



# Toronto Pearson Airport

Use of Area Navigation (RNAV) Standard Instrument Departure (SID)

CENAC - September 17th, 2014



## **Toronto Pearson (CYYZ): Area Navigation (RNAV) Standard Instrument Departure (SID)**

- Addition of RNAV SID procedures
- The phases of a CYYZ RNAV SID procedure
- What will we be publishing on November 13<sup>th</sup>, 2014?



## Why are we adding more RNAV SID procedures?

- Changes in technology
  - Flight Management System (FMS)
  - Area Navigation (RNAV)
  - Global Positioning System (GPS)
- Decommissioning of Navigation Aids (NAVAID)
  - Federal Aviation Administration (FAA)
  - NAV CANADA





The flight deck of modern aircraft have changed drastically over the last two decades. This has provided opportunities for enhancing procedures that use modern technology.



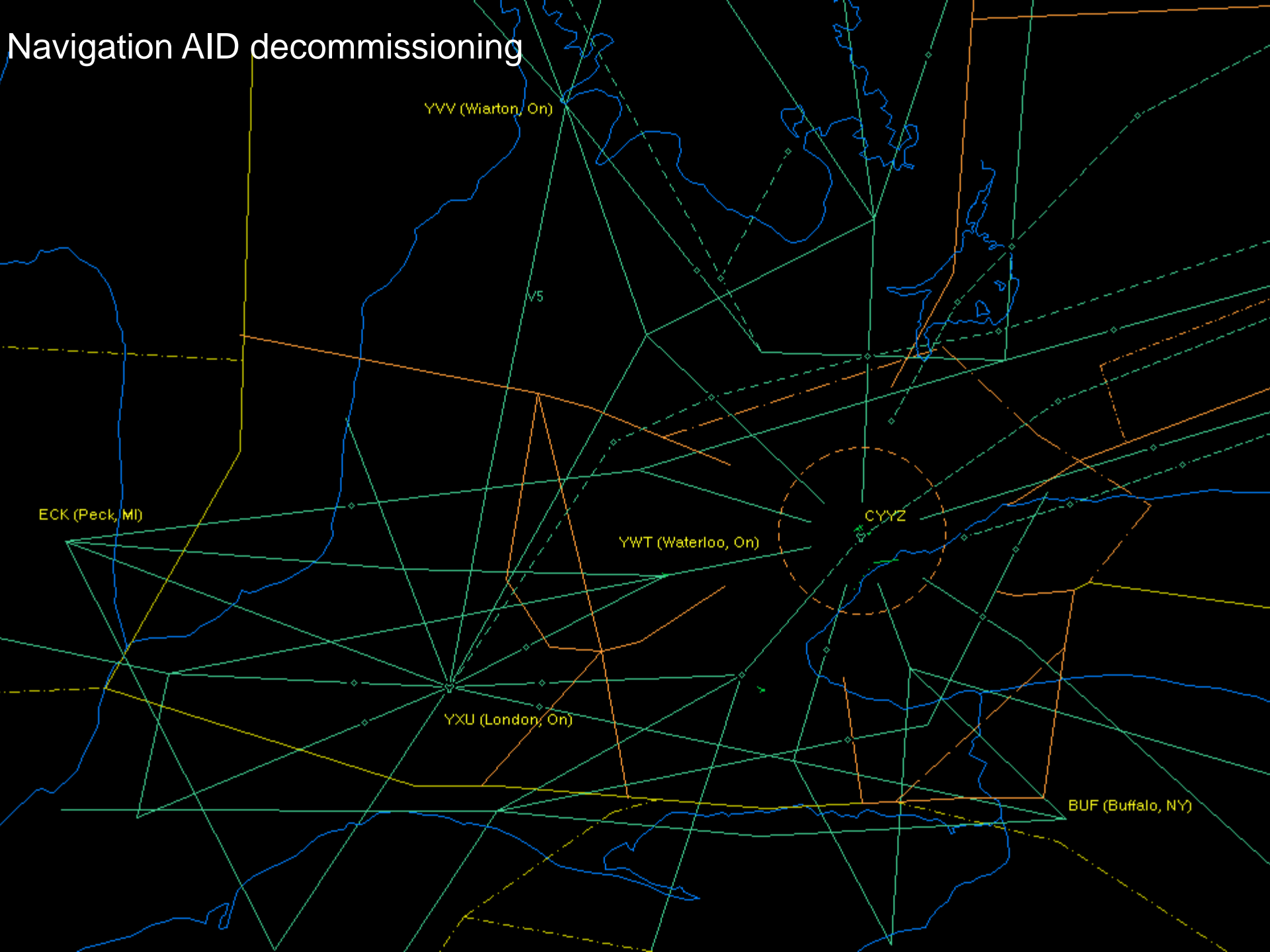
# Flight Management System (FMS)

## GPS Receiver

- All procedures
  - Airways/Intersections
  - Standard Instrument Departures (SID)
  - Standard Terminal Arrival Routes (STAR)

