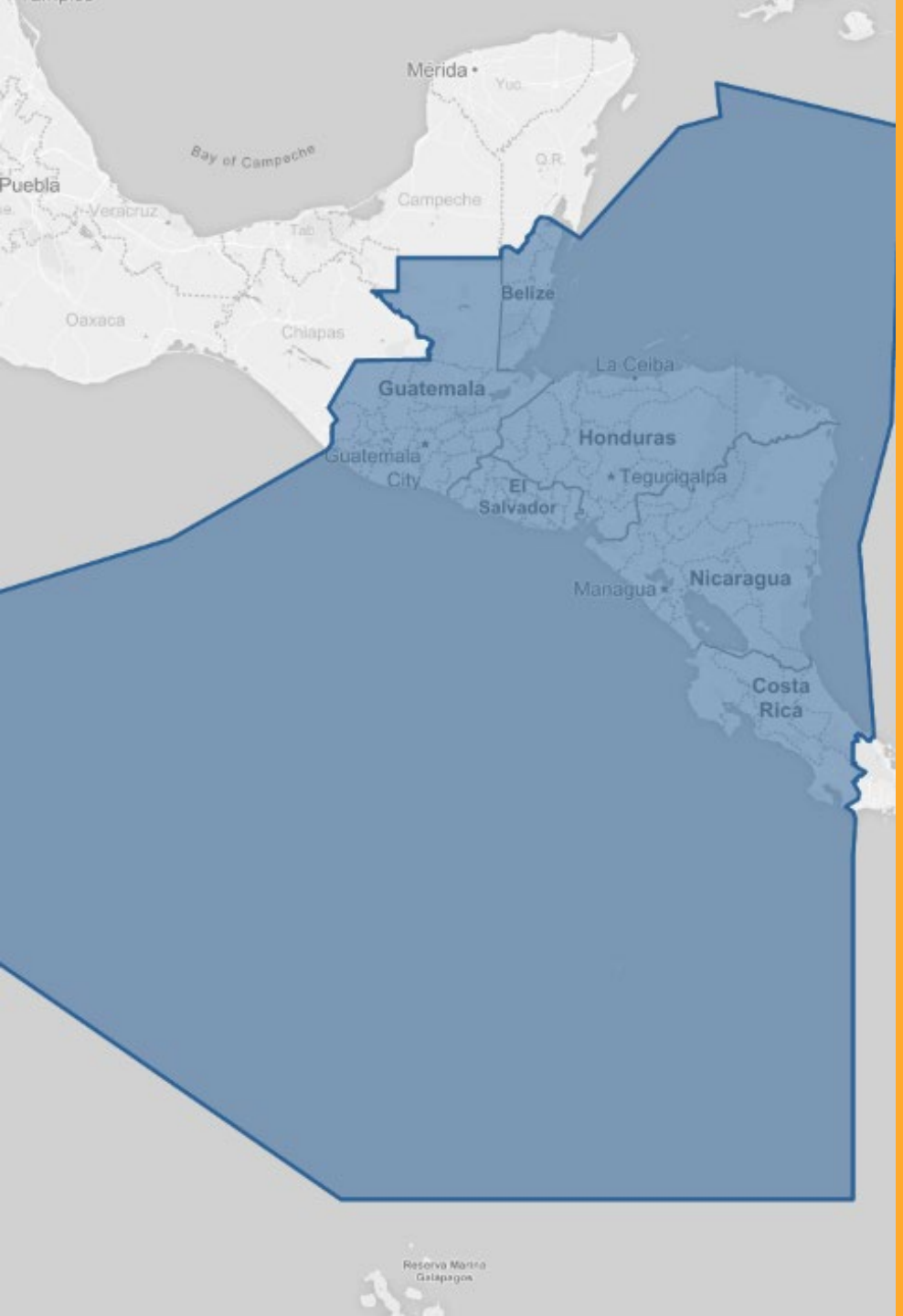


CENTRAL AMERICAN CORPORATION OF AIR NAVIGATION SERVICES (COCESNA)

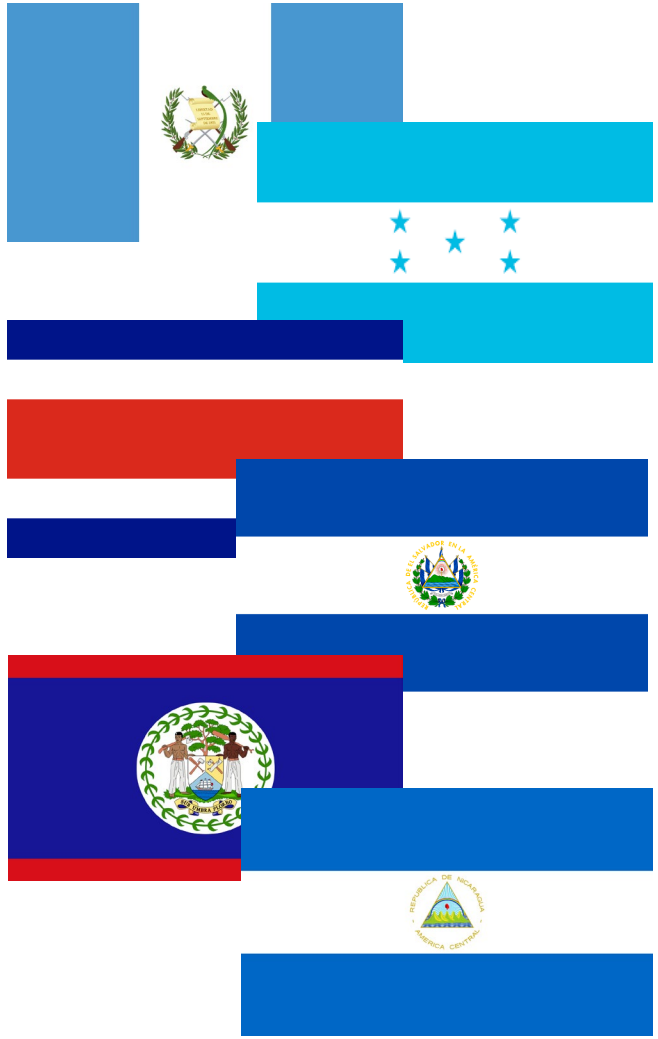
Management of SLA contingencies in Central America

COCESNA

INTRODUCTION - COCESNA

The Central American Corporation of Air Navigation Services (COCESNA) is a non-profit public service organization created within the framework of Central American integration.

It was founded with the purpose of jointly managing and developing Air Navigation Services for the benefit of its Member States: Belize, Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.



