



**Fifth GREPECAS–RASG-PA Joint Meeting (GREPECAS-RASG-PA/5) and
 Twenty-Third Meeting of the CAR/SAM Regional Planning and Implementation Group
 (GREPECAS/23)**

Virtual Phase (Asynchronous, 19 January to 17 February 2026)

In-Person Phase (Mexico City, Mexico, 4 to 6 March 2026)

Agenda Item 8: CAR/SAM Air Navigation Implementation

TRANSITION ALTITUDE HARMONIZATION IN BRAZILIAN AIRSPACE

(Presented by Brazil)

EXECUTIVE SUMMARY	
<p>The harmonization of the Transition Altitude (TA) to 10,000 ft within the Brazilian Airspace Control System (SISCEAB) is presented in this Working Paper. The initiative is aligned with ICAO provisions and regional objectives, aiming to enhance operational safety, reduce pilot workload, increase procedural standardization, and support the implementation of modern performance-based navigation procedures. The paper also highlights the Brazilian experience and invites the GREPECAS Meeting to encourage similar regional harmonization efforts.</p>	
Action:	<p>a) Request the SG2 – PANS-OPS of GESEA to coordinate technical discussions among the States and regional cooperation mechanisms, with a view to harmonizing the Transition Altitude.</p>
<i>Strategic Objectives 2026-2050:</i>	<ul style="list-style-type: none"> • Every flight is safe and secure • Aviation is environmentally sustainable • Aviation delivers seamless, accessible, and reliable mobility for all • No country left behind • The International Civil Aviation Convention and Other Treaties, Laws and Regulations Address All Challenges • The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All
References	<ul style="list-style-type: none"> • Doc 8168 Vol. II • DECEA AIC N 17/25 • Oliveira, R. S.; Oliveira, J. M. P.; Smidt, C. S.; Thomazi, M. G. Assessment of the Impacts of the SISCEAB Transition Altitudes Harmonization Project (TAHP). SITRAER 2022 Conference, Brazil, 2022.

1 Introduction

1.1 Transition Altitude (TA) is defined by ICAO as the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes, while above it the vertical position is referenced to flight levels using the standard pressure setting of 1013.2 hPa.

1.2 Historically, ICAO provisions allowed States to establish different Transition Altitudes for individual aerodromes or terminal areas, considering local terrain, obstacle environment, and operational considerations. However, the evolution of air traffic management, increased traffic density, and the widespread use of advanced avionics have highlighted the operational limitations and safety risks with multiple Transition Altitudes within the same airspace.

1.3 In Brazil, the SISCEAB comprises five Flight Information Regions (FIR) and multiple Terminal Control Areas (TMA), which historically operated with different Transition Altitudes. This diversity increased operational complexity and required altimeter setting changes during critical phases of flight, increasing the potential for human error.

1.4 In this context, the Department of Airspace Control (DECEA) initiated a project to harmonize the Transition Altitude to 10,000 ft across Brazilian TMAs, in line with ICAO recommendations and international best practices, aiming to enhance safety, efficiency, and operational predictability.

2 Discussion

2.1 The decision to harmonize the Transition Altitude to 10,000 ft in the SISCEAB was based on technical, operational, and human factors analyses.

2.2 One of the primary safety drivers for harmonization is the reduction of the risk of altimeter setting errors. A single, nationally harmonized Transition Altitude reduces pilot dependency on local procedures and minimizes the likelihood of incorrect altimeter adjustments during climb and descent.

2.3 In addition, the adoption of a 10,000 ft Transition Altitude removes the altimeter setting change from the most critical phases of flight, such as initial climb, approach, and final descent, where cockpit and ATC workload is typically highest.

2.4 From an operational perspective, a higher Transition Altitude supports the effective implementation of Performance-Based Navigation (PBN) procedures, particularly those employing Barometric Vertical Navigation (Baro-VNAV). Correct and timely QNH insertion is essential for vertical path accuracy, and harmonization at 10,000 ft provides greater stability for Flight Management System (FMS) calculations.

2.5 The harmonized Transition Altitude further facilitates the execution of Continuous Descent Operations (CDO), as aircraft can transition to QNH earlier, allowing optimized vertical profiles and contributing to fuel efficiency and environmental benefits.

2.6 Human factors considerations also played a significant role in the Brazilian decision. The altitude of 10,000 ft is globally recognized as a key operational, commonly associated with sterile cockpit procedures. Aligning the altimeter setting change outside this high-workload phase contributes to workload reduction and improved situational awareness.

2.7 The Brazilian implementation strategy foresees a phased and coordinated transition, aligned with the update of aeronautical charts and publications, ensuring adequate dissemination to airspace users, and minimizing operational disruption.

3 Benefits

3.1 The harmonization of the Transition Altitude substantially reduces the risk of altimeter setting errors. When multiple Transition Altitudes coexist within the same airspace system, flight crews must rely on local knowledge and chart-specific information, increasing the likelihood of incorrect or delayed altimeter setting changes. The adoption of a single, nationally harmonized TA eliminates ambiguity, simplifies procedures, and enhances standardization across all TMAs.

3.2 Setting the Transition Altitude at 10,000 ft removes the altimeter setting change from the most critical phases of flight. Below this altitude, pilots and air traffic controllers are typically managing high workload tasks, including aircraft configuration, approach briefings, speed control, vectoring, and traffic separation. Conducting the transition to QNH or standard pressure at or above this level, the altimeter adjustment occurs in a more stable operational environment, reducing cognitive load and minimizing the probability of human error.

3.3 Furthermore, harmonization at 10,000ft provides strong support for PBN procedures, particularly those using Baro-VNAV, which are highly sensitive to incorrect QNH settings. An earlier and standardized QNH insertion improves the accuracy of vertical path calculations by the FMS, thereby enhancing terrain clearance margins and overall approach stability.

3.4 In addition, a higher Transition Altitude facilitates the effective execution of CDO. With QNH set well in advance of the terminal area, aircraft can maintain optimized vertical profiles with fewer level-offs and late corrections. This contributes to improved operational efficiency, fuel savings, reduced emissions, and more predictable traffic flows.

3.5 Finally, the selection of 10,000 ft represents an optimal balance between safety improvement and operational feasibility. While higher harmonization levels, such as 18,000 ft, may introduce constraints related to usable flight levels and airspace design, the 10,000 ft solution delivers substantial safety and efficiency gains with minimal impact on airspace capacity.

4 Conclusion

4.1 The harmonization of the Transition Altitude to 10,000 ft in the Brazilian Airspace represents a significant and evidence-based step toward enhancing operational safety, reducing complexity, and supporting modern air navigation concepts.

4.2 The initiative aligns with ICAO provisions and international best practices, addressing long-standing risks associated with multiple Transition Altitudes and contributing to safer and more efficient air traffic operations.

4.3 The Brazilian experience may serve as a reference for other States in the CAR/SAM Regions considering similar harmonization initiatives, and it supports broader regional efforts toward standardization and interoperability.

5 Suggested actions

5.1 The Meeting is invited to Request the SG2 – PANS-OPS of GESEA to coordinate technical discussions among the States and regional cooperation mechanisms, with a view to harmonizing the Transition Altitude.

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