Cuestión 5 del Orden del Día: **Safety**

RESULT OF THE RVSM SAM AIRSPACE MONITORING PROGRAM -2022

(Presented by the Secretariat)

SUMMARY

This Working Paper (WP) summarizes the evaluation of the RVSM airspace monitoring program corresponding to the SAM region. Likewise, it presents for analysis by SAM/IG and the sub-working groups some identified operational issues and recommendations that would help reduce the level of risk in RVSM airspace.

Reference:

- GTE 23 meeting Report

1. Background

1.1 The establishment of RVSM airspace monitoring is a requirement in compliance with Annex 11, specifically section 3.3.5.1, which establishes that "in all airspaces in which a reduced minimum vertical separation of 300 m (1 000 ft) between FL 290 and FL 410 inclusive, a program should be established, at the regional level, to monitor the altitude maintenance performance of aircraft operating at those levels, to ensure that the continued application of this Minimum vertical separation meets operational safety objectives. The scope of the regional surveillance programs will be adequate to carry out performance analysis of groups of aircraft and evaluate the error stability of the altimetry system."

1.2 As part of the RVSM airspace monitoring program, from September 11 to 15 of this year, the twenty-third meeting of the GTE (GTE23) was held in the city of Lima, Peru, which was attended by representatives of 16 States/Territories and International Organizations of the CAR/SAM and NAM Regions, with a total of 23 delegates.

1.3 This working paper presents the result of evaluating the RVSM airspace collision risk model in the SAM region.

2. Analysis

2.1 The Reich Vertical Collision Risk Model (CRM) is used to evaluate system performance quantitatively. This is a model with intense mathematical foundations that, after analyzing aircraft movements (spreadsheets containing data on flights carried out in RVSM airspace), calculates the level of safety of the Flight Information Region under study. The RVSM safety assessment covers a period of twelve consecutive months and comprises 34 Flight Information Regions (FIR) in the Caribbean and South America. Each part of that airspace was treated as an isolated system with its statistical parameters.

2.2 Regarding the South American region, the monitoring process is carried out in the 27 FIRs included in the region. It is important to highlight that the SAM region contributes approximately to the 70% of the volume of CAR/SAM operations; therefore, the region will usually have a more significant number of LHDs than the CAR region (See Table I)).

AÑO	Total LHDs CAR/SAM	Total LHDs SAM	% SAM
2018	858	731	85.20%
2019	993	797	80.26%
2020	363	311	85.67%
2021	592	459	77.53%
2022	711	622	87.50%

Tabl2 I – LHD x year

2.3 LHD reports accumulated over 12 months between January and December 2022 were used for the safety assessment. **The result of the vertical collision risk assessment for 2022 was 1,255 x 10-9,** so the risk has remained within the acceptable safety level (TLS) of 5 x 10-9 fatal accidents or loss of vertical separation of 1,000 ft. (See Fig I).

2.4 **Regarding the SAM region, during 2022, three FIRs were identified with a risk level above TLS; these FIRs are La Paz, Asunción, and Guayaquil (See Fig II)**

2.5 LHDs with Code "E" - error/coordination failure between ATC units, were the most frequent in 2022, with 685 events, followed by Code "B" - The flight crew ascended/descended without ATC authorization with 8 events, Code "I" - Deviation due to turbulence or other meteorological phenomenon 5 events, Code "H" - Deviation due to failure of onboard equipment that led to an unintentional or undetected change in flight level 3 events, Code "J" - Deviation due to TCAS RA 3 events, and Code "M" - Other cases 3 events. The high number of "E" codes demonstrated the need for better coordination between adjacent air traffic service units. (See Appendix Fig III).

2.6 It is important to mention that in the analysis of 2022, some events were related to the failure of coordination due to technical issues with the equipment used for the transfer, specifically the AMHS or the AIDC. One of these failures refers to aircraft with flight plans with direct routing, which do not contain FIR entry and exit points, which causes errors in the automated coordination, increasing the risk. The GTE highlighted the challenges that direct flights between States represent for automated transfers.

2.7 Considering the significant number of events involving the Bogotá (Colombia), Barranquilla (Colombia), Lima (Peru), and Guayaquil (Ecuador) FIRs between 2019 and 2021, in follow-up to the conclusion GTE 22/01, the ICAO SAM office organized an in-person meeting from 13 to 16 March 2023 between the focal points of the States involved as part of the strategy implemented to reduce LHDs on the border. During GTE 23, Colombia presented its Action Plan to reduce LHDs in the FIRs of Barranquilla and Bogotá.

2.8 For the year 2024, it was agreed that CARSAMMA would organize, with the support of the Secretariat, a seminar aimed at the States of the CAR/SAM Regions to inform on the actions regarding the PBCS.

