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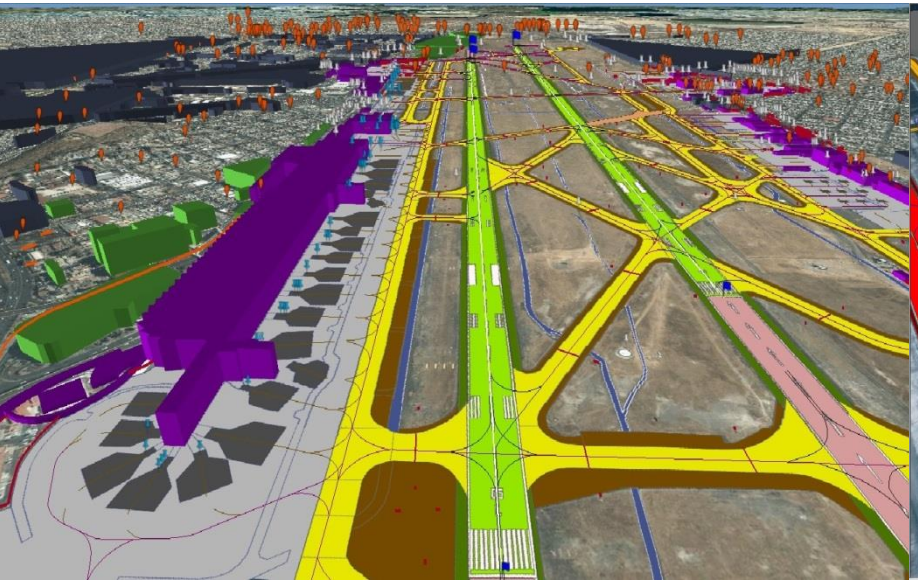
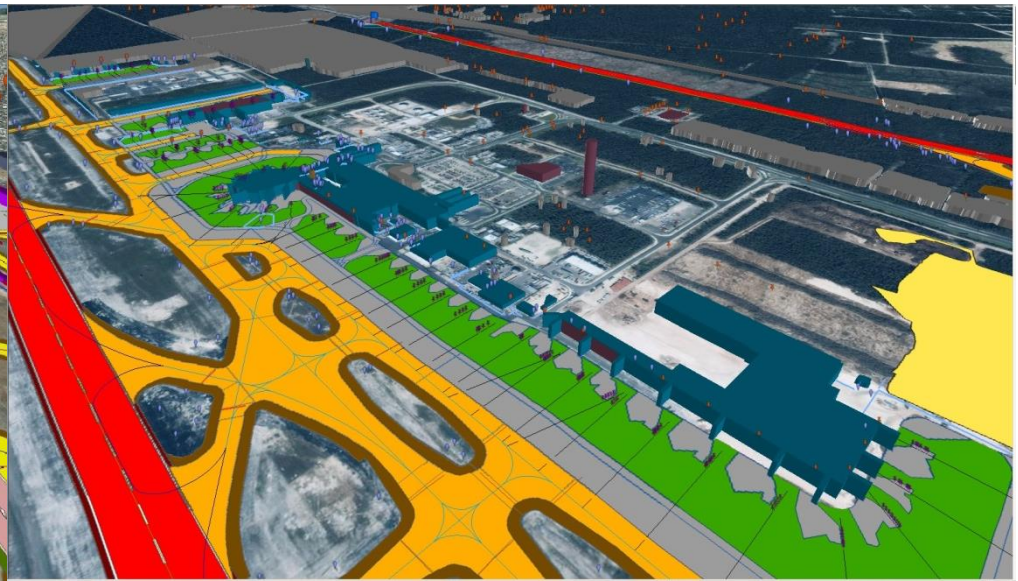
ICAO CAR/SAM electronic Terrain and Obstacle Data (eTOD) Seminar Mexico City – Nov 23rd - 25th, 2015

Dejan Damjanovic, Managing Director, FANS Group





Agenda Topics

1. AIXM, FIXM, WIXM – and the Life Cycle
2. Case Study – A.S.U.R. Airport Authority
3. Deliverable Review,
4. Value Proposition of eTOD & AMDB's
5. Thank you!

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Business Problem

- Air Transportation has reached the Saturation Point in 2015……..

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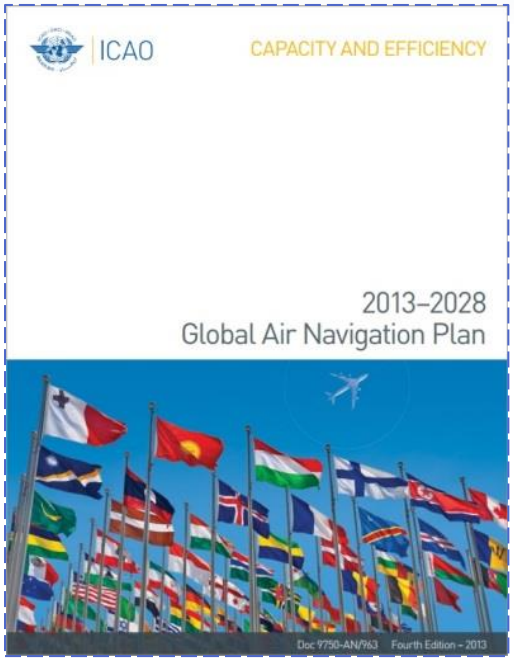
Everything starts with the Global Air Navigation Plan..

ICAO has published a Global Air Navigation Plan (G.A.N.P.), that implements a complete Migration to Future Air Navigation Systems (FANS).

- The GANP allows countries to package their upgrades according to available resources.
- This provides a clear, planned & structured pathway towards the Future Air Navigation System (**FANS**) for all ICAO nations.
- The US is implementing these Operations Concepts into the system known as Next Generation Air Transportation System or **NextGEN**.
- In Europe, this is known as Single European Sky or **SESAR**.
- Mexico's DGAC (a FANS Group Customer) is a Strategic participant to the Block Upgrade process in Latin America & North America towards supporting NextGEN & SESAR.



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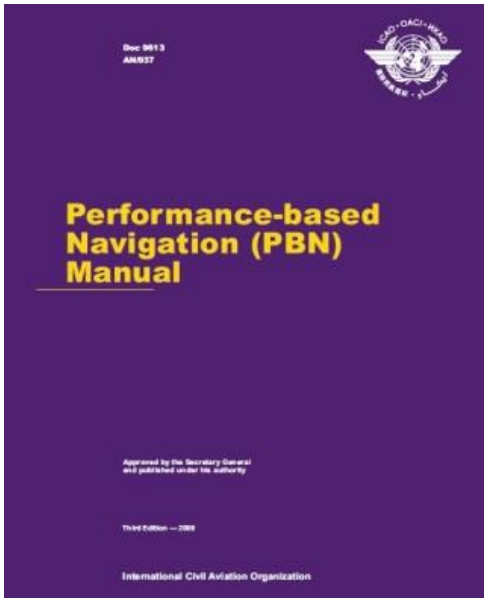
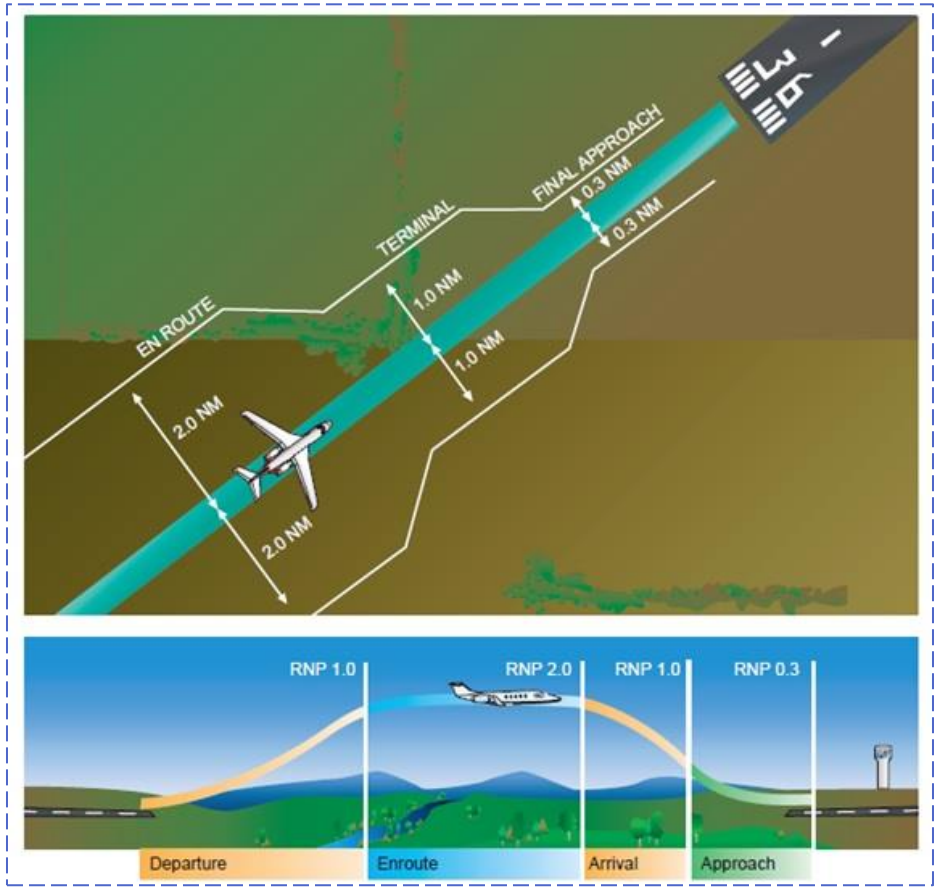
Cornerstone of FANS is PBN