INTRODUCTION - COCESNA

COCESNA is responsible for the provision of a wide range of essential services that ensure the safety, efficiency and continuity of air operations in the region. These services include:

Aeronautical surveillance

Aeronautical telecommunications

Aids to navigation (NAVAID)

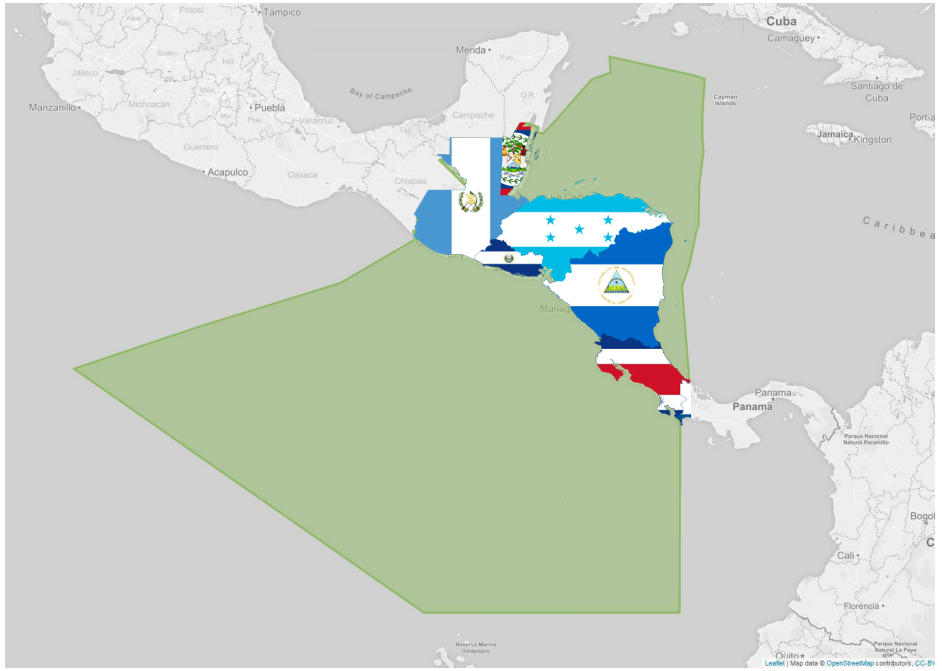
Air Traffic Services (ATS)

Aeronautical Information Services (AIS)

INTRODUCTION - COCESNA

Through these functions, COCESNA contributes to the orderly development of civil aviation in the Central American region, operating under international standards and in alignment with the policies and recommendations of the International Civil Aviation Organization (ICAO).

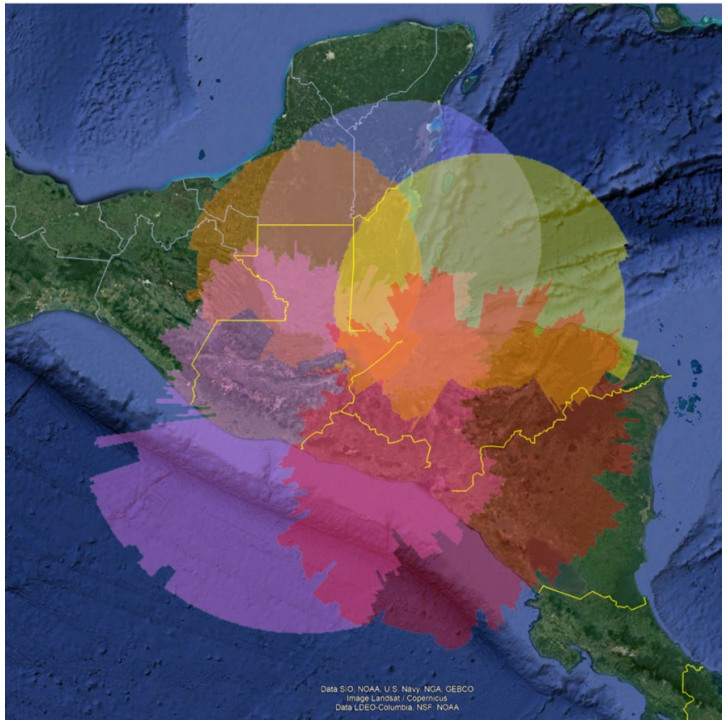
COCESNA also plays a key role in regional cooperation and integration, facilitating coordination among States to improve operational safety, technological modernization and capacity building in support of sustainable aviation development.