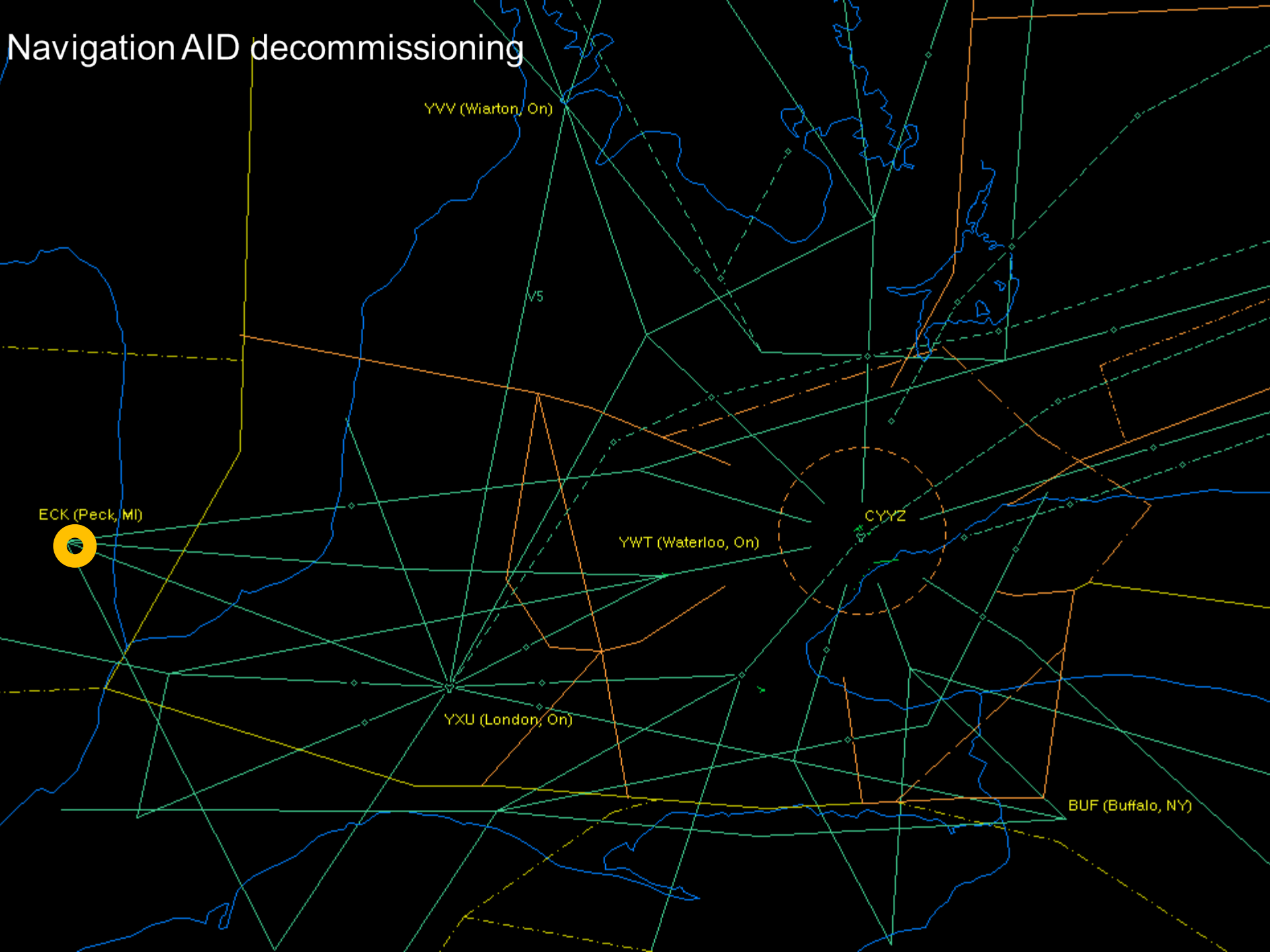


# Navigation AID decommissioning

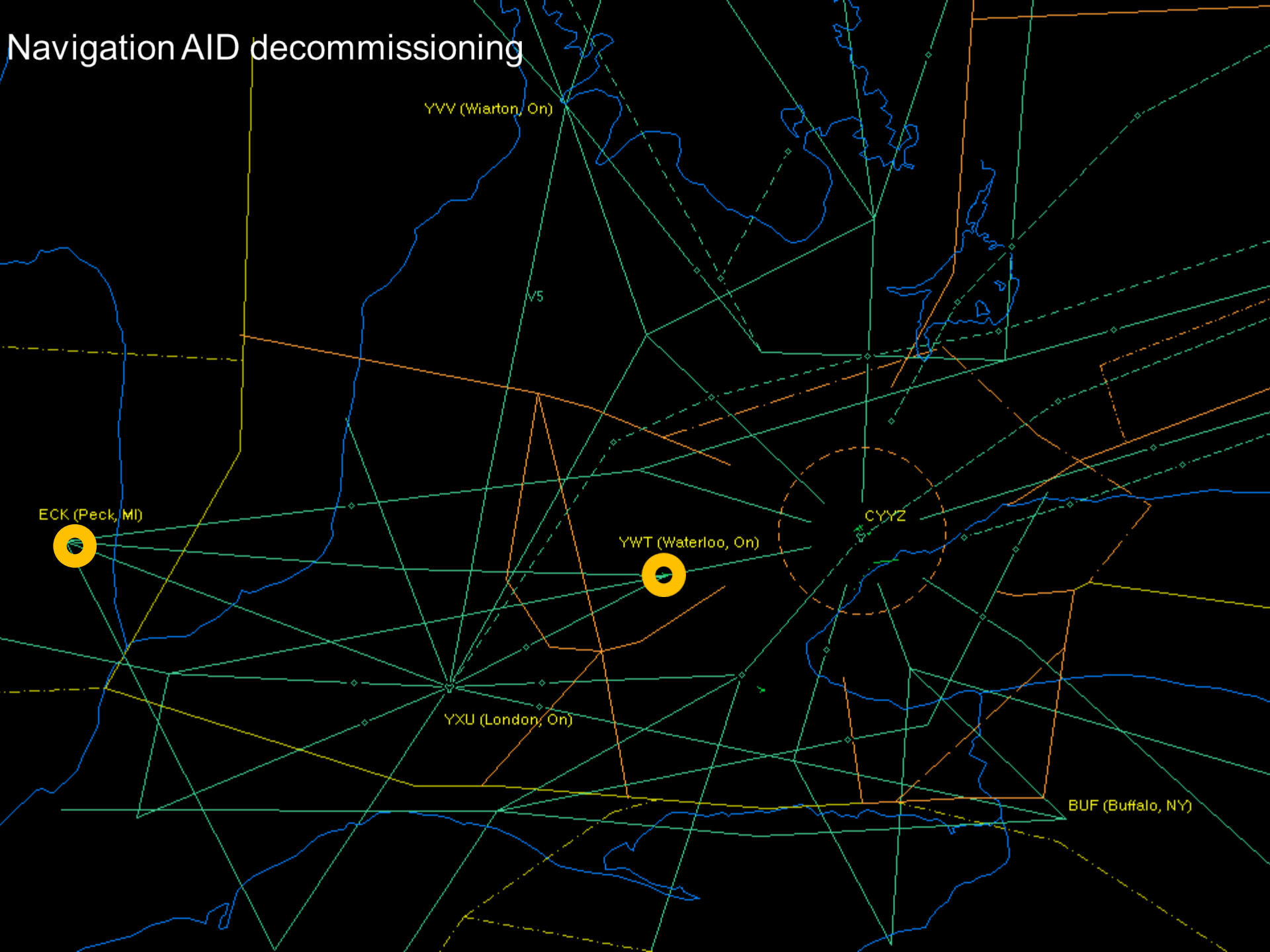




# Navigation AID decommissioning

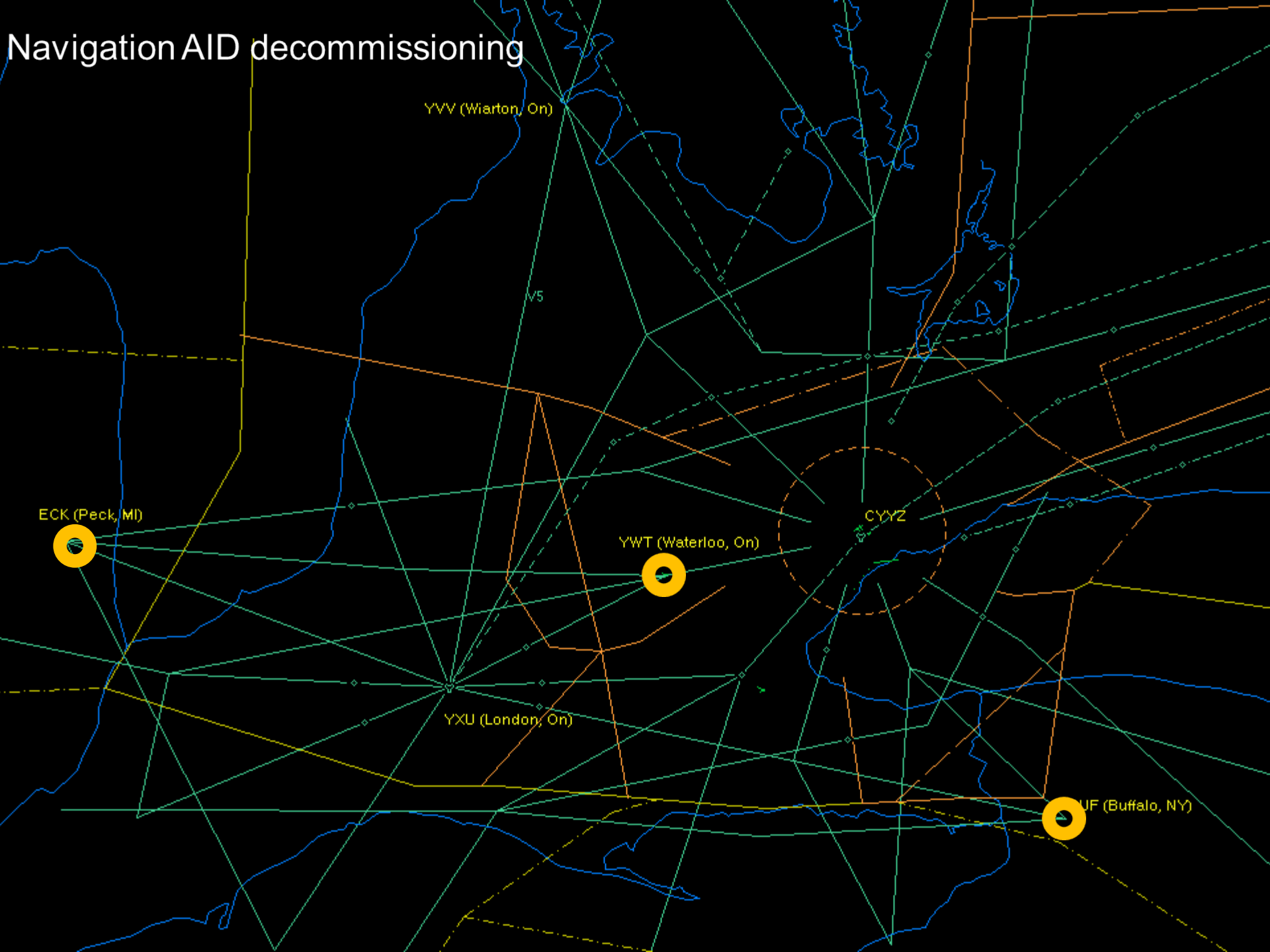


# Navigation AID decommissioning

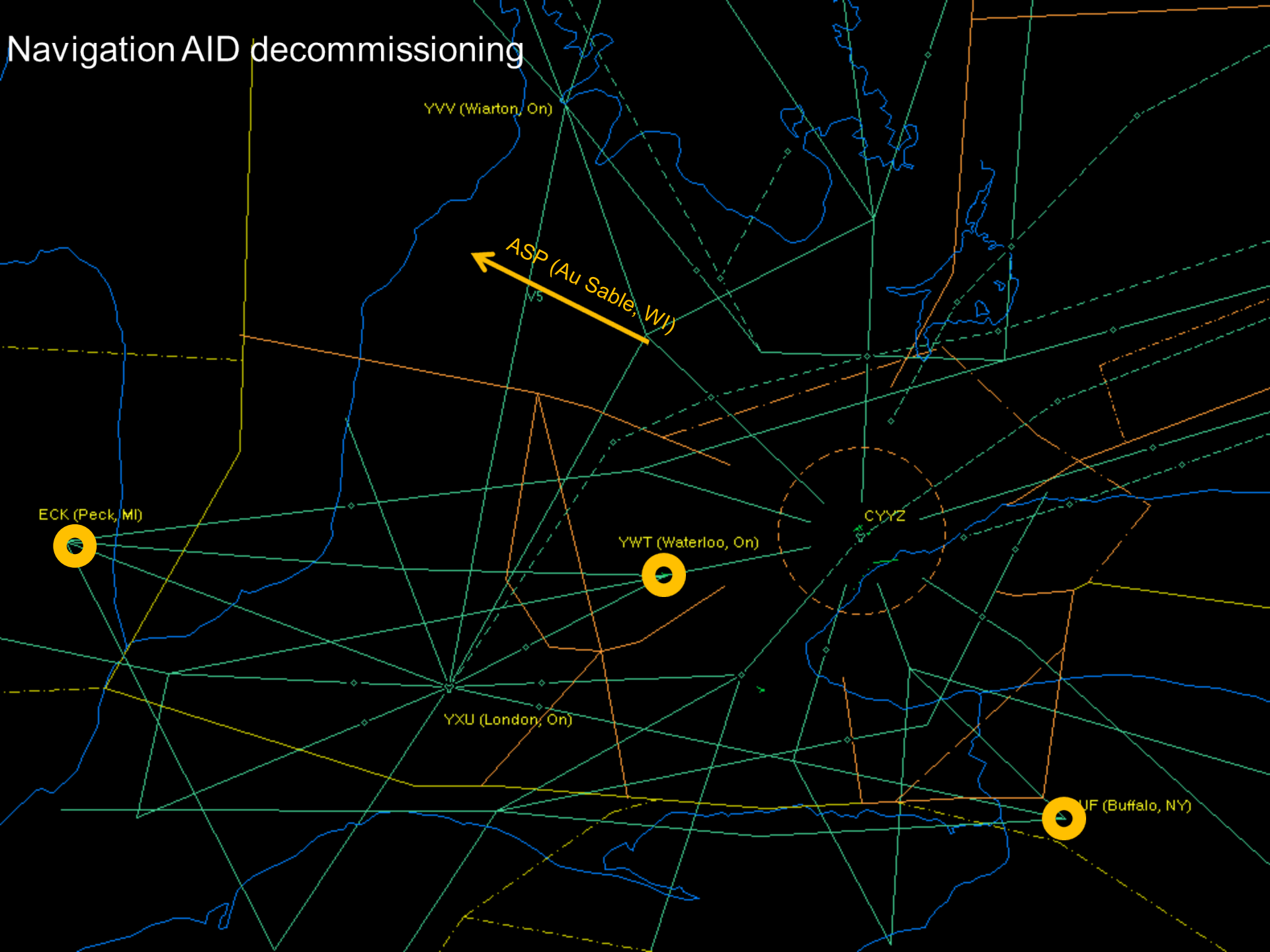




# Navigation AID decommissioning

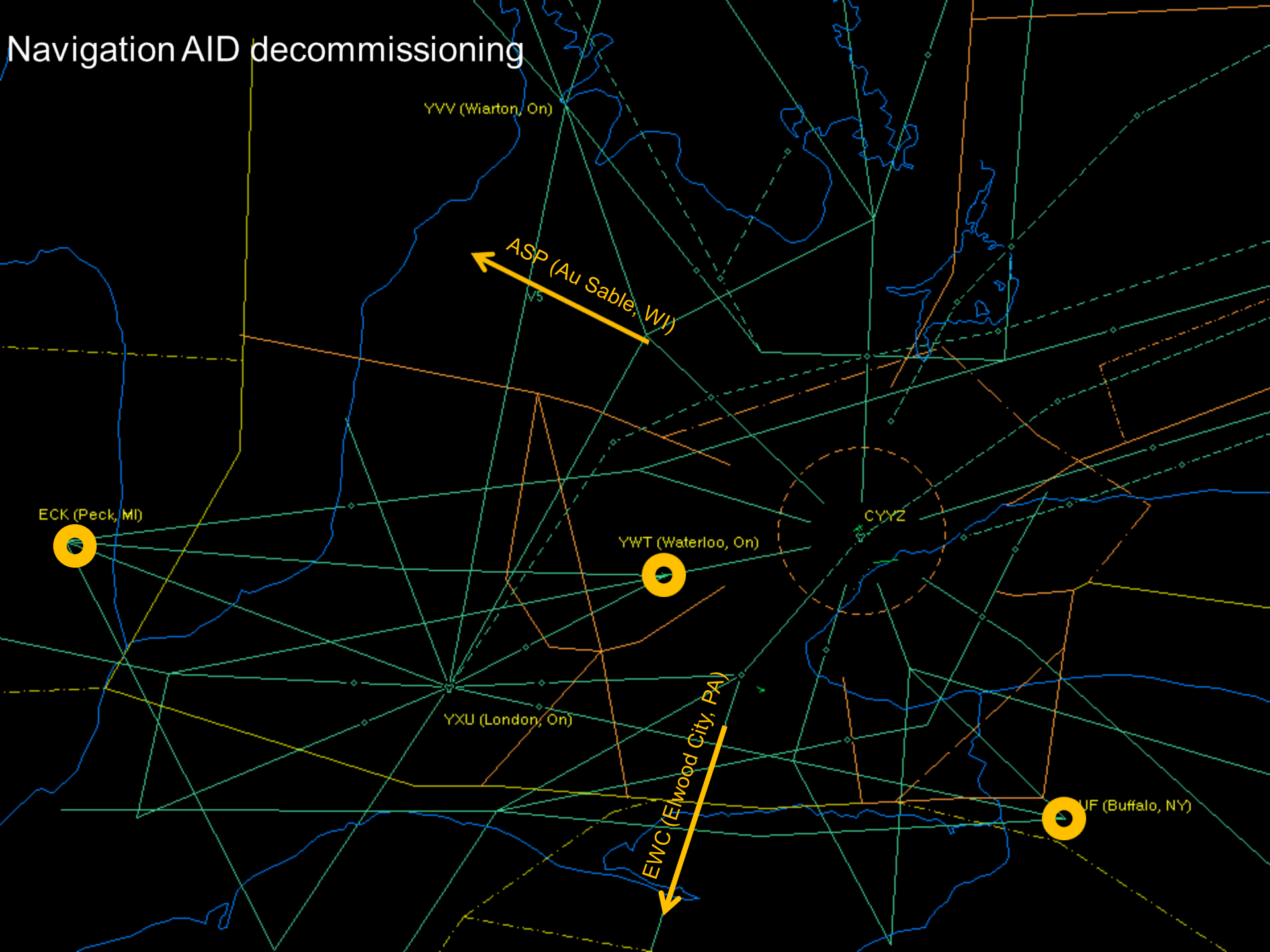


# Navigation AID decommissioning





# Navigation AID decommissioning





## Why are we adding more RNAV SID procedures?

- We need to create a system that is able to provide guidance without the reliance on ground based NAVAIDs
  - We need to use the new technology
  - We need to be able to adapt to future changes
  - We need to ensure that we integrate with the FAA route structure



CYYZ - North America

Google earth

US Dept of State Geographer

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Image Landsat

Data SIO, NOAA, U.S. Navy, NGA, GEBCO



View from Space (Altitude: 7230 km)



## CYYZ - North America

URSAL  
AVSEP  
KISEP  
TONNY

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View from Space (Altitude: 7230 km)





## CYYZ - North America

URSAL  
AVSEP  
KISEP  
TONNY  
SEDOG  
VERDO  
DEDKI

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View from Space (Altitude: 7230 km)





## CYYZ - North America

URSAL  
AVSEP  
KISEP  
TONNY  
SEDOG  
VERDO  
DEDKI  
BULGE  
BETES

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View from Space (Altitude: 7230 km)





## CYYZ - North America

URSAL  
AVSEP  
KISEP  
TONNY  
SEDOG  
VERDO  
DEDKI  
BULGE  
BETES  
OAKVL  
YQO

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## CYYZ - North America

URSAL  
AVSEP  
KISEP  
TONNY  
SEDOG  
VERDO  
DEDKI  
BULGE  
BETES  
OAKVL  
YQO  
ARTHR

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View from Space (Altitude: 7230 km)





## The phases of a CYYZ RNAV SID procedure

- 0-9 KM Ring
  - Initial Departure instructions as per noise abatement procedures
  - Leaving the runway
- 10-19 KM Ring
  - Turn towards RNAV SID (ATC initiated)
  - After noise abatement procedures
- 20-55 KM Ring
  - The aircraft will join the RNAV SID (FMS)
- Enroute phase of flight
  - Terminate RNAV SID and join flight planned route
  - Approximately 150KM from CYYZ



CYYZ

5NM Ring

North



Woodbridge

North York

0-9 KM Ring

Brampton

Peel Regional Municipality

Toronto Pearson International Airport

Toronto

Etobicoke

Toronto Island

Mississauga

Hornby

Google earth

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10 km



CYYZ

5NM Ring

Woodbridge

North York

0-9 KM Ring

Initial departure phase

Brampton

Peel Regional Municipality

Toronto Pearson International Airport

Toronto

Etobicoke

Toronto Island

Mississauga

Hornby

Google earth

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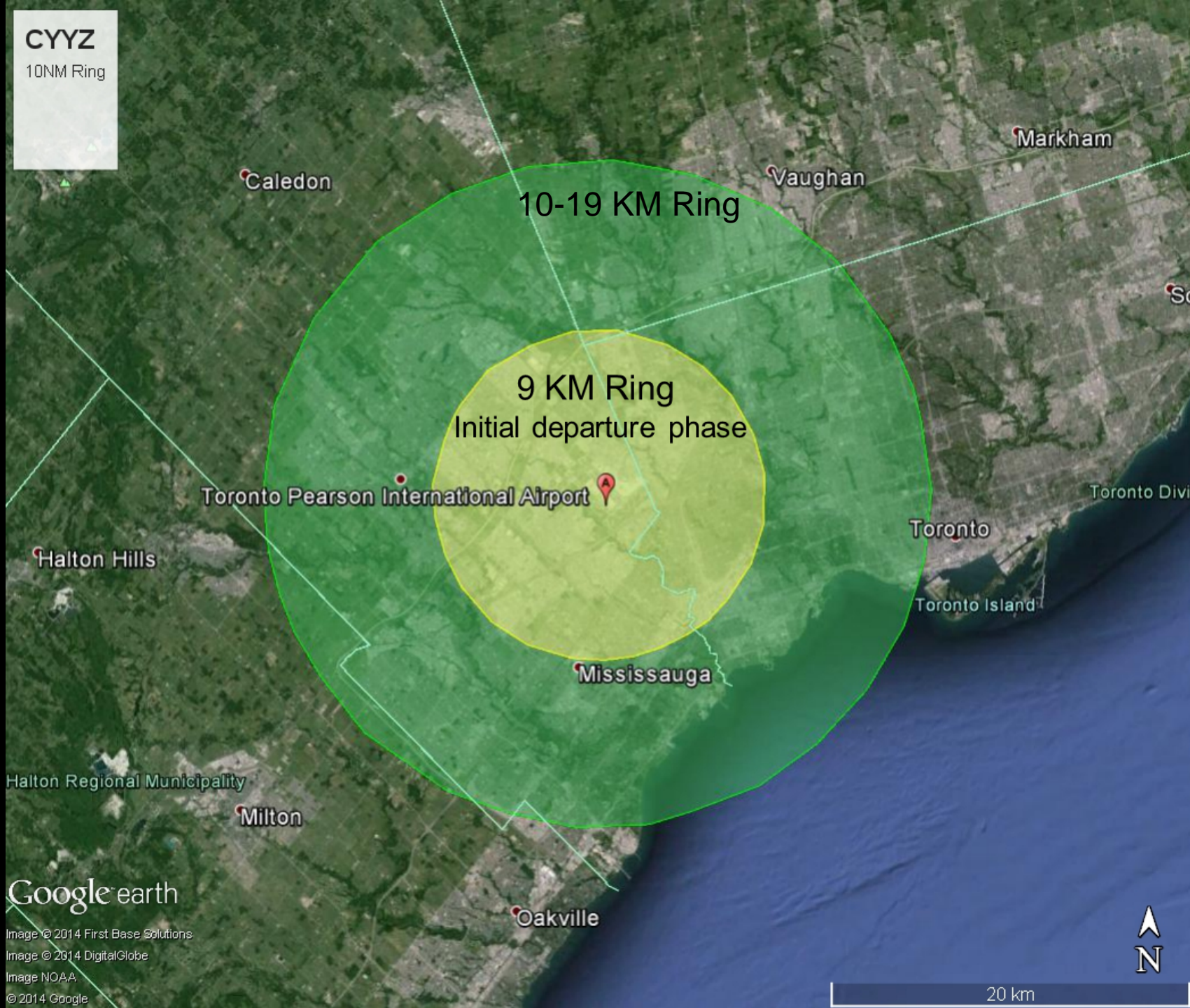


