



JTA GIS Capabilities

Background:

JTA has more than two decades of experience in cartography and Geographic Information Systems (GIS). Beginning with production using AutoCAD of site plans and maps in the aeronautical domain, this has since evolved into a sophisticated mapping and GIS capability.

Data sources, processes and methodologies:

Over time, JTA has acquired geospatial data from numerous sources and adopted or developed a variety of methods, processes, software and analytical tools.

Data Sources:

Base Map

The underlying geographical background for most JTA products consists of data taken from the Digital Chart of the World (DCW). This is a geographic database designed for small-scale base mapping. The primary sources of information for the database are the 1:1,000,000 scale Operational Navigation Charts (ONC's) and the 1:2,000,000 scale Jet Navigation Charts (JNC's) developed by the Defense Mapping Agency (DMA). The DCW provides worldwide coverage compiled and provided in 5 degree x 5 degree tiles. It contains political boundaries, terrain elevation data, hydrographic features, physiographic features, transportation and utility infrastructure, cultural features, populated places, and land cover data (U.S. only).

Databases:

JTA overlays data from the following sources on the base map just described.

Digital Aeronautical Flight Information File (DAFIF) – an aeronautical database issued by the US National Imagery and Mapping Agency.

Contains data on:

- airports and heliports
- runways
- instrument landing systems
- terminal procedures
- navigation aids
- radio communications sites and frequencies
- airspace boundaries
- air routes
- offroute terrain clearance altitudes (ortca)
- etc.



National Airspace System Resource (NASR) – an aeronautical database issued by the US Federal Aviation Administration (FAA) covering all US airspace.

Data types include:

- ARTCC's and their related facilities
 - landing facilities (airports, heliports, gliderports, etc.) data
 - ARTCC and Oceanic Control Area/Flight Information Region (CTA/FIR) airspace boundaries
 - Jet, Victor, and Colored airways
 - alternate routings (CDRs) to facilitate the safe flow of air traffic during periods of severe weather
 - remote communications outlets (RCO) and enroute flight advisory service (EFAS) outlets data
 - positional, charting, and facility makeup data for fixes used in airway navigation
 - information on all FAA Flight Service Stations and Air/Ground Stations
 - descriptions of holding patterns
 - descriptions of runway end landing systems
 - location identifiers for all active FAA facilities plus Canadian and DoD overseas identifiers
 - point-to-point descriptions of all Instrument Flight Rule (IFR) and visual flight Rule (VFR) military training routes
 - descriptions of all VHF Omni-directional Range (VOR), Non-directional Beacon (NDB), Tactical Air Navigation (TACAN), Fan marker, and Consolan facilities used in airspace navigation
 - all high, low, special high and low, high and low single directional, and TEC routes
 - descent profiles
 - special use airspace data
 - data on all airports with terminal communications
 - descriptions of all US and select foreign locations that provide weather reports
- ACES (Adaptation Controlled Environment System) - US airspace definitions.
- ICAO Regional Plans - contains data on worldwide air traffic infrastructure (routes, communications, navigation and surveillance assets, air routes, etc.).
- Official Airlines Guide - data on scheduled air traffic worldwide.
 - ETMS, ASPM and Offload data – sources of recorded US air traffic data.
 - TIGER Data

**Terrain elevation data:**

- from the National Elevation Dataset (NED) within the US
- from the Shuttle Radar Topography Mission (SRTM) elsewhere

Weather data including:

- NEXRAD convective weather radar images of CONUS from NOAA at 10 minute intervals
- in season, the Collaborative Convective Forecast Product (CCFP)

Populated places, population densities and urban area extents from the Gridded Population of the World, version 3 (GPWv3) and the Global Rural-Urban Mapping Project (GRUMP)

Software:

Software products used within JTA for cartographic and GIS tasks include:

- AutoCAD 2000i/2005
- ArcView 3.2a
- ArcGIS 8.1
- PostGRE/PostGIS
- MATLAB Mapping Toolbox
- Commercially available 3D Viewers

