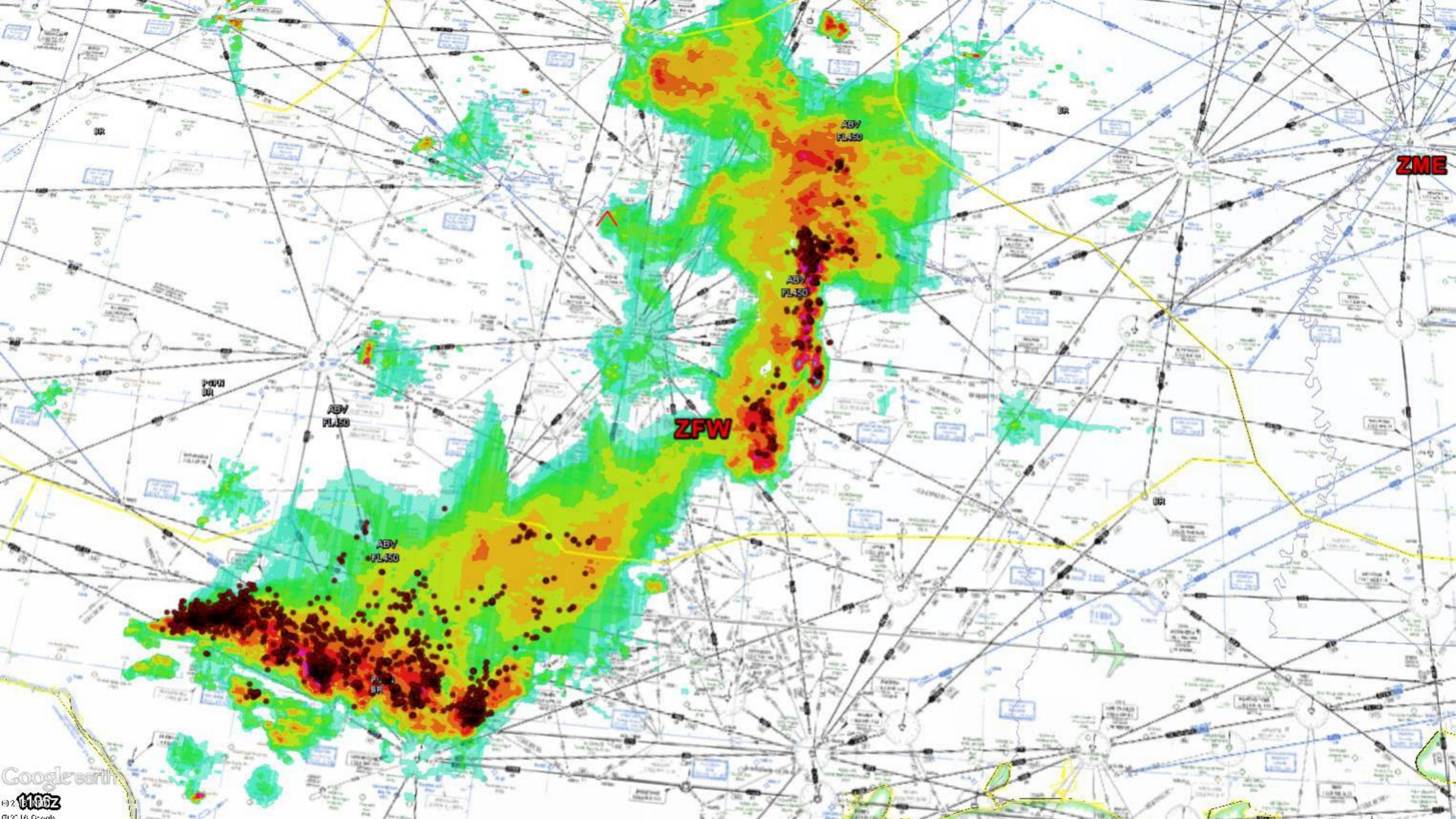
ALOHA!

Presentation by Mark Spence
President/CEO WxOps Inc

GEOSPATIAL AND THE EFB CONNECTED AIRCRAFT

Pre-flight …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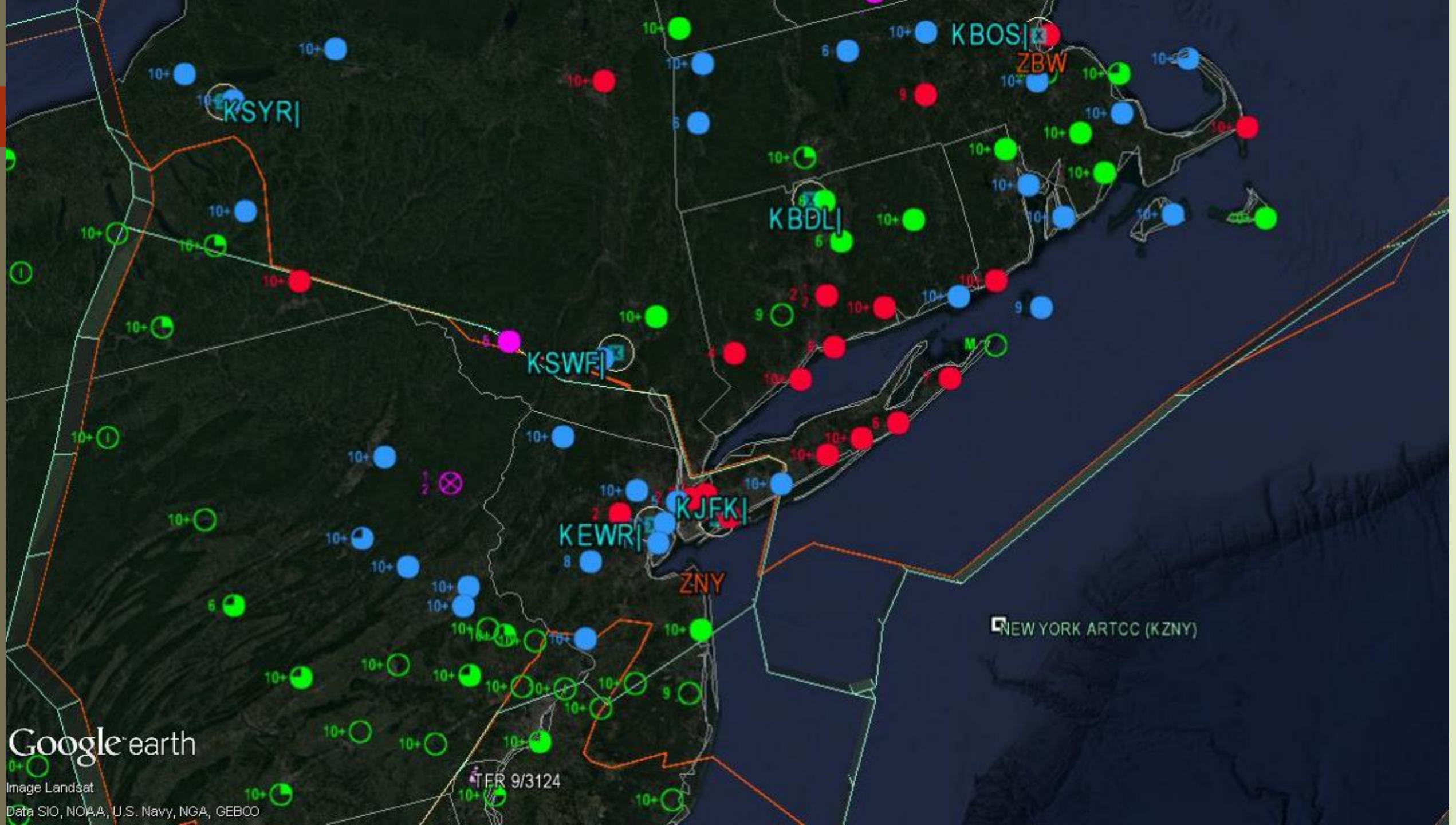
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KSYR
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KSWF
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Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