2.9 Another issue addressed during GTE 23 was about the aircrafts that use RVSM airspace without being included in the RMA RVSM capabilities database. The presentation highlighted the need for response to CARSAMMA communications by States of the CAR/SAM regions regarding this issue. The GTE 23 asked the Secretariat to establish a coordination mechanism between the States and

CARSAMMA to keep updated the information in the RVSM CAR/SAM registered aircraft database updated.

3. Recommendations

3.1 It is recommended that the SAM FIRs whose risk is above the acceptable level (TLS) should establish a strategy to reduce risk in RVSM airspace that includes, among other actions, implementing multilateral efforts to reduce LHDs.

3.2 It is recommended that States continue the automation of transfer between control centers, including the AIDC and the AMHS. Likewise, the exchange of surveillance data.

3.3 It is recommended that States take note of the failures that have occurred due to the presentation of flight plans with direct routing and the impact this has on the coordination between air traffic services.

4. Suggested actions

4.1 The meeting is invited to:

a) Take note of the information provided in this Working Paper;

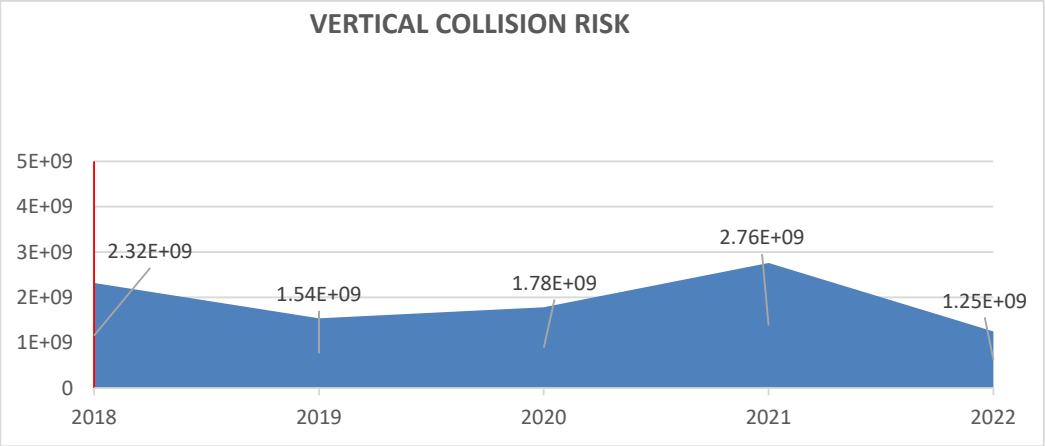
b) support the recommendations of Section 3 of this WP;

c) continue the implementation of AIDC, as well as the exchange of surveillance data, as a mechanism to reduce the number of LHD events; and

d) suggest any additional action that is considered necessary.

APPENDIX

Figure I shows a table with the results of the CRM evaluations in the period 2018-2022, indicating that operations in RVSM airspace have remained within the acceptable safety level of 5 x 10−9 fatal accidents per flight or due to loss of standard 1,000 ft vertical separation



The Fig II shows the FIRs that suffered a TLS above the acceptable safety level of 5 x 10−9 fatal accidents per flight or loss of standard vertical separation of 1,000 ft.

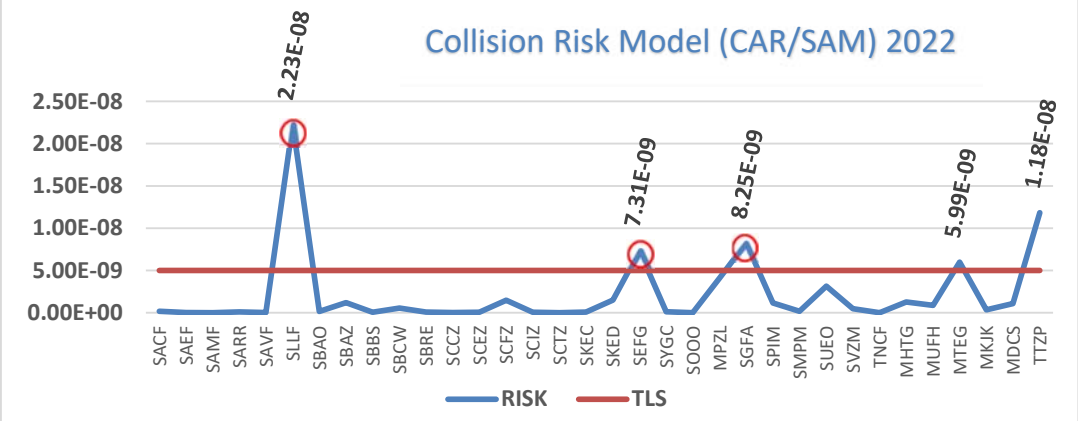


Fig III. shows the total failures 2022, detailing each type of failure Total de LHD por tipo

-	A	B	C	D	E1	E2	F	G	H	I	J	K	L	M	Total
#LHD	1	8	0	2	401	284	0	0	3	5	3	0	1	3	711

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