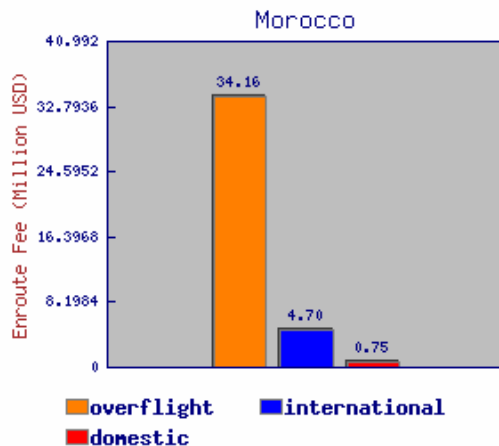
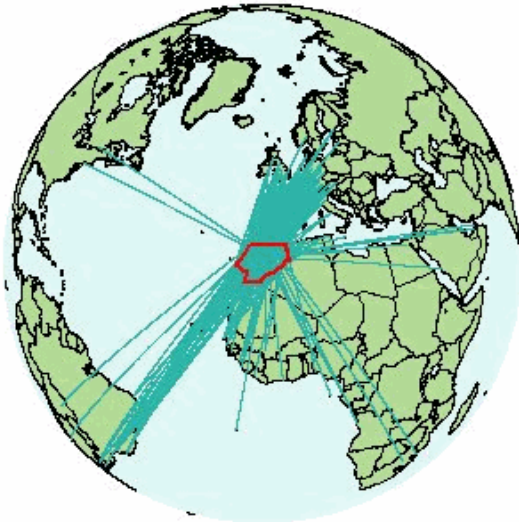
Tools:

JTA uses tools developed externally such as the FAA Integrated Noise Model and EuroControl's Base of Aircraft Data (BADA) but has also developed tools internally that are used in performing aviation analysis. These include:

- Global Air Traffic Operations Research (GATOR) – given scheduled or actually traffic data, this tool, depending on the level of detail in the traffic data, either estimates or determines the distances flown by scheduled or actual flights in the airspace belonging to different states or in other pre-defined geographic areas of interest. GATOR produces a variety of statistical descriptions of this traffic and calculates the revenues from fees for air traffic services and airport services based on actual fee structure data as collected by IATA or other possible fee structures the impact of which can thereby be evaluated.

The summary page of statistics from GATOR for Morocco.

Morocco (MA)



Analysis Report

Country Name	Morocco
ICAO Region	Europe and North Atlantic
ANSP	Office National des Aéroports

Demand Report

FIRs	Routes	Airlines	Airports	Annual Flights	Total Distance (km)
1	587	63	10	138,528	79,535,723

Enroute Charge Calculation

MOROCCO	Basis:	MTOW
	Calculation:	Formula No. 1 (see Note 4)
+	Unit Rate:	EUR 25.36
+	Effective:	01.01.2004

Revenue Report (USD)

Year	2001 ~ 2006	2007 ~ 2011	2012 ~ 2016
Revenue	\$39,607,053	\$42,001,906	\$44,687,842
USD/km	\$0.50	\$0.53	\$0.56

Demand/Revenue by User Type (2001-2006 Annual Data)

Flow type	En-Route Charge	Annual Flights	Average Charge per flight
Overflight	\$34,157,915	98,176	\$348
International	\$4,698,920	31,252	\$150
Domestic	\$750,218	9,100	\$82

Demand/Revenue by FIR (2001-2006 Annual Data)

FIR Name	Routes	Airlines	Annual Flights	Total Distance (km)	Annual Fee (USD)
Casablanca	587	63	138,528	79,535,723	\$39,607,053

