COE CST Second Annual Technical Meeting:

Determine Baseline National Airspace System Impacts from Space Operations

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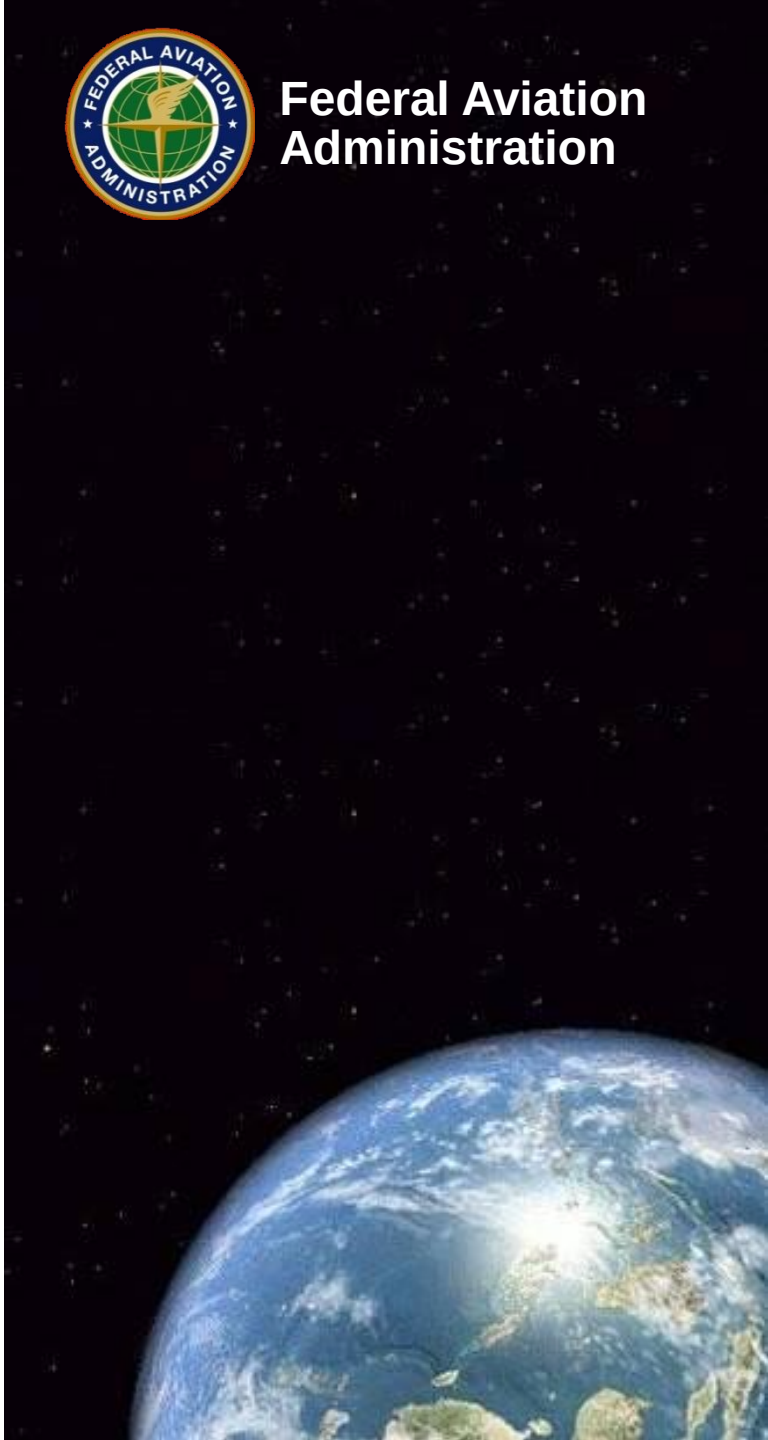
Federal Aviation Administration



Overview

- Team Members
- Purpose of Task
- Research Methodology
- Schedule & Milestones
- What We Have To Date
- Future Work
- Next Steps
- Contact Information

Team Members

- Dr. Nathaniel E. Villaire
- Dr. Daniel Robert Kirk
- Dr. Samuel T. Durrance
- Mr. Sebastian Rainer

Purpose of Task

- Purpose:
  - To provide a solution that safely and expediently reroutes aircraft around a space launch vehicle travelling in the national airspace based on added costs.
- Objectives:
  - Create a program that can display alternate flight paths for a given flight
  - Determine alternate flight paths based on monetary costs and time
- Goals
  - Have a working proof of concept
  - Simple to use design

Research Methodology

- Problem
  - Current NAS closures due to space vehicle launch is very expensive and costly for aircraft
  - Determine the most efficient and cost effective diversion of aircraft around closed airspace

Research Methodology (cont.)

