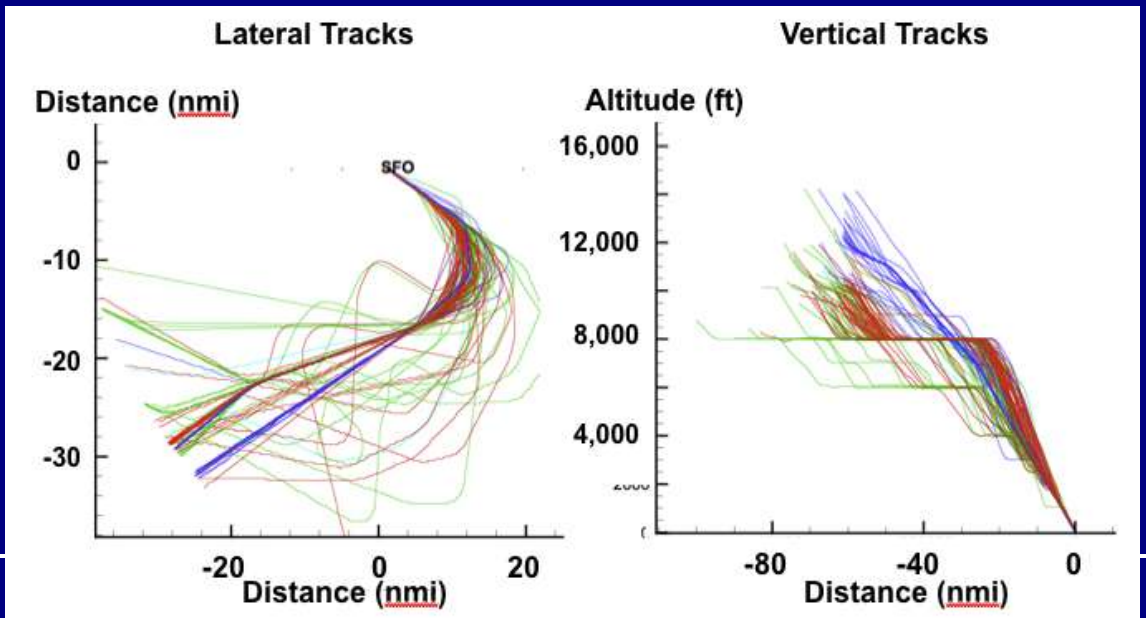


But how is the extra fuel burn balanced against the environmental benefit?

Airspace Environmental Challenges

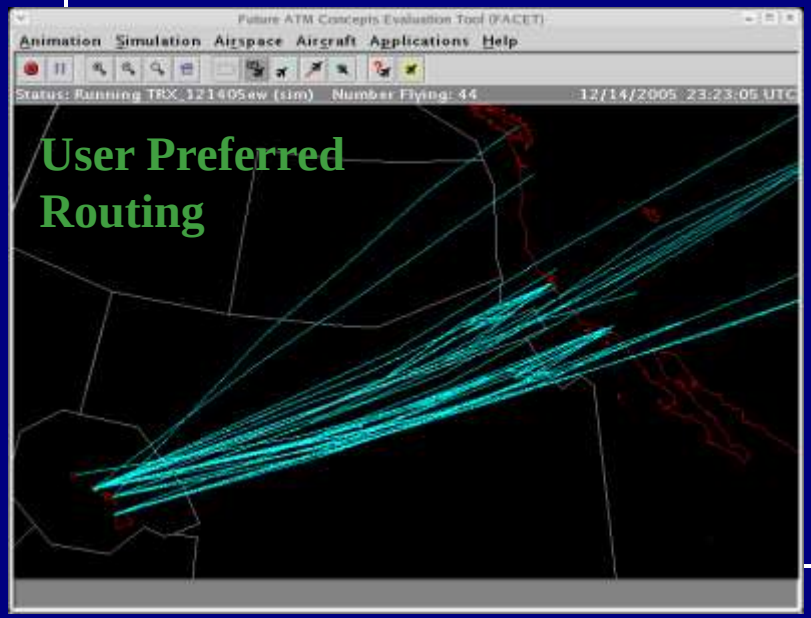
Current “dive and drive” descents and vectoring and to maintain arrival spacing in the terminal area are fuel inefficient, noisy and require multiple controller/pilot interactions.