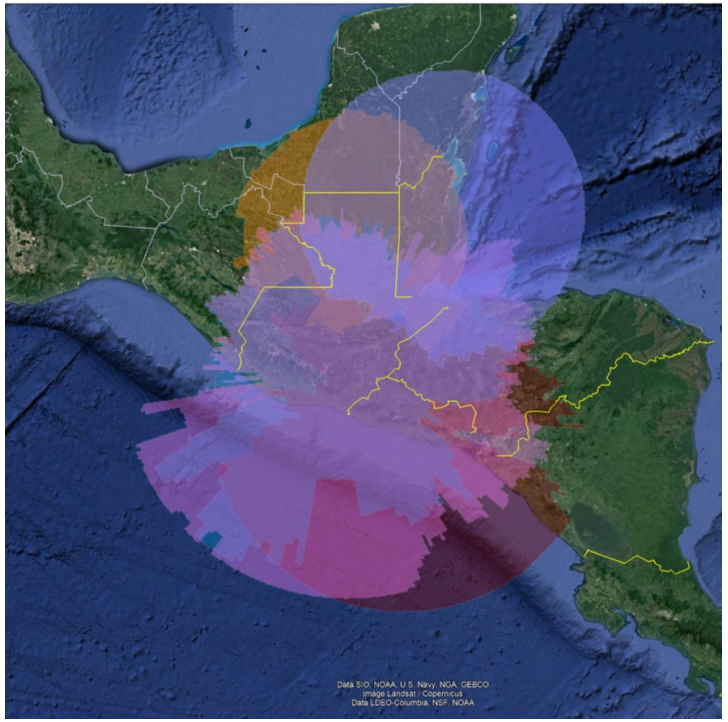
INTRODUCTION – COCESNA

AERONAUTICAL SURVEILLANCE

Belize

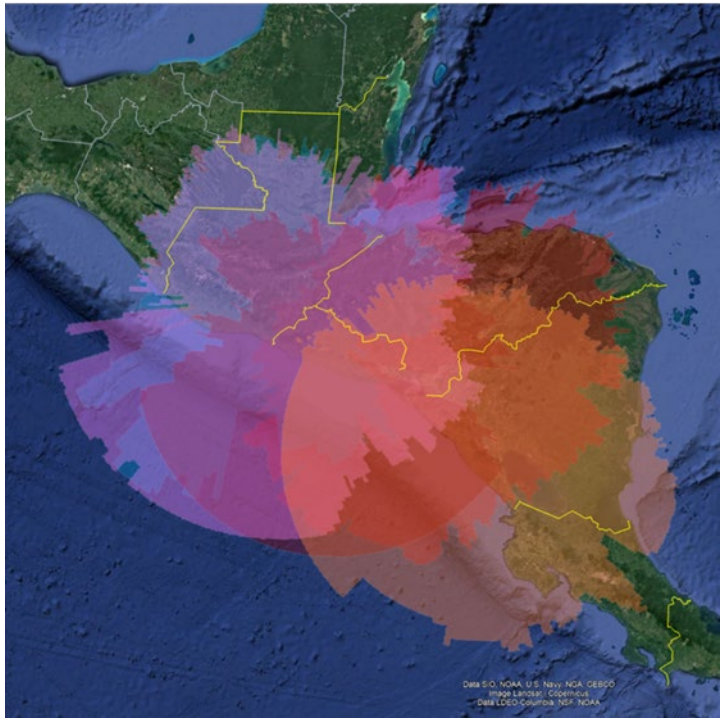


Guatemala

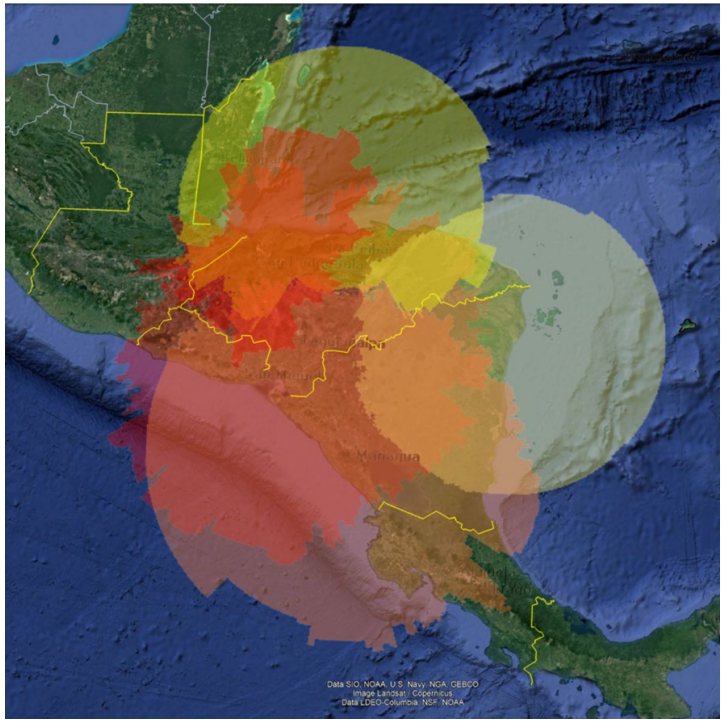


INTRODUCTION – COCESNA
AERONAUTICAL SURVEILLANCE

El Salvador



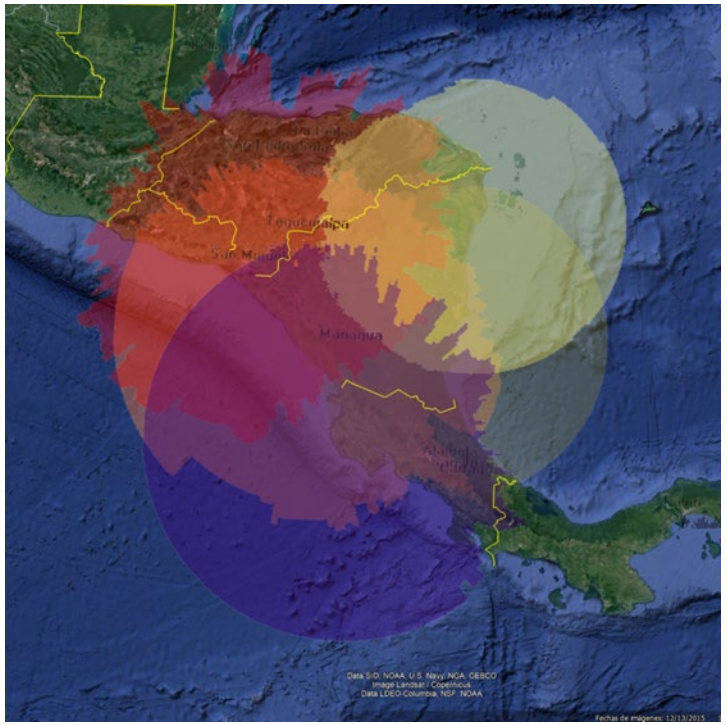
Honduras



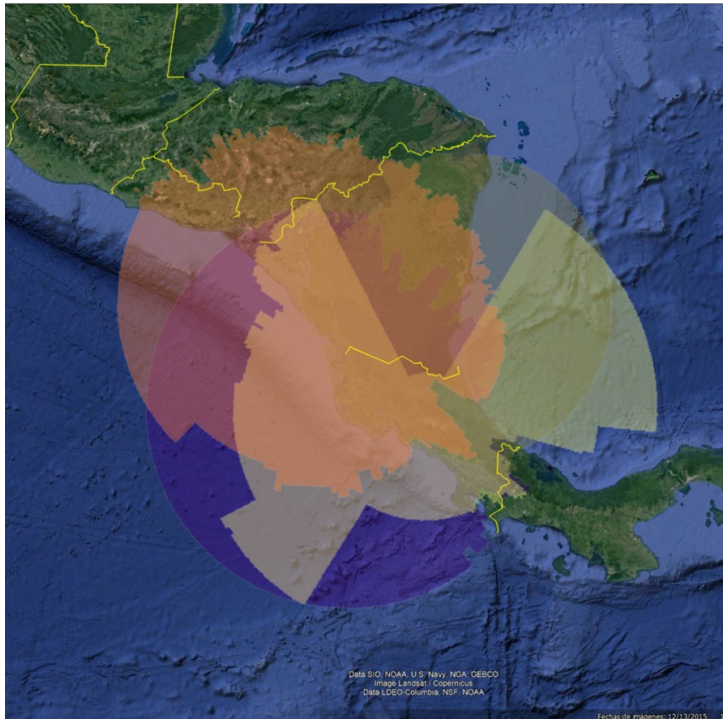
INTRODUCTION – COCESNA

AERONAUTICAL SURVEILLANCE

Nicaragua

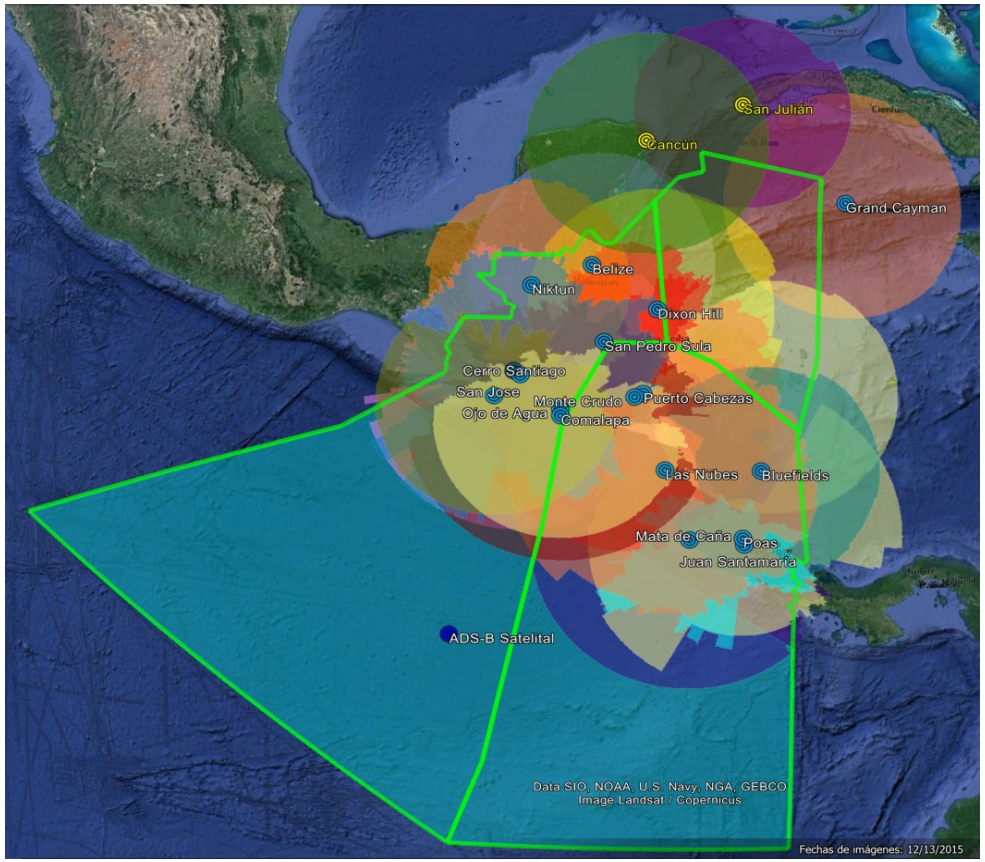


Costa Rica



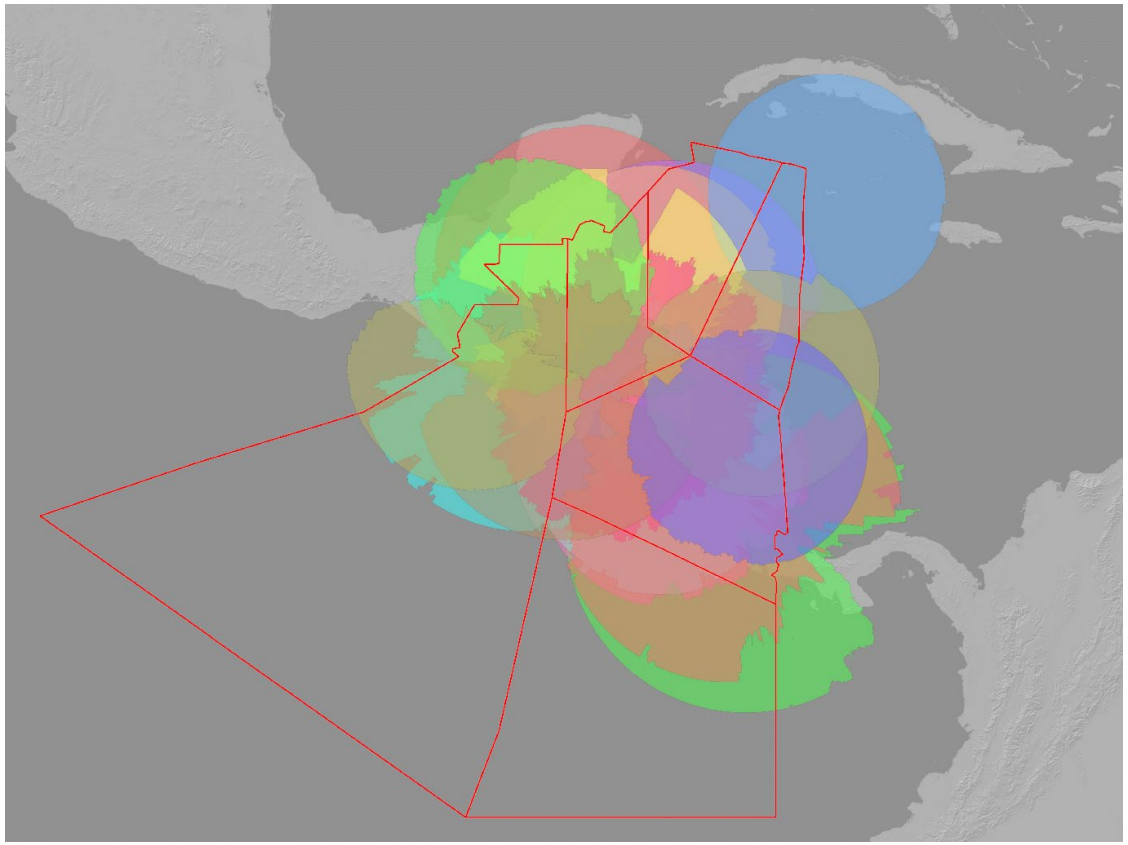
INTRODUCTION – COCESNA

AERONAUTICAL SURVEILLANCE



INTRODUCTION – COCESNA

AERONAUTICAL COMMUNICATION



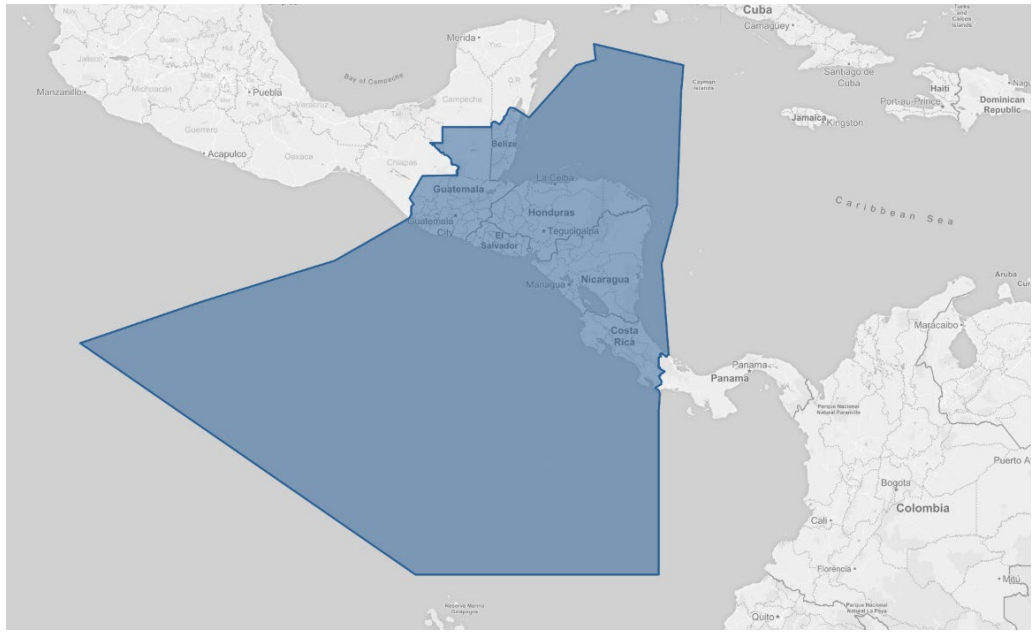
INTRODUCTION – COCESNA
AIR TRAFFIC SERVICE

The Central American Upper Airspace (FIR MHCC) covers an area of 2,928,006 km².

It is a homogeneous airspace, with standardized procedures that ensure safe and consistent operations across borders. All types of airspace users can fly through this region with no noticeable changes in:

The quality or type of services they receive, or

Navigation and communications systems.



INTRODUCTION – COCESNA

AIDS TO NAVIGATION

CONTINGENCIES IN CENTRAL AMERICA

Introduction

Contingency planning is a key component of maintaining the continuous and safe operation of air navigation services (SLAs) in the face of disruptive events.

COCESNA, as a regional provider, develops a comprehensive approach aligned with ICAO SARPs and national regulations, responding to:

- Technical, natural or human events that affect the provision of services.
- The need for binational and regional coordination to respond to disruptions.
- Strengthening institutional resilience in the face of emerging crises.

Evaluation of Services and Resources

To plan properly, COCESNA has implemented:

- A continuous assessment of ATS, CNS, and third-party vendor infrastructure.
- Analysis of vulnerabilities in critical air traffic control, communications and surveillance services.
- Updated inventory of alternative resources such as:
  - ✓ Secondary control positions.
  - ✓ Redundant communication systems.
  - ✓ Personnel trained in emergency scenarios.

This allows for a quick and controlled response to service interruptions.

Review of Procedures

COCESNA ensures that its operating procedures are prepared for emergencies by:

🔄 Regular review of operating manuals and ATFM.
📘 Inclusion of specific scenarios such as:

- Zero ATC (total interruption of control).
- Failure of radar surveillance systems.
- Severe weather events or natural disasters.