CNS/ATM Report

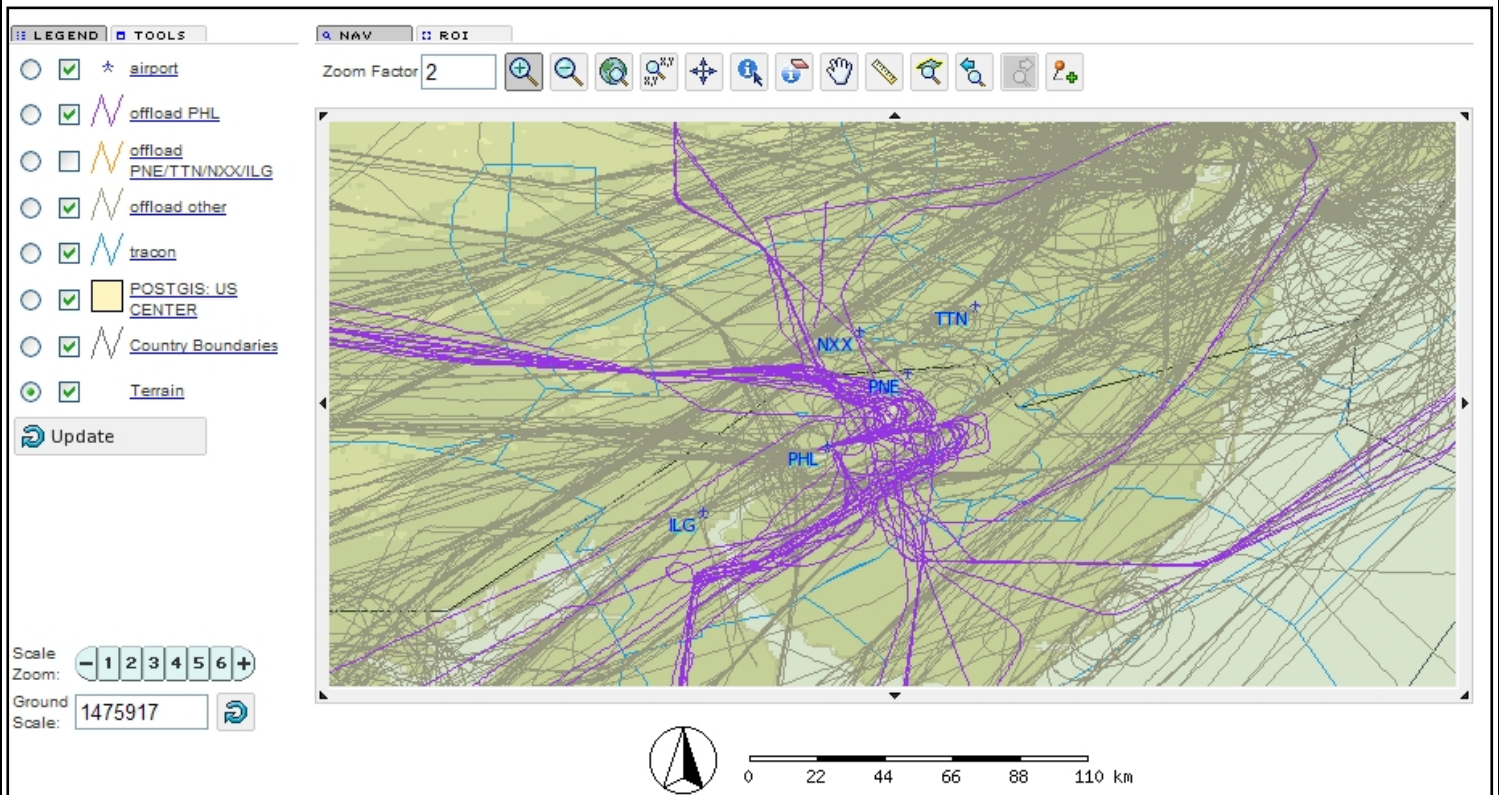
COMM	APP	TWR	ATIS	ARTC
	8	17	1	3
NAVAID	VOR	VOR-DME		NDB
	3	15		16



Web-Based GIS Applications:

JTA hosts a suite of JTA-designed Web/GIS map applications on its web servers, accessible through the JTA web site. The heart of these applications is the GIS database, which organizes our data collected from diverse sources. Relying on spatially-enabled map engines, they can not only pull up different layers of maps and graphs but also include analysis features and utilities.

Snapshot from an analysis of arrivals into Philadelphia and nearby airports





Personnel expertise:

JTA personnel have years of experience in mapping and GIS. Key personnel in this area are:

-**Daniel Huff** - IT Administrator/Graphics Administrator

- proficient in editing and map production from AutoCAD and ArcView
- experienced with other non-GIS graphics packages such as CorelDraw, Adobe, Excel, Word, PowerPoint etc..

-**Jon Torrance** - systems engineer - B.Eng (Aerospace), M.Eng.(Mechanical)

- proficient in AutoCAD and ArcView, including AutoLISP and Avenue programming, and in MatLab.

-**Sam Turner** - system engineer - B.S. Physics, Computer Science concentration, University of Maryland

- proficient in C and Java programming, data analysis using MATLAB and Mathematica, knowledge of physics and mathematics.