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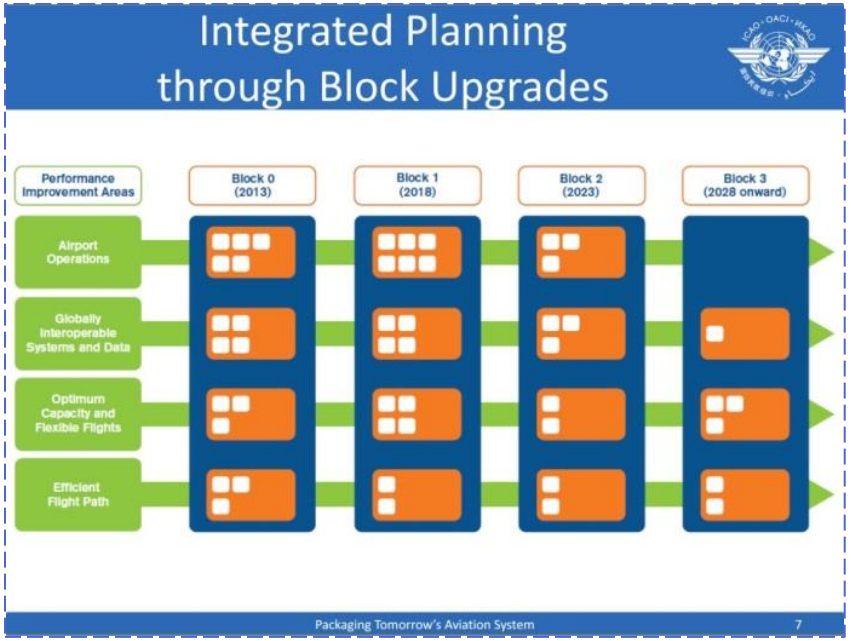
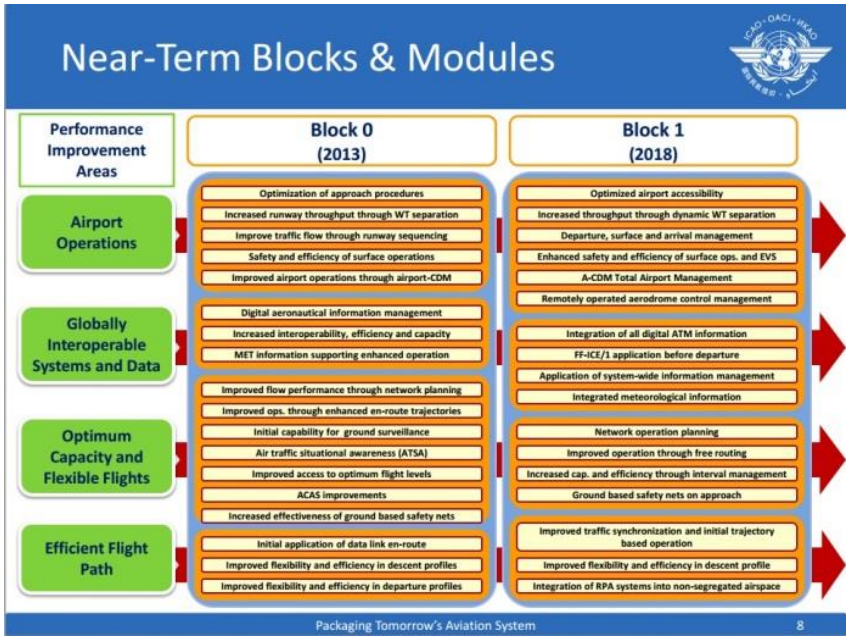
Structure of the GANP





- Our ASUR project is one of the earliest steps towards adoption of Blocks Zero (0) & One (1), enhancing present and future air traffic in the 9 ASUR airports- Mexico's largest and most valuable Tourist Destinations.

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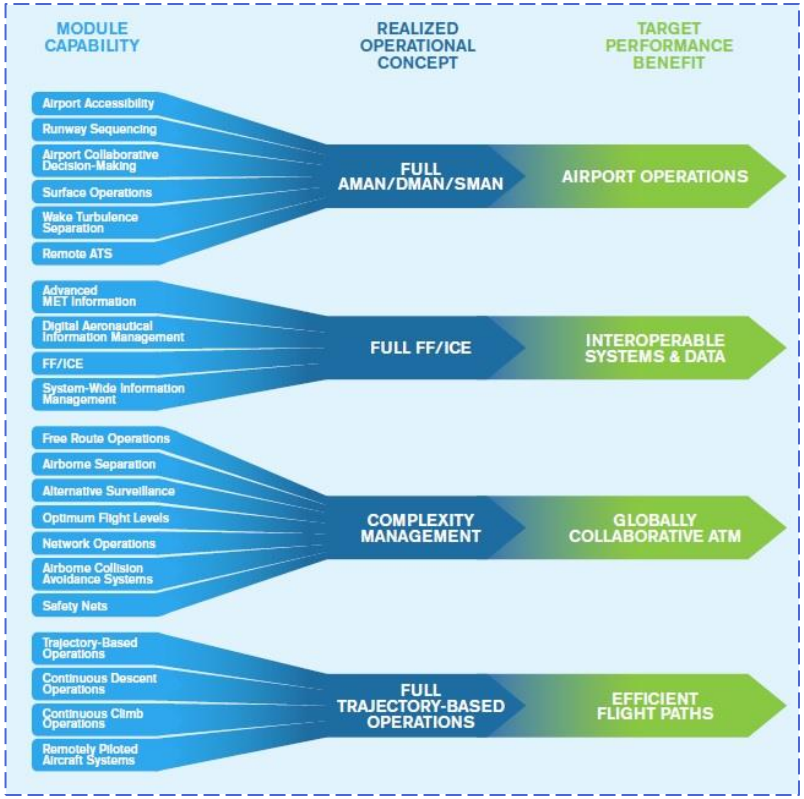
Key Block Upgrade themes require eTOD & Airport Digital Maps..

- Airport Operations.
  - Require knowledge of Obstacles to optimized Arrival & Departure procedures.
  - Require knowledge of Airport Map to optimize Surface Movements.
- Globally Inter-Operable Systems & Data.
  - Require knowledge of Obstacles and Airport Map to share with all relevant stakeholders – ATM, Airline, Military, and others.
- Optimum Capacity & Flexible Flights.
  - Require knowledge of Obstacles and Airport Map to implement PBN Arrivals and Departures to improve hourly capacity.
- Efficient Flight Paths
  - Require knowledge of Obstacles to minimise flight times, noise, and carbon emissions, while maximizing Safety and Revenues.



To succeed, we need a Common Language….

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AIXM is the data glue for FANS

- **Aeronautical Information eXchange Model (AIXM)**
- An XML specification for all Aeronautical Information
  - Replaces paper Aeronautical Information Publications (**AIP**)
  - Allows all 200+ ICAO signatory countries to electronically share their AIP information in a common data format
  - Enables the use of **Digital NOTAMS**, where the critical airmen's information is tied to a database record, not just text
- A companion format known as Flight Information eXchange Model (**FIXM**) delivers Aircraft Position reporting in 4D
  - Improved Collision Avoidance and Spacing Performance
- A 3rd companion format - Weather Information eXchange Model (**WIXM**)
  - Reports weather worldwide in a standard format.

