



**Twenty-third Meeting of the Working Group on Scrutiny (GTE/23) of the CAR/SAM Regional Planning and Implementation Group (GREPECAS)**

Lima, Peru, from September 11 to 15, 2023

**Agenda Item 5: Other Matters**

**ANALYSIS OF THE EVALUATION PROCESS OF THE CALCULATION OF VERTICAL RISK IN RVSM AIRSPACE FOR SAFETY ENHANCEMENT**

(Rapporteur)

<b>SUMMARY</b>	
This Working Paper aims to present and approve new data in the Vertical Risk Calculation study (CRM) to improve mitigating or corrective actions in the RVSM airspace and identify opportunities to improve the process.	
<b>Action</b>	See Item 3 of this working paper
<i>Strategic objective:</i>	<ul style="list-style-type: none"><li>• Safety</li></ul>
<i>References:</i>	<ul style="list-style-type: none"><li>• ICAO Doc. 9574 - Manual on a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive.</li><li>• Orientation Manual for the Points of Contact (POC) accredited to CARSAMMA.</li><li>• Working paper 06 - GTE/22</li></ul>

**1. Introduction**

1.1 The Planning and Implementation Regional Groups (PIRGs) have established Regional Monitoring Agencies (RMAs) to meet the objectives of the RVSM monitoring program (ICAO Doc.9574, paragraph 6.4.4 and 6.4.5 – Responsibilities of an RMA). These RMAs shall provide annual reports to the Regional Planning and Implementation Group.

1.2 CARSAMMA calculates the Risk Value using the Collision Risk Model (CRM), established in ICAO Document 9574 (Manual on a minimum vertical separation of 300 m between FL290 and FL410 inclusive), taking as a reference parameter a TLS of 5 X 10<sup>-9</sup> fatal accidents per flight hour. The objective

is to conduct a quantitative (CRM) and qualitative (SMS) evaluation of operations in the RVSM airspace to enhance the safety level in the CAR/SAM regions.

1.3 The ICAO Collision Risk Methodology (CRM), used to develop the global system performance specification Doc.9574, takes into account the height-hold performance specification and aircraft height-hold performance requirements, which consist of:

- Target level of safety (TLS) (safety objective);
- CRM- Collision Risk Model (risk estimation tool); and
- Acceptable means of risk assessment.

1.4 The CRM calculation process consists of two components:

- Collect reports of large height deviations (LHD) and traffic sample data (TSD) from the air navigation service providers (ANSPs) of the FIRs studied and;
- Results of aircraft height-keeping performance monitoring systems from regional monitoring systems and data exchange with other RMAs.

1.5 According to documents 9574 and 9937, the evaluation is necessary to guarantee that operations in RVSM airspace do not increase the risk of collision so that the total vertical risk does not exceed the defined safety objectives.

## **2. Analysis**

2.1 Although the 2021-estimated total risk for the CAR/SAM region was  $2.76 \times 10^{-9}$ , which was below the acceptable TLS ( $5.0 \times 10^{-9}$ ), six FIRs were above the TLS ( $5.0 \times 10^{-9}$ ), exceeding the defined security objectives.

2.2 At each annual meeting, the GTE analyzes the result of the CRM calculations delivered by CARSAMMA and carries out work with the FIRs that obtained a TLS value higher than that established.

2.3 The Collision Risk Model uses a mathematical formula to calculate the FIR's Risk Level without showing the details of the analyzed events. Two factors that negatively influence the CRM are the number of LHD events suffered by each FIR and the duration of these events.

2.4 In 2022, the FIRs with the TLS (2021) above the level held a meeting to identify actions to reduce the collision risk.

2.5 It is essential to analyze the external factors that increase the FIR risk, including LHD events caused by neighboring FIRs that negatively impact the risk level.

2.6 When determining which FIR negatively affected the risk of the surrounding FIRs, the regional authorities may jointly take actions to reduce the risk resulting from the operational errors that generate the LHD.

2.7 Although the risk assessment for the year 2021 has shown that the CAR/SAM regions remain below the expected risk level (TLS); it is necessary to ensure that each of the FIRs in the region is below the goal.

**3. Suggested Actions:**

The Meeting is invited to:

- a) Take note of the information in this working paper;
- b) request to CARSAMMA the information on the FIRs that cause the increase in the risk level of the adjacent FIRs, mainly those above the TLS;
- c) request to CARSAMMA the information on the specific events that impacted the risk level of the adjacent FIRs, mainly those above the TLS;
- d) based on the information provided by CARSAMMA, hold joint meetings with the FIRs that suffer the increase in risk and with the FIRs that caused it; and
- e) recommend other actions deemed necessary.