10 km



CYYZ

10NM Ring



Toronto Pearson International Airport

10-19 KM Ring

9 KM Ring  
Initial departure phase

Toronto

Toronto Island

Mississauga

Oakville

Milton

Halton Hills

Caledon

Vaughan

Markham

Halton Regional Municipality

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20 km



CYYZ

10NM Ring

10-19 KM Ring  
Turn towards RNAV SID

9 KM Ring  
Initial departure phase

Toronto Pearson International Airport

Halton Hills

Halton Regional Municipality

Milton

Oakville

Vaughan

Markham

Toronto

Toronto Island

Toronto Divi

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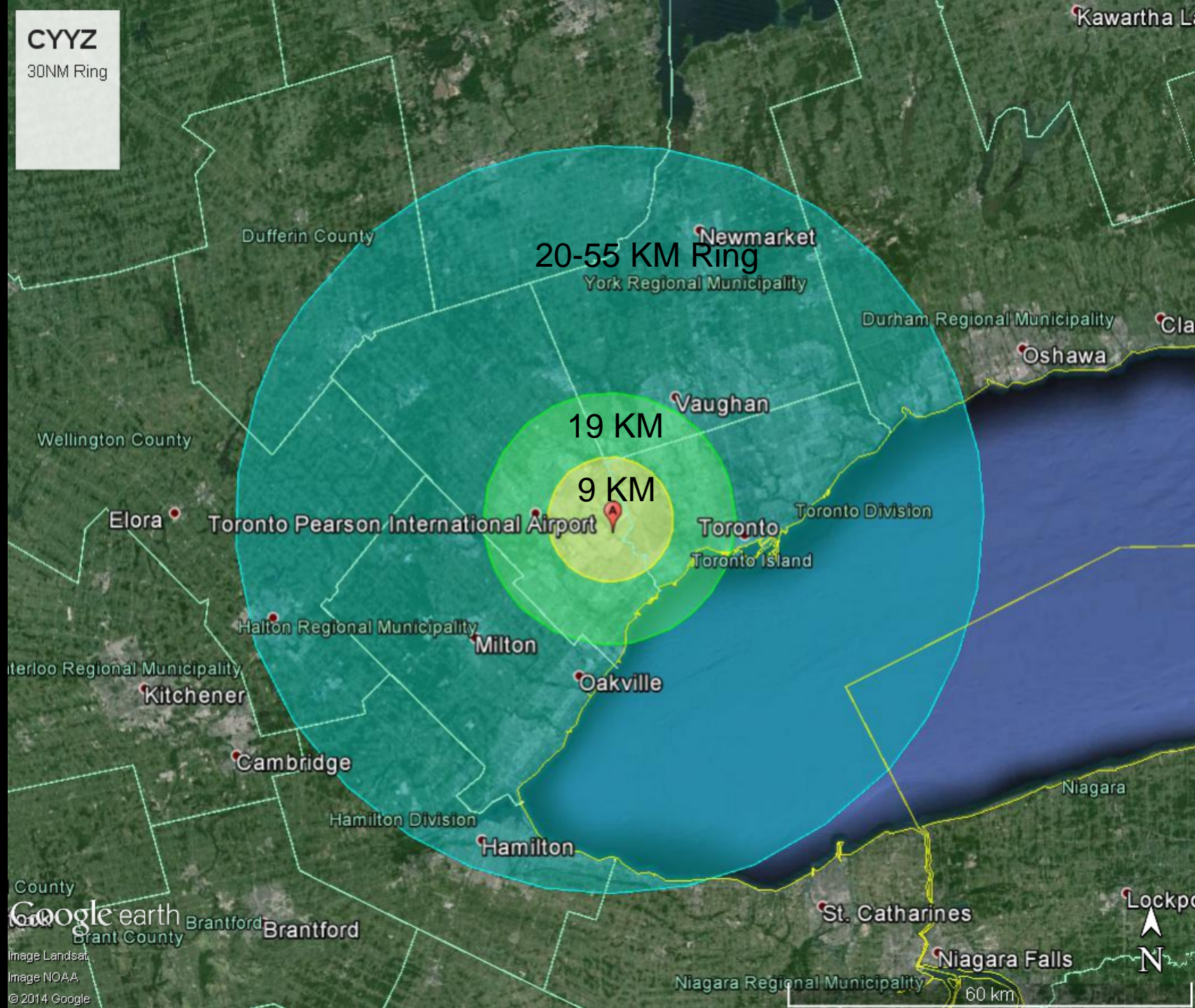