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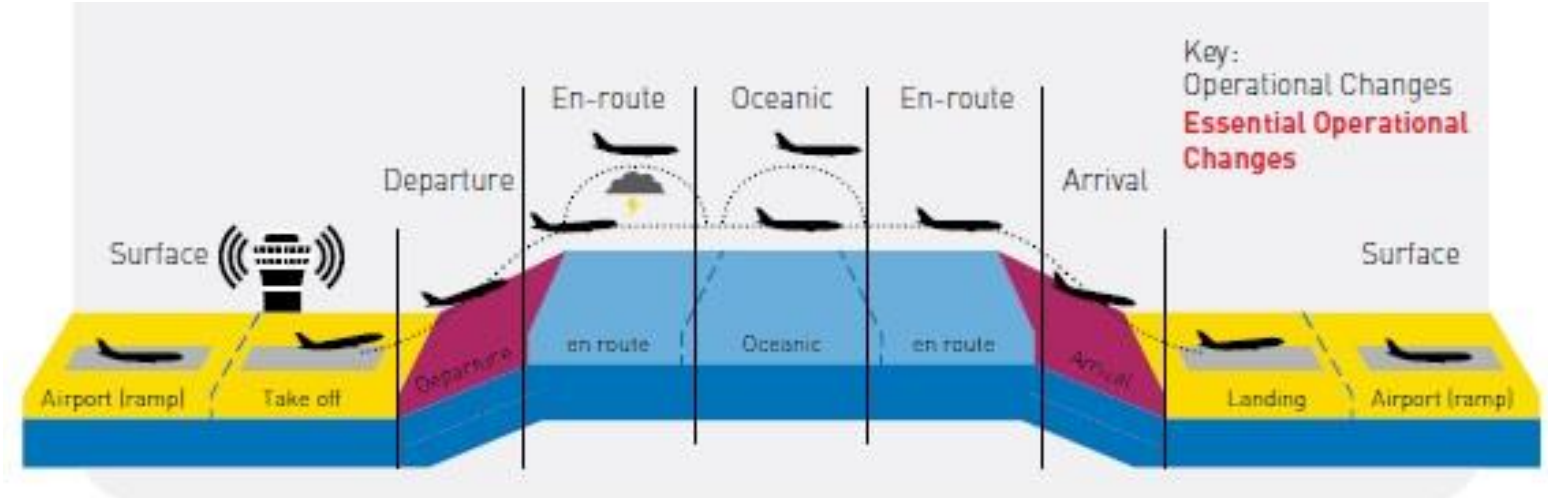
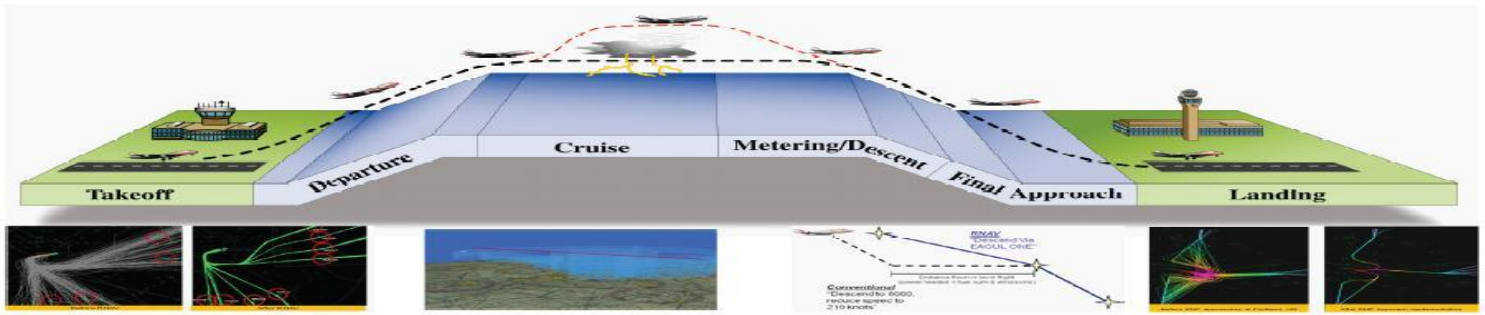
Life Cycle of FANS Flight Ops



NextGEN or SESAR – the Life Cycle is the same..



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Where is eTOD required in Flight Ops?

Life Cycle Phase	Why it requires eTOD data
Departure Management	• Terrain data for Engine-Outs • Obstacle data for Engine-Outs • Airport Maps to minimize taxiing • Cadastral & Environment data for Departures
PBN Flight Operations	• Terrain data for PBN separation • Obstacle data for PBN separation • Terrain data for Drift-Down/Let down
Metroplex	• Terrain data for SID/STAR • Obstacle data for SID/STAR • Cadastral & Environment data for SID/STAR
In-Trail Enroute	• Terrain data for PBN separation • Obstacle data for PBN separation • Terrain data for Drift-Down/Let down
Continuous Descent	• Terrain data for SID/STAR • Obstacle data for SID/STAR • Cadastral & Environment data for SID/STAR
Surface Movements	• Airport Maps to minimize taxiing

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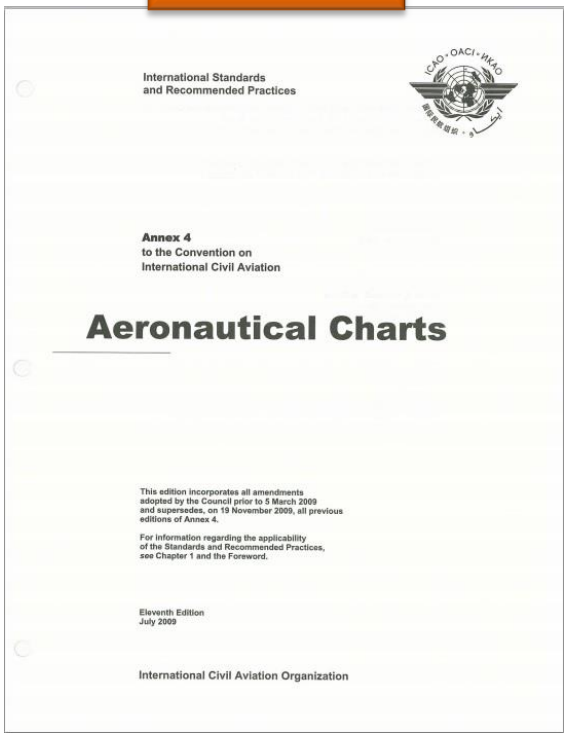
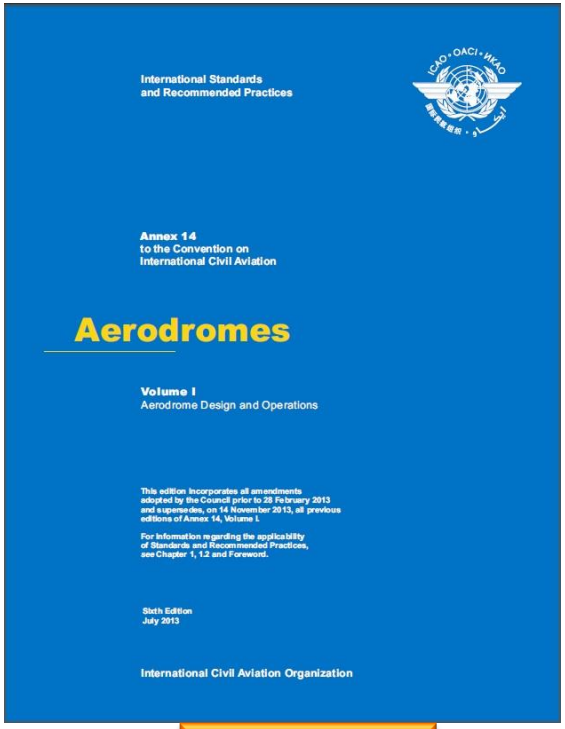
ICAO has 3 Annexes on eTOD..

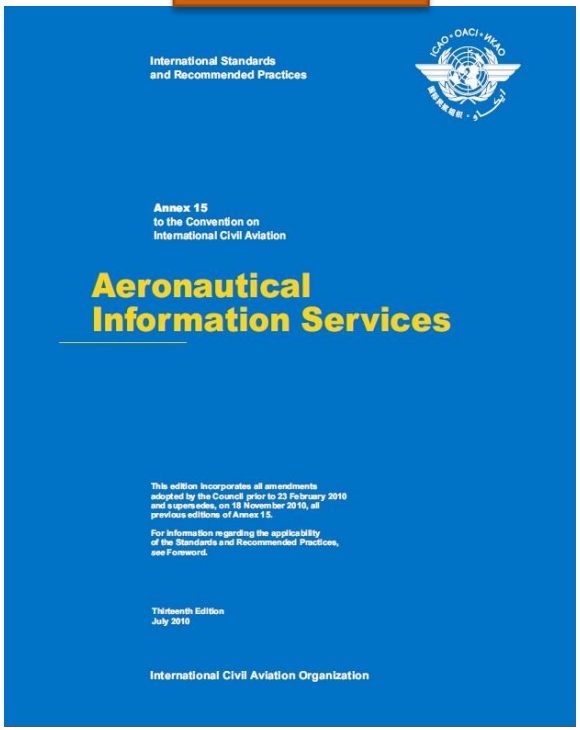
Annex-4



Annex-14



Annex-15



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What does each provide us with?