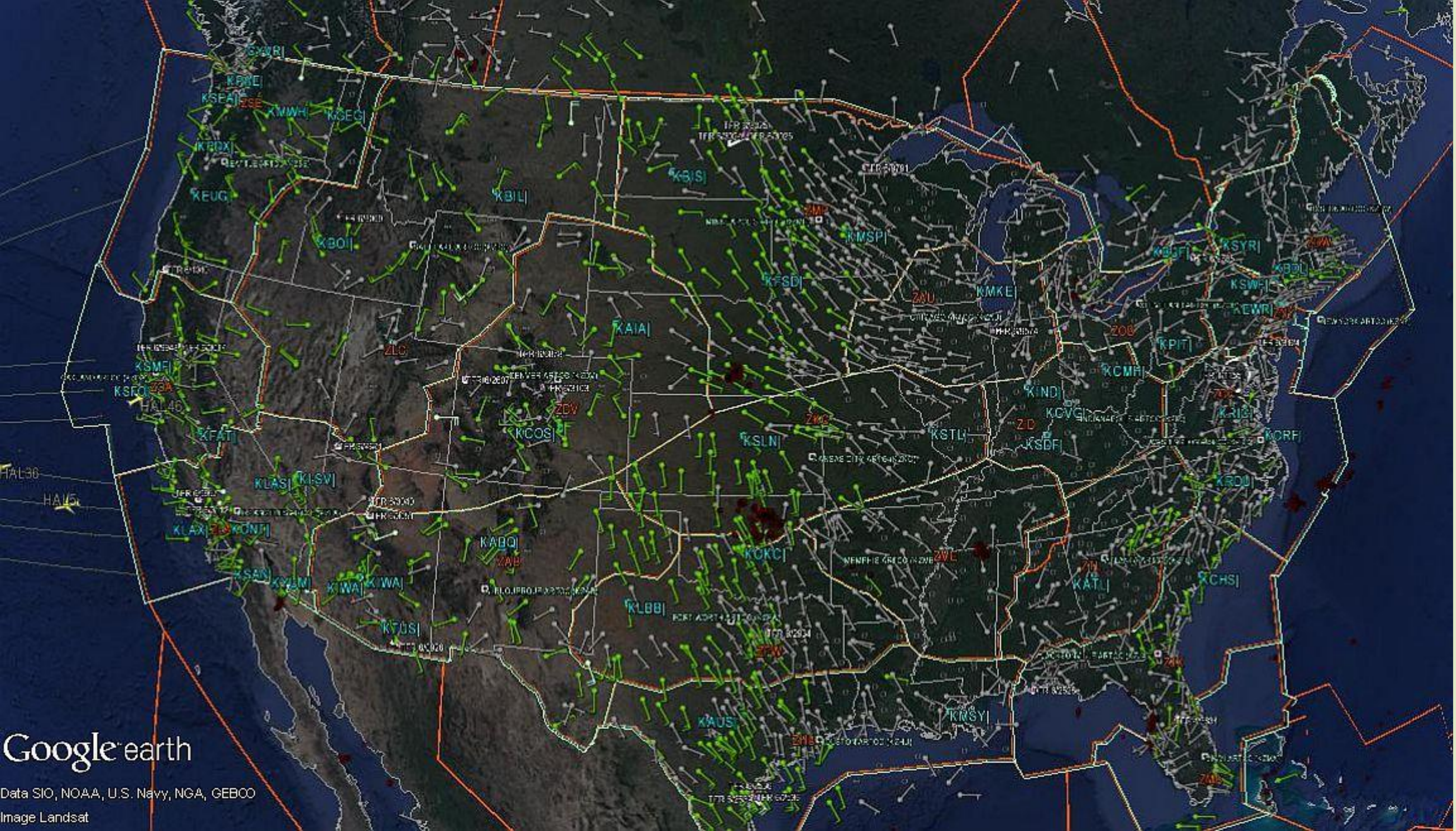

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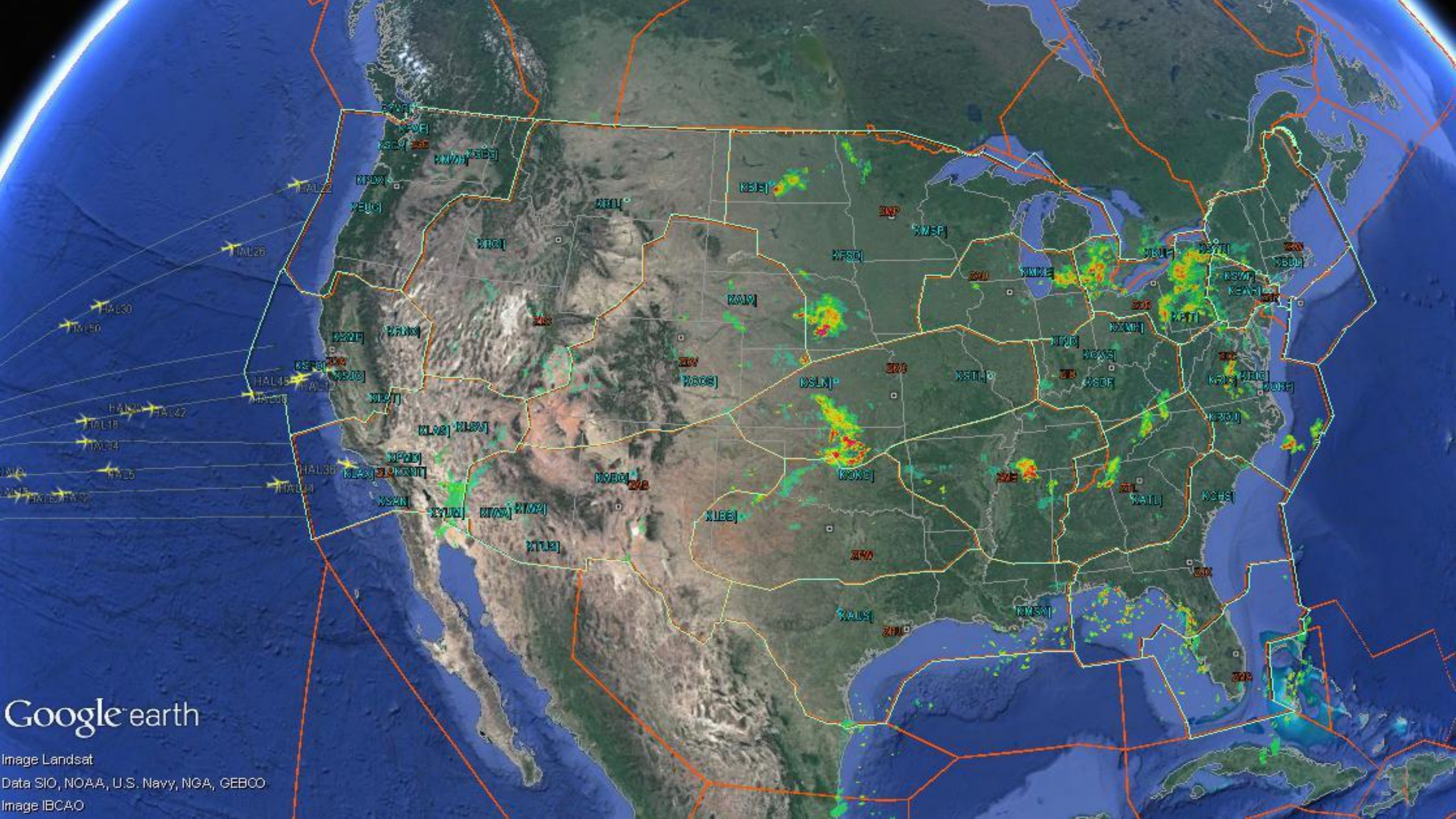