🤝 Coordination with Member States to ensure applicability and regulatory validity.
This process ensures a robust and flexible operating framework.

Contingency Measures

The measures established by COCESNA allow the operation to be maintained under different scenarios:

🟢 Activation of backup systems:
- Alternate communications, satellite links and technical redundancy.
- PBN procedures and performance-based navigation to maintain security.

🟡 Application of ATFM measures:
- GDP (Ground Delay Programs).
- Route redirection.
- Temporary flow restrictions with support from other FIRs.

🔵 Delegation of services:
- Coordinated transfer of control to another ANSP according to existing agreements.
- Clear mechanisms for vertical and horizontal transfer of airspace.

CONTINGENCIES

- Central America is characterized by high exposure to extreme weather events such as hurricanes and floods.
- This vulnerability represents an ongoing threat to the critical infrastructure of Air Navigation Services (ANS).
- In November 2020, hurricanes ETA and IOTA severely impacted Nicaragua and Honduras, while in July 2024, Hurricane Beryl indirectly affected CENAMER due to the closure of Jamaica's airspace.
- These events provided real-world proof of the effectiveness of ANS contingency plans in the region.

CONTINGENCIES

- To analyze the impact of hurricanes ETA, IOTA and Beryl on air navigation services.
- Evaluate the implemented response from the perspective of contingency planning and management.
- Identify best practices and lessons learned.

HURRICANES ETA AND IOTA

CONTINGENCIES
HURRICANE ETA AND IOTA

📍 **Overall Impact**

Affected countries: 6 (Nicaragua, Honduras,

Guatemala, El Salvador, Belize, Costa Rica)

People affected: > 8.3 million

Displaced people: ~1.5 million

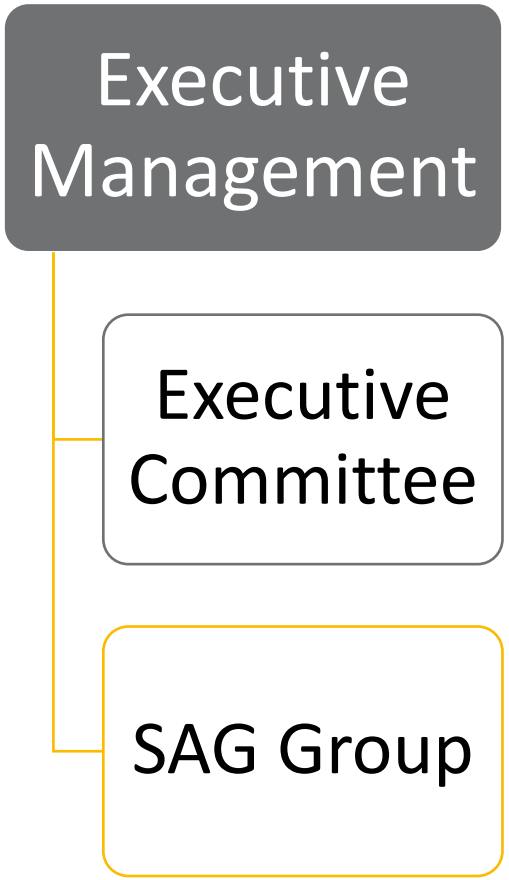
Reported Deaths: > 250

Homes damaged/destroyed: > 100,000

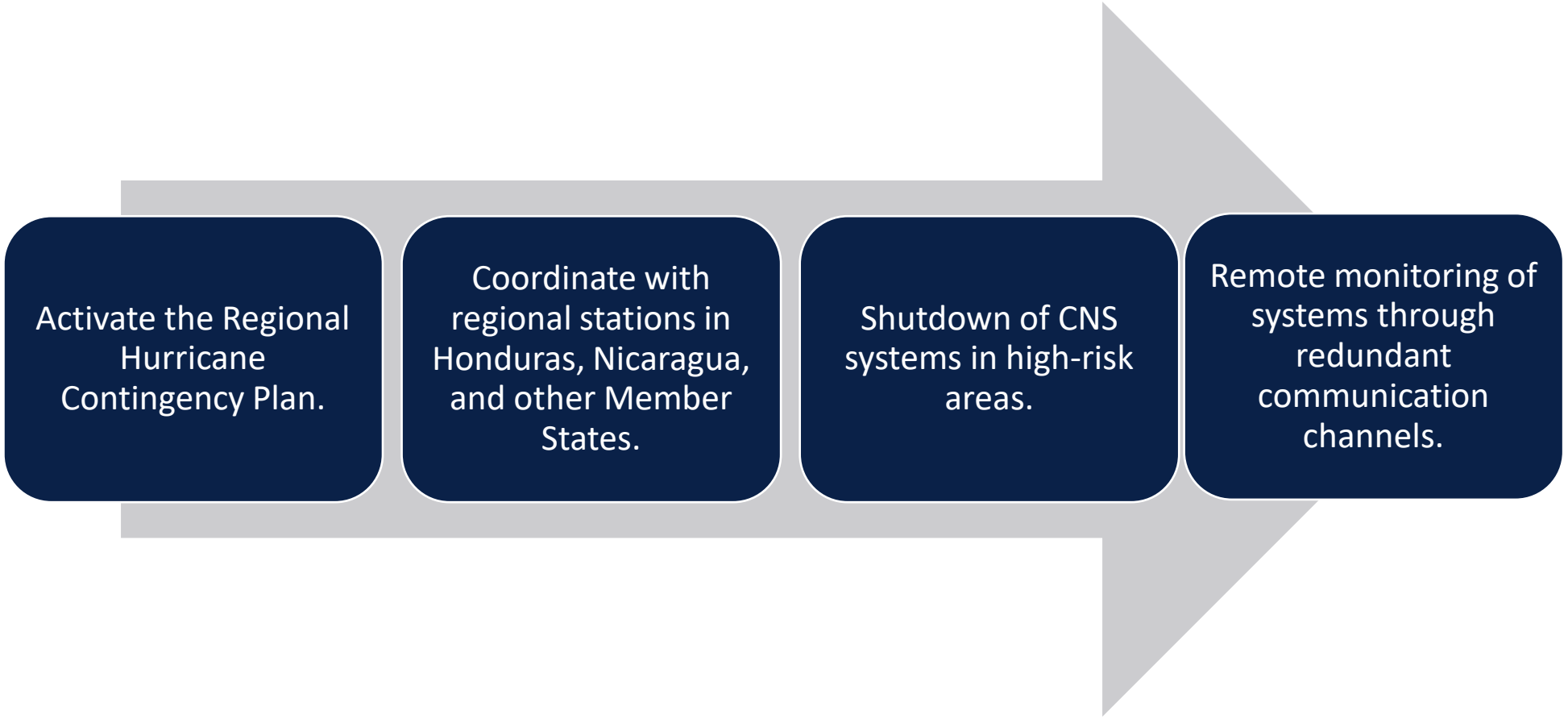
Phases and organization

Contingency management phases:
-Activation: Identification of the event and initial communication.
-Execution: Application of operational measures according to the scenario.
-Deactivation: Progressive return to normality.

Management structure:
-DE-CEO and Senior Air Navigation Management: They lead the entire process.
-Operational Safety Committee of the SRB: Evaluates, approves and supervises.
-SAG Group: Coordinates technical and operational actions during the contingency.