- **Annex-4**
  - Defines the Take Off Flight Path Area (TOFPA).
  - Used in **Type A Obstacle Charts.**
  - **Type A** no longer required if Annex-15 eTOD data is available
- **Annex-14**
  - Defines the traditional and Precision Surfaces used before Annex-15 was revised.
  - Used in **Type B Obstacle Charts.**
  - **Type B** no longer required if Annex-15 eTOD data is available
- **Annex-15**
  - New concept of Area-1, Area-2, Area-3, Area-4
  - Encompasses much larger area around each Runway to better support PBN Operations.

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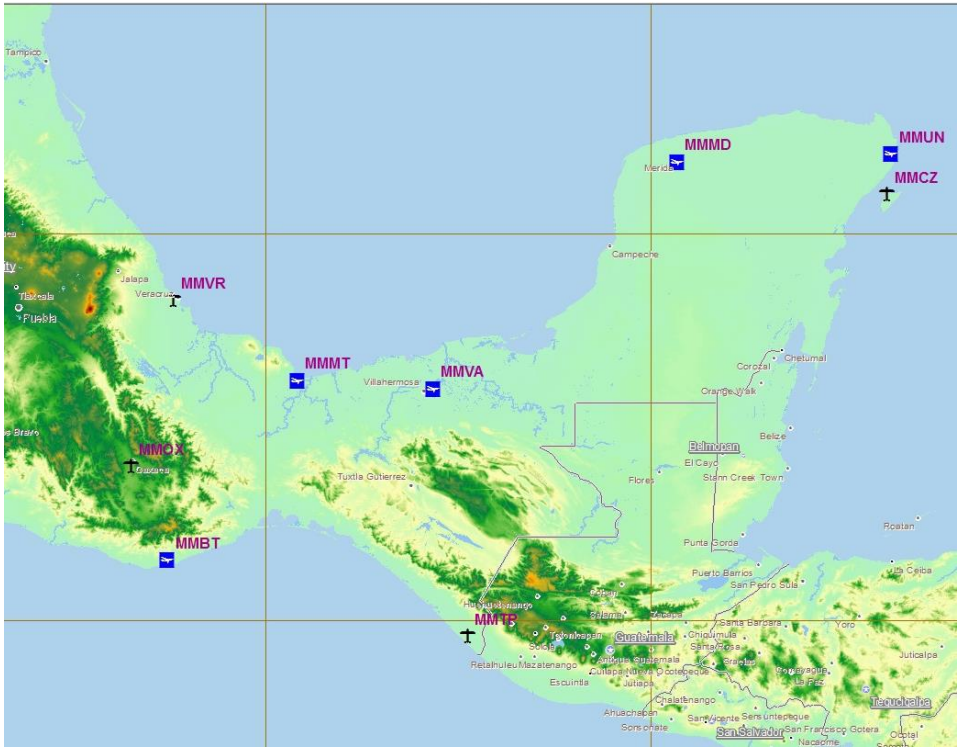
Case Study: Mexico eTOD Project

Grupo Aeroportuario del Sureste, Wide blend of Air Traffic: Intl Airline, Regional, Business, GA

Objective: Meet ICAO Annex 15, Chapter 10 eTOD requirements by Nov-2015

- CANCUN:
  - Annual PAX 17.5M, 2nd largest apt in Mexico
- COZUMEL:
  - Annual PAX 0.5M, growing tourist destination
- HUATULCO:
  - Annual PAX 0.5M, Canadian Tourist hub
- MERIDA:
  - Annual PAX 1.4M, ATC Area Control Center
- MINATITLAN:
  - Annual PAX 0.1M, mostly Business & GA
- OAXACA:
  - Annual PAX 0.5M, highly terrain challenged
- TAPACHULA:
  - Annual PAX 0.1M, southernmost airport
- VILLAHERMOSA:
  - Annual PAX 1.1M, regional tourist destination
- VERACRUZ:
  - Annual PAX 1.1M, major Port of Mexico



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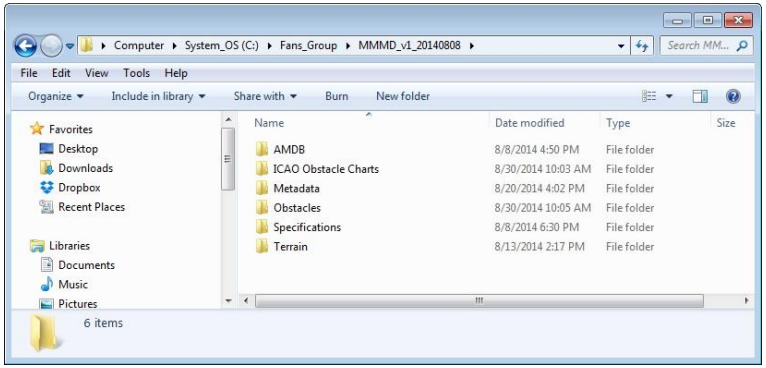
2h/4h/6h/8h Flight Radius to NextGEN, SESAR…

Case Study: eTOD for ASUR airports

Terrain & Obstacles delivery

- Database standard is EUROCAE ED-98(A).
- Obstacle Criteria is ICAO Annex 4, Annex 14 (1st Phase) and Annex-15 (2nd Phase).
- Coverage is ICAO Area-2ABC.
- Formats include: **AIXM**, SHP, AutoCAD, KML/KMZ



Airport Mapping delivery

- Airport Mapping Database (AMDB) standard is EUROCAE ED-99(B).
- All features include building or obstacle ground elevation, and height of structure or feature.
- These AMDB are suitable for all ICAO requirements, as well as being used in Airline Electronic Flight Bag systems such as iPads.
- Formats include: **AIXM**, SHP, AutoCAD, KML/KMZ
- Provides pathway to FAA and EUROCONTROL **D-NOTAMS.**

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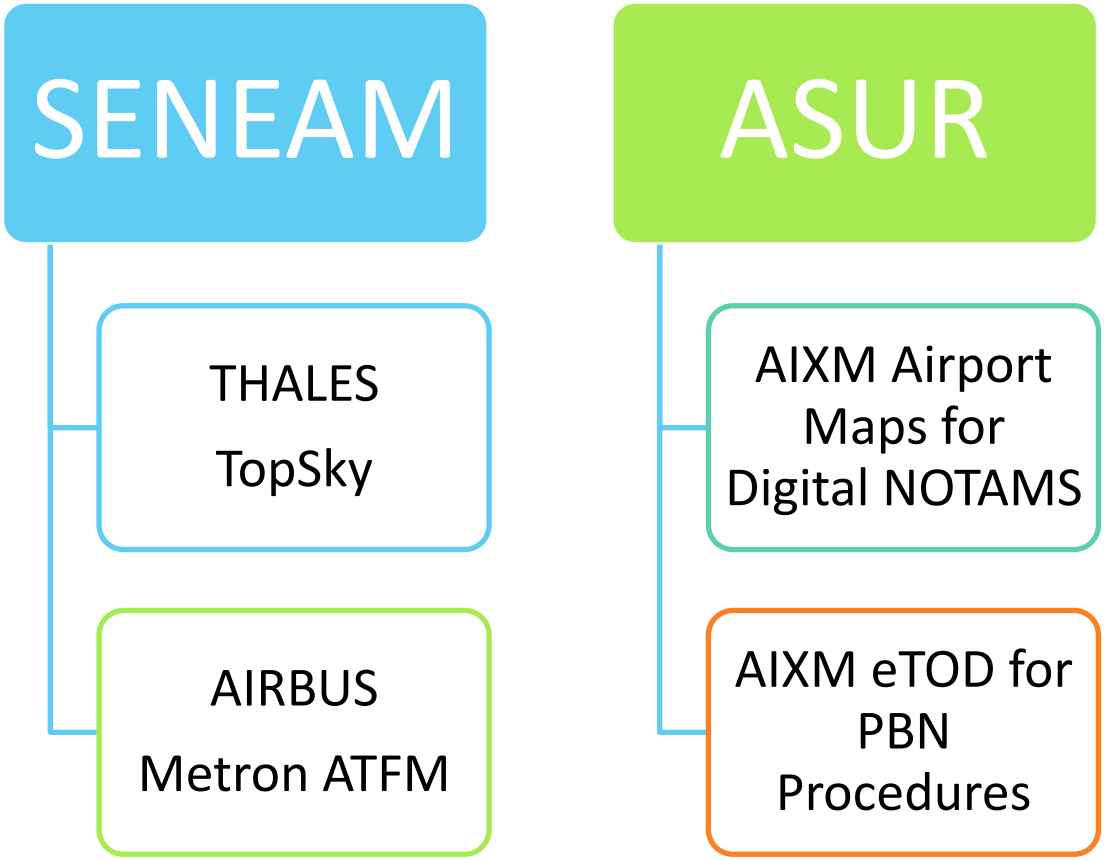
The ANSP & CAA are already moving towards FANS & AIM….



