



**SEVENTH MEETINGS OF THE SAT IMPLEMENTATION MANAGEMENT GROUP (SATIMG/7)
AND
SAT SAFETY OVERSIGHT GROUP (SAT SOG/7)**

Dakar, 6-10 April 2026

Agenda Item 3: Airspace and ATS Route improvements

**OPERATIONAL IMPACT OF SPACE LAUNCH ACTIVITIES ON DAKAR OCEANIC FIR -
COORDINATION MEASURES AND LESSONS LEARNED**

(Presented by ASECNA)

SUMMARY	
<p>This paper presents the operational impact of three commercial space launch activities that have impacted Dakar Oceanic (FIR-GOOO), managed by ASECNA, during the period May 2025 to February 2026. The three launches</p> <ul style="list-style-type: none"> - SpaceX Starship Super-Heavy Flight 9 (May 2025), - Blue Origin New Glenn ESCAPADE (November 2025), and - ULA Vulcan Centaur USSF-87 (February 2026) <p>generated Aircraft Hazard Areas (AHAs), Debris Response Areas (DRAs) and 10⁻⁷ debris risk corridors extending into or adjacent to the Dakar oceanic FIR.</p> <p>The paper describes the coordination framework established under CANSO Latin America & Caribbean and CADENA (CANSO ATFM Data Exchange Network for the Americas), the Traffic Management Initiatives (TMIs) implemented, the management of airspace during each event, lessons learned, and actions required.</p> <p>Action by the Meeting at paragraph 3.</p>	
REFERENCES	<ul style="list-style-type: none"> - SAT-IMG/06 SoD, Action Item 06-02 - ANSPs share their experience on STO/HAO coordination and present a WP in line with the SAT SG/02 Decision to the next SAT IMG - SAT SG/02 Decision - Request for SAT States to share their experience on CSO coordination
Strategic goals	<p>A-Every Flight is safe and secure</p> <p>C- Aviation Delivers Seamless, Accessible, and Reliable Mobility for All</p>

1. Introduction

- 1.1 Commercial space launch activities have increased significantly in frequency and geographic scope, with launch trajectories from sites on the eastern seaboard of the United States and from Boca Chica, Texas, now routinely generating hazard corridors that extend across the Atlantic Ocean and impact the airspace of multiple Flight Information Regions (FIRs), including Dakar Oceanic FIR (GOOO), managed by ASECNA.
- 1.2 At its Sixth Meeting (SAT-IMG/06, virtual, 10-13 November 2025), the SAT IMG noted that the accommodation of Commercial Space Operations (CSO) and Space Transport Operations (STO) had been identified as a major topic for the future SAT-IMG work programme, following the conclusions of the Forty-second Session of the ICAO Assembly (A/42, Montreal, September – October 2025). The Group further recalled the SAT SG/02 Decision requesting SAT States to share their experience on CSO coordination. Accordingly, Action Item 06-02 was agreed, explicitly requesting ANSPs to share their experience on STO/HAO coordination and to present a working paper at SAT-IMG/07.
- 1.3 This working paper is submitted by Dakar oceanic FIR in response to Action Item 06-02. Between May 2025 and February 2026, three commercial space launch operations generated Aircraft Hazard Areas (AHAs), Debris Response Areas (DRAs), and 10^{-7} probability debris risk corridors that extended into, or in close proximity to, the Dakar Oceanic FIR. These events required ASECNA to participate in multinational coordination frameworks, implement Traffic Management Initiatives (TMIs), issue NOTAMs, and establish real-time communication channels with space operations authorities and adjacent Air Navigation Service Providers (ANSPs).
- 1.4 This paper is submitted to the SAT-IMG/07 meeting in order to:
 - a) document the operational experience of Dakar oceanic FIR during each of the three launch events;
 - b) share the coordination measures applied and the lessons learned; and
 - c) propose actions to strengthen the integration of space transport operations (STOs) into the ATM system within the SAT region.