20 km



CYYZ

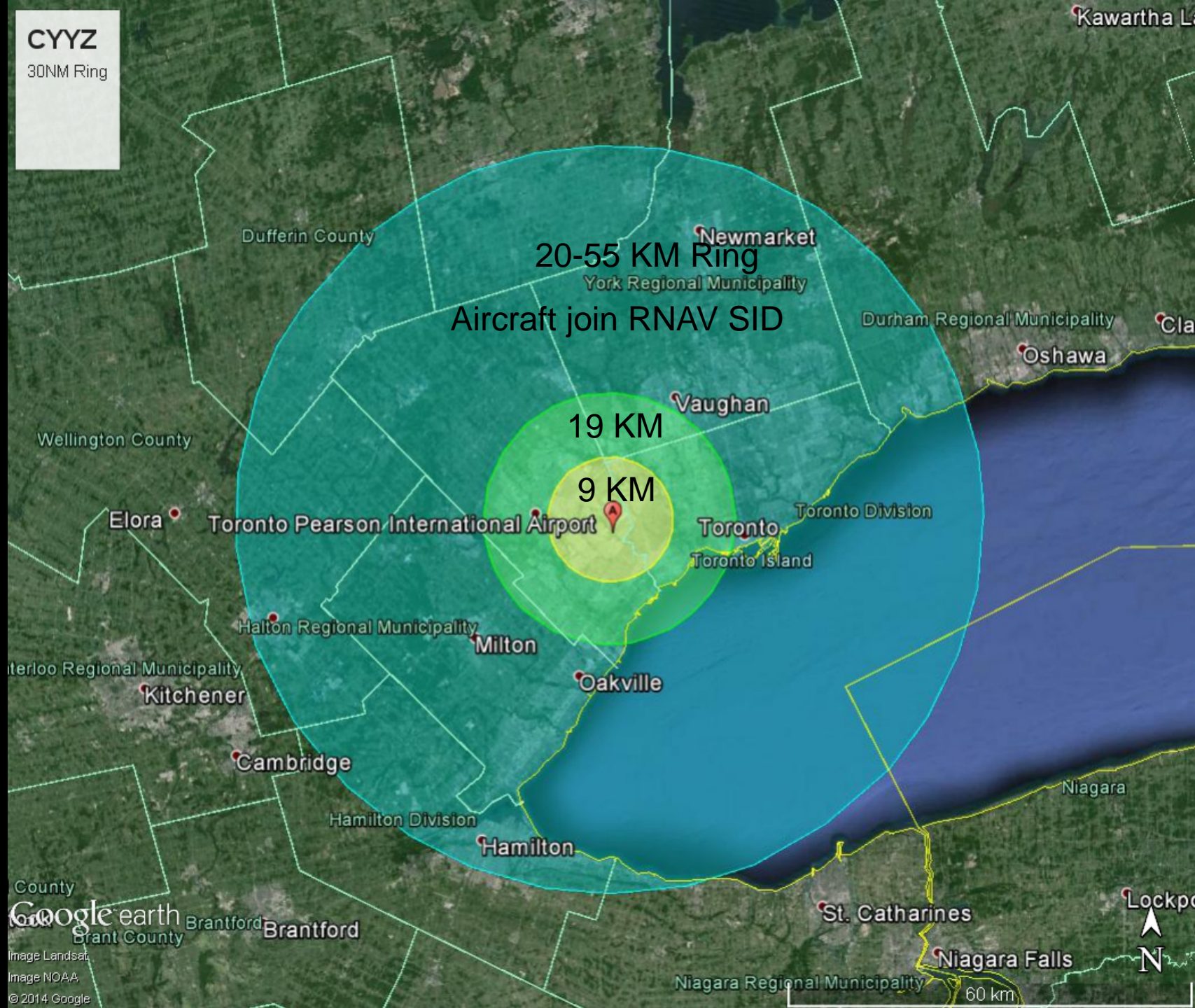
30NM Ring





CYYZ

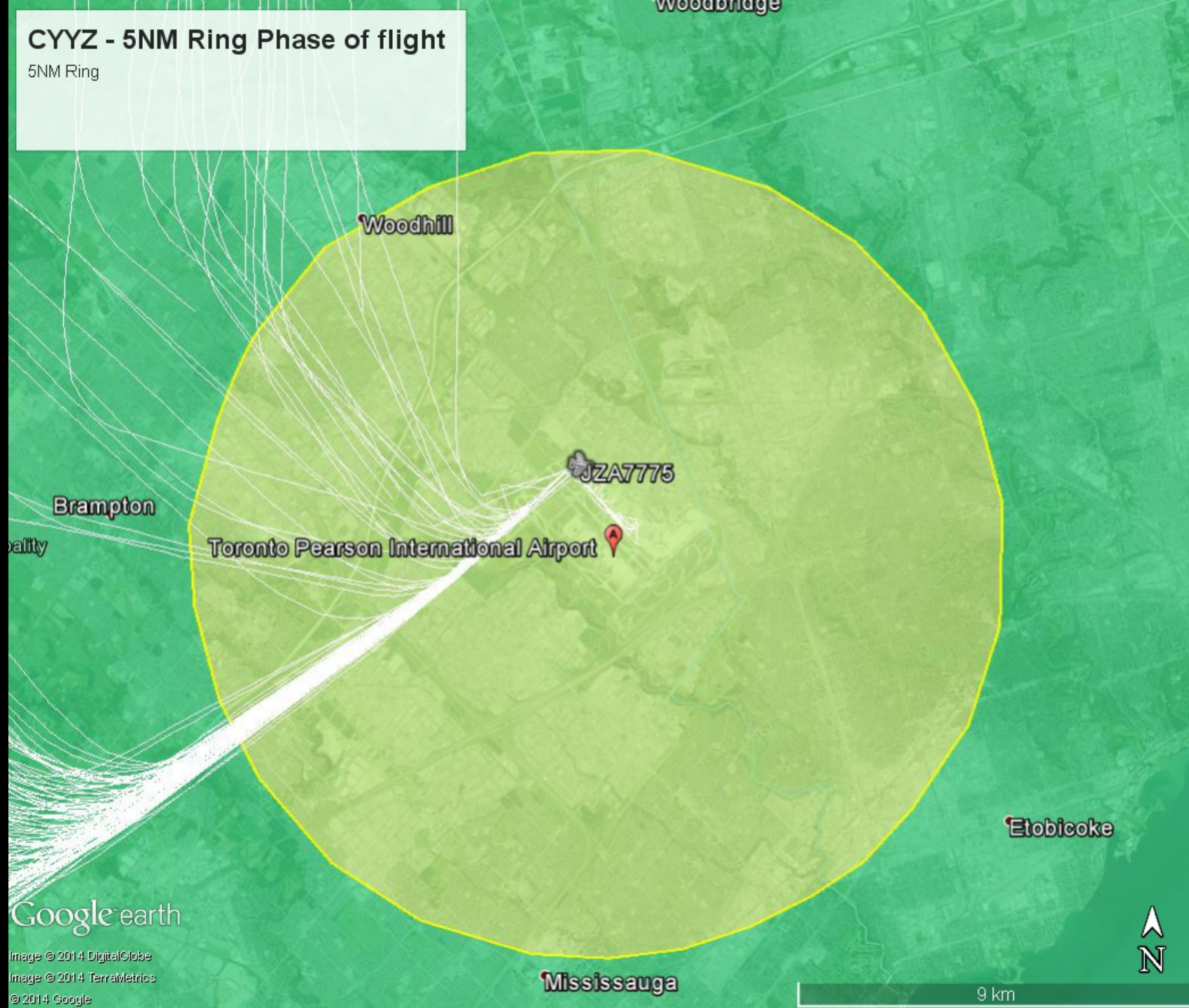
30NM Ring





# CYYZ - 5NM Ring Phase of flight

5NM Ring



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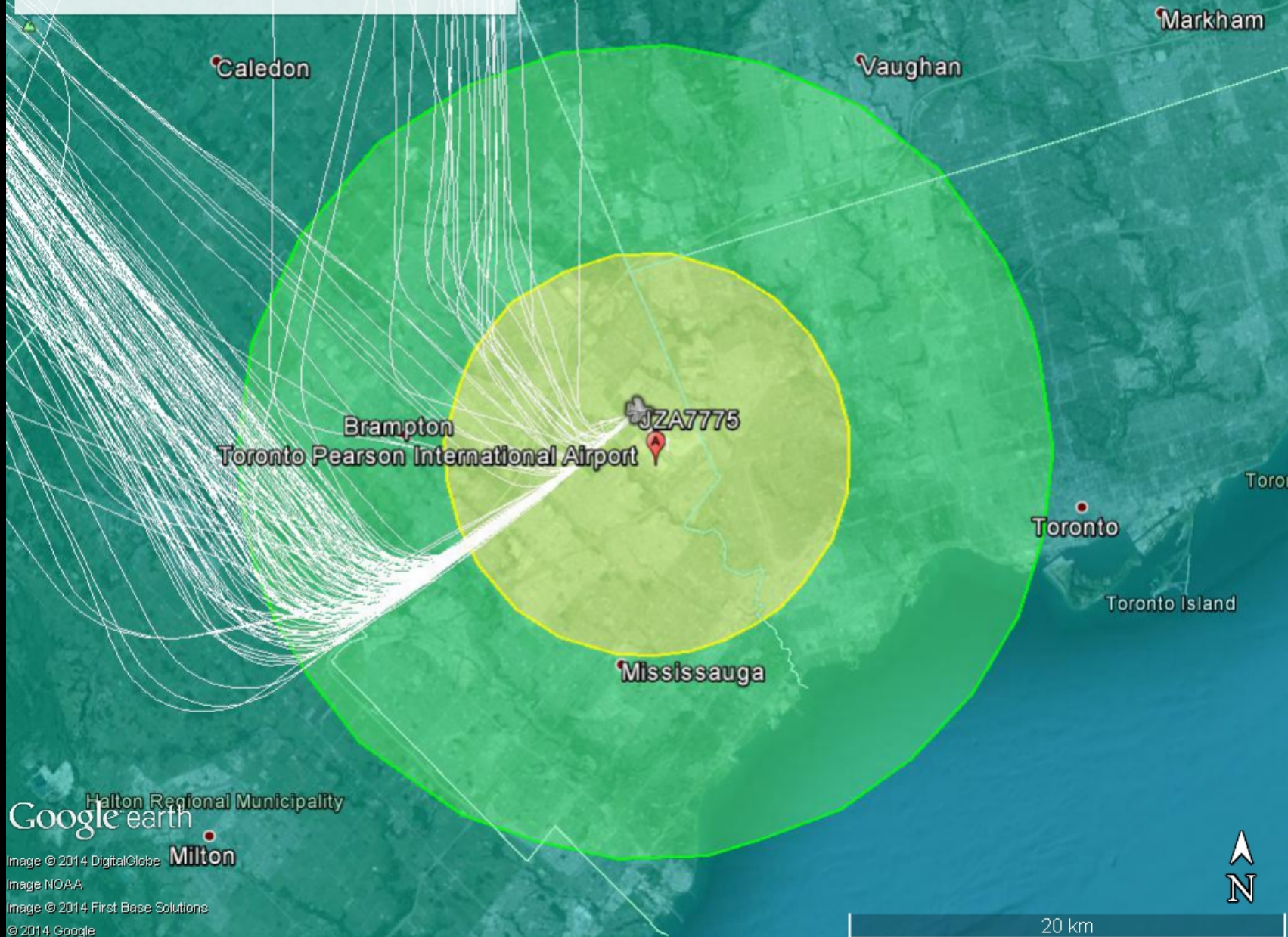
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# CYYZ - 10NM Ring Phase of flight

10NM Ring



Google earth

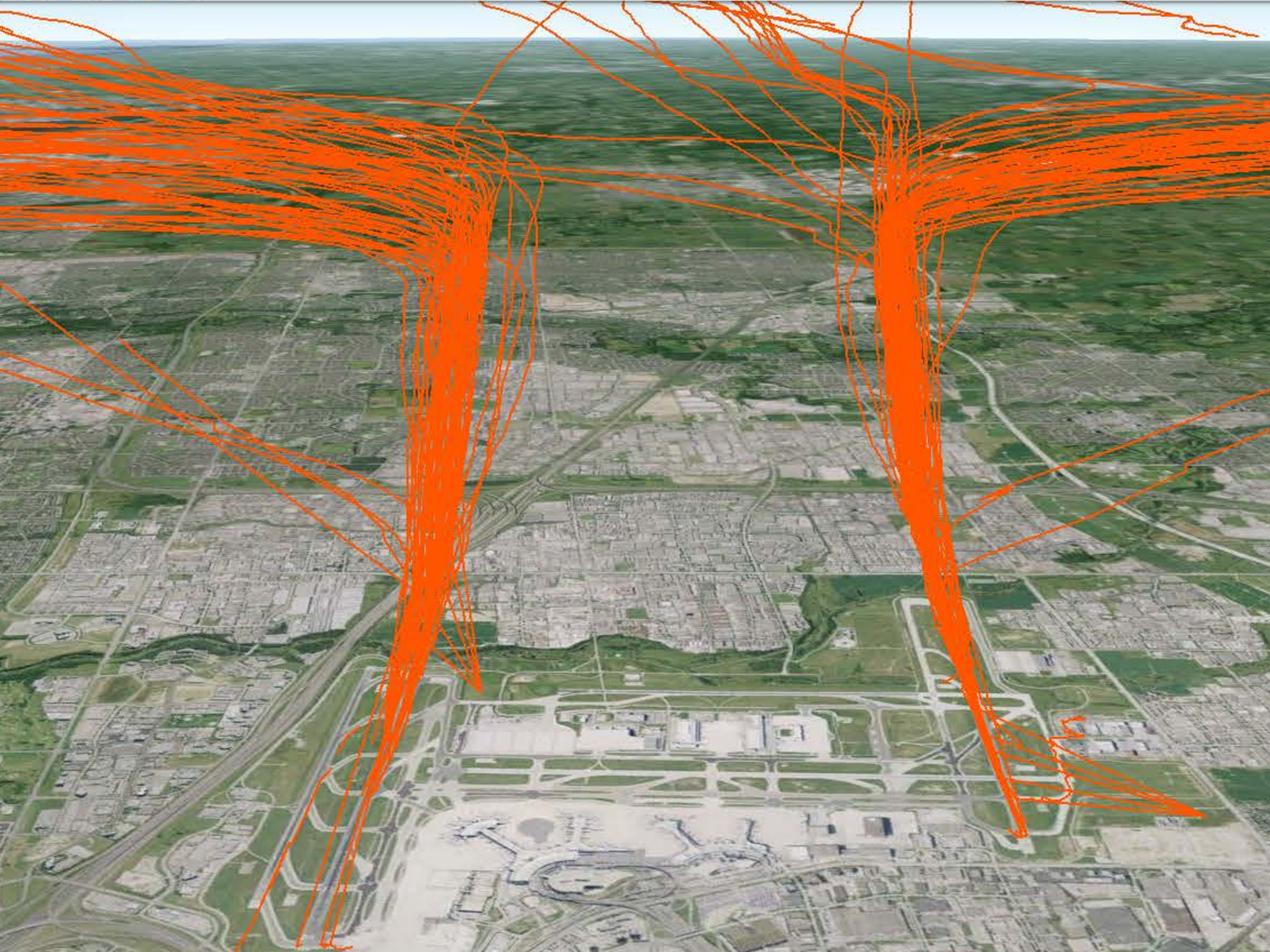
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Image NOAA

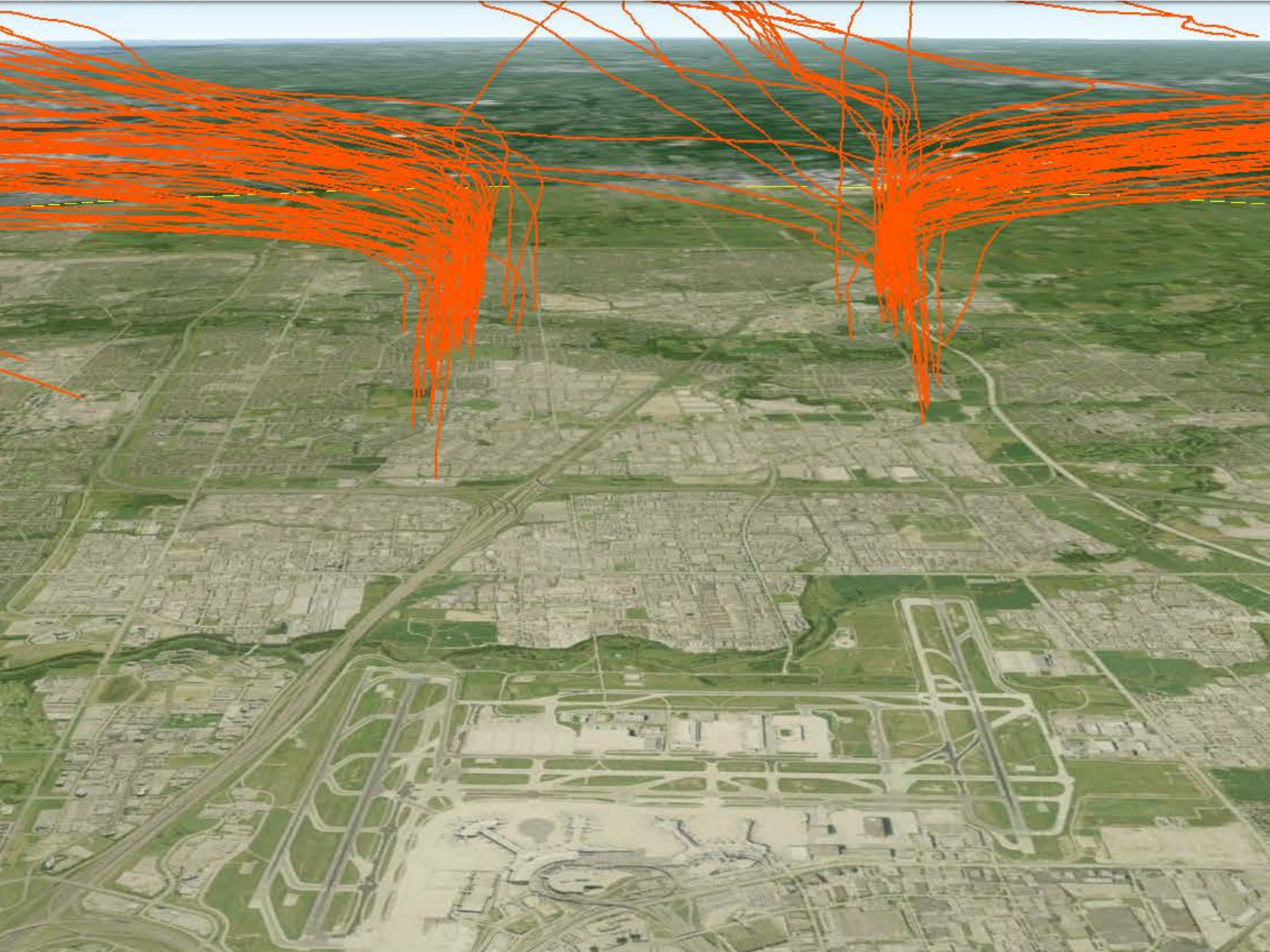
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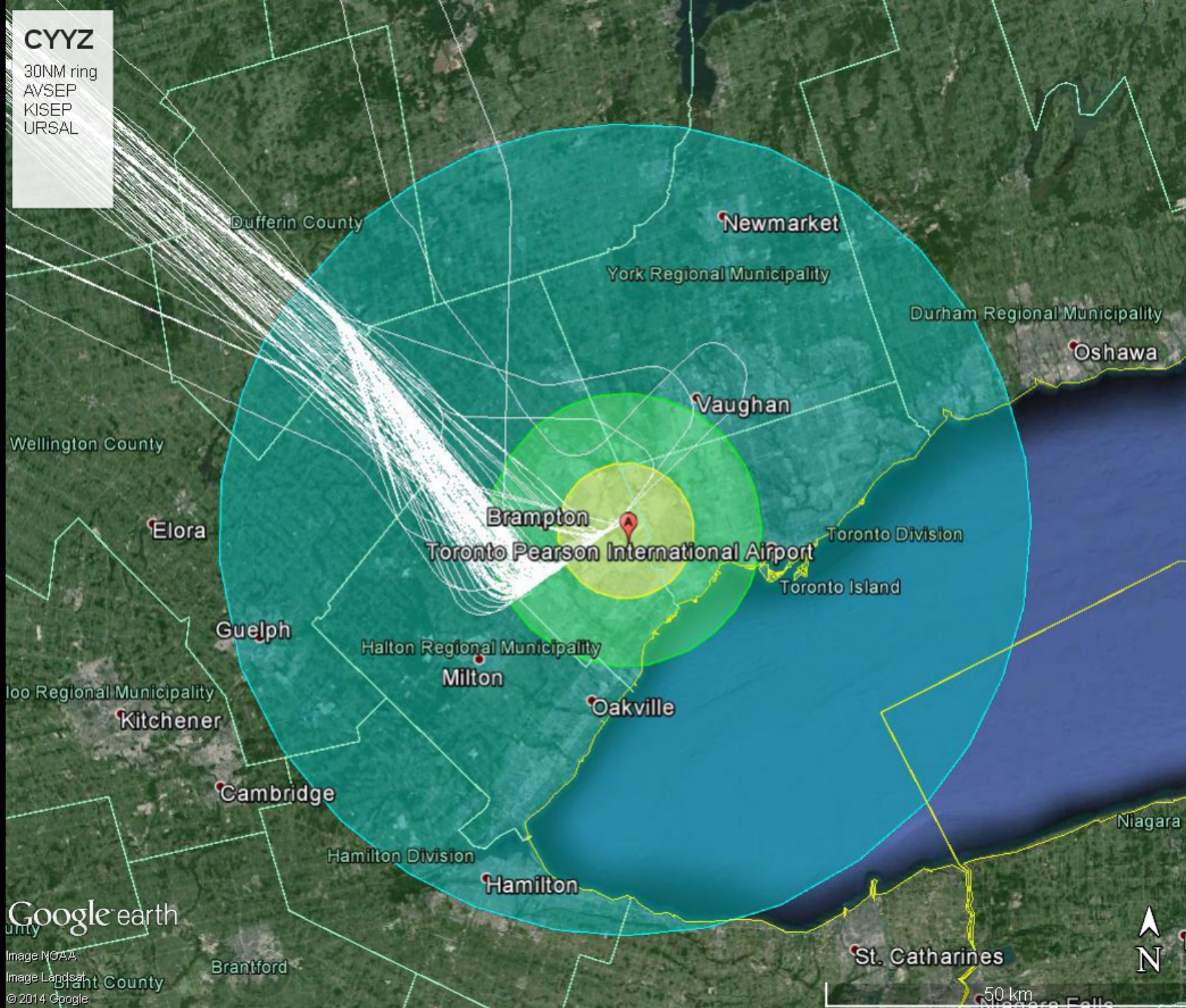