- Proposed Solution
  - Investigators will use analysis of appropriate, existing, data supplied by the FAA to identify specific effects of CSV operations on the safe, expeditious flow of traffic in the NAS. (Proof of Concept)
  - Develop software that suggests alternate routes based on cost savings around closed airspace

Schedule & Milestones

The expected period of performance of this proposal is from 1 June, 2012 until 31 May, 2013.

***Phase 1 activity**

**** Phase 2 activity**

The expected major milestones of the proposed project are:

- *September 15, 2012 - Complete acquisition of data base expertise, applicable hardware and computer capabilities. Begin analysis of FAA LOAs from the affected ARTCCs.

- *September 30, 2012 – Complete categorization of data and selection of a processing program. (Data to be supplied by FAA. Program to be selected/developed by the FIT Research Team.)

Schedule & Milestones (cont.)

- *December 1, 2012 – Complete loading of the sample data bank and run test cases of CSV launch effects on separation of selected NAS operations.

- *December 31, 2012 – Select the data base processing system and computer requirements to be used to accomplish FAA/AST objectives.

Schedule & Milestones (cont.)

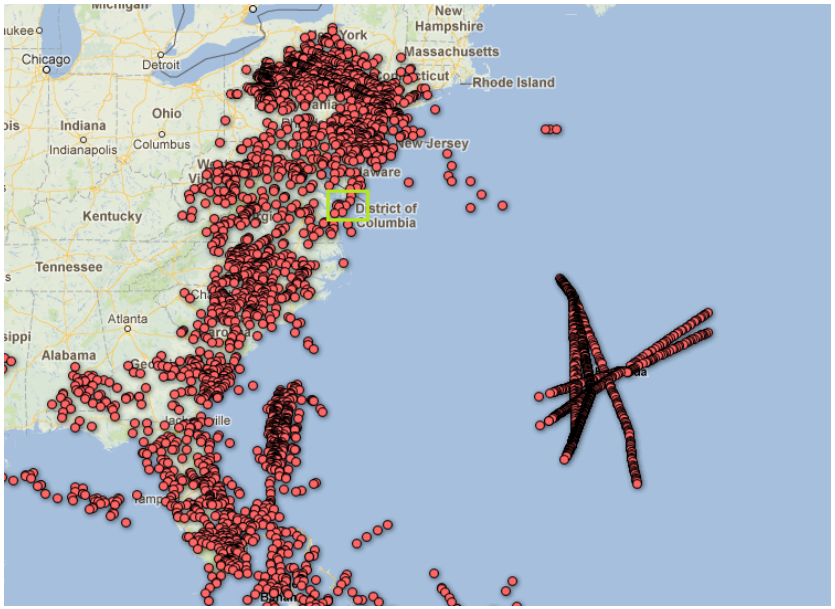
- **February 1, 2013 – Modify the data base program to adjust for any errors encountered to date and process cost analyses of selected airspace separation models involving CSV launches form sites designated by the FAA/AST.

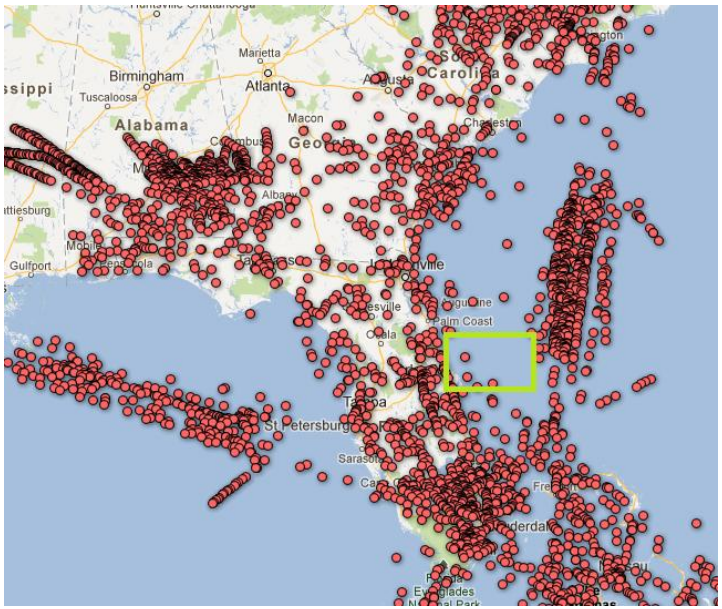
- **March 31, 2013 – Develop the CSV Launch Effects Tool to satisfy the FAA/AST requirements listed in paragraph #9, “a” above.