CONTINGENCIES
HURRICANE ETA AND IOTA



CONTINGENCIES
HURRICANE ETA AND IOTA

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🛩️ Aviation and Air Navigation Infrastructure

Airports affected: 6 international aerodromes

Damaged navigational aids:
-VOR/DME
-ILS
-ATS affected: 1 TWR (temporary power outage/flooding)

Communication systems disrupted: Multiple VHF stations due to power outages and flooding

CONTINGENCIES
HURRICANE ETA AND IOTA

International airports affected by hurricanes

Toncontin International Airport (Tegucigalpa, Honduras)
Operations were temporarily suspended due to extreme weather conditions and damaged access roads.

Ramón Villeda Morales International Airport (San Pedro Sula, Honduras)
Severely affected by flooding; The runway and the terminal were submerged.
It remained closed for several days and required a complete cleaning and repair of the infrastructure.

Augusto C. Sandino International Airport (Managua, Nicaragua)
Partial access disruptions and intermittent power outages were reported.
Some navigation aids and VHF stations were out of service for several hours.

La Aurora International Airport (Guatemala City, Guatemala)
Low visibility and minor damage to perimeter infrastructure were reported.
Operations were suspended during the hours of greatest impact.

El Salvador International Airport (San Salvador)
There was no major structural damage, but temporary interruptions of communication were reported.

Philip S. W. Goldson International Airport (Belize)
Degraded operating conditions were reported, mainly due to thunderstorms and surface water accumulation.

CONTINGENCIES
HURRICANE ETA AND IOTA

After hurricanes ETA and IOTA, the Ramón Villeda Morales International Airport suffered severe flood damage, with water levels reaching between 1.5 and 4 meters.

The following systems were affected:

Navigation aids: DVOR and ILS
Tower communication systems
Weather equipment: AWOS system
Backup power systems that support these facilities

All of these systems remained out of service due to flood-related damage.

CONTINGENCIES
HURRICANE ETA AND IOTA

Condition in 2020:
The communication systems depended on the La Mesa substation and tower generators.

Measures adopted:
Alternative communication channels were evaluated and, where possible, activated.
Coordination with national authorities was essential to resume services.

CONTINGENCIES
HURRICANE ETA AND IOTA

Impact in 2020:
The DVOR system was severely damaged due to flooding.
Key components required replacement.

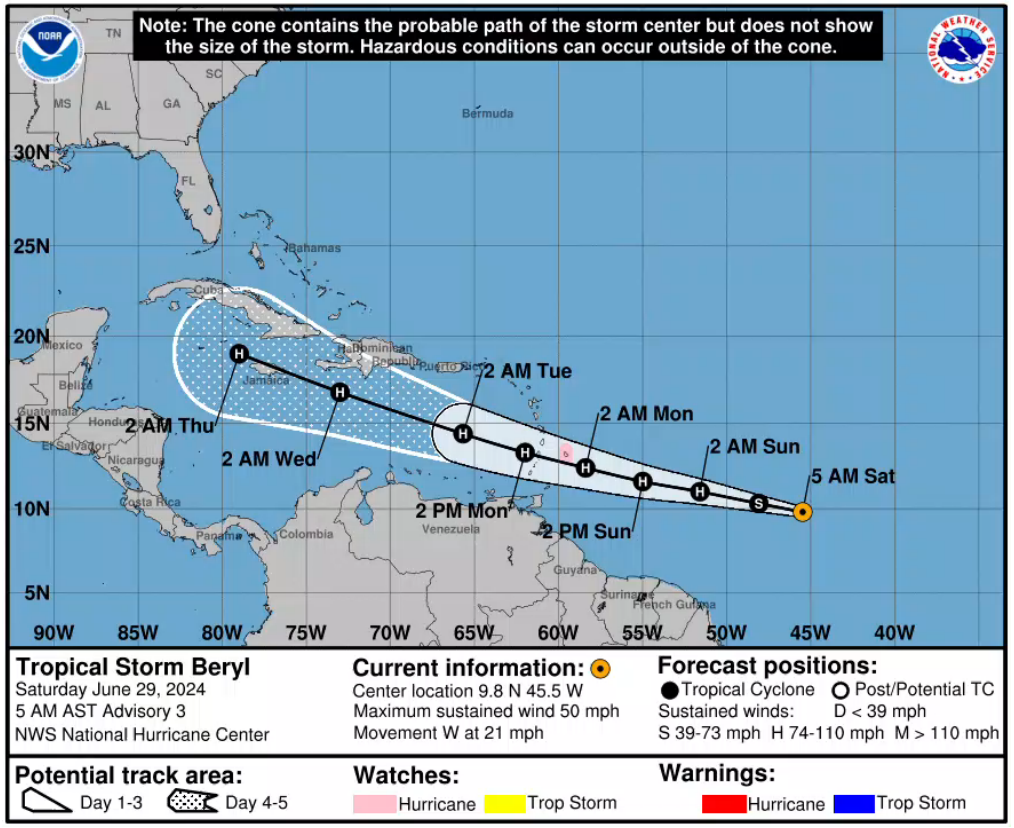
Recovery actions:
Equipment from other COCENSA stations was reused.
On-site testing and reinstallation were carried out.
Recovery was estimated to take 3 weeks, depending on the availability of spare parts.

HURRICANE BERYL

CONTINGENCIES
HURRICANE BERYL

Hurricane Beryl, initially classified as a Category 3 storm but later reached Category 5 on the Saffir-Simpson scale, was a major weather event.

With sustained winds of up to 185 kilometers per hour and even stronger gusts, Beryl significantly impacted several Caribbean islands, causing heavy rainfall, flooding, and severe damage to local infrastructure.