**CYYZ**

30NM ring  
AVSEP  
KISEP  
URSAL



Google earth

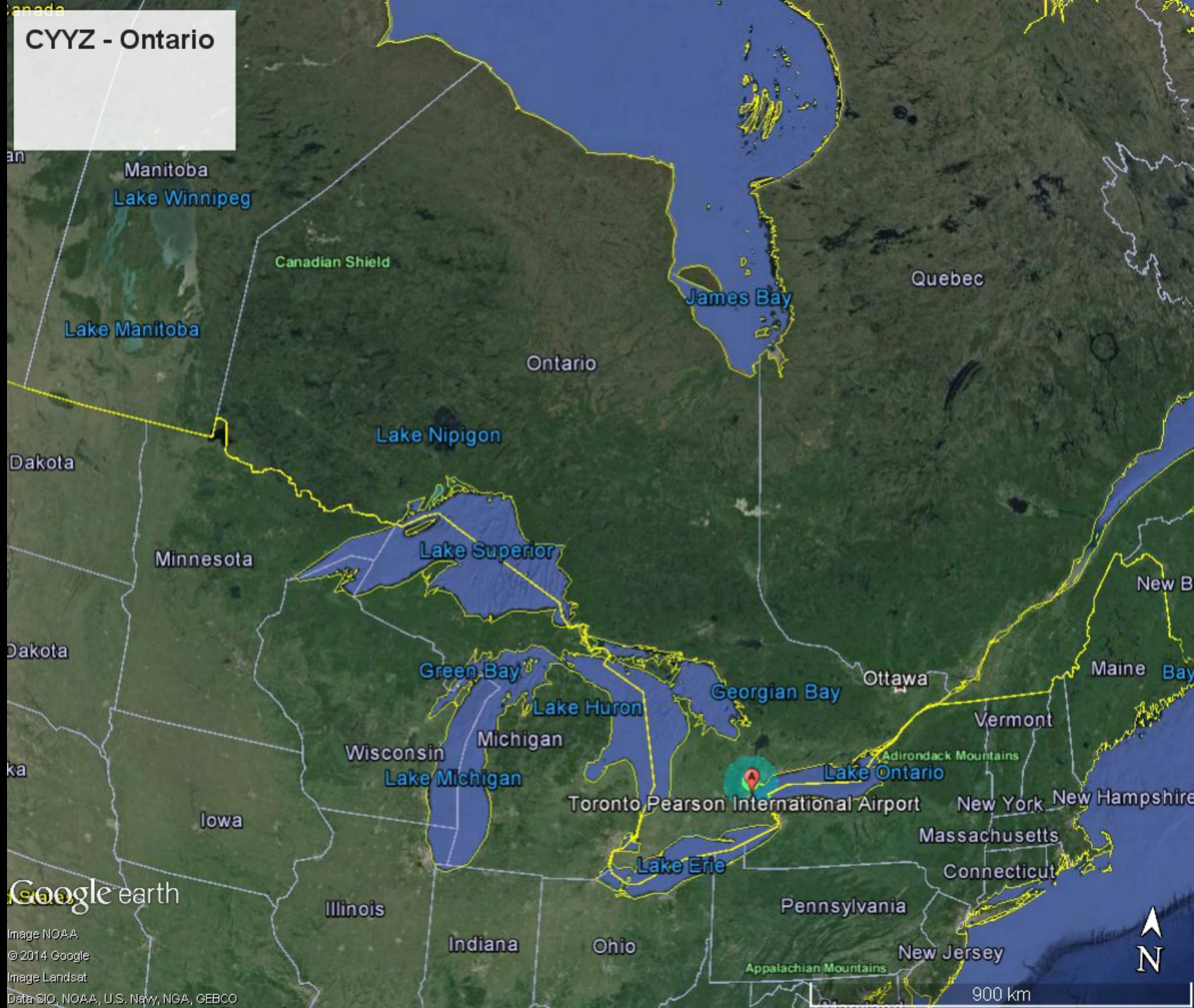
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# CYYZ - Ontario



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## Ontario

CA1195 ACA1195

ewan

Manitoba  
Lake Winnipeg

ACA159 ACA159

WJA309 WJA309

WJA445 WJA445

## Lake Manitoba

WJA675

WJA535 WJA725

North Dakota

## Lake Nipigon

## Ontario

ACA11.29

JZA541 JZA533

## Minnesota

ACA543

ACA1119

ACA117

uth Dakota

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Image IBCAO

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Wisconsin GGN7349

Toronto Pearson International Airport

## Lake Erie

## Hudson Bay

## Ungava Bay

ACA015

James Bay

## Quebec

JZA7829

JZA7825 JZA7823

JZA7833

JZA7807

ACA273 JZA7771 JZA7781

## Green Bay

## Georgian Bay

**Ottawa**

## Vermont

Maine Ba

New Hampshire

**Massachusetts**

## Connecticut

900 km

N



# CYYZ - Enroute Phase of flight

North America

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US Dept of State Geographer

Image Landsat

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View from Space (Altitude: 5441 km)



## What will we be publishing on November 13<sup>th</sup>, 2014?

- RNAV SID procedures for the remaining departure routes
  - Western Canada (Vancouver and area)
  - Western U.S.A. (Los Angeles, San Diego, etc.)
  - Southwestern U.S.A. (Las Vegas, Texas, Memphis, etc.)
  - Southern destinations (Caribbean & South America)
  - Eastern Seaboard (New York, Boston, etc.)



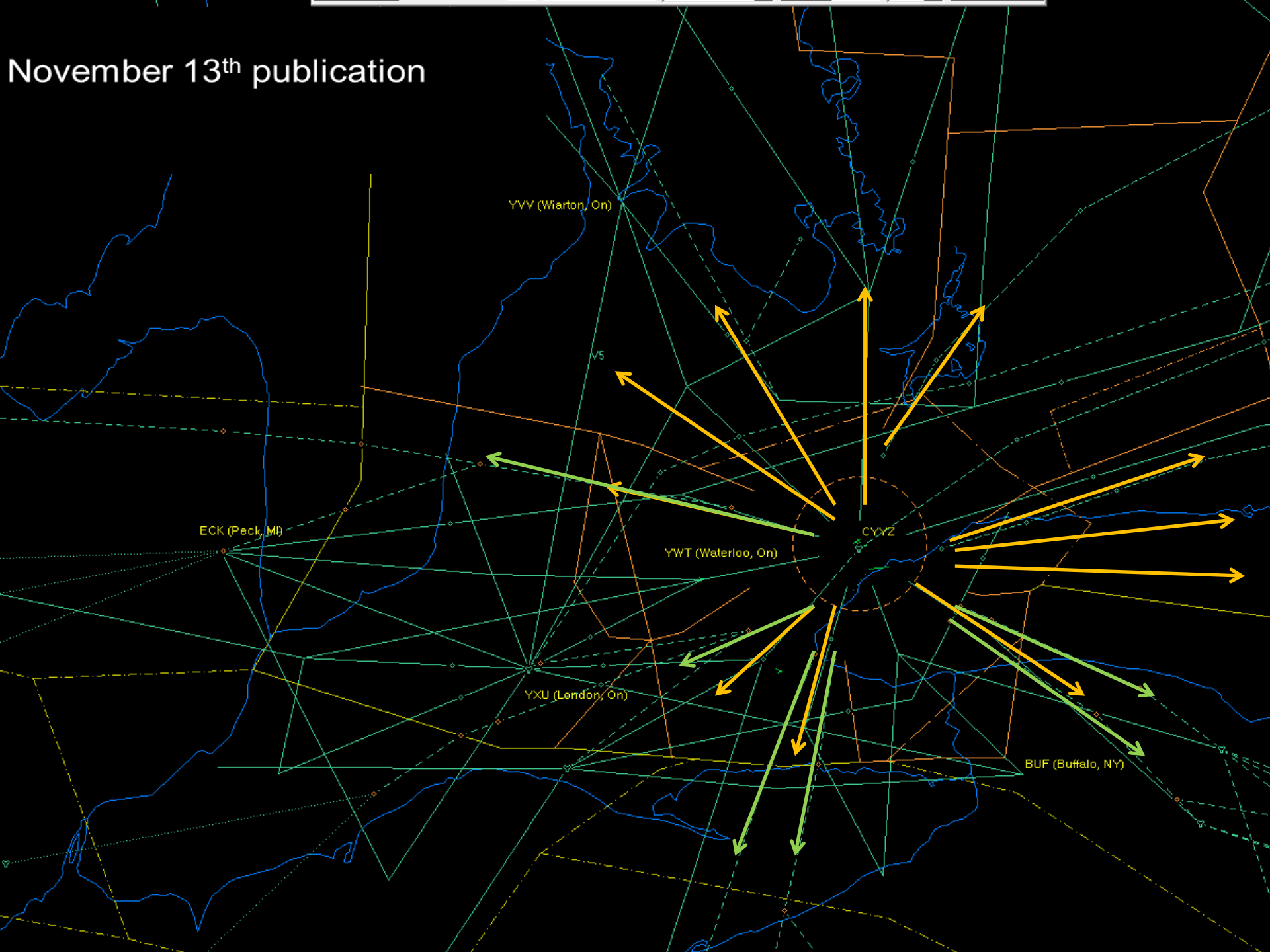
**Current CYYZ Operations**

The map illustrates the current flight operations from Toronto (CYYZ) to various destinations. The destinations and their corresponding flight paths are:

- Northwest Canada & Asia (via YVW (Warton, On))
- Western Canada
- Western U.S.A.
- Southwest U.S.A. (via YXU (London, On))
- Florida & Caribbean
- Eastern Canada & Europe
- Northern On & Asia
- Northeast On & Europe
- Eastern Seaboard (via BUF (Buffalo, NY))

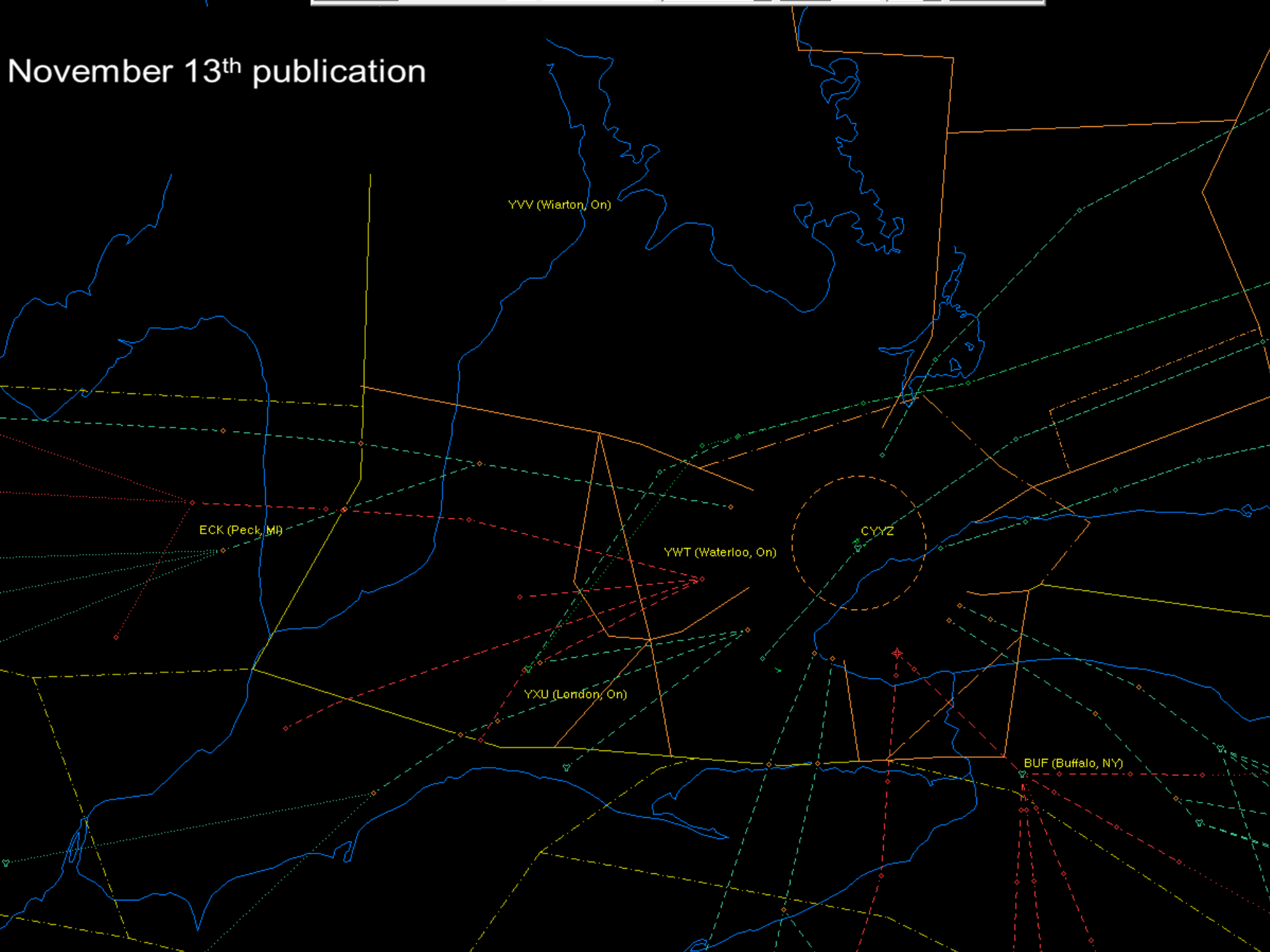
Other airports shown on the map include ECK (Peck, MI) and YWT (Waterloo, On). The map uses a color-coded system to represent different flight paths and regions.