- **May 31, 2013 – Deliver a CSV launch/recovery data management tool which will fulfill the requirements of #10 above.

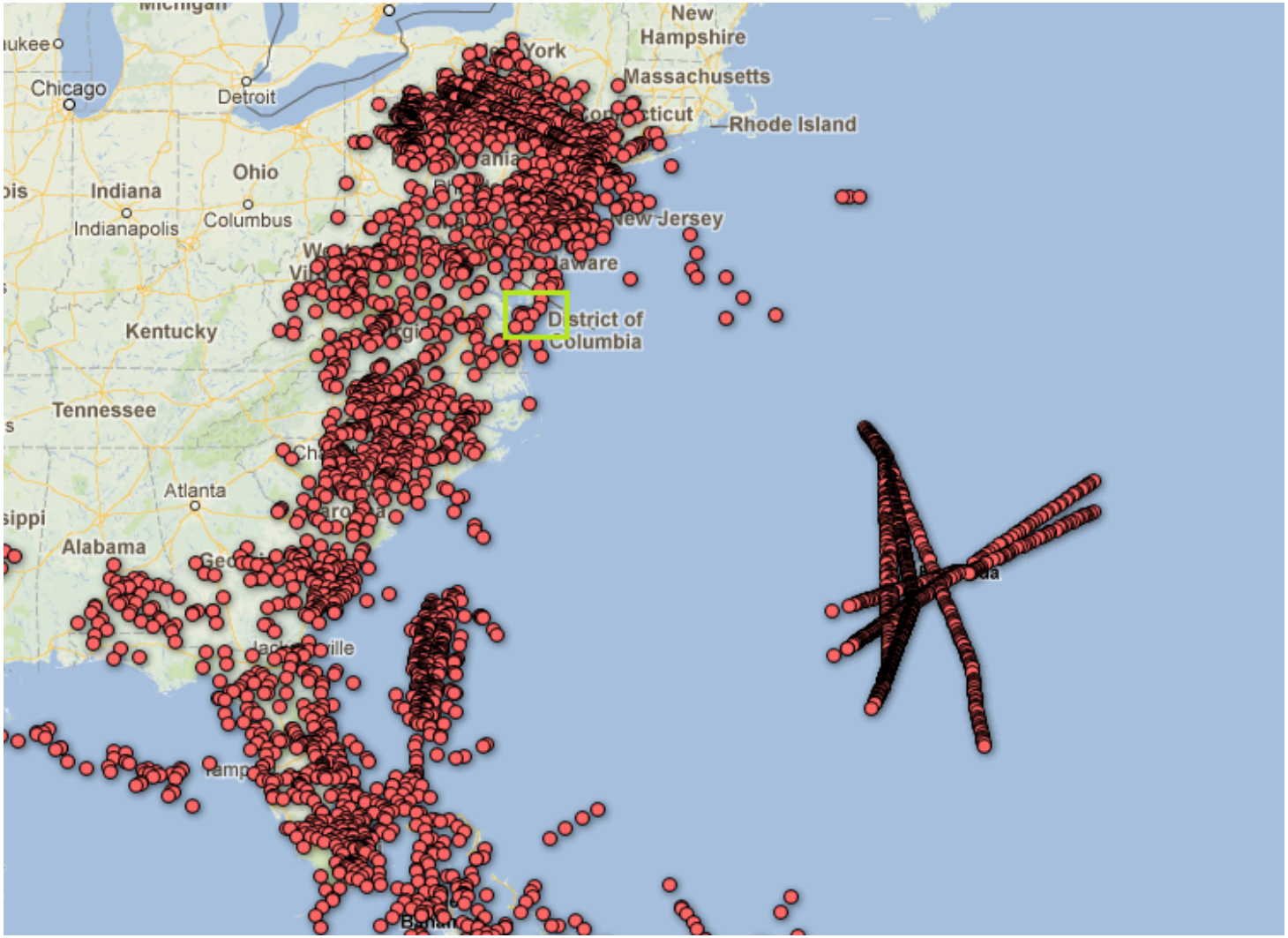
What We Have To Date

- Sample flight data
- NOTAM information for Cape Canaveral
- Basic program structure outlined
  - Database structure
- Trial data plots