http://www.airbusprosky.com/news/press-releases/550-seneam-selects-airbus-prosky-to-launch-air-traffic-flow-management-initiative-in-mexico.html
https://www.thalesgroup.com/en/worldwide/aerospace/event/seneam-pursues-its-goal-excellence-choosing-thales-topsky-aim-system

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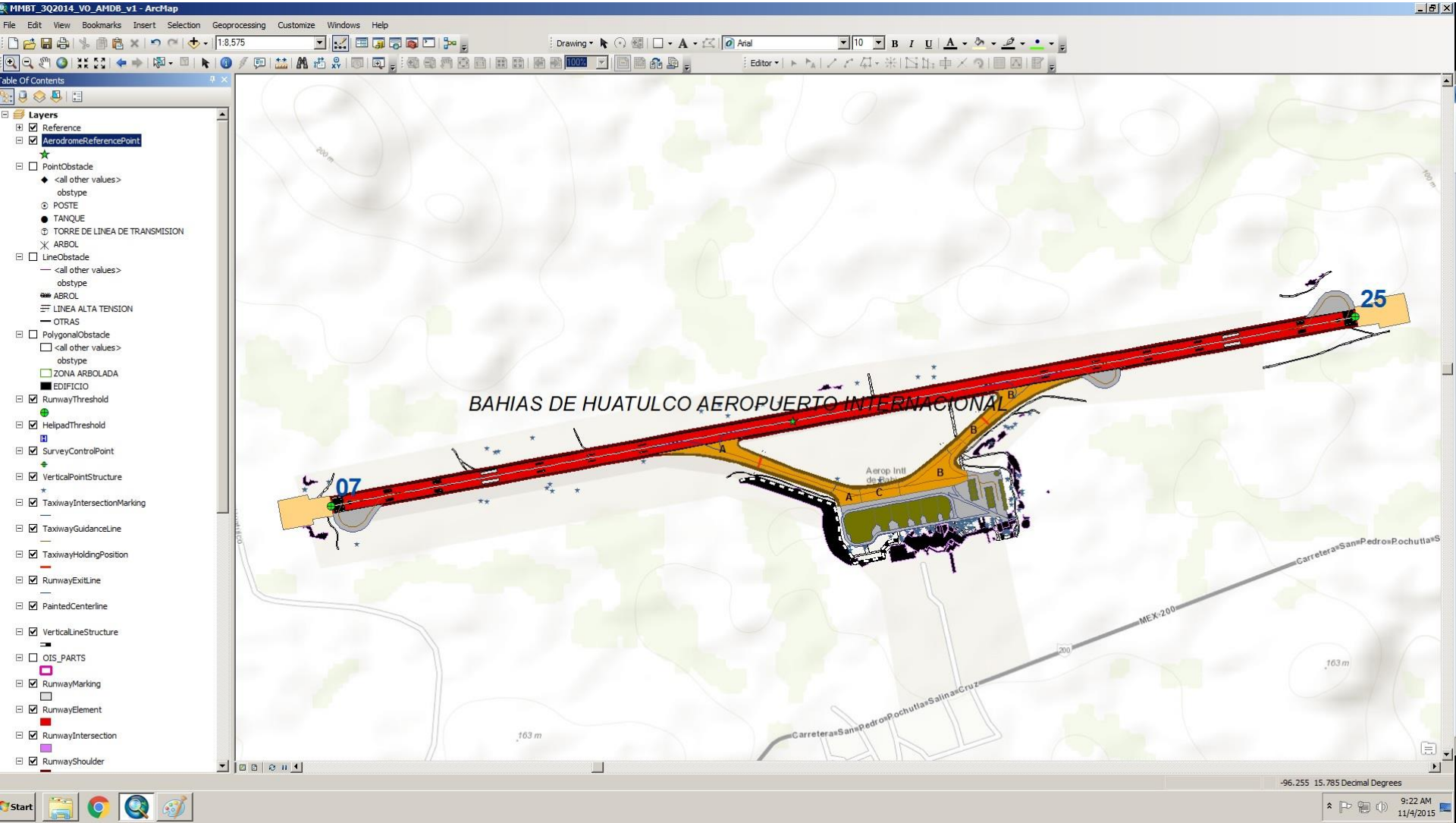
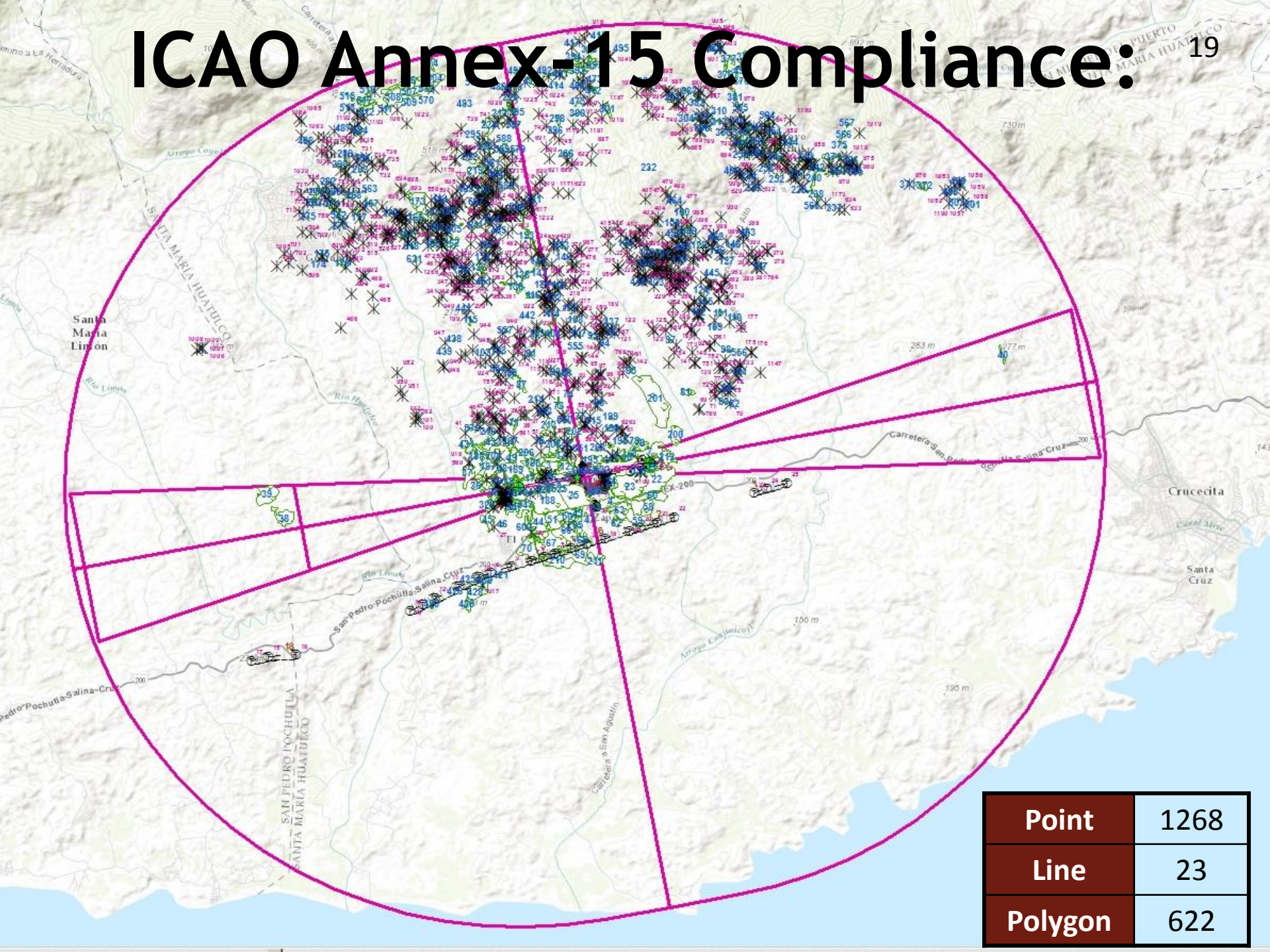
Example Airport: MMBT