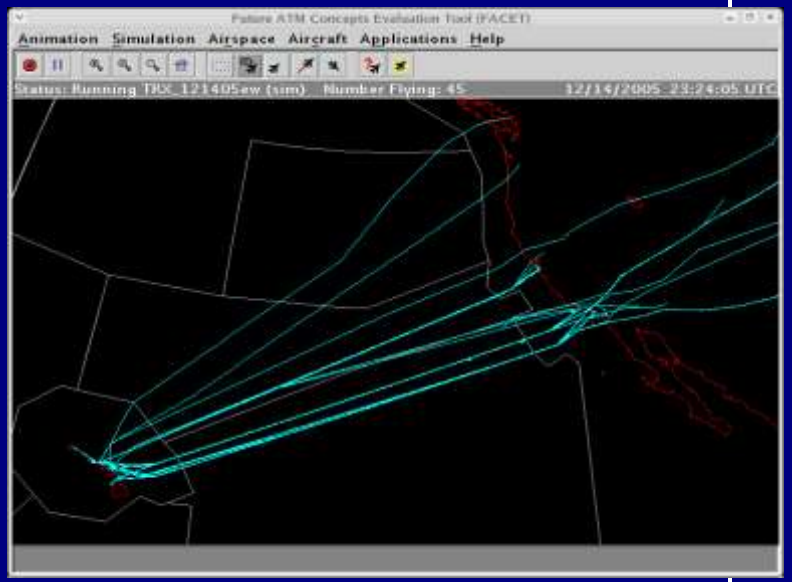
Efficient Descent Advisor conserves fuel, reduces noise and controller/pilot workload



Airspace Environmental Challenges

Traffic flow management can reduce demand-capacity imbalances



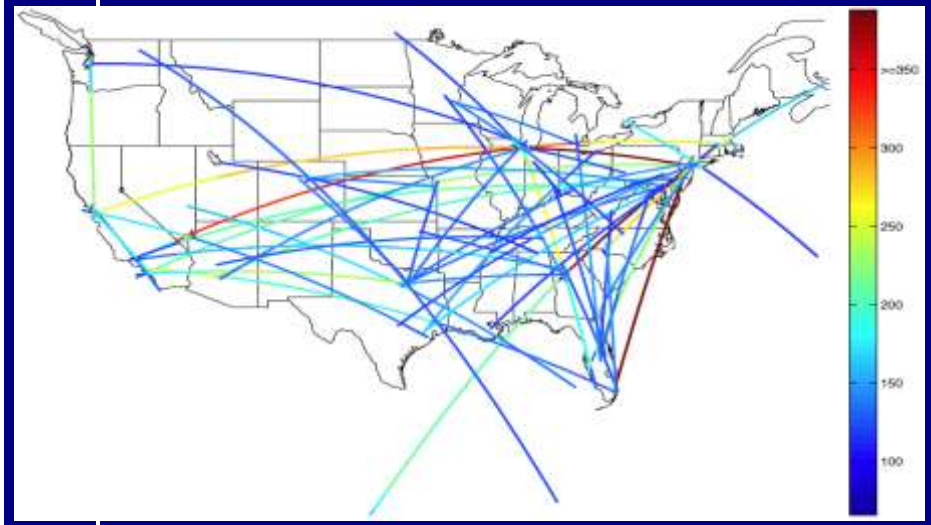


Optimizing traffic flows, addressing weather uncertainties and reducing ground delays reduce fuel consumption and emissions

Airspace Environmental Challenges

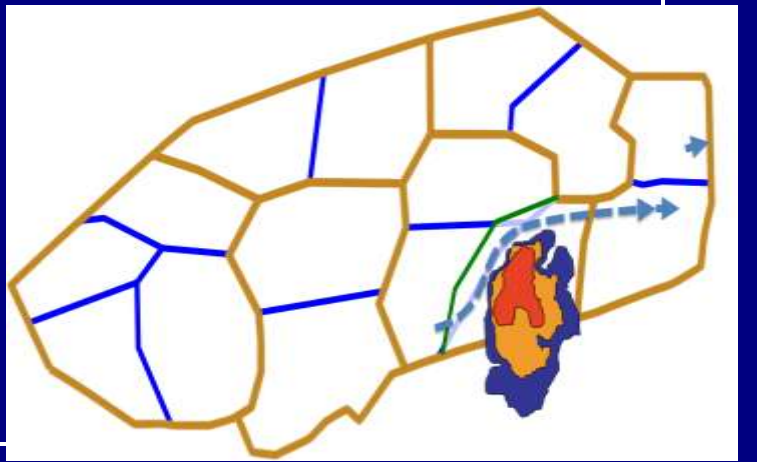
Predictable **surface operations** reduce taxi and hold times allowing a reduction of noise and emissions in airport neighborhoods

Airspace Environmental Challenges



Dynamic Airspace Configuration increases capacity by modifying the airspace to shift capacity to where it is needed

Reducing delays, allowing for direct routing and enabling system flexibility to operate efficiently in both peak and low demand periods reduces environmental impacts



Summary

NextGen concepts and *technologies are maturing*

Environmental *research has been accelerated*

Research is making progress toward *initial technology product transitions*

Planning and actively engaged in research and new transition initiatives with Industry, academia, and government partners