2 Discussion

2.1 Overview of Launch Events

2.1.1 Three space launch events occurred during the reporting period that generated operational impact on the Dakar Oceanic FIR. A comparative summary is presented below:

Parameter	SpaceX Starship Flight 9	Blue Origin New Glenn ESCAPEDE (N0131)	ULA Vulcan Centaur USSF-87 (A1064)
Launch Site	Boca Chica / Starbase, TX	Cape Canaveral, FL	Cape Canaveral, FL
Primary Date	27 May 2025	09 November 2025	12 February 2026
Launch Window	2330Z–0134Z (late-night)	1938Z–2211Z (evening)	0800Z–1248Z (daytime)
Backup Windows	4 (May 28–31)	5 (Nov 10–14)	6 (Feb 13–18)
Max Malfunction Closure	Up to T+116 min	Varies per AHA	Up to T+50 min

Dakar oceanic FIR (GOOO) Impact	10 ⁻⁷ corridor; coordination with Cayenne FIR	10 ⁻⁷ corridor; NOTAM issued;	10 ⁻⁷ corridor; NOTAM issued;
Coordination Framework	CANSO LAC / CADENA / FAA ATO / TTCAA	CANSO LAC / CADENA / FAA ATO / TTCAA / ASECNA	CANSO LAC / CADENA / FAA ATO / TTCAA / ASECNA
Concurrent Launch	None	None	Ariane 6 VA267 (French Guiana)

2.2 Launch 1 - SpaceX Starship Super-Heavy Flight 9 (May 2025)

2.2.1 SpaceX Starship Super-Heavy Flight 9 was launched from Boca Chica / Starbase, Texas, with the primary window on 27 May 2025 from 2330Z to 0134Z, following the cancellation of earlier attempts on 22 and 23 May 2025. The launch trajectory generated multiple Debris Response Areas (DRAs) and a 10⁻⁷ debris risk corridor extending across the Caribbean and into the South Atlantic. Coordination was organized under the CANSO Latin America & Caribbean and CADENA frameworks, with the FAA ATO Space Operations serving as the lead space authority. Two pre-launch coordination meetings were convened on 19 May 2025 (PIARCO TMM Coordination Meeting) and 20 May 2025 (Stakeholder Briefing), both held at 1500 UTC.

2.2.2 The Dakar Oceanic FIR was not subject to a pre-emptive airspace closure during this event; however, Cayenne FIR (SOOO), which lies adjacent to the Dakar Oceanic FIR boundary, was significantly impacted. Cayenne coordinated with Dakar and Atlantico FIR regarding oceanic flight rerouting, and a NOTAM (LFFA W0954/25) was published covering the 10⁻⁷ area, active on launch days from 2330Z to 0330Z. No flights were permitted within the Cayenne FIR from T0-45 minutes through to T0+116 minutes (the maximum malfunction closure period - the longest of the three events). A direct hotline was established between the Space Operations Center and the Cayenne duty manager for real-time DRA status monitoring.

2.2.3 The principal Traffic Management Initiatives implemented across the broader coordination area during this launch included: a NO ENTRY restriction in the Piarco FIR (TTZP) east of waypoint GLAAS to the lateral limits of the FIR, effective from 2130Z; a 5 Minutes-in-Trail restriction applied by Piarco ACC from 2130Z to 2200Z; ground stops for eastbound departures to KZNY; closure of 21 airway routes in Mexico (MMFR FIR) by SENEAM; complex northbound traffic restrictions in Cuba (MUFH FIR) until 0135Z; and rerouting of southbound L455 traffic to L456 via ATCSCC from 2230Z to 0030Z. ZMA stopped accepting handoffs on flights transiting any AHA/DRA/10⁻⁷ area from 2300Z. The maximum malfunction closure extended up to T0+116 minutes, imposing the longest sustained airspace restriction of the three events.