Image Landsat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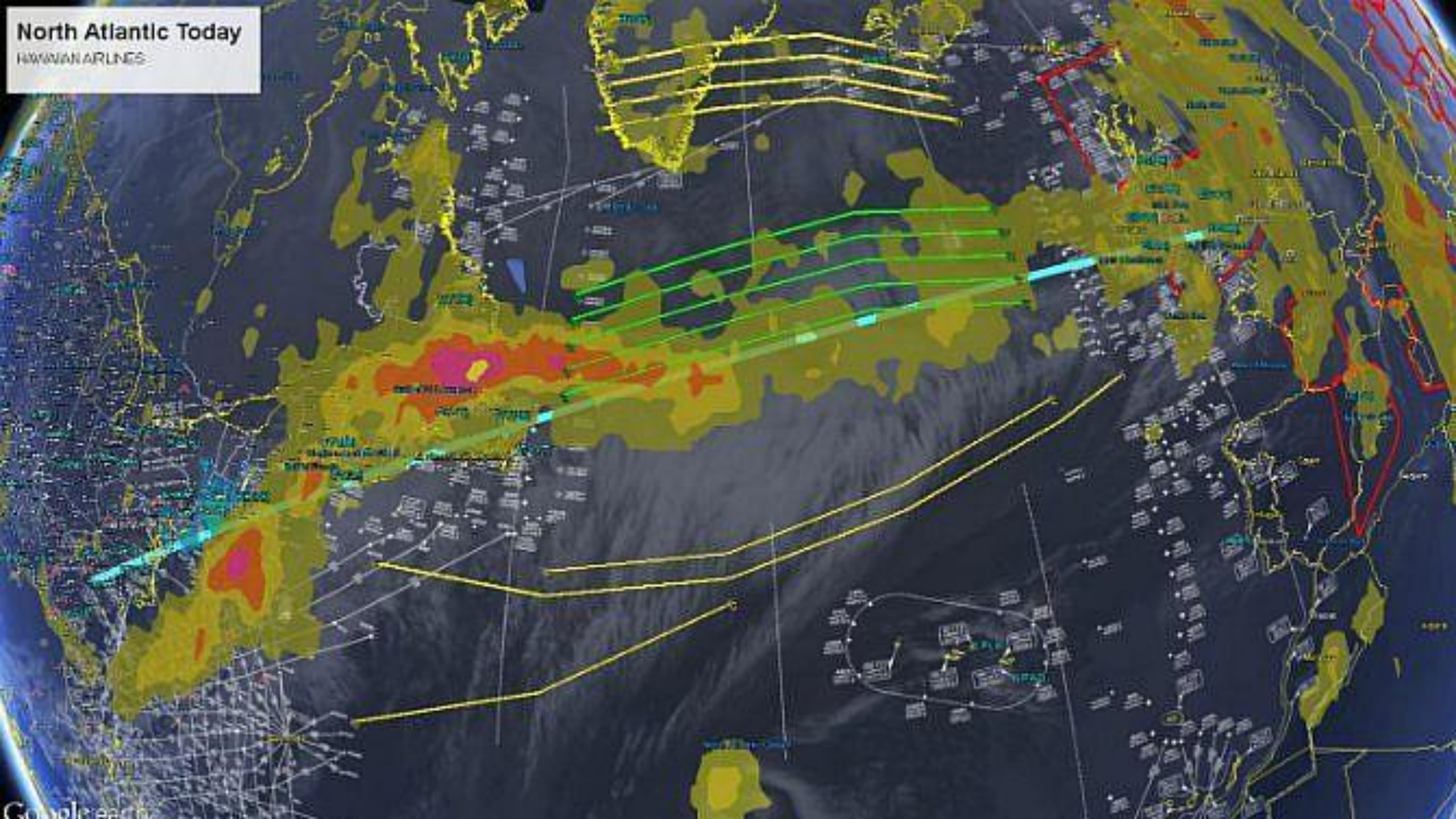
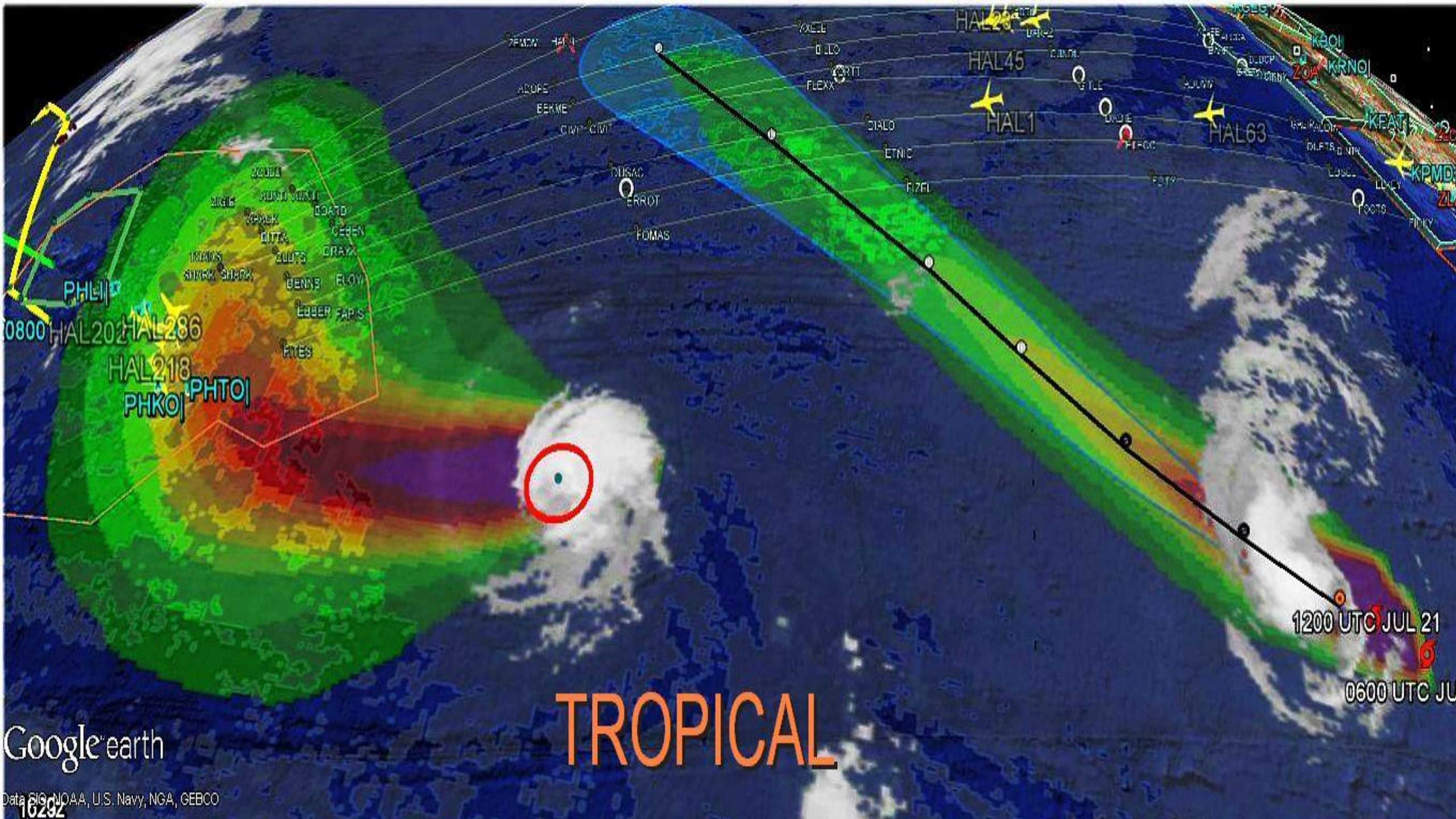