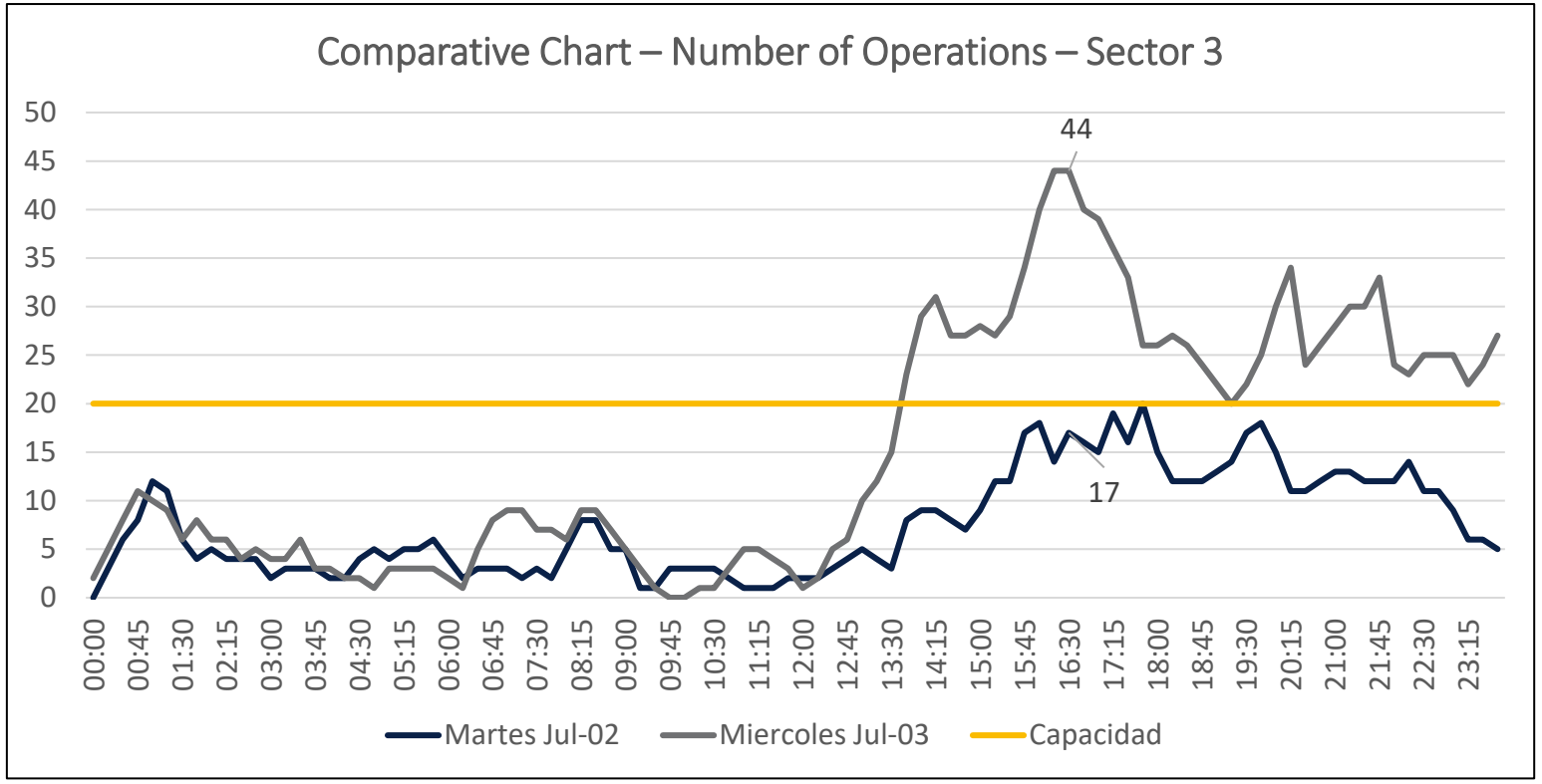


CONTINGENCIES
HURRICANE BERYL

On Wednesday, July 3, 2024, Jamaica closed its airspace due to the path of the hurricanes, causing the diversion of all aircraft flying between the U.S. East Coast and South America, both north and south, into Central American airspace.

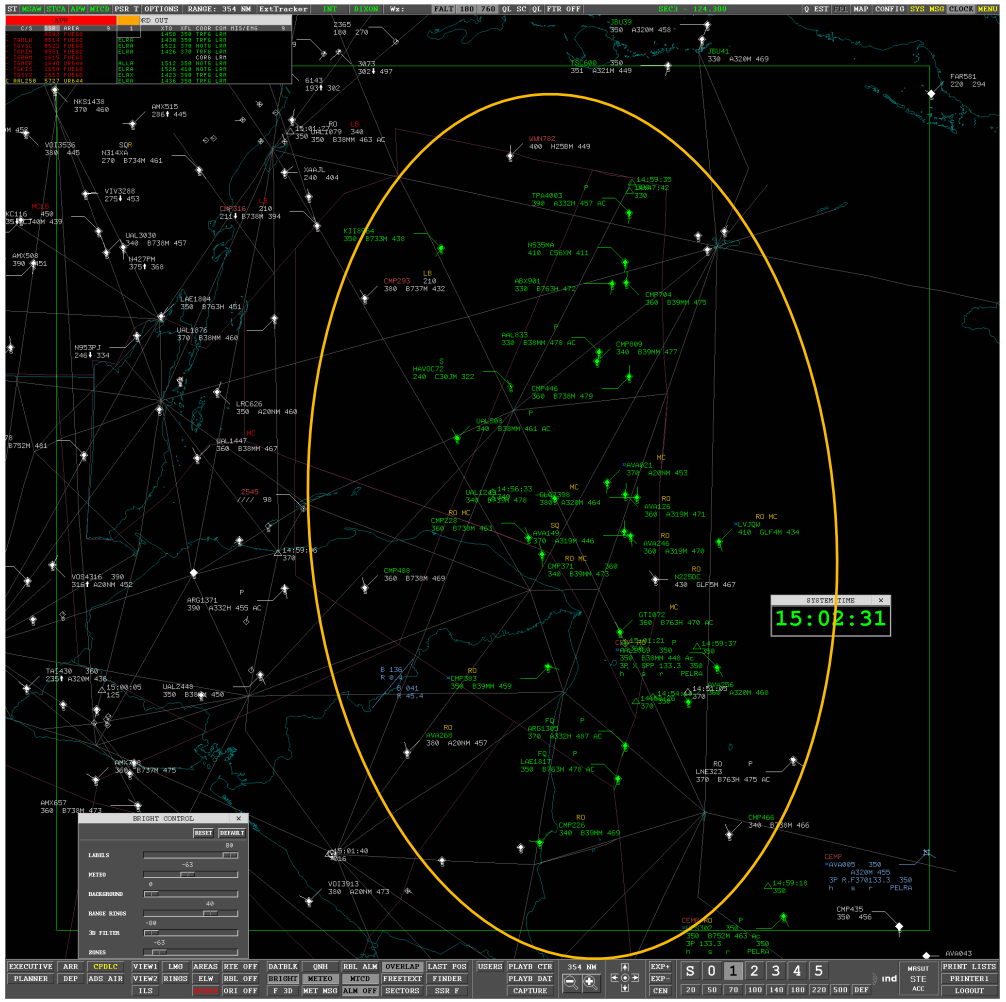
CONTINGENCIES
HURRICANE BERYL

The closure of Jamaica's airspace increased the number of flights, exceeding the sector's normal capacity of 20 aircraft, with up to 44 operations recorded in 15-minute segments.



CONTINGENCIES
HURRICANE BERYL

Given the increase in operations and weather conditions that caused deviations in air routes, which placed a significant burden on air traffic services, it became imperative to implement measures to mitigate these operational risks.