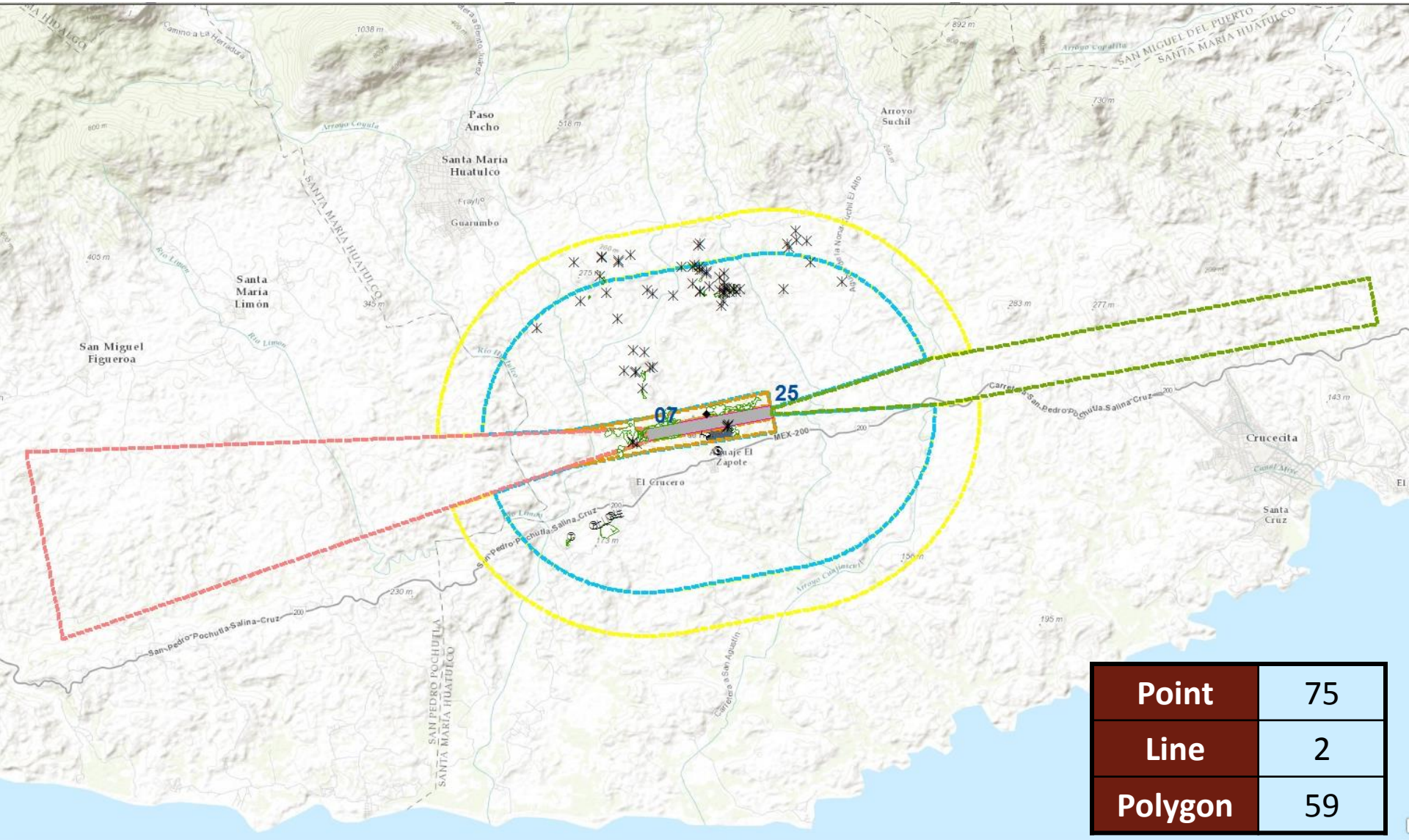


ICAO Annex-15 Compliance:



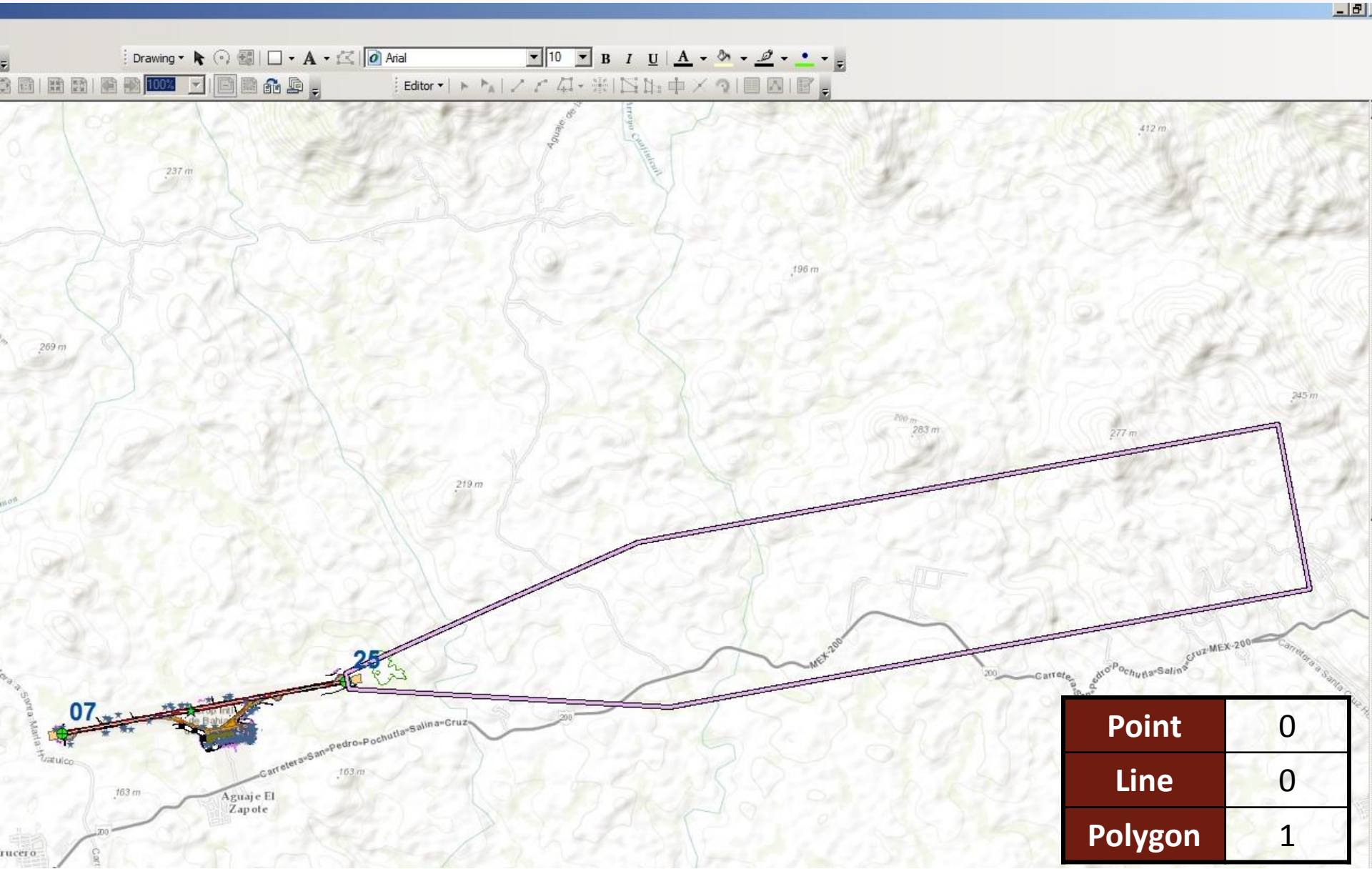
Point	1268
Line	23
Polygon	622

ICAO Annex-14 Compliance:



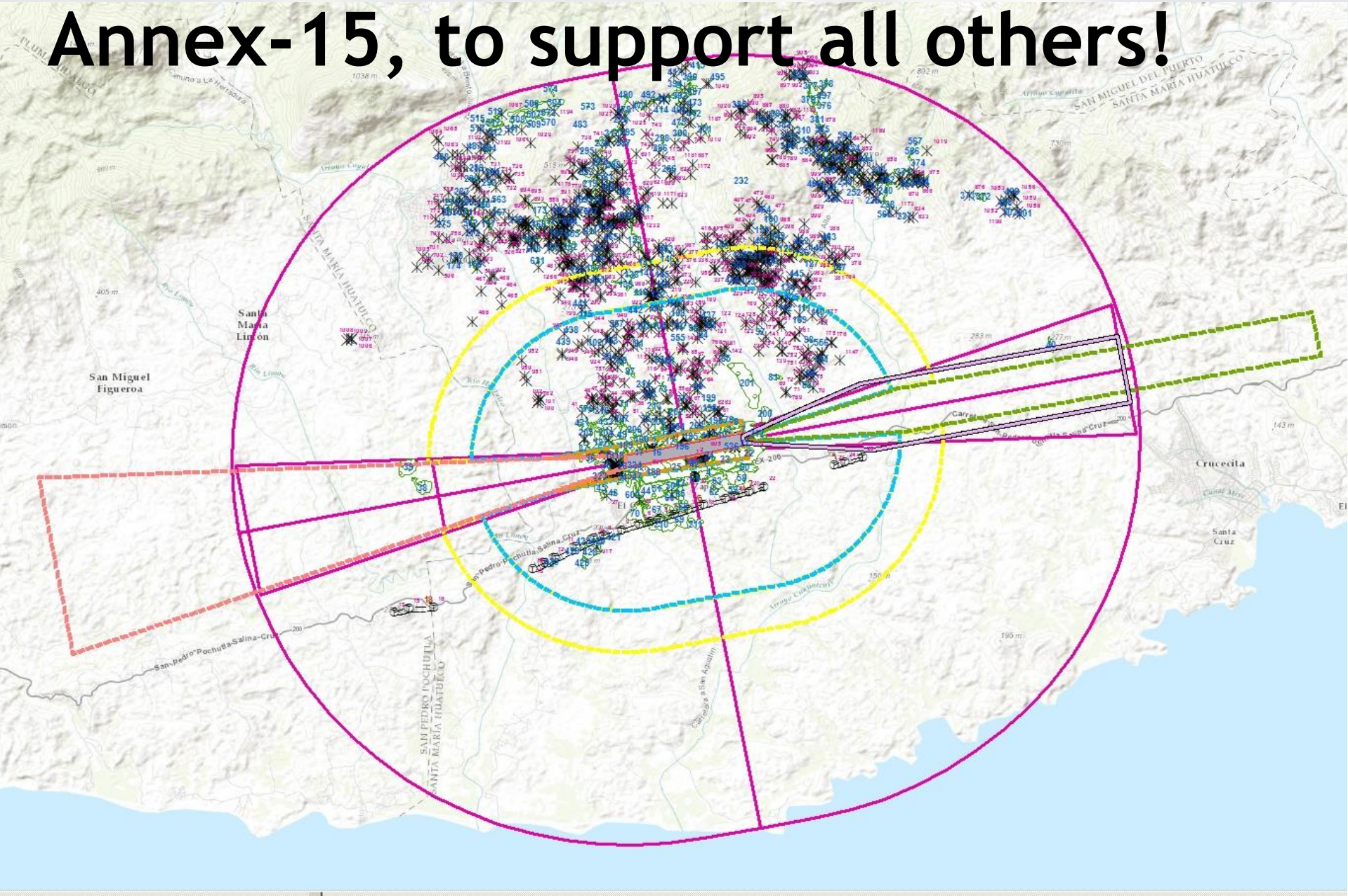
Point	75
Line	2
Polygon	59

ICAO Annex-4 Compliance:



Point	0
Line	0
Polygon	1

Important Lesson: Must begin with Annex-15, to support all others!



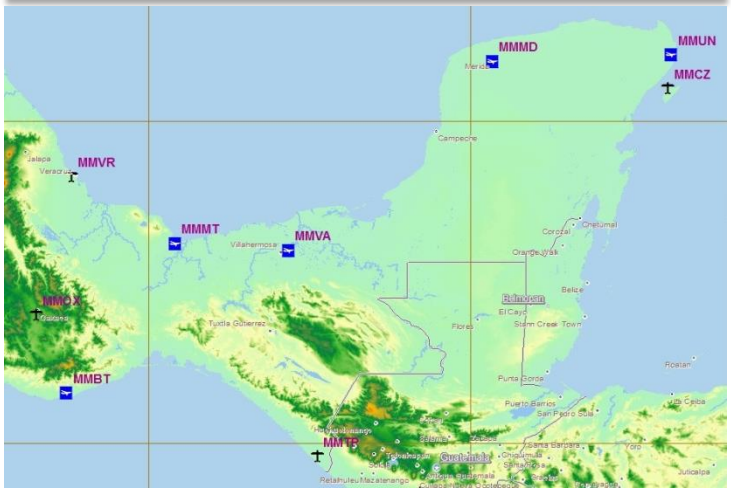
Value Proposition: Airline benefit

Airline	Airline	Airline
Aeroflot	Delta Air Lines	Southwest Airlines
Aerolíneas Argentinas	EuroAtlantic Airways	Spirit Airlines
Aeroméxico	Finnair	Sun Country Airlines
Aeroméxico Connect	Frontier Airlines	Sunwing Airlines
Aerotucán	Interjet	Thomas Cook Airlines
Air Berlin	Jetairfly	Thomas Cook Airlines Scandinavia
Air Canada	JetBlue Airways	Thomson Airways
Air Canada Rouge	LAN Airlines	Transaero Airlines
Air Europa	LAN Peru	Transportes Aéreos Guatemaltecos
Air France	LOT Polish Airlines	Tropic Air
Air Transat	Magnicharters	TUIfly operated by Arkefly
AirTran Airways	Maya Island Air	TUIfly Nordic
Alaska Airlines	MAYAir	United Airlines
American Airlines	Monarch Airlines	US Airways
Apple Vacations	Nordwind Airlines	Vacation Express
Arkefly	Novair	Virgin America
Avianca	Neos	Virgin Atlantic
Avianca El Salvador	Orbest Portugal	VivaAerobus
Blue Panorama Airlines	Orenair	Volaris
British Airways	PAL Airlines	WestJet
Condor	Perla Airlines	White
Copa Airlines	Pullmantur Air	Whitejets
Cubana de Aviación	SATA International	XL Airways France

All of these airlines fly into some or all of the ASUR airports. They can all benefit from improved:

- **Two-Engine Take-Off Performance,**
- **Engine-Out Performance,**
- **New fuel-efficient PBN Procedures,**
- **Electronic Flight Bag Airport Maps**

This project provides for new potential Revenues for ASUR & it's partners!