North Atlantic Today
HAWAIIAN AIRLINES

ENROUTE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HAL63
HAL202
HAL286
HAL218
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PHTO
KBOI
KRNO
KEAT
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DIABLO
ETNIC
FIZEL
DUSAC
ERROT
FOMAS
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Google earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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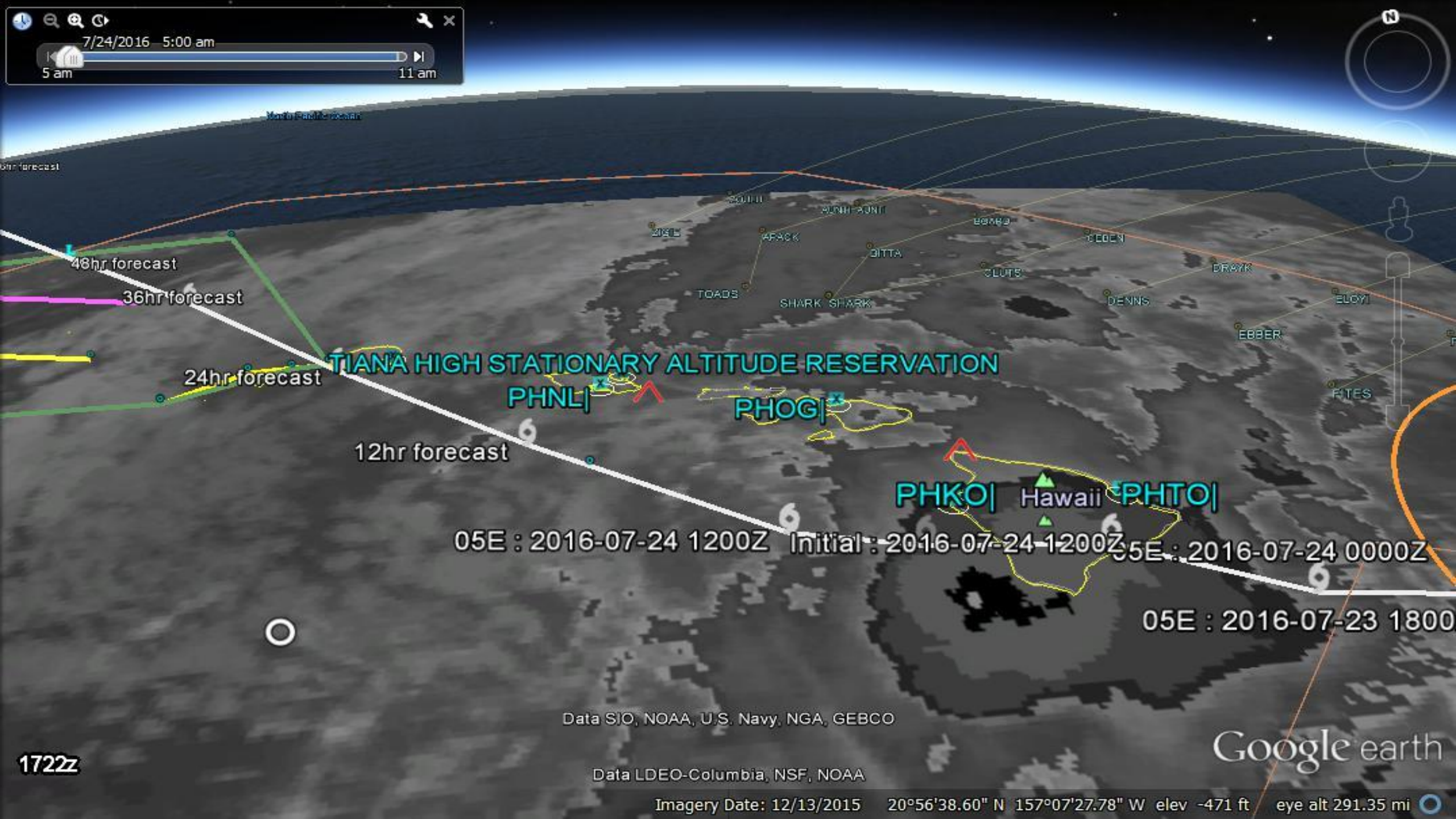
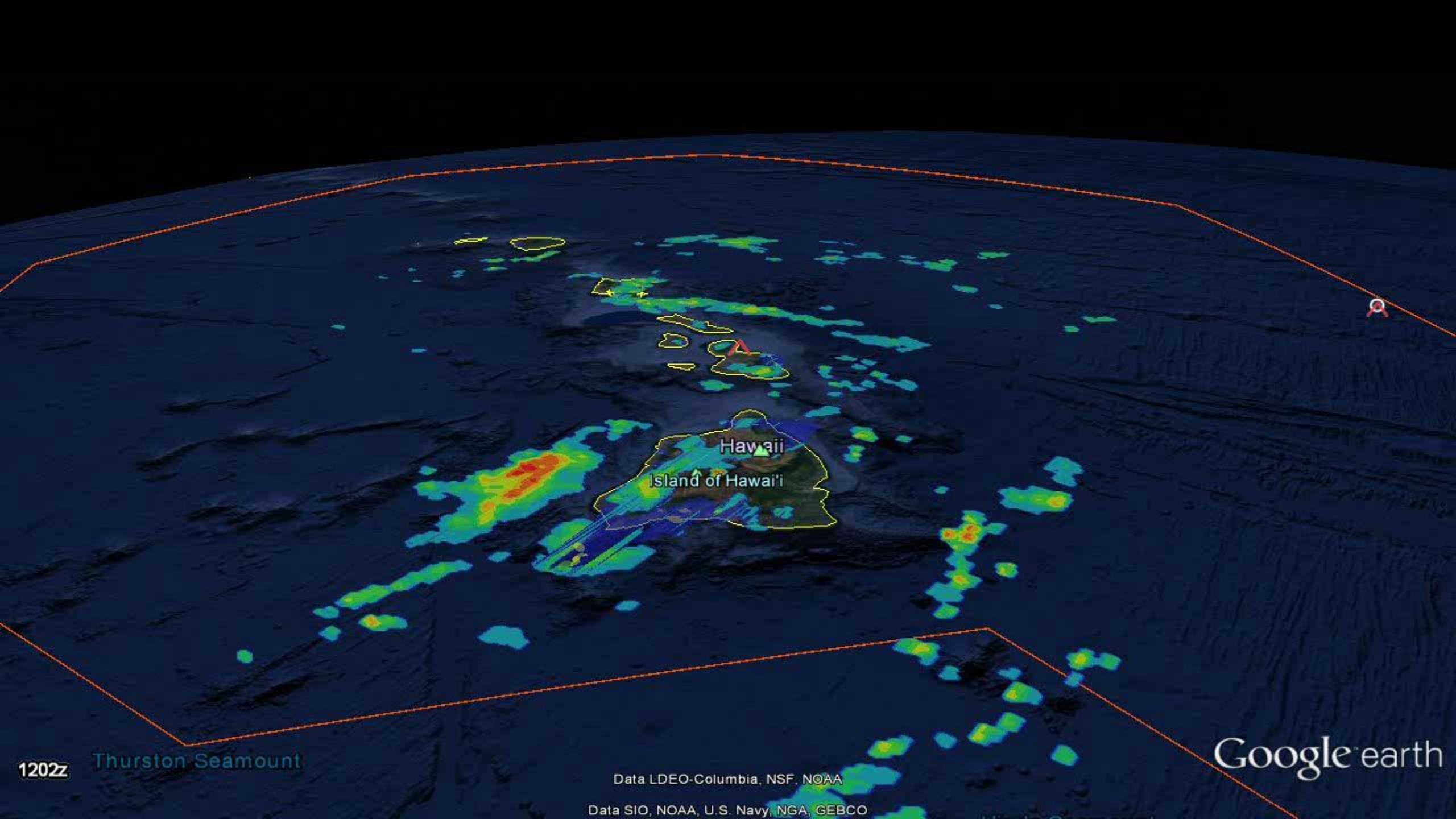

7/24/2016 5:00 am
5 am
11 am
48hr forecast
36hr forecast
24hr forecast
12hr forecast
TIANA HIGH STATIONARY ALTITUDE RESERVATION
PHNL
PHOG
PHKO
Hawaii
PHTO
05E : 2016-07-24 1200Z Initial : 2016-07-24 1200Z
05E : 2016-07-24 0000Z
05E : 2016-07-23 1800
TOADS
SHARK SHARK
DENNS
EBBER
CLUTS
DRAYK
ELOYI
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
1722z
Google earth
Imagery Date: 12/13/2015 20°56'38.60" N 157°07'27.78" W elev -471 ft eye alt 291.35 mi


Hawaii TANCC ARTCCs
Niihau
TIANA HIGH STATIONARY ALTITUD
Kaua'i
PHLI
Rainier Seamount
PHNL
O'ahu
Honolulu
PHNG
Hawai'ian Islands
Lana'i
Moloka'i
Kaho'olawe
PHKO
Island of Hawai'i
Hawaii
Maui
PHOG
Maui Channel
Day 1 Significant Weather Outlook
Valid Sun, Jul 24, 2016
Severe Thunderstorms
Flash Flooding
Heavy Snowfall
Freezing Rain
PHTO
Hilo
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2016 Google
Image Landsat
Data LDEO-Columbia, NSF, NOAA
Google earth