2.3 Launch 2 - Blue Origin New Glenn ESCAPEDE (November 2025)

2.3.1 The Blue Origin New Glenn ESCAPEDE mission (N0131), a NASA scientific mission (Escape and Plasma Acceleration and Dynamics Explorers), was launched from Cape Canaveral Space Force Station, Florida. The primary launch window was on 09 November 2025, with five backup windows available from 10 to 14 November 2025. A stakeholder briefing was held on 07 November 2025. This event, Dakar Oceanic FIR were formally included in the multinational coordination framework, alongside CANSO LAC, CADENA, FAA ATO Space Operations. ...etc.

2.3.2 The launch trajectory generated three Aircraft Hazard Areas (AHA-A comprising sub-areas A1, A2, and MYNA; AHA-B; and AHA-C), each with distinct nominal and malfunction release times. A 10⁻⁷ debris

risk corridor extended into the Dakar oceanic FIR (DAKAR 8 area). However, Dakar Oceanic FIR was not pre-emptively closed. A review of traffic patterns on the two preceding Sundays confirmed that no flight trajectories were parallel to the launch trajectory- a result assessed as operationally positive. A NOTAM was published to raise awareness among airspace users in the event of area activation. In the event of DRA activation, the 30-degree rule was to be applied within the affected airspace. Real-time hotline coordination served as the primary communication mechanism between ASECNA and adjacent operational centres.

2.3.3 Key Traffic Management Initiatives applied in the Piarco FIR (TTZP) included: closure of airway UL435 from 1845Z; a 20 Minutes-in-Trail restriction on two alternative oceanic routes (Route 1 via 1500N04200W and Route 2 via 1400N04200W, with reversal); three designated en-route holding areas (Holding Areas A, B, and C); and a mandatory equipment requirement for CPDLC/ADSC and HF radio for all aircraft transiting the Piarco FIR. A 50 NM buffer was activated around the danger area and DRA in the event of a non-nominal event. Two NOTAMs were published for this event: one covering the danger area, and a second describing the full Airspace Management Plan (AMP) including holding procedures. Within ZSU/ZMA, a total of 19 airways were closed across L, M, and Y categories, with alternate routing available for a limited subset. The FAA ATO Space Operations hotline was activated 60 minutes prior to AHA window opening, with a roll call at T-45 minutes.

2.3.4 Post-event coordination discussions within the CADENA Regional Implementation Group (RIG) meeting of 19 November 2025 identified several operational difficulties specific to this launch that have direct relevance to the SAT region:

- a) Multiple changes to AHA coordinates during the planning phase required Piarco ACC (TTZP) to develop new ATFM plans on each occasion, placing significant additional workload on operational and planning staff. Stable and timely publication of hazard area geometry is therefore essential.
- b) The launch was postponed on multiple occasions, including a delay during the countdown on 13 November 2025, during which the TFRs and AHAs remained active and protected, preventing airlines from using the affected airspace. A late advisory was also issued extending the AHA active period by approximately 30 minutes, generating additional disruption to flight planning. This confirms that T-0 delays impose disproportionate costs on airspace users, even when no actual safety event occurs.
- c) The initial AHA product did not include a contour over Bahamian airspace, although the trajectory ultimately affected it. Blue Origin had not established a prior coordination agreement with the Bahamas, highlighting the need for launch operators to secure advance Letters of Agreement (LOAs) with all affected States before operations commence.
- d) Maiquetia ACC (Venezuela) appeared to have had insufficient information regarding the launch, despite having been invited to the stakeholder briefing and having received the presentation materials. This underscores the need for direct and confirmed engagement with all adjacent FIRs, and for the establishment of reliable points of contact (POCs) with neighbouring ANSPs, including SAL, Santa Maria, Dakar, and Maiquetia.
- e) Dakar oceanic FIR formally proposed the creation of a space launch Letter of Agreement (LOA) to formalize coordination procedures. CANSO confirmed that a regional space launch LOA and associated guidance material are currently under development, and committed to including Dakar oceanic FIR once the LOA framework is finalized.