November 13<sup>th</sup> publication





November 13<sup>th</sup> publication





## What will we be publishing on November 13<sup>th</sup>, 2014?

- RNAV SID procedures for the remaining departure routes
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  - Western U.S.A. (Los Angeles, San Diego, etc.)
  - Southwestern U.S.A. (Las Vegas, Texas, Memphis, etc.)
  - Southern destinations (Caribbean & South America)
  - Eastern Seaboard (New York, Boston, etc.)
- Routes to reflect current practices using new technology
- Enhance our ability to keep aircraft climbing towards their destination
- Align the in-trail separation requirement entering FAA airspace with the established radar separation minimum





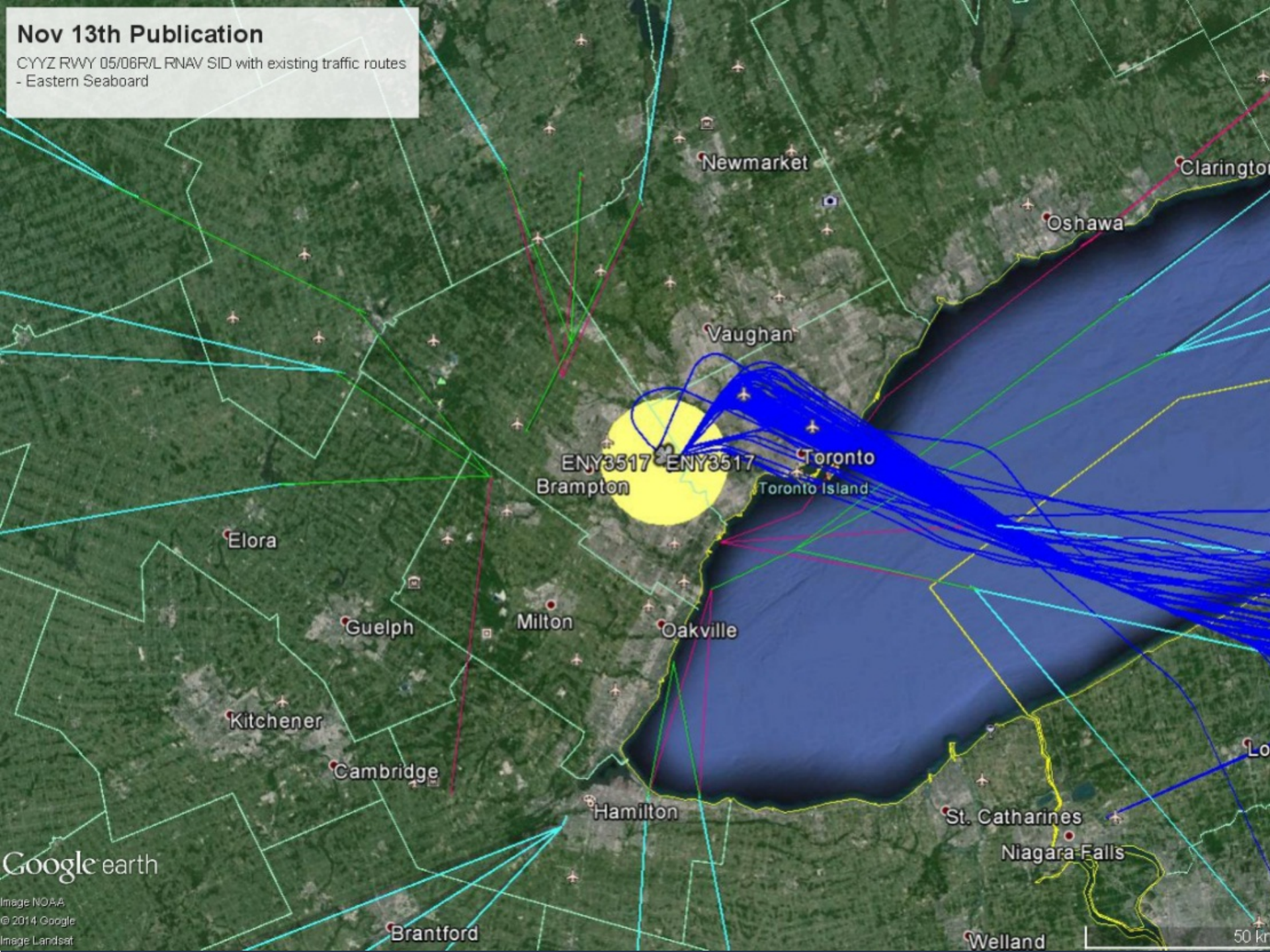
## What will we be publishing on November 13<sup>th</sup>, 2014?

- What will this look like?
  - RWY 05/06R/L
  - RWY 23/24R/L Operation
  - RWY 15R/L
  - RWY 33R/L



**Nov 13th Publication**

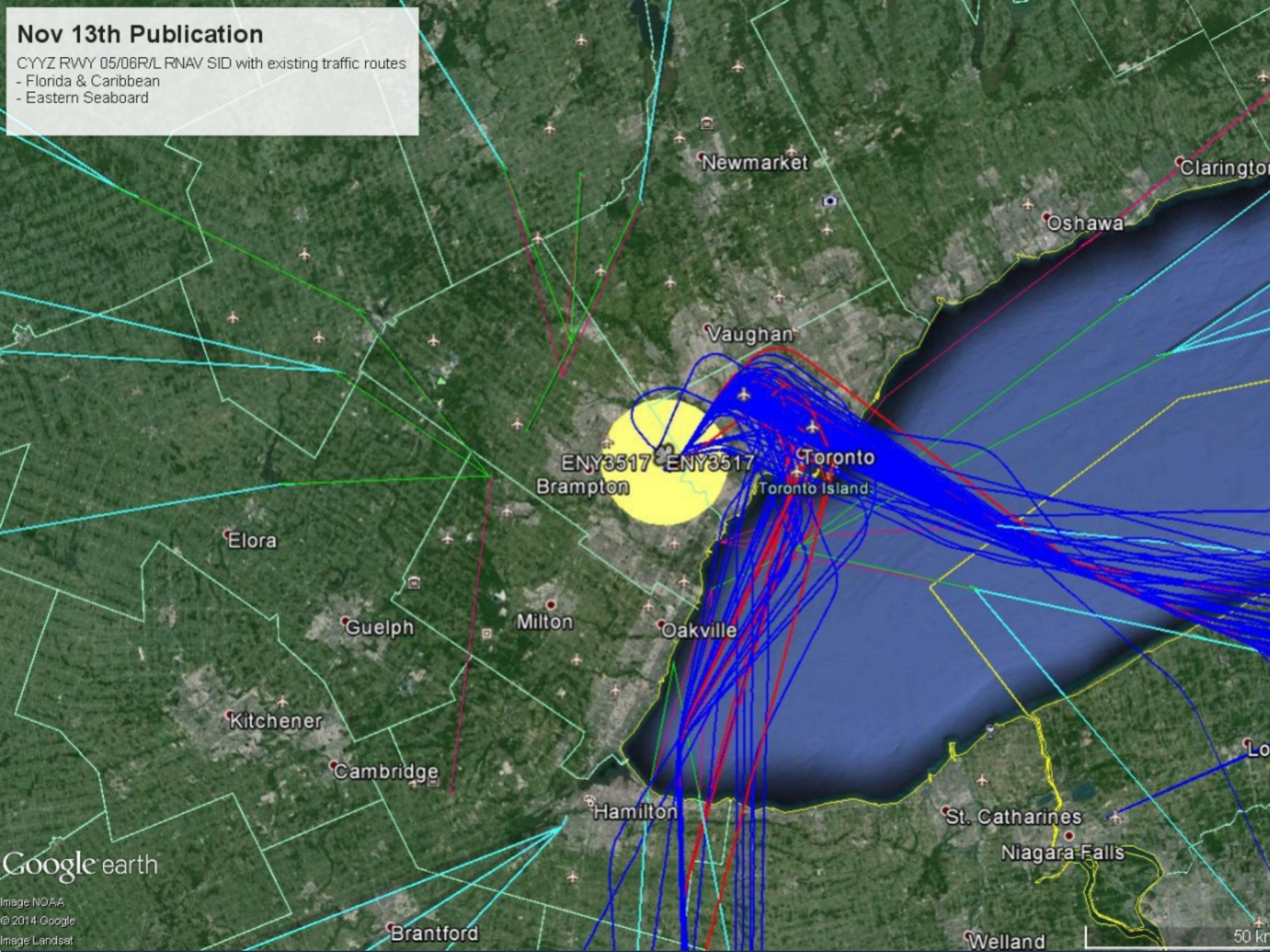
CYYZ RWY 05/06R/L RNAV SID with existing traffic routes  
- Eastern Seaboard





**Nov 13th Publication**

CYYZ RWY 05/06R/L RNAV SID with existing traffic routes  
- Florida & Caribbean  
- Eastern Seaboard

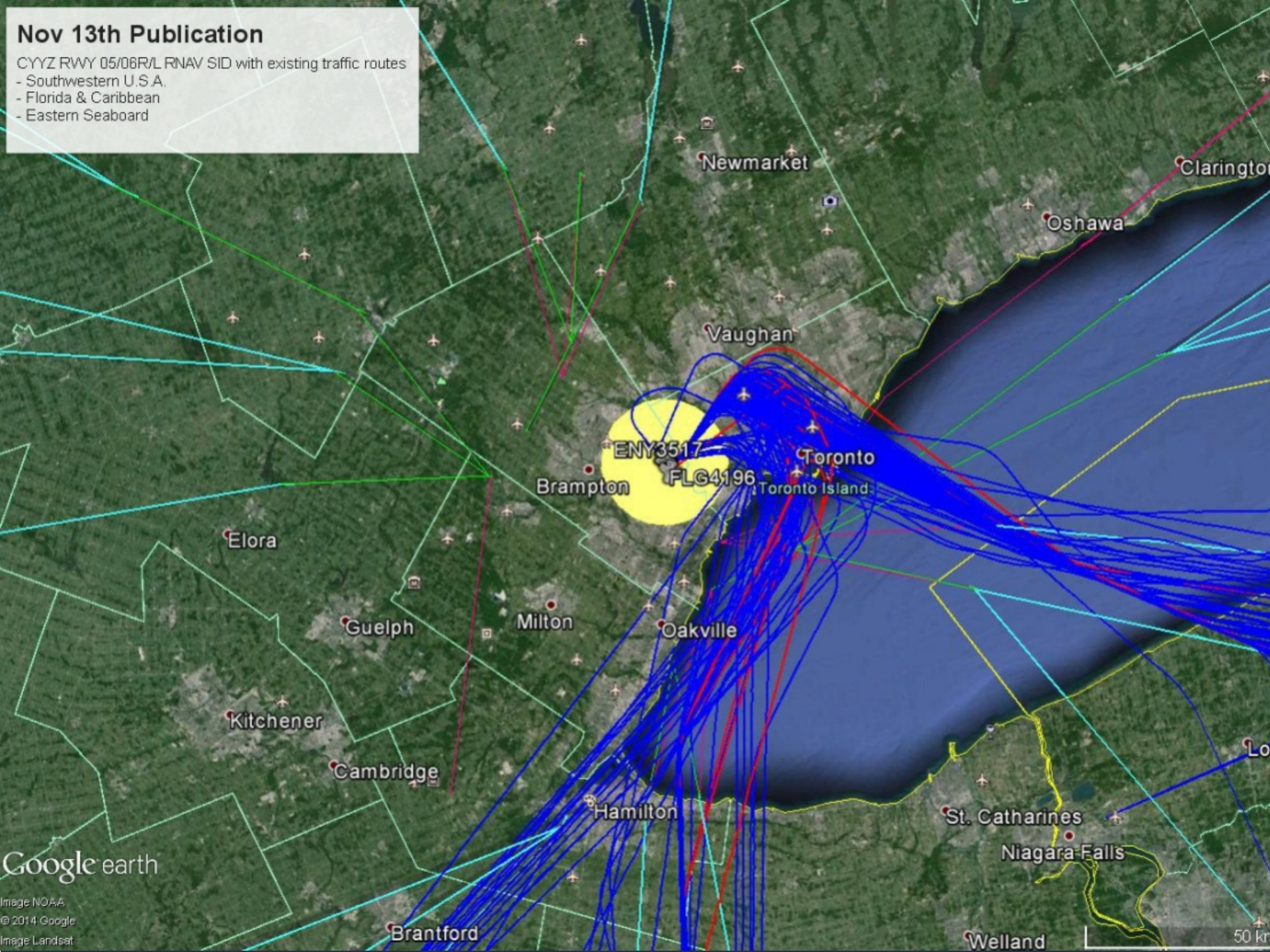




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- Southwestern U.S.A.
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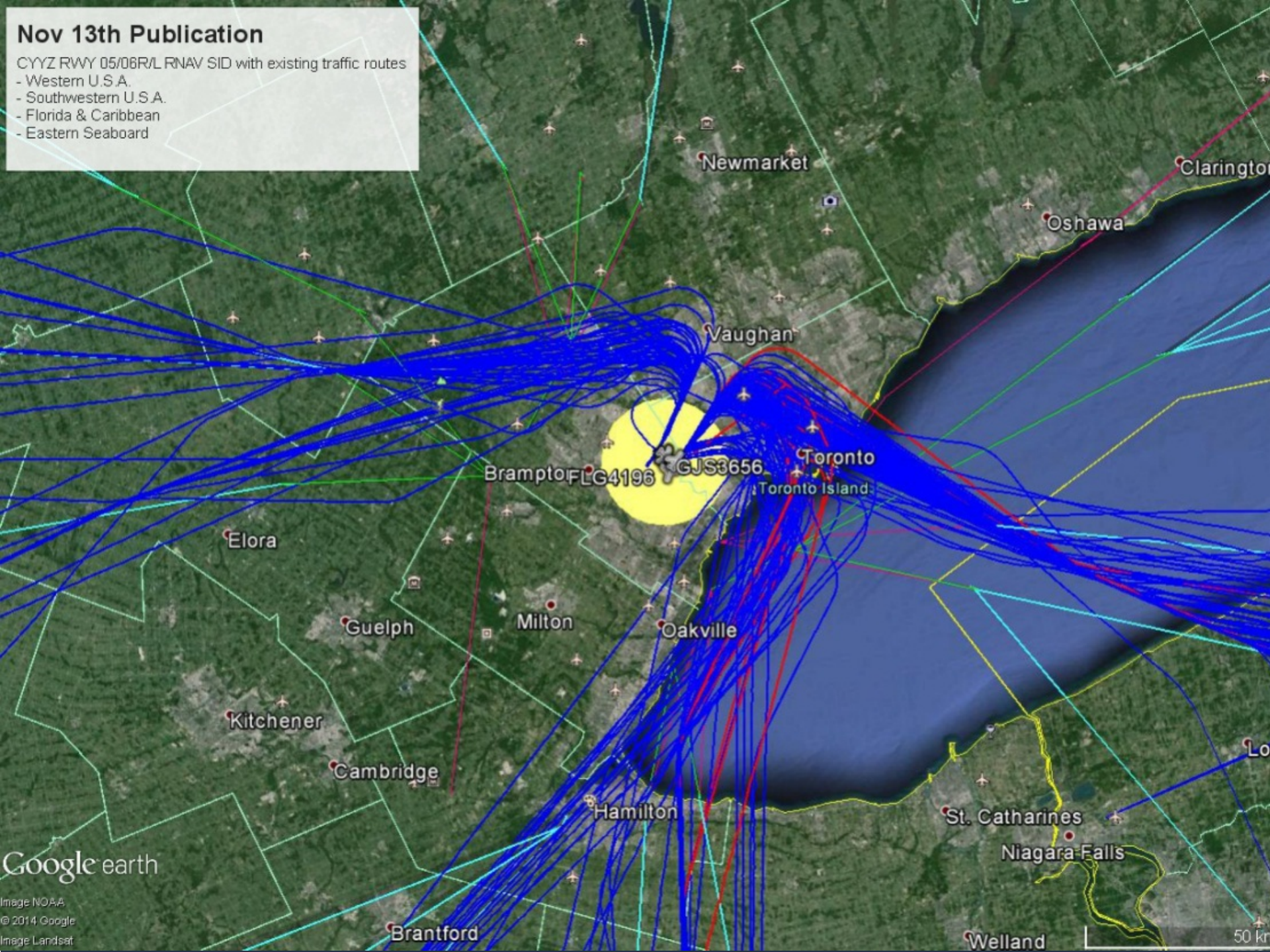
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- Southwestern U.S.A.
- Florida & Caribbean
- Eastern Seaboard