Hawaii
Island of Hawai'i
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Thurston Seamount
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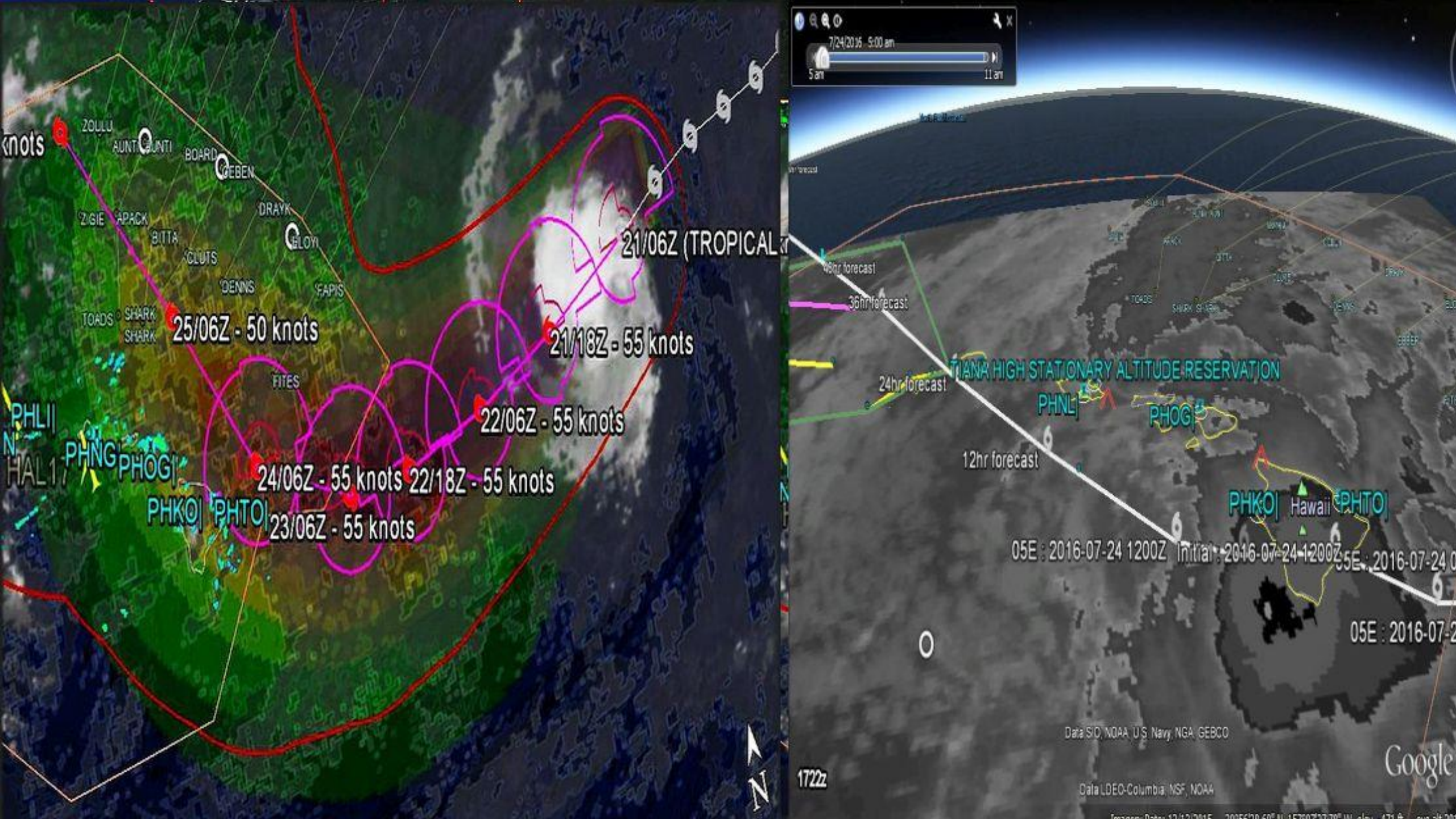
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth


knots
ZOLULU
AUNT
AUNTI
BOARD
EBEN
ZIGIE
APACK
BITTA
DRAYK
LOYI
CLUTS
DENNS
FAPIS
TOADS
SHARK
SHARK
25/06Z - 50 knots
21/06Z (TROPICAL
21/18Z - 55 knots
FITES
22/06Z - 55 knots
24/06Z - 55 knots
22/18Z - 55 knots
23/06Z - 55 knots
PHLI
HAL
PHNG
PHOG
PHKO
PHTO
7/24/2016 5:00 am
5 am
11 am
48hr forecast
36hr forecast
24hr forecast
12hr forecast
TIANA HIGH STATIONARY ALTITUDE RESERVATION
PHNL
PHOG
PHKO
Hawaii
PHTO
05E : 2016-07-24 1200Z
Initial : 2016-07-24 1200Z
05E : 2016-07-24 0
05E : 2016-07-2
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Google
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Post Flight and FORENSICS


ZOLLU
AUNTI AUNTI
BOARD
CCDEN
BRAYK
ELDYT
FAPIS
ZIGIE
APACK
DITTA
CLUTS
DENNS
EBBER
FITES
TOADS
SHARK SHARK
CKH 113.9
N21°15.9'
W157°42.2'
OGG 115.1
N20°54.4'
W156°25.3'
UPP 112
SOK 115.4
N21°54.0'
W159°31.7'
BYROW
OKALA
WILYE
Hawaii
HNL 114.8
N21°18.5'
W157°55.8'
PUFFI
NONNI
V12
HOOPA
KATHS
CHOKO
NIXEE
CARRP
DOVRR
LNY 117.7
N20°45.9'
W156°58.1'
NOYES
KOA
0042z
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Google earth


