Agenda Item 4: Report of activities and deliverables of the GT – INTEROP and Subgroups

IMPLEMENTATION OF ADS-B IN BRAZIL

(Presented by Brazil)

SUMMARY

This note presents the main milestones and plans for the ADS-B system implementation in Brazil

References

- Annex 10, Telecommunications ICAO Aeronautics Volume IV Surveillance and Anti -Collision Systems.
- First NAM/CAR/SAM Meeting/Workshop on Planning the Implementation of Automatic Dependent Surveillance – Broadcasting (ADS-B/ANP/1) (Teleconferences, March 2 to 4, 2022).
- Considerations Guide Techniques Operational for the implementation of ADS-B in the SAM Region.

Goals Strategic of the ICAO:	*A – Safety* *B – Capacity and Efficiency of the Air Navigation*

1. INTRODUCTION

1.1 The current model used by Brazil for surveillance is based mainly on primary and secondary radars, in addition to an ADS-C system for application in the EUR/SAM corridor (FIR-AO), since 2009, with CPDLC resources, and a ADS-B installed in the Offshore region, to meet the demands of air traffic in the Brazilian oil basins.

1.2 Due to demand in the oil basin region, ATS surveillance based on ADS-B OUT has been operational since November 2018 in the Campos Basin region, in the state of Rio de Janeiro.

2. DISCUSSION

2.1 Based on the lessons learned in the implementation of ADS-B in the Campos Basin region, DECEA is implementing ADS-B in the Santos Oil Basin, covering an area of approximately 350,000 km² and, subsequently, in the Espírito Santo Oil Basin, both planned for 2026. Subsequently, DECEA will replace the ADS-B equipment currently installed in the Campos Basin.

2.2 The deployment and replacement of the aforementioned equipment will occur in phases, so that the air traffic service via ADS-B will be available throughout the oceanic oil

prospecting/exploration region of the Santos, Campos and Espírito Santo basin until the end of 2026, as detailed in Figure 1.

2.3 It is important to highlight that there is a provision for an ADS-B "mandate" in ocean basins, however, there is no ADS-B version defined to date.

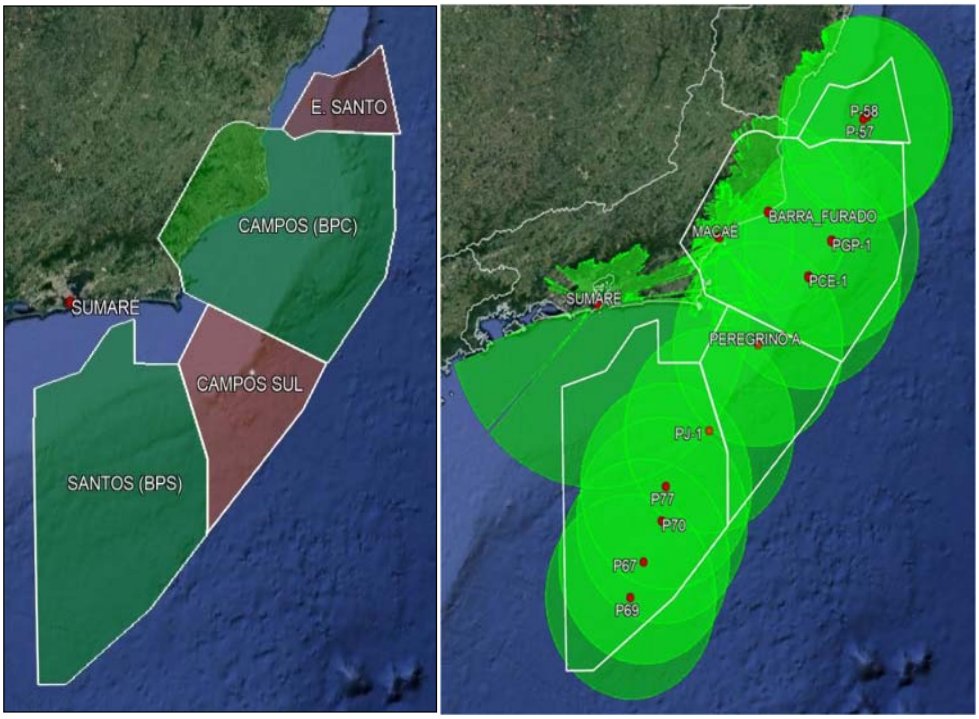

Figure 1 – ADS-B Coverage in the Campos, Santos and Espírito Santo Oil Basins (FL 010 – 1000 feet)