2.4 Launch 3 - ULA Vulcan Centaur USSF-87 (February 2026)

2.4.1 The ULA Vulcan Centaur USSF-87 mission (A1064), carrying a U.S. Space Force payload, was launched from Cape Canaveral Space Force Station, Florida. The primary launch window was on 12 February 2026, from 0800Z to 1248Z - the only daytime window launch among the three events - with six backup windows available from 13 to 18 February 2026. A stakeholder briefing was convened on 10 February 2026 at 1730 UTC, organized by CANSO LAC / CADENA.

2.4.2 The launch generated three AHAs (A, B, and C), three DRAs, and 10^{-7} debris risk areas affecting the New York FIR, Piarco FIR, Dakar Oceanic FIR, SAL FIR, and Santa Maria FIR. In the Dakar oceanic FIR, the 10^{-7} debris risk area was defined by coordinates approximately between 1700N03730W, 1633N03530W, 1558N03300W, 1505N02930W, 1430N02719W, and 1145N02836W. The airspace was not pre-emptively closed; instead, ASECNA issued a NOTAM to inform all users of the risk area, with the 10^{-7} criteria applied as briefed. In the event of DRA activation, ATFM actions and rerouting were to be implemented as required. A designated point of contact within Dakar Oceanic FIR was established for real-time coordination.

2.4.3 This event was further complicated by a concurrent launch: Ariane 6 VA267 from Kourou, French Guiana, which generated two danger zones (ZA and ZB) within the Piarco FIR and the Cayenne FIR (SOOO), active daily from 12 to 22 February 2026 between 1212Z and 1743Z. The simultaneous management of two independent launch trajectories - one originating from the north (Cape Canaveral) and one from the south (Kourou) significantly increased the operational complexity of the Piarco FIR, which employed a 50 NM buffer around both sets of danger areas and designated two en-route holding waypoints for combined management.

2.4.4 Traffic Management Initiatives for the USSF-87 launch within the Piarco FIR included: a 20 Minutes-in-Trail restriction for same-level aircraft east of 56° W filed through the DRA; two en-route holding areas (Holding Area A at 1600N04600W and Holding Area B at 1500N04200W); and NOTAMs A0166/26 (Airspace Management Plan) and A0164/26 (Ariane 6 VA267 danger area). At the NAS level, a 25 NM buffer FEA was created by ZNY encompassing AHA-A and AHA-C to meet non-radar oceanic separation requirements. Airways within the buffer were closed via ZMA NOTAMs. The FAA ATO Space Operations hotline was activated 60 minutes prior to AHA activation, with a roll call at T-45 minutes.

2.5 Coordination Framework and Communication

2.5.1 All three launch events were coordinated under the CANSO Latin America & Caribbean and CADENA frameworks, with FAA ATO Space Operations serving as the primary liaison between space operators and ANSPs. Pre-launch coordination was conducted through formal stakeholder briefings held one to two weeks prior to the primary launch window. These briefings provided ANSPs with detailed airspace management plans, NOTAM requirements, TMI timelines, hotline contact information, and contingency procedures.

2.5.2 Real-time communication during launch windows was managed through dedicated hotlines, typically activated 60 minutes prior to AHA window opening. A structured roll call at T-45 minutes allowed all ANSPs to confirm readiness. At T-10 minutes, ATO Space Operations examined flight plan data for aircraft that could potentially infiltrate hazard areas at T-0, and at T-7 minutes, controlling facilities reported on actions taken to ensure hazard area avoidance. This protocol proved effective in ensuring timely and coordinated closures.

2.5.3 The inclusion of SAT States in the coordination framework is noteworthy. This reflects the growing recognition that eastward launch trajectories from the United States routinely generate debris risk corridors extending into the South Atlantic region.