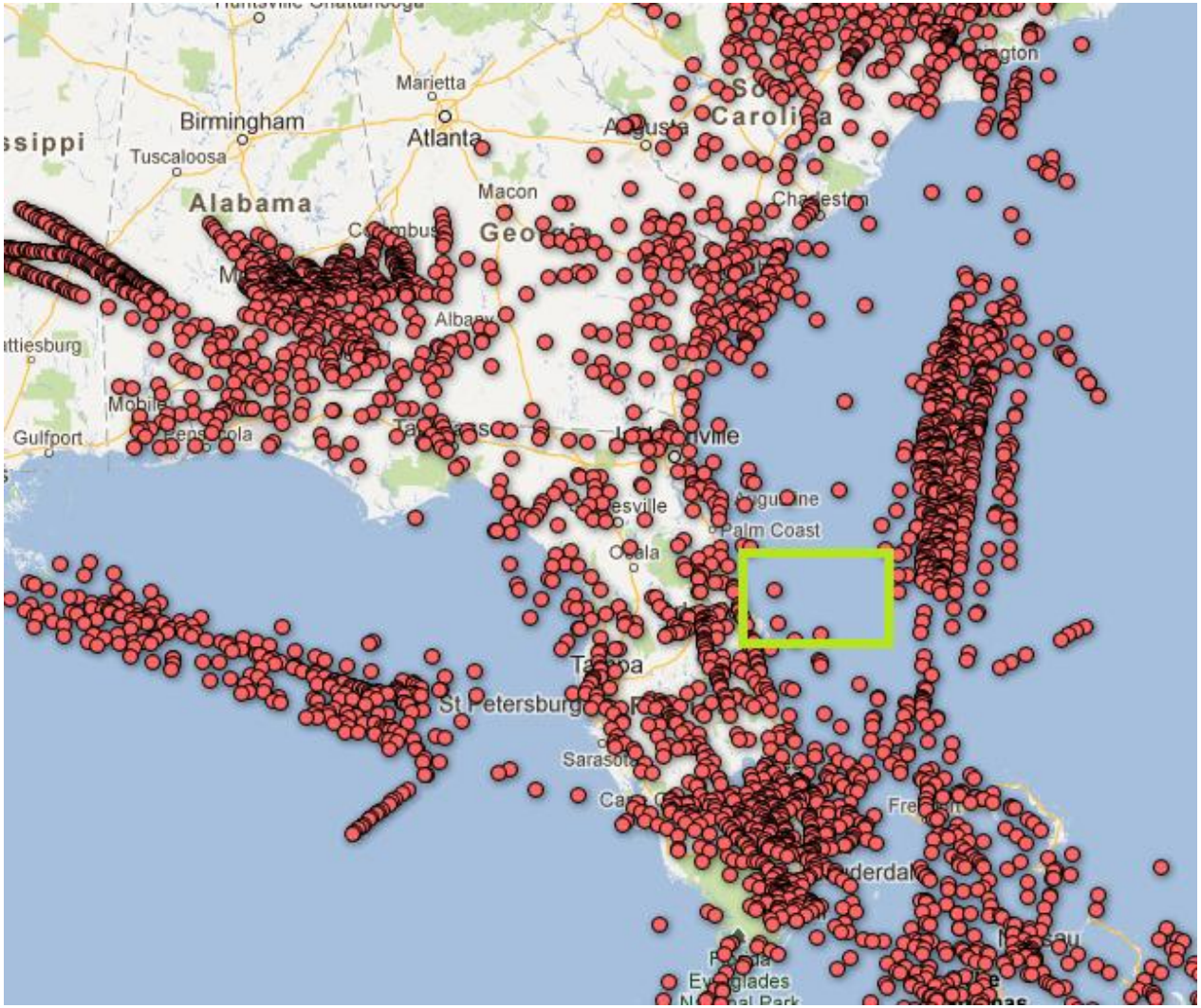




What We Have To Date



What We Have To Date



Future Work

- Continue developing software
  - Integrate time into program
  - Integrate METAR into program
  - Integrate cost analysis into program
- Begin trail runs of software
- Discuss ARTCC procedures
- Discuss procedures with Cape Range Officer

Summary

- Data acquired
- Examined commercial software
  - Determined Excel is not an option
- Begin developing new software
  - Considering weather effects
  - Costs of diversions

Next Steps

- Review pertinent LOAs
- Additional Data
  - Acquire METAR data
  - Acquire IFR international route charts
  - Acquire cost diversion data
  - Acquire range dimensions
- Continue to develop the software
- Resolve outstanding problems

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