



**Agenda Item 5: Operational implementation of new ATM automated systems and integration of the existing systems**

**STATUS OF ADS-B IMPLEMENTATION IN BRAZIL**

(Presented by Brazil)

<b>SUMMARY</b>	
This paper presents information on the status of ADS-B implementation in Brazil.	
<b>References</b>	
<ul style="list-style-type: none"><li>• <i>Workshop for ADS-B implementation, Lima-Perú, November, 13-16, 2017;</i></li><li>• SAM/IG/22 Final Report.</li></ul>	
<b>ICAO Strategic Objectives:</b>	<i>A - Operational safety B - Capacity and efficiency of air navigation C - Aviation Security and Facilitation D - Economic development of air transport E-Protection of the environment.</i>

**1. Background**

1.1 DECEA's strategic program for the evolution of Brazilian air traffic management, SIRIUS BRAZIL, aligned with the recommendations contained in Doc 9750 and aligned with the ASBU, considers the implementation of ADS-B in some of its projects to meet the operational demands, while contributing to the evolution of the future ATM concepts.

1.2 One of these projects was to improve air navigation services in the oil-ocean basins in the southeastern region of Brazil and had the objective of supporting the air operations of interest of the oil activity that is characterized by the movement of helicopters between the mainland and platforms or vessels anchored in that basin, in the ocean area, for the transportation of people and cargo. Since November 2018 the TMA-Macaé operates with surveillance information obtained by ADS-B and radar.

1.3 Another project of great relevance is the implementation of ADS-B earth stations throughout the Brazilian territory, to provide surveillance coverage in the continental FIRs.

1.4 In addition, DECEA is signing with AIREON a Technical and Operational Cooperation Agreement for the evaluation of satellite-transmitted ADS-B surveillance data.

## 2. Discussion

### Campos Basin

2.1. To serve the Campos Basin, in the air space corresponding to the TMA-Macaé, 6 ADS-B stations were installed, four stations on maritime platforms and two on the mainland. This infrastructure, integrated with the current radar network that supports air traffic control in that region, allows surveillance throughout the airspace of the TMA to 500 feet and more.

2.2. Currently, 100% of the 122 helicopters flying in that region are already equipped with the avionics required to support ADS-B 1090 ES.

2.3. The ADS-B exclusive operation in the TMA-Macaé began on November 8, 2018 and, from that date, only ADS-B equipped aircraft can enter the airspace. State aircraft, which are not equipped with ADS-B 1090 ES, can enter that airspace for specific missions.

2.4. The ADS-B system, together with other ATS automation and communications capabilities, allows APP-Macaé to provide a minimum separation of up to 5 NM between aircraft flying at low altitudes.

### Continental ADS-B

2.5. The Brazilian administration began the negotiations to establish 68 terrestrial ADS-B stations in its territory, with the objective of providing better and more accurate surveillance data which will add operational benefits in the short and medium term, such as the use of the 4D path and the reduction of the time needed for ATM decision making.