2.6 Lessons Learned

2.6.1 The following operational lessons were identified through the management of the three launch events:

- a) Advance notification is essential. The layered ATM planning cycle, from strategic seasonal planning through to tactical NOTAM issuance, requires launch notifications to be provided with sufficient lead time. Last-minute or late-stage revisions to launch windows, as experienced with

the Starship Flight 9 primary date cancellations on 22 and 23 May 2025, have a disproportionate impact on the integrity of the overall ATM cycle and increase the workload of ANSP.

- b) The absence of a common taxonomy between space and aviation communities creates coordination barriers. During each event, ANSPs were required to interpret terminology (AHA, DRA, 10⁻⁷ area, nominal closure, malfunction closure) that is not yet standardized within ICAO documentation. Harmonized definitions and procedures are needed to facilitate machine-readable data exchange and reduce the risk of misinterpretation.
- c) Concurrent launch events (as with the Ariane 6 VA267 coinciding with USSF-87 in February 2026) significantly increase airspace management complexity and require a unified operational picture across all affected ANSPs.
- d) Traffic pre-analysis prior to launch events is of high operational value. The review of Sunday traffic patterns prior to the ESCAPADE event, which confirmed no trajectories parallel to the launch corridor, allowed Dakar oceanic FIR to maintain normal operations without pre-emptive closure, while remaining fully prepared for contingency action.
- e) Contingency holding procedures must be pre-established, published, and exercised. The formal designation of holding areas in the Piarco FIR (and, for USSF-87, also referencing oceanic holding further east) provides a model for Dakar oceanic FIR to consider in its own contingency planning for future STO-related airspace restrictions.
- f) The protracted malfunction closure period associated with Starship-class vehicles (up to T+116 minutes) represents a distinctive challenge not encountered with smaller launch vehicles. This extended window requires sustained ATM measures over a prolonged period and significantly impacts traffic flow across multiple FIRs.

2.7 Future Actions

2.7.1 Based on the operational experience documented above, the following actions are identified as necessary to strengthen the safe and efficient integration of space transport operations into Dakar Oceanic FIR and the broader SAT region:

- a) SAT/IMG should develop a dedicated guidance framework for space launch events impacting the SAT Region, ensuring standardization and operational readiness through:
 - 1.- Establishing coordination mechanisms including standardized notification procedures
 - 2.- Harmonizing NOTAM templates for consistent and timely dissemination of information; and
 - 3.- Setting Letter of Agreement (LoA) template, taking into account the regional space launch LOA framework currently under development by CANSO Latin America & Caribbean (as confirmed during the CADENA RIG meeting of 19 November 2025), with a view to formalizing coordination procedures between the SAT Region and the space launch coordination community.
- b) SAT/IMG should encourage ICAO to accelerate the development of harmonized guidance material for STOs in accordance with AN-Conf/14 Recommendation 3.1/6, specifically addressing NOTAM dissemination standards, stakeholder communication protocols, real-time data-sharing mechanisms, and contingency procedures applicable at the inter-regional level.
- c) SAT/IMG should support the development of a regional database of space launch events affecting the SAT region, to serve as a basis for pattern analysis, pre-event traffic studies, and the progressive refinement of regional STO management practices.

3. ACTION BY THE MEETING

3.1 This paper responds to Action Item 06-02 agreed at SAT-IMG/06, which requested ANSPs to share their experience on STO/HAO coordination in line with the SAT SG/02 Decision. The meeting is invited to:

- a) Note the operational experience of Dakar Oceanic FIR during three commercial space launch events- SpaceX Starship Super-Heavy Flight 9 (May 2025), Blue Origin New Glenn ESCAPADE (November 2025), and ULA Vulcan Centaur USSF-87 (February 2026) - and the coordination measures implemented;
- b) Take into account the proposed future actions;
- c) Provide directions as deemed necessary.

— END —