2.4 Considering the experience acquired in the ADS-B project in the Campos Basin, DECEA began a process in 2018 to provide surveillance via ADS-B for the Brazilian continental airspace, based on the following premises:

a) The ADS-B system will provide coverage for the aircraft control en route over the continent, above FL 245;
b) Primary and secondary radars will continue to be an alternative means of aeronautical surveillance, providing their respective services both in the transition phase to ADS-B, and for the aircraft control not equipped with adequate transponders;
c) It is important to highlight that a Continental ADS-B mandate, version DO260B, is expected by 2030;
d) Continental ADS-B implementations follow the schedule according to the phases shown in the following table:

Table 1 – Continental ADS-B deployment phases

Phase	FIR	Begin	End	No. Receivers
1st	3 CINDACTA III	January /23	February /24	13
2nd	2 CINDACTA II	March /24	December 24	12
3rd	1 CINDACTA I	December 24	August/25	08
4th	4 CINDACTA IV	september /25	May /26	33
TOTAL ACQUISITIONS: **66 Receivers; 4** Processing Centers ; **1** Monitoring Center (**CGTEC)**				

2.5 Regarding the implementations planned in Phase 1, DECEA has already implemented the ADS-B system in 10 (ten) locations, out of the 19 (nineteen) planned in the contract, with the completion of the remaining 09 (nine) stations planned by 2024.

2.6 The following figures illustrate the locations in which ADS-B has already been deployed and the total number of locations served in this Phase 1, containing the respective theoretical coverage planned (FL 245).