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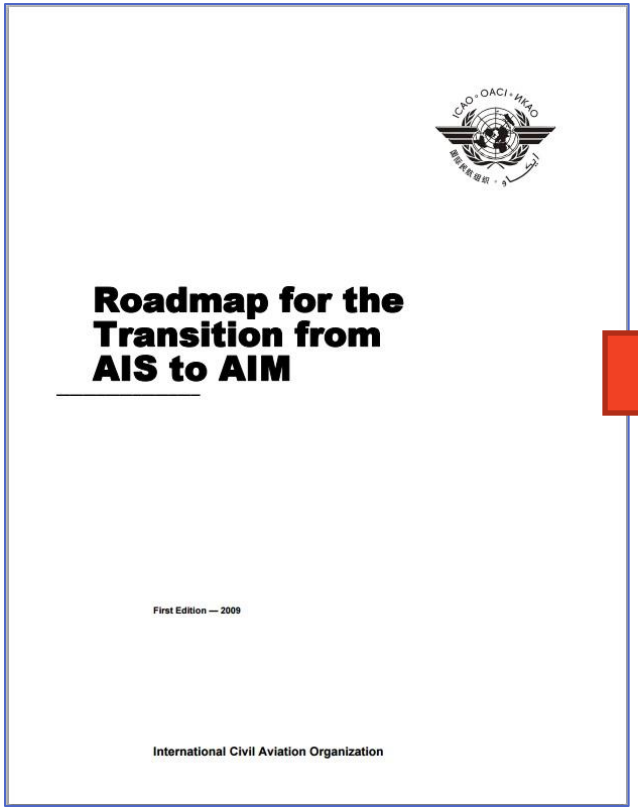
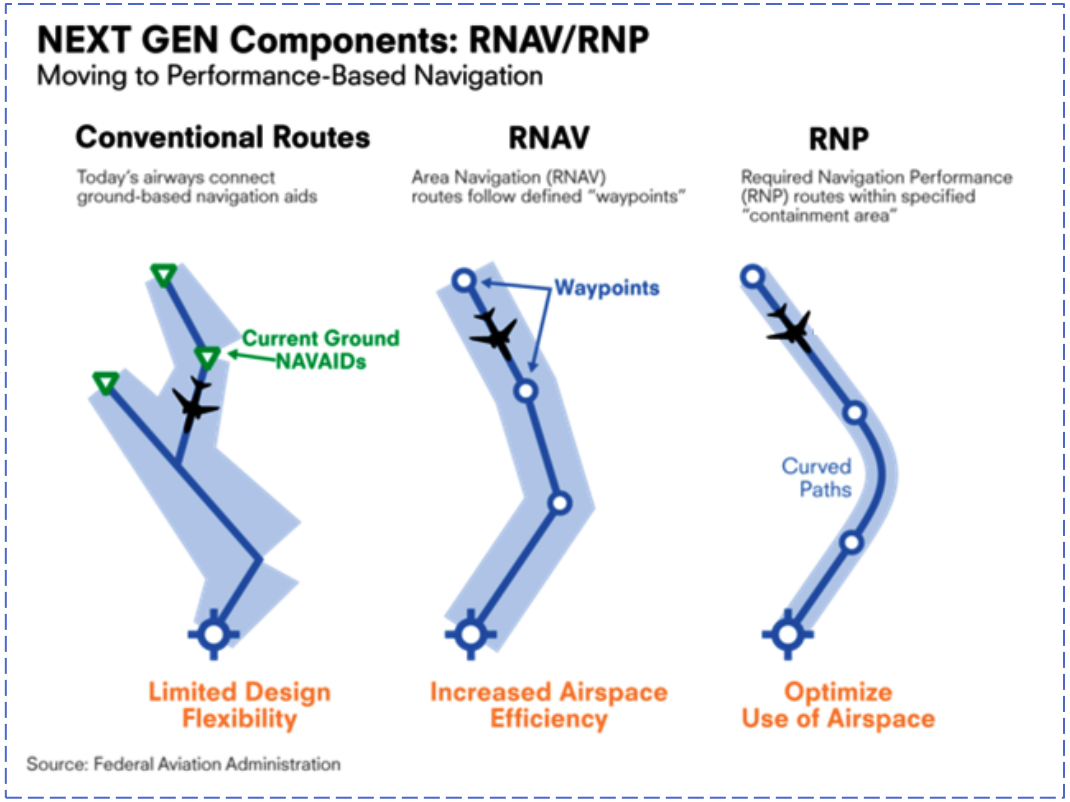
Value Proposition: PBN Implementation





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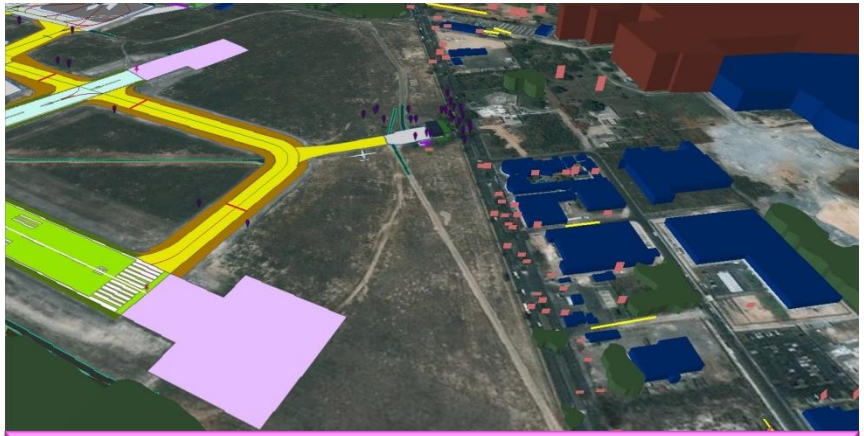
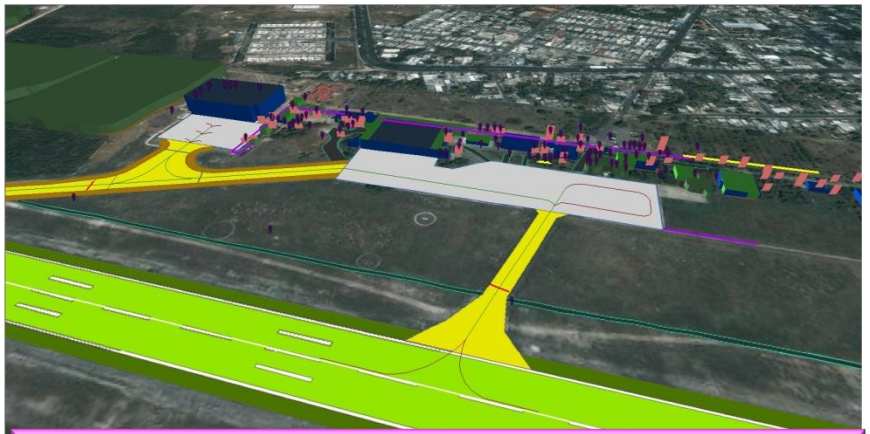
Value Proposition: Digital NOTAMS

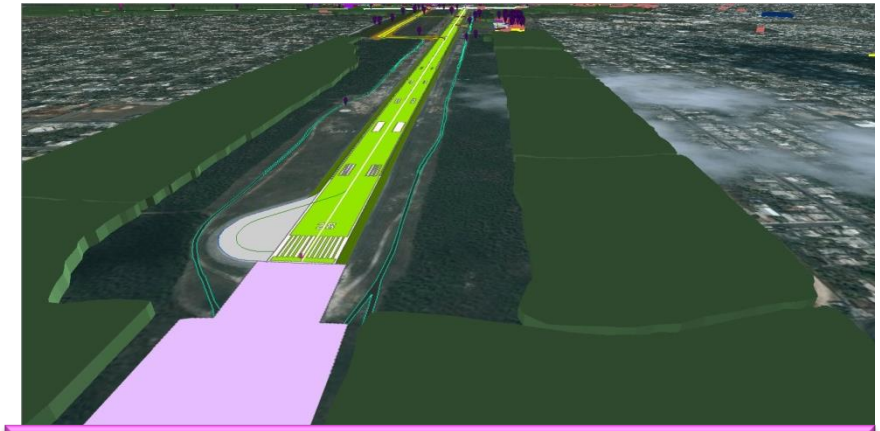
Value Proposition: Better Airport Management



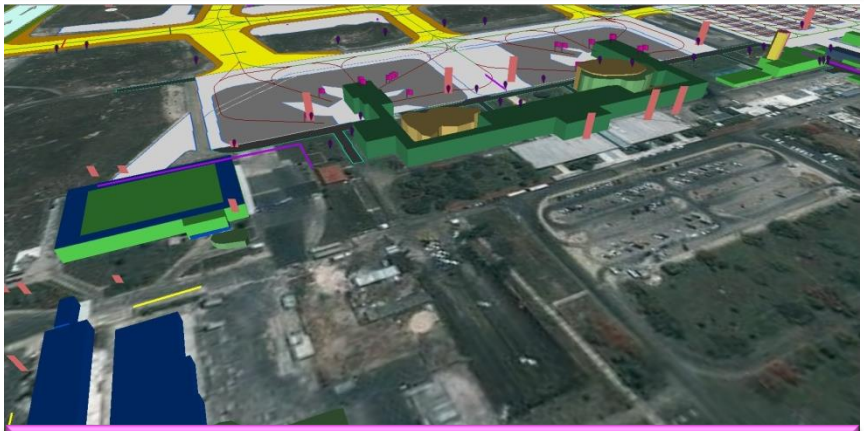
(AMDB) helps Airport in development of airport real estate



(AMDB) helps Airport in Neighborhood Noise Management



(Obstacles) helps Airport improve takeoffs with tree removals



(AMDB) helps develop better Road & Rail links to Airport

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Conclusions:

- The Air Transportation industry can only solve it's problems by the structured implementation of ICAO Block Upgrades as defined in the GANP.
- Most Block Upgrades requires a sound foundation of eTOD and Airport Mapping information.
- ICAO Annex-15 provides a reliable standard for how to collect eTOD and Airport Maps.
- FANS Implementations such as NextGEN and SESAR will reward those Airports who embrace eTOD and Airport Maps sooner with opportunities for increased traffic.

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Thank you for your time

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