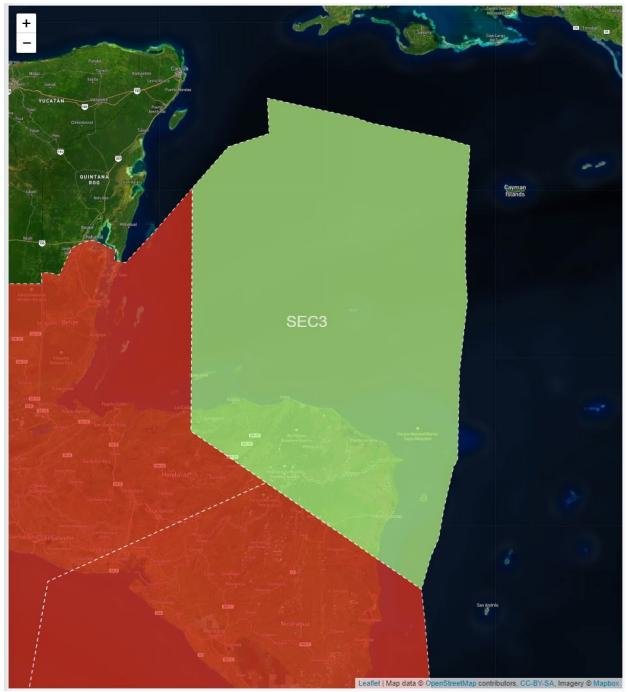
CONTINGENCIES
HURRICANE BERYL

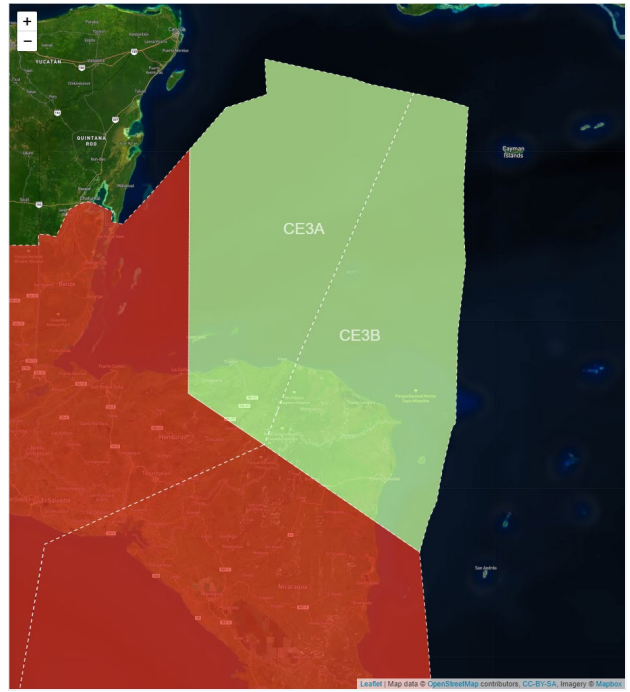
Dynamic sectorization:

With the aim of increasing the capacity of Air Traffic Services (ATS) and effectively managing the expected demand due to increased operations, Control Sector 3 was subdivided into the following sub-sectors:

CE3A

CE3B





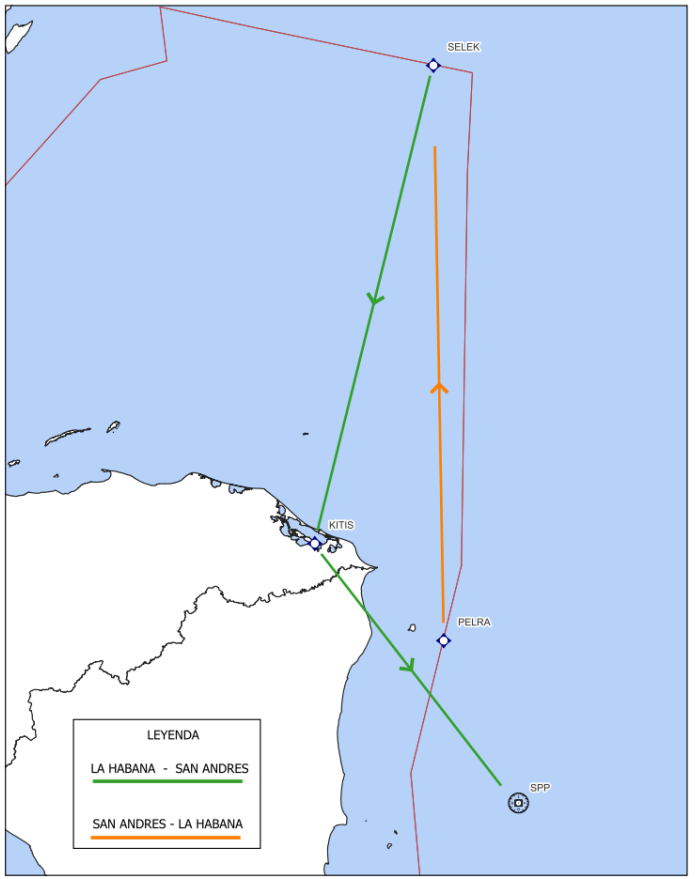
CONTINGENCIES
HURRICANE BERYL

Contingency flow coordination:

To reduce the complexity of air traffic, the following flows were defined:

Southbound traffic from Havana airspace to Panamanian airspace, flying over CENAMER/COCESNA, must proceed via SELEK DCT KITIS DCT SPP.

Northbound traffic from Panamanian airspace to Havana airspace, flying over CENAMER/COCESNA, must be carried out through PELRA DCT SELEK.



CONTINGENCIES
HURRICANE BERYL

Coordination with Airlines and ANSP:

In order to inform all parties involved, the following activities were carried out:

Notification to the ATFM CADENA group about the traffic flows to be implemented by CENAMER/COCESNA.

Publication of NOTAM A1505/24 to inform pilots and air navigation personnel of the actions implemented by CENAMER/COCESNA.


```
(A1505/24 NOTAMN
Q)MHCC/QAFXX/IV/NBO/E/000/999/1100N09130W999
A)MHCC B)2407031853 C)2407052359
E)MHCC FIR NOTIFIES ALL SOUTHBOUND TRAFFIC FROM HABANA(MUFH) AIRSPACE
TO PANAMA(MPZL) AIRSPACE OVERFLYING CENAMER/COCESNA MUST PROCEED FROM
SELEK DCT KITIS DCT SPP.
ALL NORTHBOUND TRAFFIC FROM PANAMA(MPZL) AIRSPACE TO HABANA(MUFH)
AIRSPACE OVERFLYING CENAMER/COCESNA MUST PROCEED FROM PELRA DCT
SELEK)
```

Regional and International Cooperation

The contingency approach is based on collaboration::

🌐 Participation in the ATM CAR Contingency Plan.

🤝 Bilateral agreements with the states of Central America that:

- They establish joint procedures..
- They share facilities and responsibilities.

  📈 Progress towards a regional collaboration network to cover all Central American states.

  📄 Alliances with other ANSPs and international organizations guarantee an articulated and efficient response.

✓ Key benefits of this approach:

Increased resilience of the regional SLA system.
Reduction of operational impacts in emergencies.
Improvement of air traffic safety and efficiency.
Direct contribution to the sustainable development of air transport in the region.

Conclusions

1. The Central American region is highly vulnerable to extreme natural events, which requires robust and up-to-date contingency plans to ensure the safe continuity of air navigation services.
2. Recent events (ETA, IOTA, and Beryl) highlighted the importance of resilient infrastructure, especially in communications, navigational aids, and backup power systems.
3. The implementation of measures such as dynamic sectorization, coordination of traffic flow, and timely notification enabled an effective response to traffic overload and adverse operating conditions.
4. The experience gained underlines the need to strengthen joint planning and regional cooperation, especially in scenarios of high demand or unexpected airspace closures in nearby regions.

Conclusions

5. COCESNA has developed a comprehensive approach to contingency planning that includes scenario identification, procedure review, definition of contingency measures, and regional and international collaboration. These initiatives comply with ICAO provisions in its SARPS and with the regulations of Member States, ensuring that air navigation services in the Central American region remain operational even in adverse conditions.
6. COCESNA's contingency planning not only ensures continuity of services, but also strengthens operational safety and efficiency in air traffic management, contributing to the sustainable development of civil aviation in the region

Request for action

Meeting participants are invited to take note of the information presented and:

a) Strengthen collaboration with ICAO and other regional ANSPs to align contingency initiatives with global safety and efficiency goals.

b) Continuously monitor the contingency measures implemented, in order to identify opportunities for improvement.

c) Promote the adoption of sustainable and resilient practices among all actors in the aviation sector in the region.

Thank you