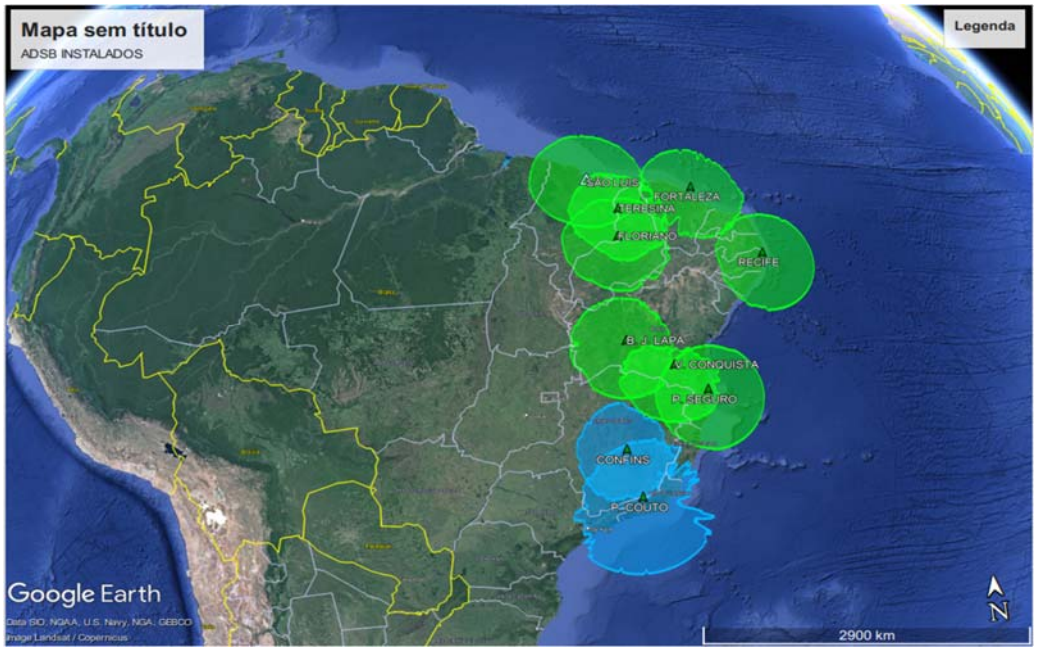

Figure 2 – ADS-B systems implemented in Phase 1 (in progress) – FL 245

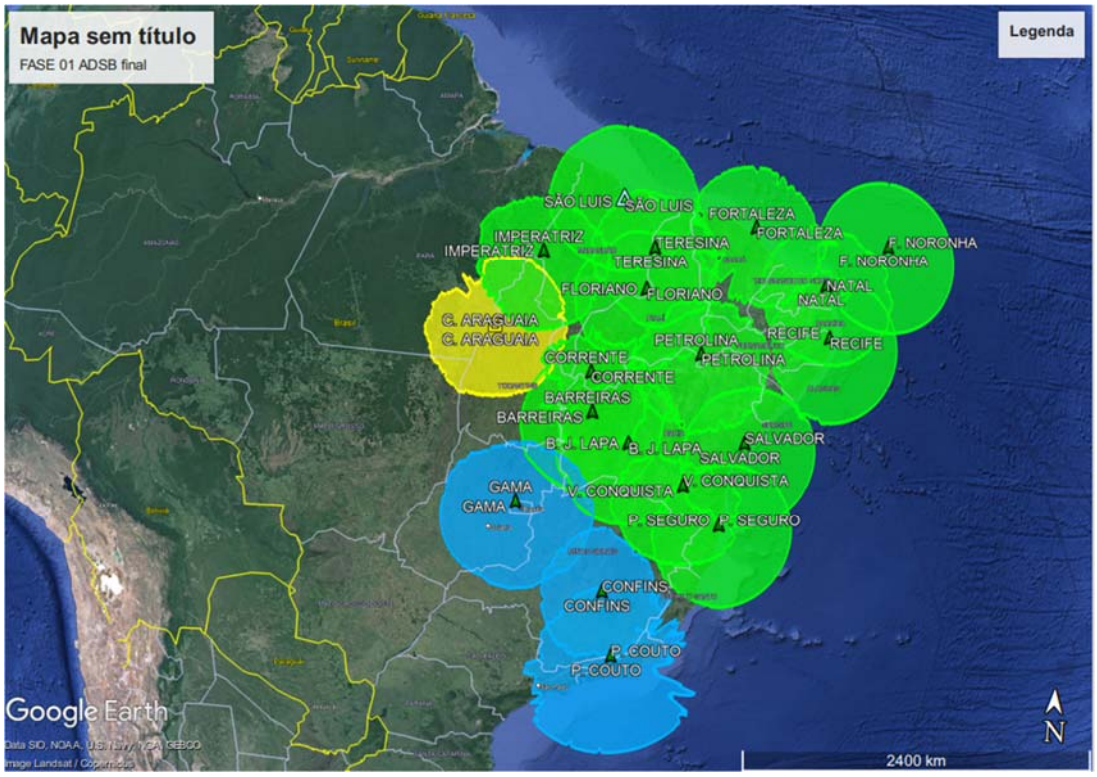

Figure 3 – ADS-B systems to be deployed at the end of Phase 1 – FL 245

2.7 During the execution of the implementations of Phase 1 of the Continental ADS-B project, the following difficulty was encountered:

a) Need to change the location of the reception antennas of the ADS-B system, which was initially designed to be installed on a metal tower at an estimated height of 25 meters and was later modified to be installed on the roof of the station in the place where the ADS-B system equipment is located. This change occurred after an analysis of the antenna coverage, when it was discovered that the metal tower itself would be an obstacle to aircraft signals. As a result, projects needed to be adapted in all locations.

2.8 Considering the experiences gained in the Phase 1 implementation process, the following lessons learned can be considered for future ADS-B deployments:

a) It is essential to analyze the visibility coverage of the receiving antennas of the ADS-B system to obtain their best positioning; and

b) When carrying out a site study in the places to be implemented, it is essential to verify the existence of an adequate grounding network, telecommunications network infrastructure, stabilized energy and lightning rod coverage, as well as the existence of property security infrastructure.

2.9 It is important to add that, based on the results of the analyzes on the use of ADS-B via satellite in areas of interest in Brazil, DECEA considered the use of the ADS-B via satellite service to improve the necessary conditions technically and financially viable. Surveillance coverage in oceanic airspace.

2.10 In this context, DECEA plans to contract the ADS-B satellite solution by contracting the service of a constellation of satellites that would provide Air Traffic Surveillance (ATM) services in the FIR-AO, under the jurisdiction of DECEA, which includes a vast remote airspace over the Atlantic Ocean, and measures approximately 11 million square kilometers.

2.11 DECEA therefore intends to implement space-based (satellite) ADS-B surveillance, with the goal of oceanic airspace being served through the use of ADS-B satellite service by 2027.

3. ACTION SUGGESTED

3.1 The Meeting is invited to:

a) take note of the activities made by Brazil; and

b) analyze other considerations that the Meeting estimate relevant.

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