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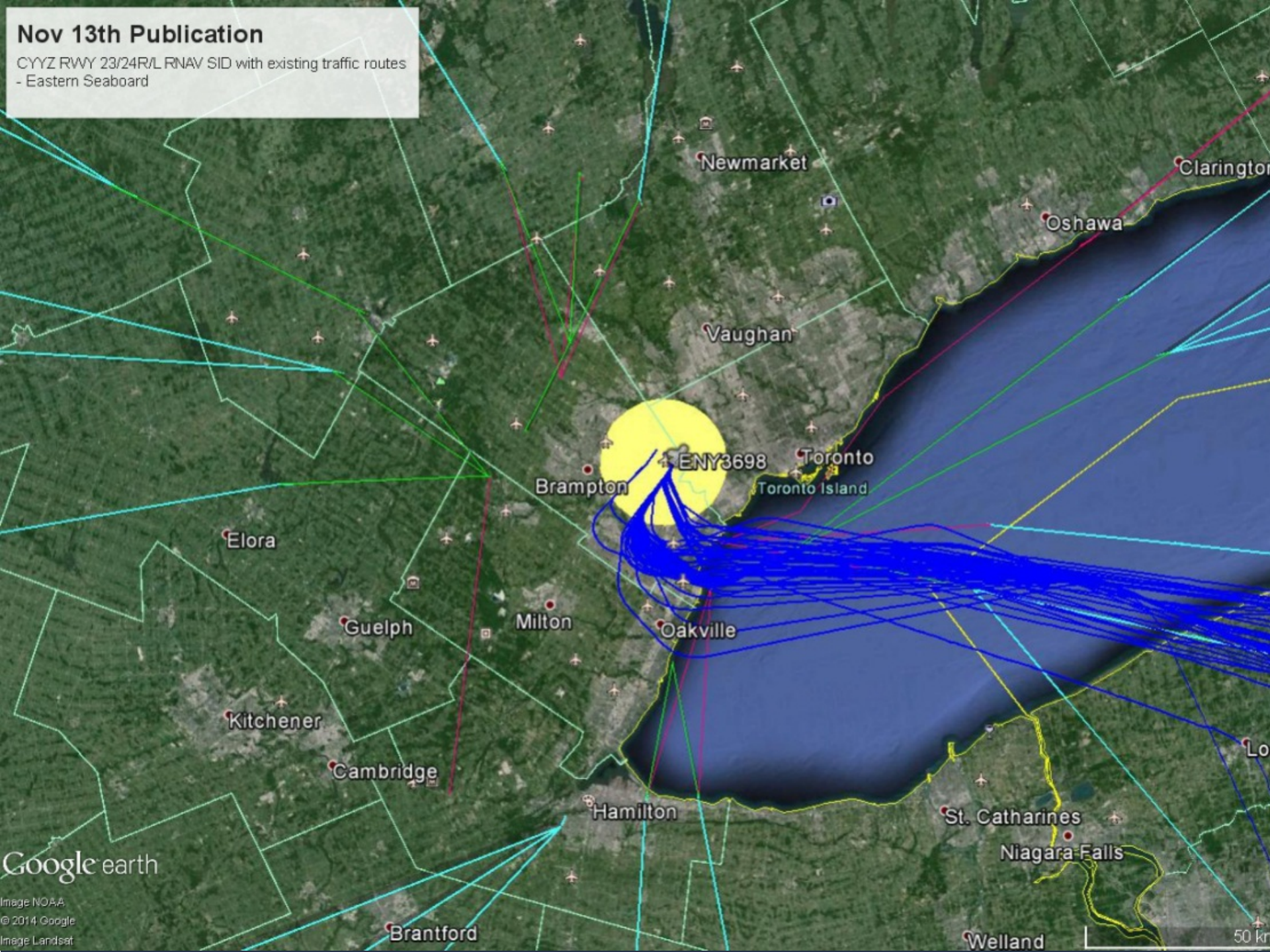
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50 km



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CYYZ RWY 23/24R/L RNAV SID with existing traffic routes  
- Eastern Seaboard



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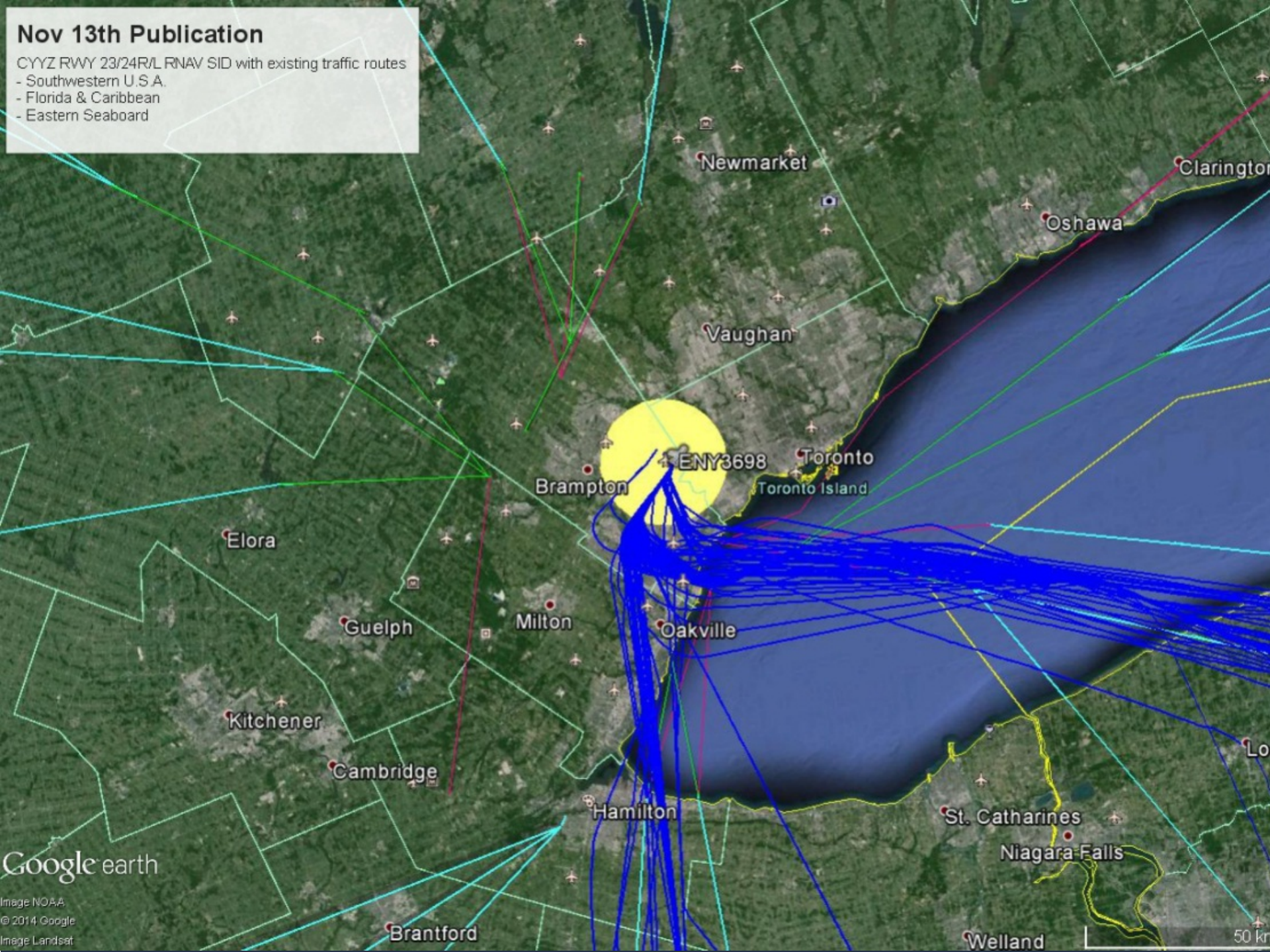
50 km



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- Southwestern U.S.A.
- Florida & Caribbean
- Eastern Seaboard



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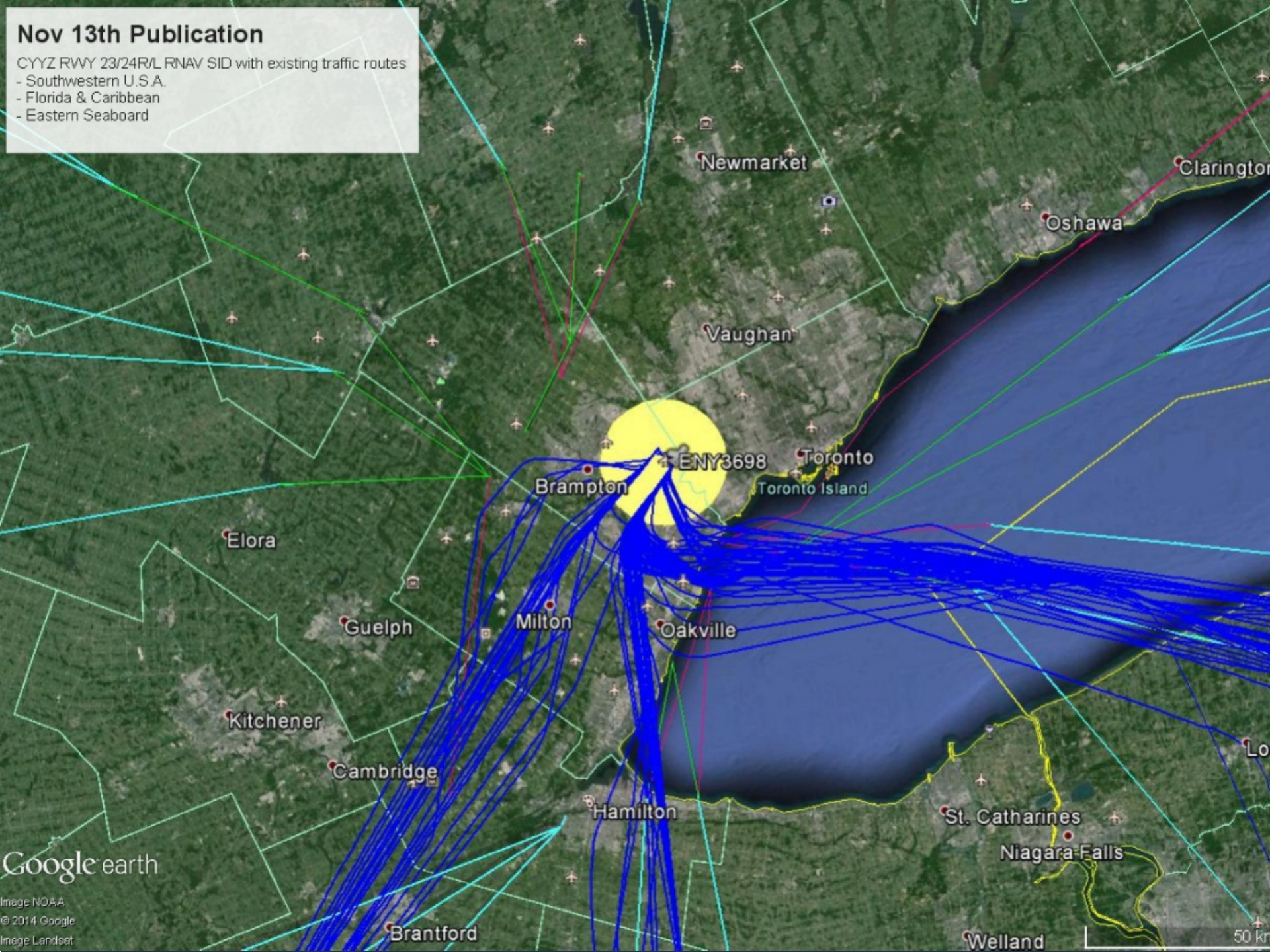
50 km



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CYYZ RWY 23/24R/L RNAV SID with existing traffic routes

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- Florida & Caribbean
- Eastern Seaboard