Belgium
Prague
Czech Republic
Slovakia
Moldova
Chisinau
Paris
Bratislava
Austria
Hungary
Romania
Switzerland
France
Slovenia
Croatia
Belgrade
Bucharest
Sarajevo
Serbia
Bulgaria
Montenegro
Prishtina
Italy
Podgorica
Skopje
Rome
Albania
Ankara
Turkey
Spain
Madrid
Greece
Athens
Cyprus
Nicosia
Damascus
Algiers
Tunis
Malta
Amman
Gaza Str
Tunisia
Tripoli
Cairo
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
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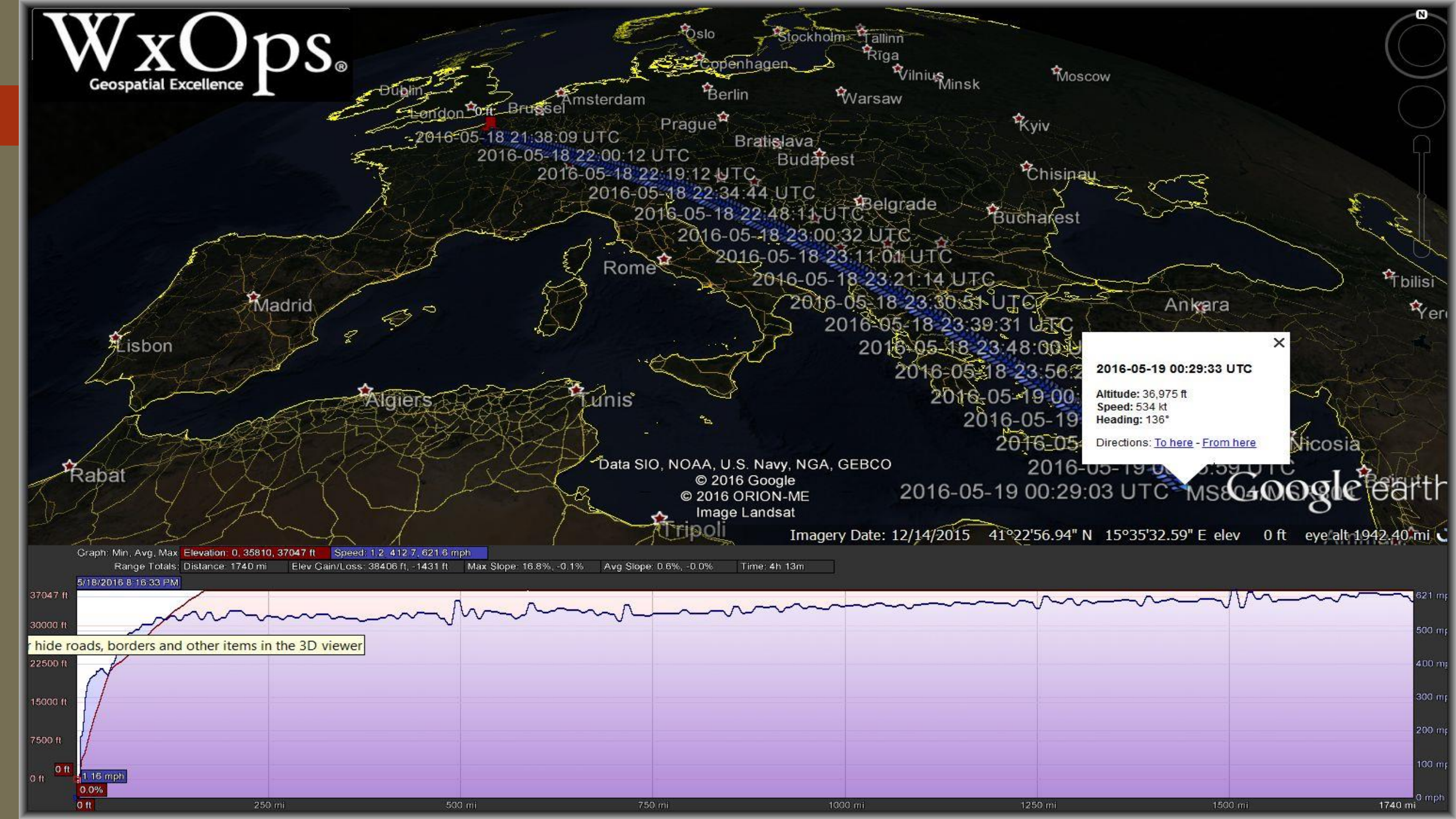
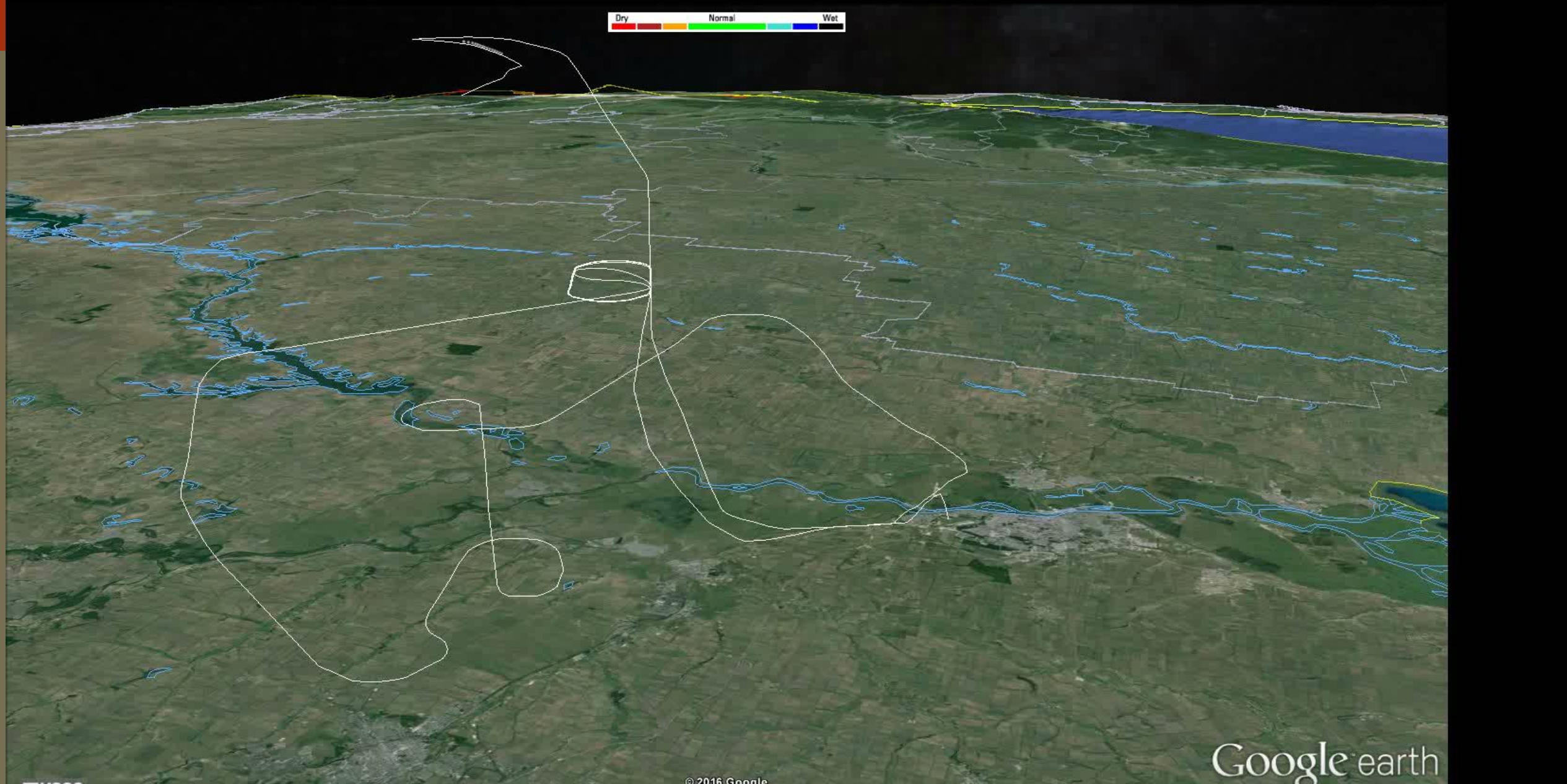

WxOps
Geospatial Excellence
Oslo
Stockholm
Tallinn
Riga
Copenhagen
Vilnius
Minsk
Moscow
Dublin
London
Amsterdam
Brussel
Berlin
Warsaw
Prague
Kyiv
Bratislava
Budapest
Chisinau
Belgrade
Bucharest
Rome
Madrid
Lisbon
Ankara
Tbilisi
Algiers
Tunis
Nicosia
Rabat
Tripoli
2016-05-18 21:38:09 UTC
2016-05-18 22:00:12 UTC
2016-05-18 22:19:12 UTC
2016-05-18 22:34:44 UTC
2016-05-18 22:48:11 UTC
2016-05-18 23:00:32 UTC
2016-05-18 23:11:01 UTC
2016-05-18 23:21:14 UTC
2016-05-18 23:30:51 UTC
2016-05-18 23:39:31 UTC
2016-05-19 00:29:33 UTC
Altitude: 36,975 ft
Speed: 534 kt
Heading: 136°
Directions: To here - From here
2016-05-19 00:29:03 UTC
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2016 Google
© 2016 ORION-ME
Image Landsat
Google earth
Imagery Date: 12/14/2015 41°22'56.94" N 15°35'32.59" E elev 0 ft eye alt 1942.40 mi
Graph: Min, Avg, Max Elevation: 0, 35810, 37047 ft Speed: 1.2, 412.7, 621.6 mph
Range Totals: Distance: 1740 mi Elev Gain/Loss: 38406 ft, -1431 ft Max Slope: 16.8%, -0.1% Avg Slope: 0.6%, -0.0% Time: 4h 13m
5/18/2016 8:16:33 PM
37047 ft
30000 ft
22500 ft
15000 ft
7500 ft
0 ft
621 mph
500 mph
400 mph
300 mph
200 mph
100 mph
0 mph
hide roads, borders and other items in the 3D viewer
0 ft
1.16 mph
0.0%
0 ft
250 mi
500 mi
750 mi
1000 mi
1250 mi
1500 mi
1740 mi