2.6. The project is structured in phases of implementation, which meet the operational needs:

1. Phase 1: EURO/SAM Corridor (UN741, UN856, UN873, UN857)



Fig. 1 – Continental ADS-B – Phase 1

2. Phase 2: NAM/SAM Corridor (UA317, UA312, UL795, UL201, UL304, UZ13, UB680)



Fig. 2 – Continental ADS-B – Phase 2

3. Phase 3: Routes UL306, UL540, UM799, UW33, UZ7

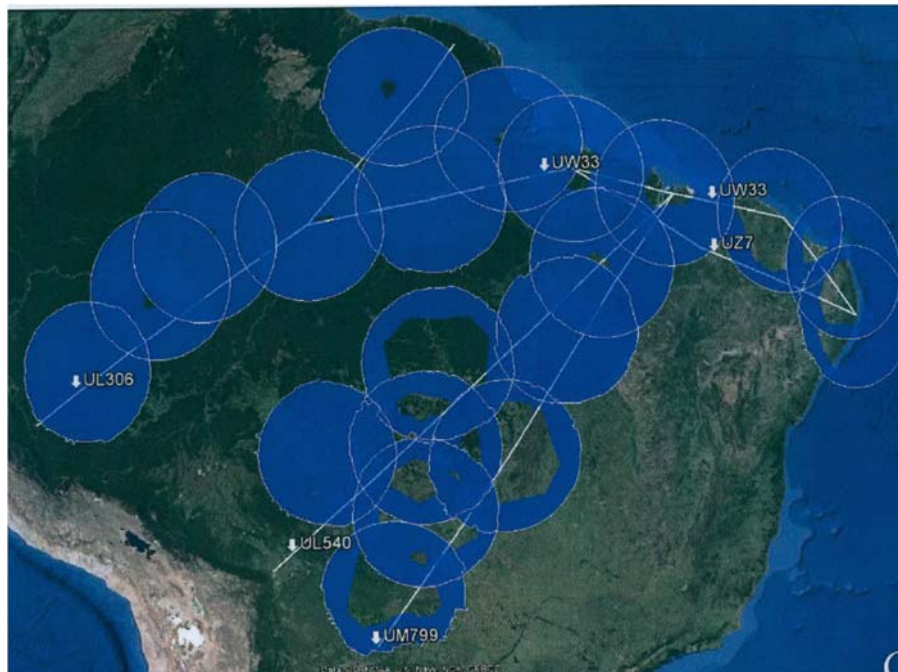


Fig. 3 – Continental ADS-B – Phase 3

4. Phase 4: Routes UL309, UL793, UL655, UB554, UM402, UM415

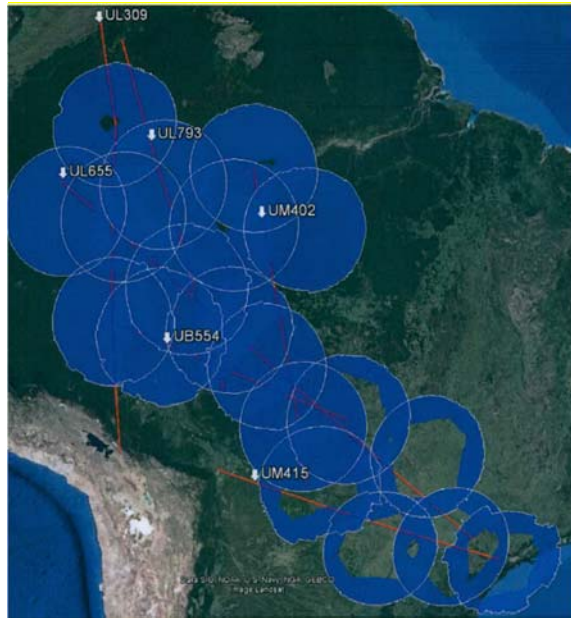


Fig. 4 – Continental ADS-B – Phase 4

**Multilateration**

2.7. Added to the implementation project of ADS-B stations is the project for the implementation of a WAM system in the TMA - Porto Alegre, which includes the installation of a central processing system, WAM stations in sufficient quantity to provide the necessary coverage, remote interrogation units and supervisory subsystems.

2.8. The project seeks to provide surveillance coverage in 3 (three) volumes of the TMA Porto Alegre, described in the following figure:

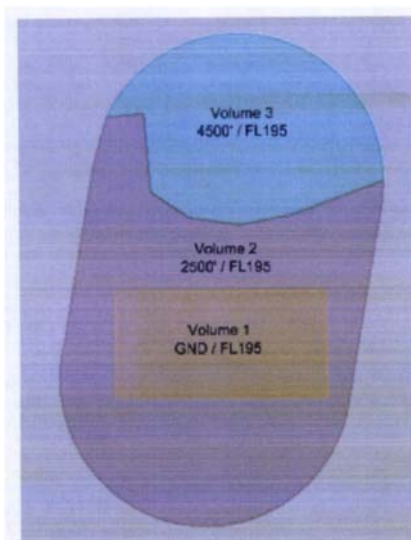


Fig. 5 – WAM TMA-PA - Volumes

2.9. The WAM system will have the ability to detect, identify, track and process aircraft equipped with A / C Mode, ELS and EHS Mode transponders as well as aircraft equipped with ADS-B 1090 MHz Extended Squitter.

2.10. The surveillance data will be transmitted to the ATC centers using the ASTERIX Cat protocol 19, 20, 21 and 23.

### **Agreement of Technical and Operational Cooperation with AIREON company**

2.11. The evolution of ADS-B technology and its adoption by global civil aviation led to the emergence of a solution alternative based on satellite communication, better known as space-based ADS-B or satellite ADS-B. This solution uses the infrastructure of a constellation of low-orbit satellites of the IRIDIUM network for the reception of ADS-B data from aircraft, which will be processed in processing centers for subsequent shipment to ANSPs, service providers of air navigation.

2.12. As the ADS-B satellite technology is incipient, it is necessary to in-depth evaluation of its advantages and disadvantages, from the technical and operational point of view.

2.13. Therefore, the Brazilian administration chose to sign an agreement with the company AIREON LLC, whose objective is the collection of surveillance data for aircraft that use the airspace under the responsibility of the DECEA, obtained through ADS technology. -B satellite. With these data, it will be possible for the specialists of the DECEA to carry out studies and technical and operational analyzes, which will subsidize the decision making by the top management of the DECEA, regarding the convenience of its adoption for the improvement of the surveillance and of airspace control.

2.14. The evaluation of the technical and operational performance of the ADS-B surveillance based on the solution of AIREON applied to the airspace of the DECEA will consist of two phases:

#### **A) Tracking of Specific Aircraft**

2.15. AIREON proveerá el rastreo de aeronaves durante el período de prueba planificado en las áreas de interés del DECEA, con el fin de probar las capacidades del ADS-B satelital.

#### **B) Real-time Tracking**

2.16. Consists of collecting and sending data in real time through a virtual private network ("VPN") server connected to the Internet, of aircraft equipped with the ADS-B and flying in pre-test areas -selected by the DECEA. These tests will aim to extend the analyzes from Phase 1 for all FIRs under the jurisdiction of the DECEA and continue testing the ADS-B satellite services.

2.17. The possible benefits of the application of the ADS-B Satellite technology, which will be subject to the evaluations proposed in this Agreement, include, but are not limited to:

- Increase the scope of the surveillance service in ocean areas and/or complement it in airspaces over the continent, where operational demand is identified and the use of land monitoring infrastructure is not possible or viable;
- Improved air traffic management in the airspace managed by DECEA and how this space can

be optimized to expand air traffic capacity through more direct routes and / or through the application of reduced separation minima between aircraft;

- Improvement of air traffic flow management in Brazilian airspace
- Improvement of Search and Rescue operations ("SAR") in the airspace managed by the DECEA.
- Greater understanding of the technical characteristics of the satellite ADS-B service offered by AIREON.

### 3. **Suggested actions**

3.1 The Meeting is invited to:

- a) Take note of the information provided; and
- b) consider other aspects deemed needed.

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