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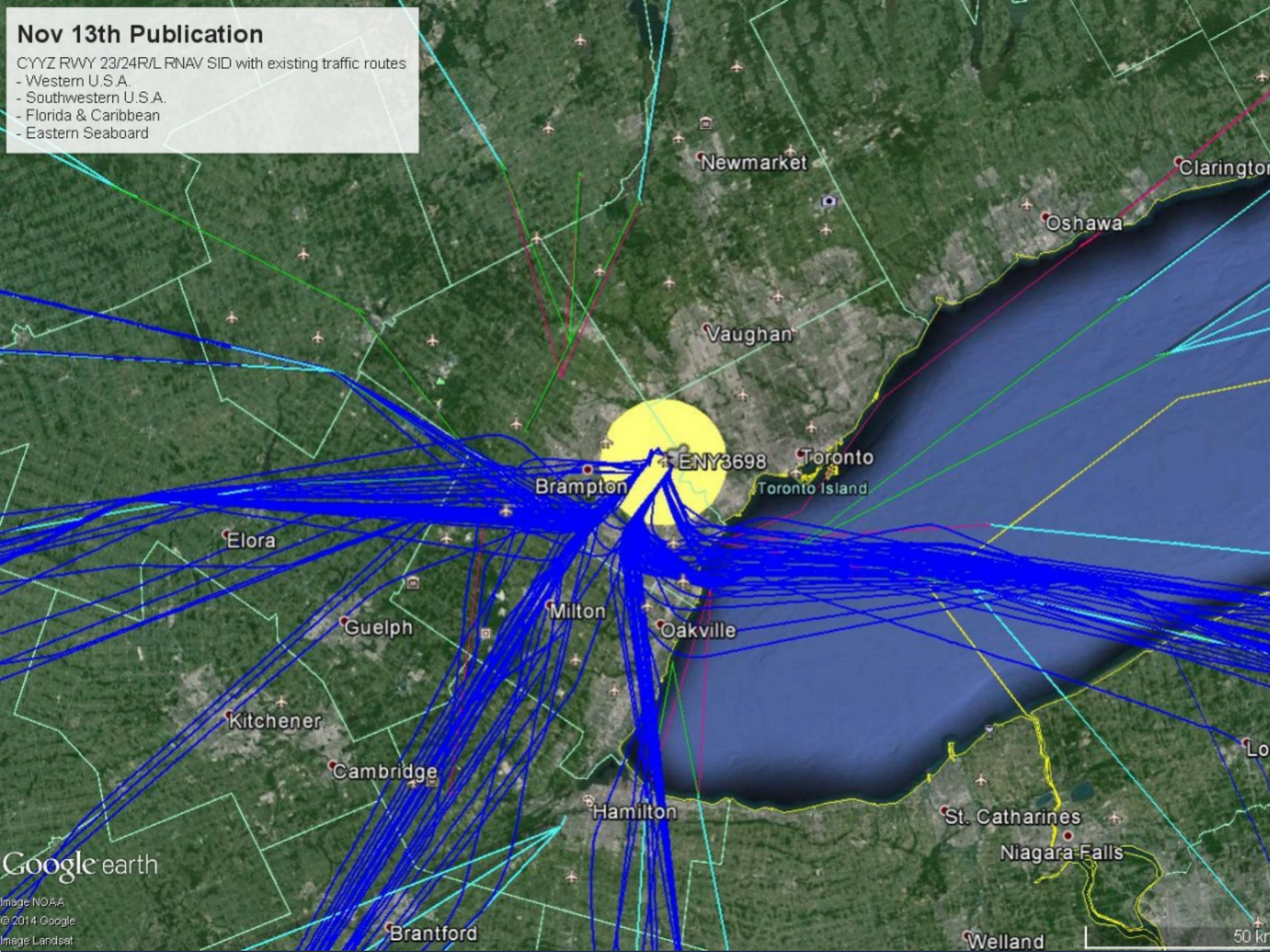
50 km



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CYYZ RWY 23/24R/L RNAV SID with existing traffic routes

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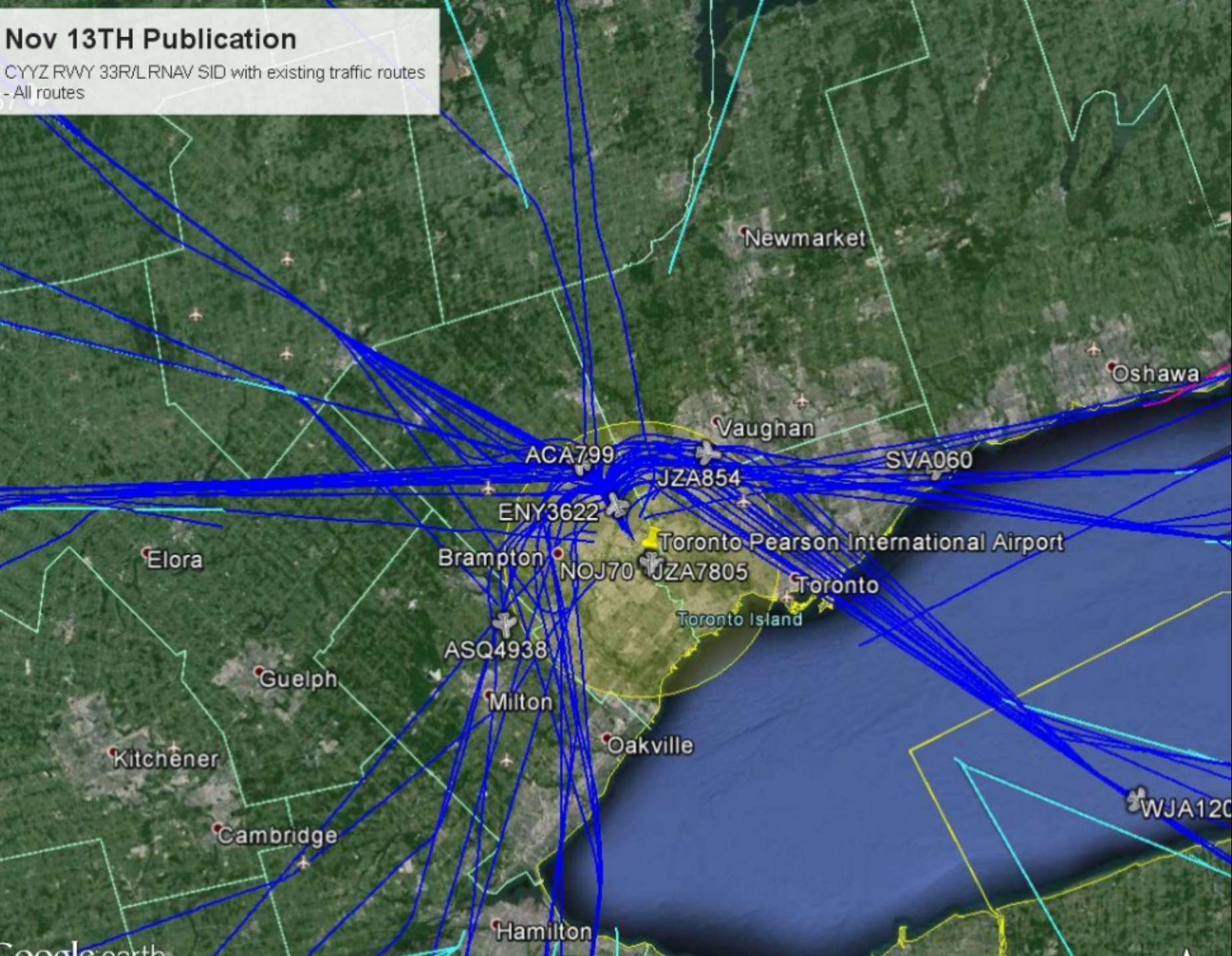
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50 km



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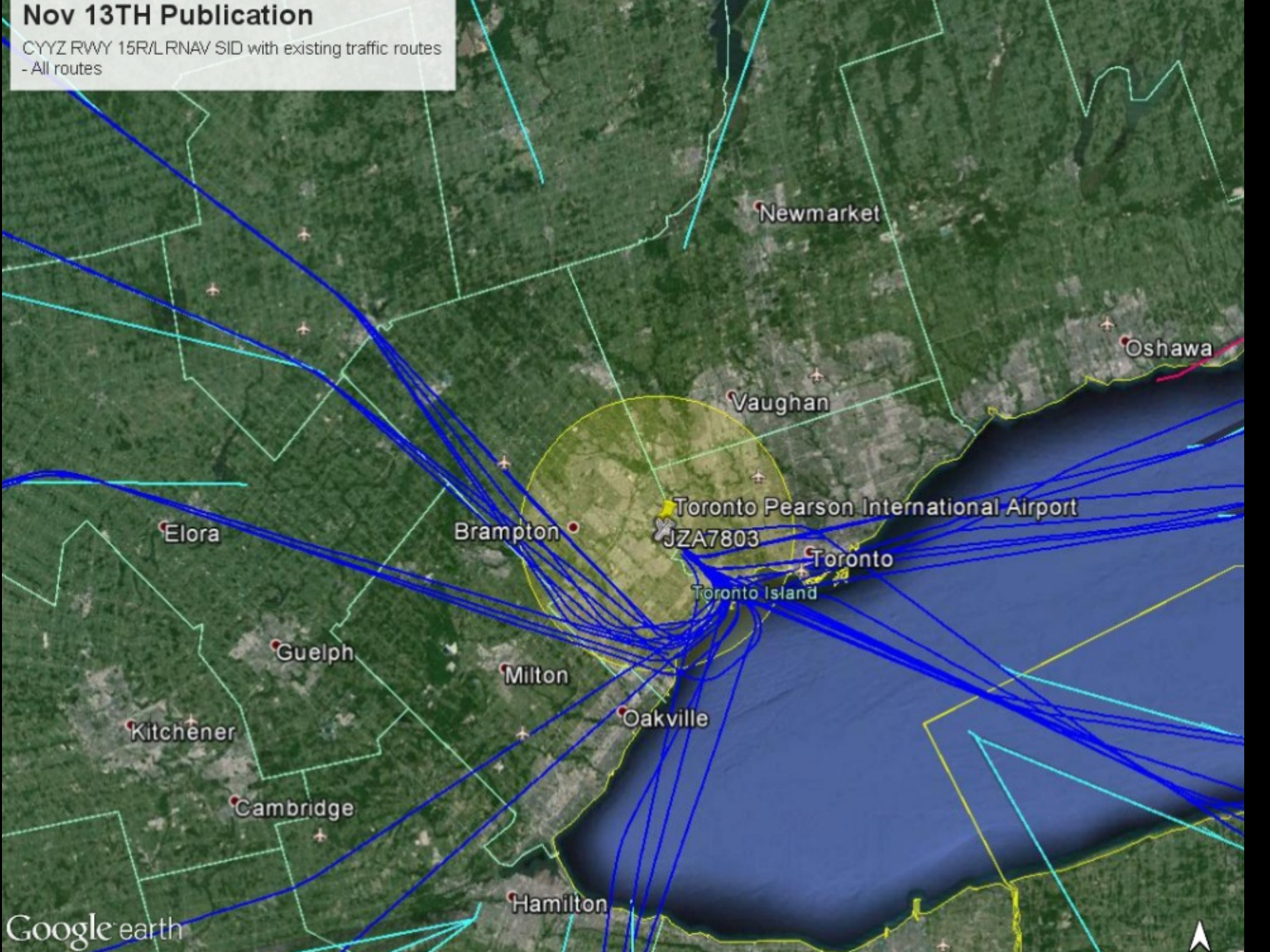
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- All routes





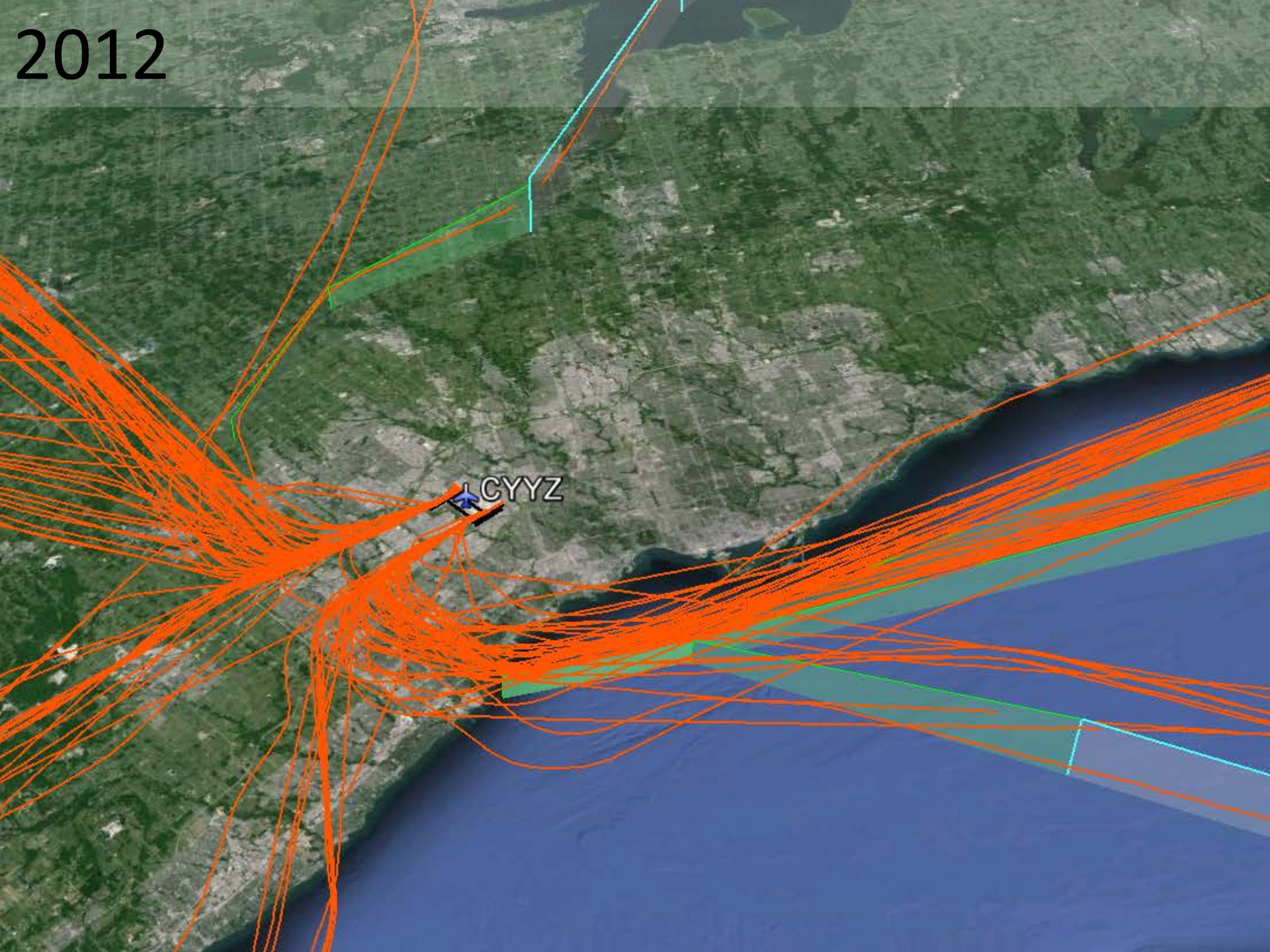
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CYYZ RWY 15R/LRNAV SID with existing traffic routes  
- All routes





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