Dry
Normal
Wet
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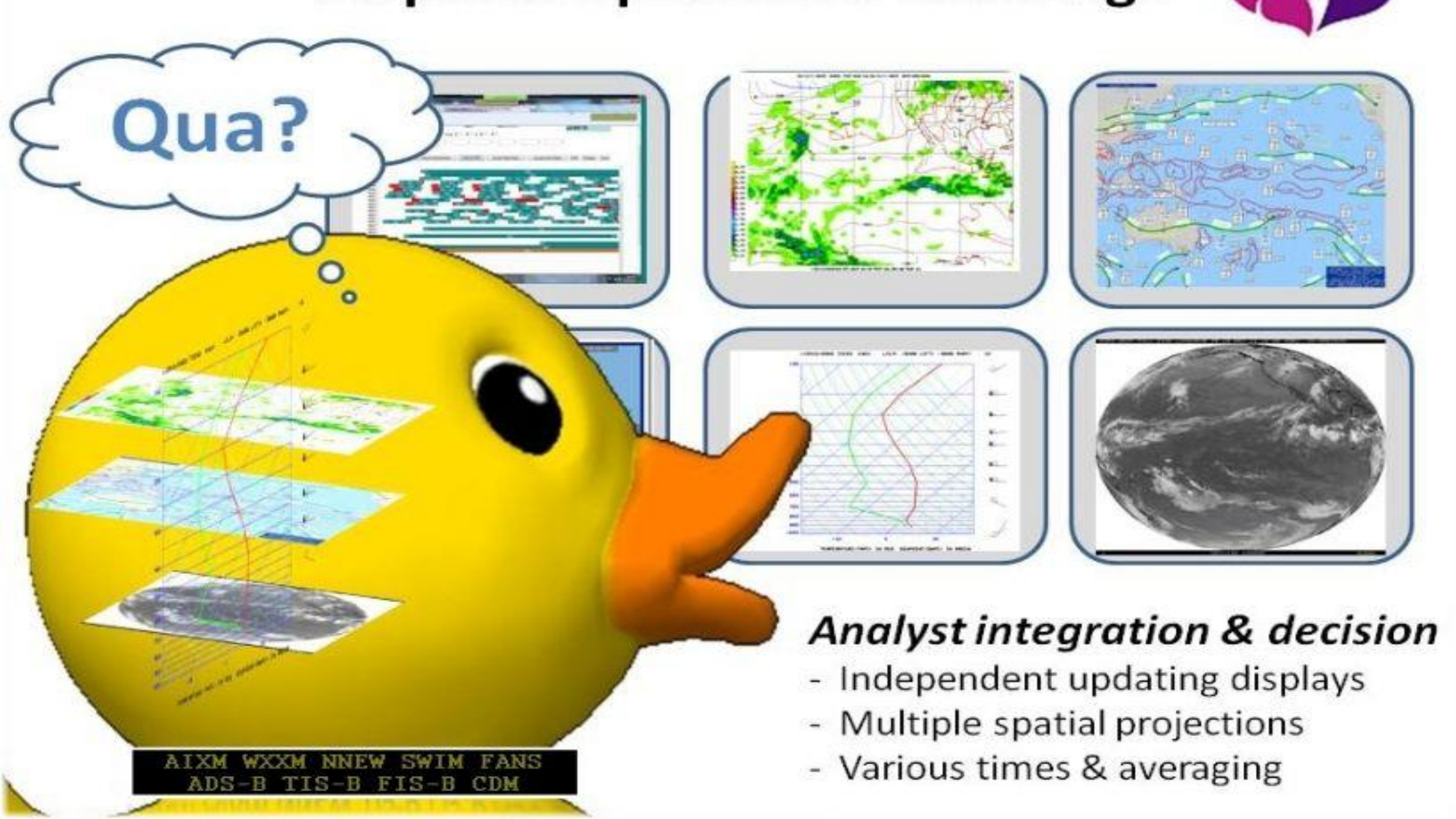
Google earth

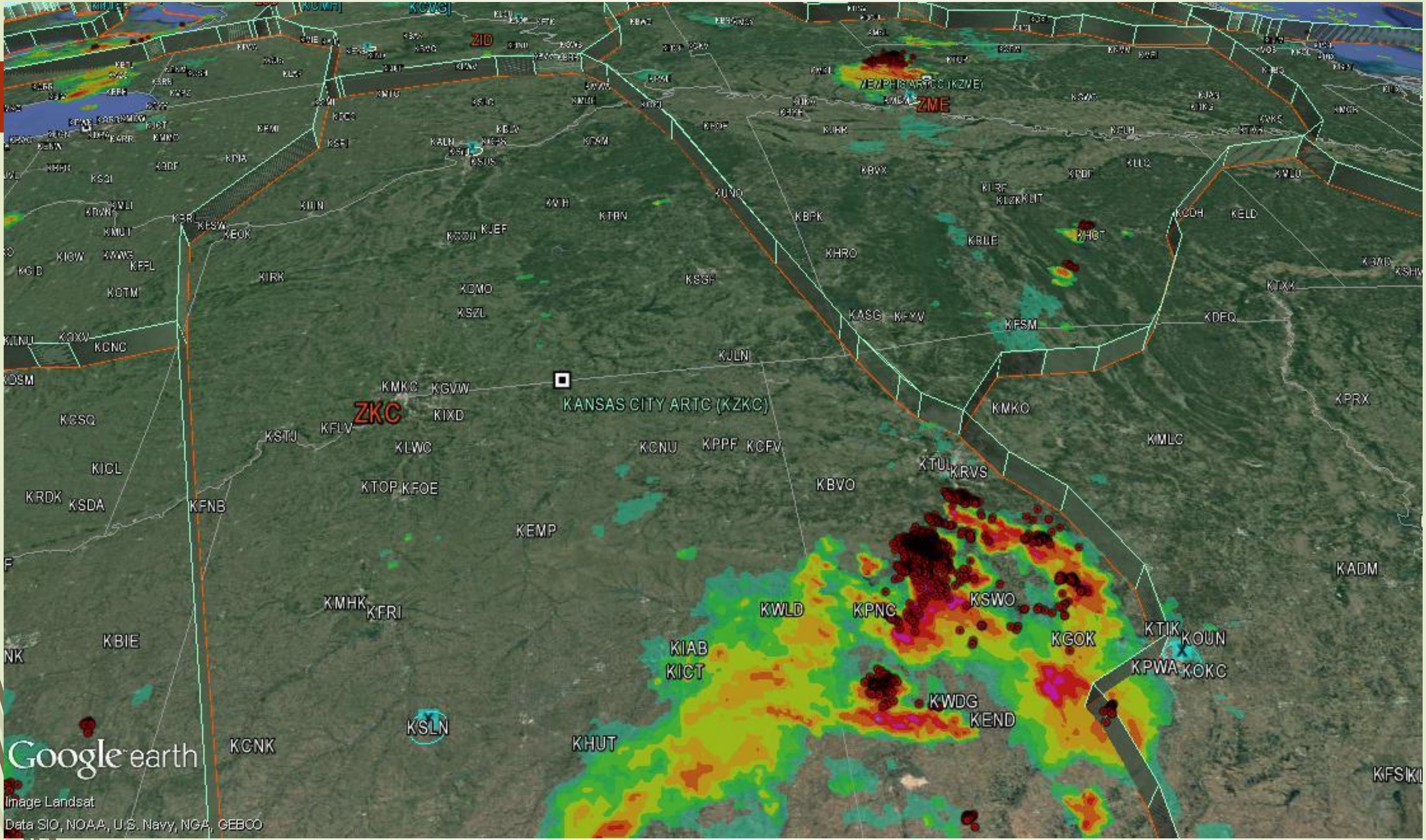
HUMAN FACTORS, TASK SATURATION AND THE GEOSPATIAL

- Use of 4D geospatial displays and exchange of big data has its advantages and challenges.
- What are the challenges?
- What are the advantages?
- Any examples?