-**Thomas Lee** – principal software engineer - B.Sc., Computer Engineering, M.Sc., Computer Science

- proficient in PostGreSQL/PostGIS, Oracle and mySQL using PL/SQL, and in Perl, PHP, FLASH, C++, MatLab and Java programming, and Avenue programming in ArcView.

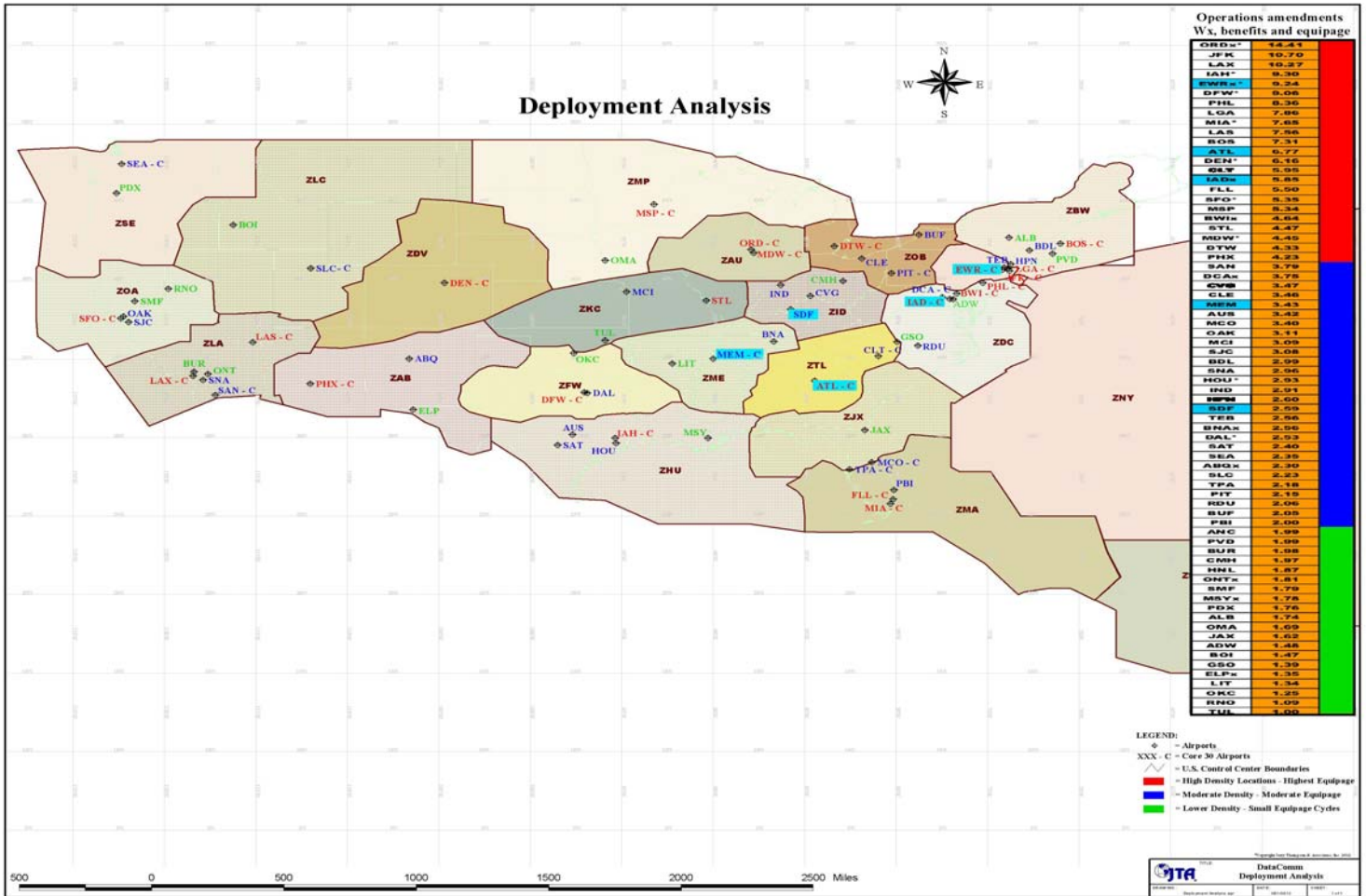
Customers:

JTA has undertaken projects significantly involving GIS for customers including:

- GOS Aeronavigatsia (Russia)
- ENNA (Algeria)
- Northrop Grumman
- Raytheon
- US Air Force Southern Command
- Boeing
- Federal Aviation Administration (United States)
- NAVCanada
- People's Republic of China
- Kuwait
- Saudi Arabia
- Windmill International
- Williams Aviation
- FAA William J. Hughes Technical Center

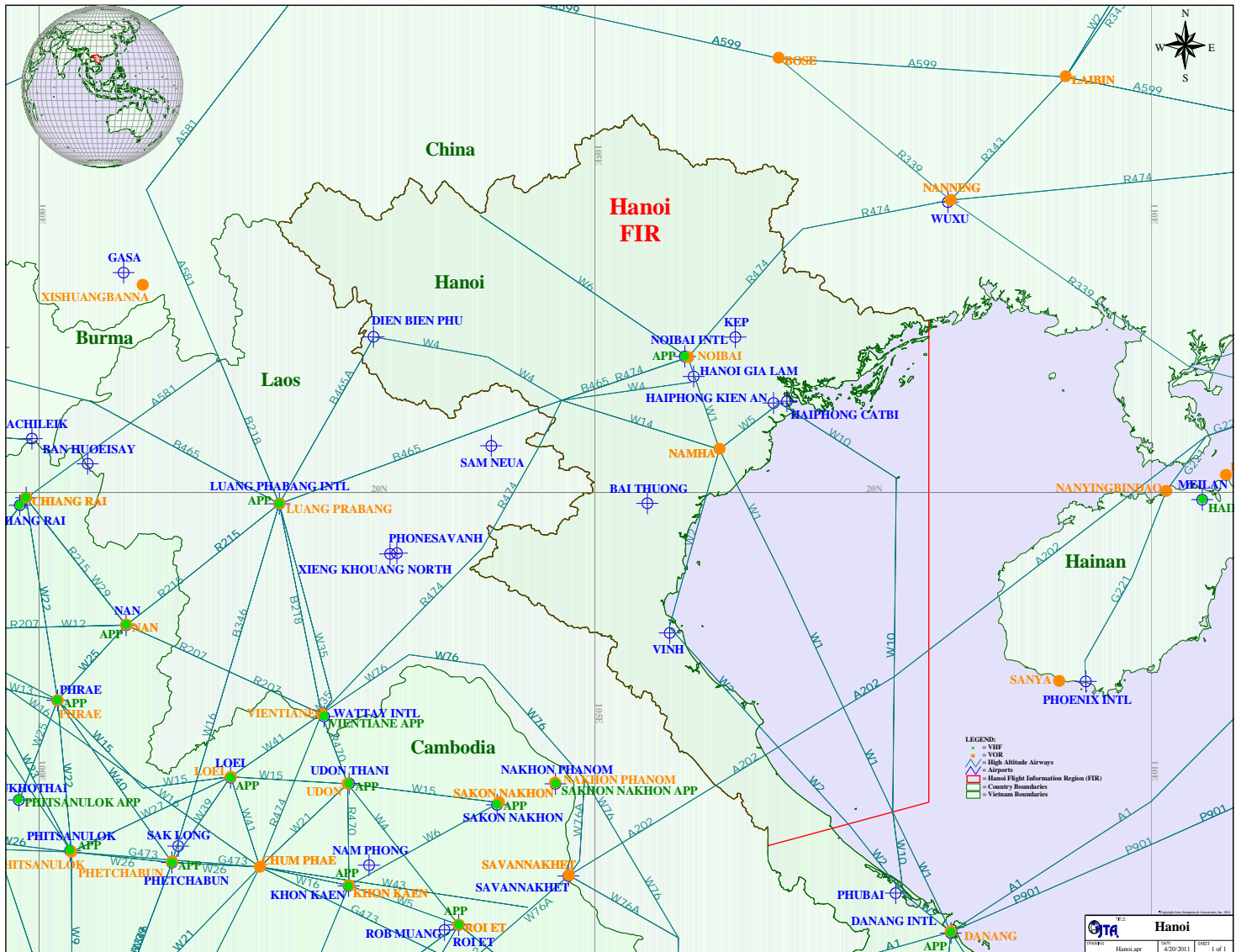


Sample of Work:



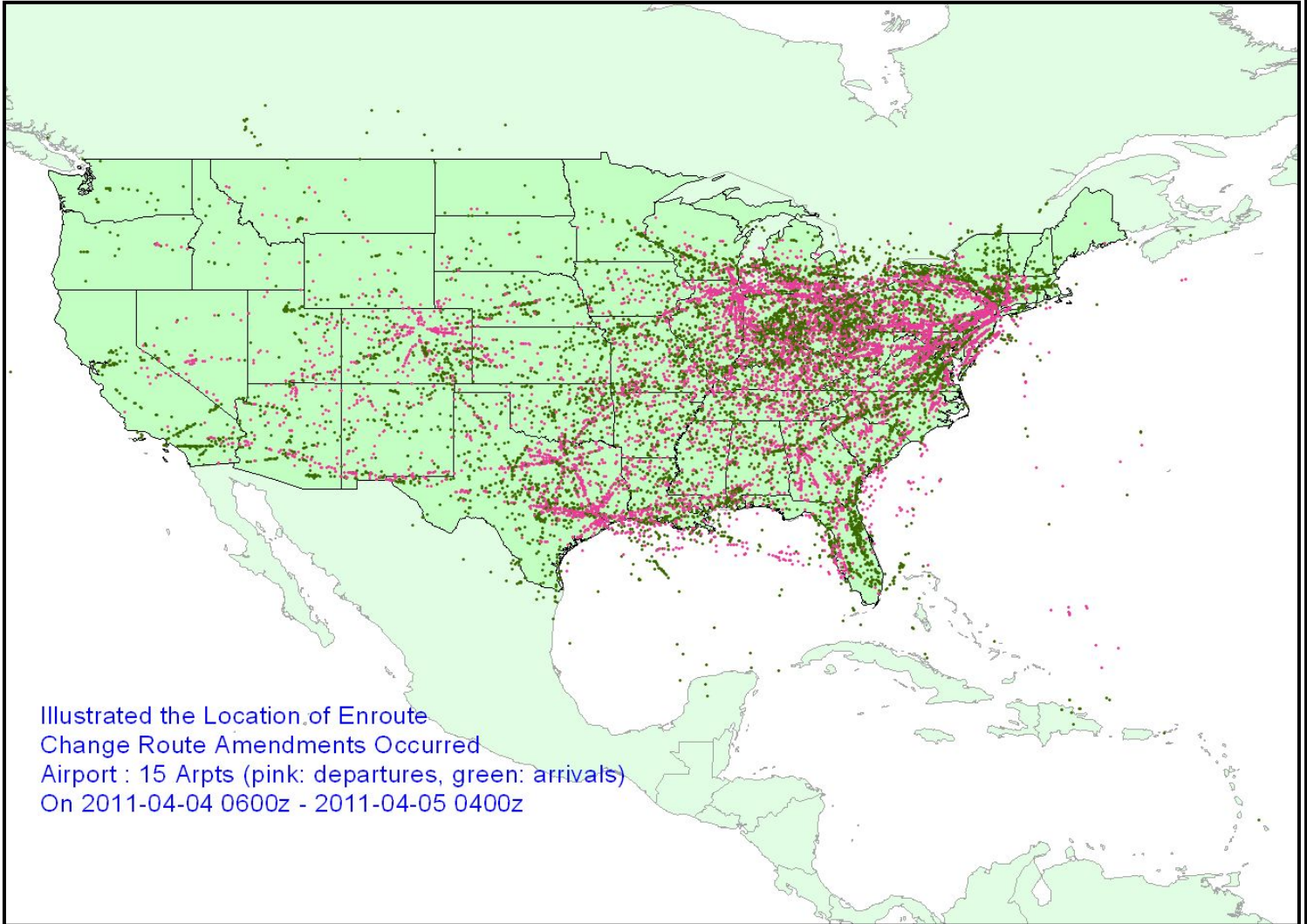


Sample of Work:





Sample of Work:

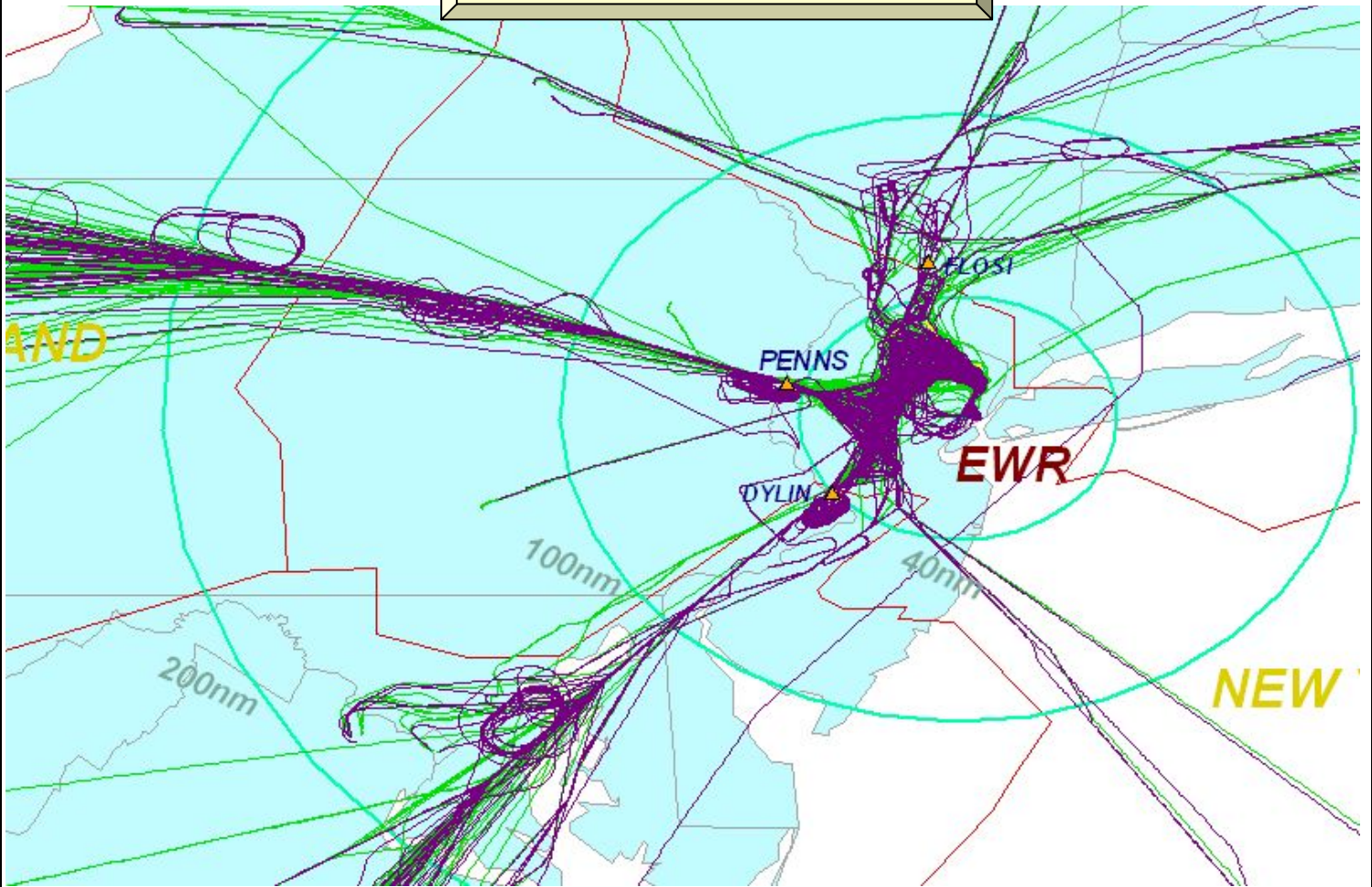


Illustrated the Location of Enroute
Change Route Amendments Occurred
Airport : 15 Arpts (pink: departures, green: arrivals)
On 2011-04-04 0600z - 2011-04-05 0400z



Sample of Work:

*EWR Holding (local 10:00-18:00)
Flight Tracks*





A composite image showing convective weather over the United States from NEXRAD. The imagery for this and other dates can be viewed as an animation on the JTA web site at www.jta-atc.com. JTA extracts and stores the geometry of the NEXRAD data and can therefore combine it with other data themes in GIS applications.



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