Analyst integration & decision

- Independent updating displays
- Multiple spatial projections
- Various times & averaging


KANSAS CITY ARTC (KZKC)
ZKC
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KIXD
KFLV
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KLWC
KTOP
KFOE
KEMP
KCNU
KPPF
KCFV
KJLN
KBVO
KTUL
KRVS
KMKO
KMLC
KPRX
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KPNC
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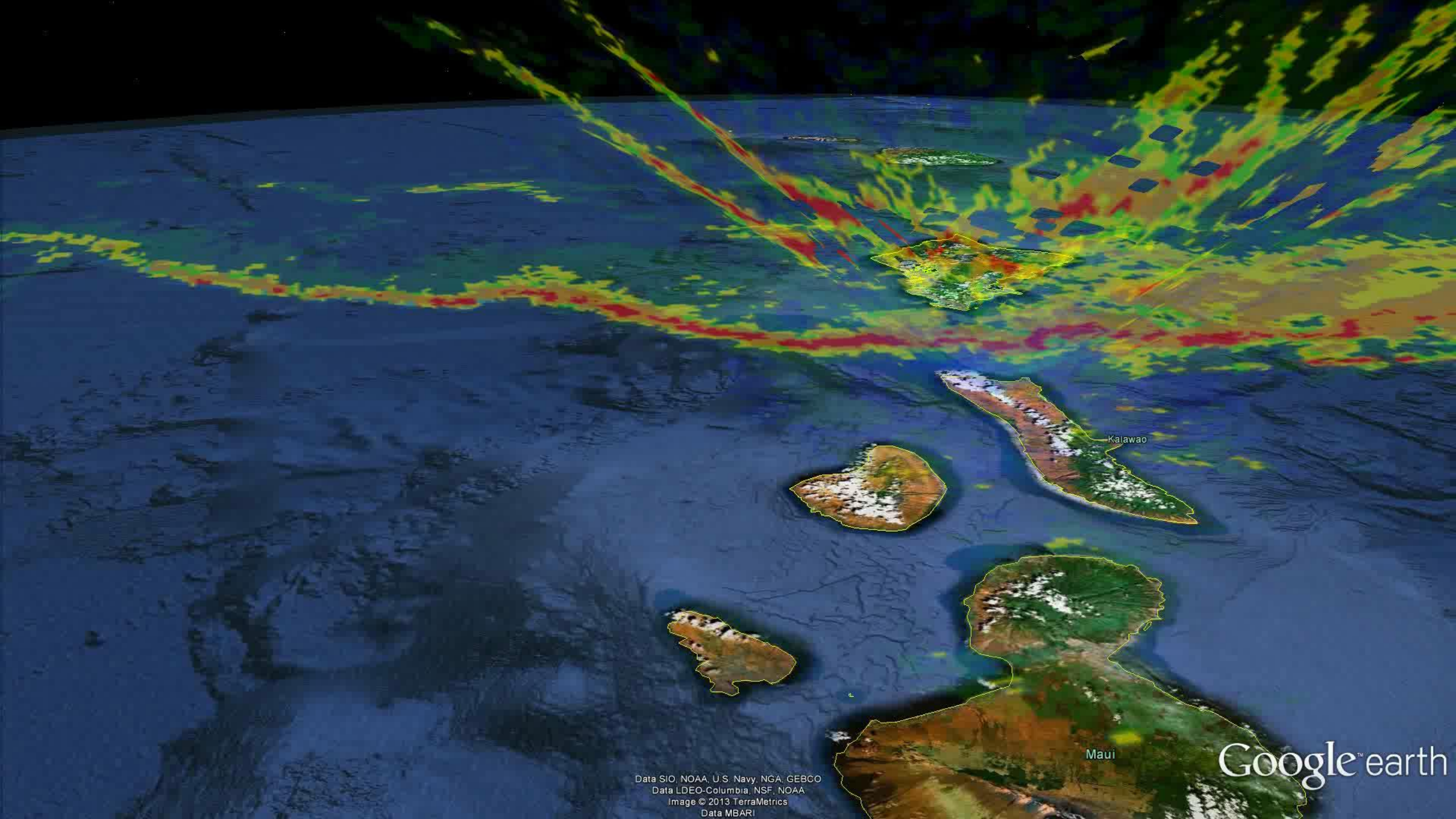
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO


Kalawao
Maui
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Image © 2013 TerraMetrics
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Google earth

TURBULENCE

packs a **mean** punch

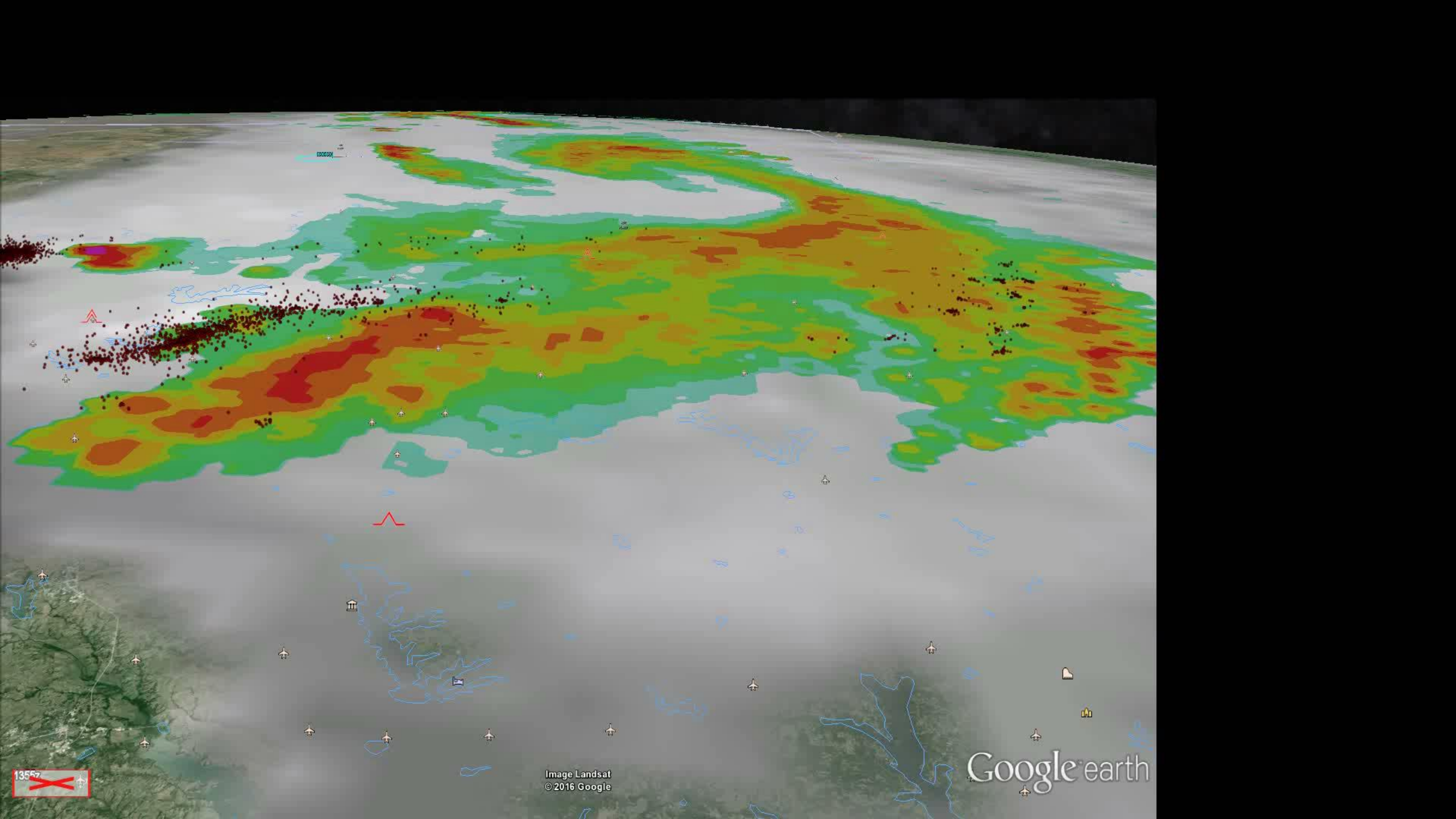
Turbulence is more than a nuisance it's an invisible threat pilots must be prepared to address every time they fly.

It threatens passenger safety, pilot control, even damages the airplane; not to mention it wreaks havoc on schedules and flight plans. In fact, each year turbulence costs the aviation industry:

$5 million
in maintenance

$35 million
in passenger and
crew injuries

$1.36 billion in
operational costs
due to flight
planning time, delays
and re-routing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WxOps®

Geospatial Excellence

TIM

TIM

Bluetooth

AID

834

AOC Data

ACARS Data

Safety Data

SAT-SS

VF

VHF

ARINC

RackSpace

FCS

ATC

Cell

SAT-AOC

Charts

SCCM

MDM

MAM

OpsTablet

OpsDocs

OpsPlot

Email

LIDO

DR Fortress

RackSpace

$$

$$$

It's about the data!

What data? When and how will we use it?

How big do we expect the data streams? (Either rate or volume)?

What parts of the business do you think needs 'more data' that we don't already have?

It's about the business case!

Q: What number of aircraft is required to make a business case that will provide a reasonable return on investment?

A: (1) The more aircraft the more the ROI.

It cuts ~~both~~ all kind of ways:

The government, the provider and the airline needs to have both a solid data integration plan and a sustainable business case.