ICAO International Civil Aviation Organization
North American, Central American and Caribbean Office

CAR/SAM Planning and Implementation Regional Group (GREPECAS) Twenty Second Scrutiny Working Group (GTE) Meeting

(GTE/22)

Final Report

Mexico City, Mexico 26 to 30 September 2022

Prepared by the Secretariat

January 2023

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HISTORICAL

ii.1 Place and Date of the Meeting

The CAR/SAM Planning and Implementation Regional Group (GREPECAS) Twenty Second Scrutiny Working Group Meeting (GTE/22) was held at the ICAO NACC Regional Office in Mexico City, Mexico, from 26 to 30 September 2022.

ii.2 Opening Ceremony

Mr. Ricardo Delgado, Regional Officer, Aviation Security and Facilitation of the North American, Central American and Caribbean (NACC) Office of the International Civil Aviation Organization (ICAO) provided opening remarks, welcomed the participants to the ICAO NACC Regional Office and officially opened the meeting.

ii.3 Officers of the Meeting

The GTE/22 Meeting was chaired by the GTE Rapporteur, Mrs. Diana Luque Salcedo. Mr. Eddian Méndez, Regional Officer, Air Traffic Management and Search and Rescue of the ICAO NACC Regional Office served as Secretary of the Meeting, assisted by Mr. Roberto Sosa, Regional Officer, Air Traffic Management and Search and Rescue of the South American (SAM) Regional Office and Mrs. Mayda Ávila, Regional Officer, Communications, Navigation and Surveillance of the ICAO NACC Regional Office.

ii.4 Working Languages

The working languages of the Meeting were English and Spanish. The working papers, information papers and report of the meeting were available to participants in both languages.

ii.5 Schedule and Working Arrangements

It was agreed that the working hours for the sessions of the meeting would be from 09:00 to 15:30 hours daily with adequate breaks.

ii.6 Agenda

Agenda Item 1: Election of the Rapporteur and Adoption of the Provisional Agenda and Schedule

1.1 Election of the GTE Rapporteur
1.2 Adoption of the Provisional Agenda and work schedule

Agenda Item 2: Review of the valid CARSAMMA and Scrutiny Group Meetings Conclusions and Recommendations

2.1 Review of previous conclusions
2.2 Review of previous recommendations

Agenda Item 3: Review of the Results of Large Height Deviation (LHD) Analysis

3.1 Indicator data on points of greatest occurrence of LHD events.
3.2 Actions taken for the enhancement of LHD event data capture and for the improvement of Reduced Vertical Separation Minimum (RVSM) status capture by Registration States or Operator
3.3 Results of the assessment project for safety in RVSM airspace for the CAR and SAM Regions
3.4 Identification of trends
3.5 Lessons learned by CAR/SAM States to reduce the number of LHDs
3.6 Report on the progress made by States on LHD management
3.7 Report on the flight plan audit

Agenda Item 4: Activities and Tasks to be Reported to the GREPECAS

4.1 Update of the GTE Terms of Reference (ToRs)
4.2 Review of tasks to be reported to GREPECAS
4.3 GTE/Regional Aviation Safety Group–Pan America (PA-RAST) cooperation.
4.4 CARSAMMA/GTE and North American Approvals Registry and Monitoring Organization (NAARMO) Cooperation

Agenda Item 5: Other Business

ii.7 Attendance

The Meeting was attended by 10 States/Territories from the NAM/CAR/SAM Regions and 3 International Organizations, totalling 43 delegates as indicated in the list of participants.

ii.8 Conclusions and Decisions

GREPECAS records its action in the form of conclusions and decisions as follows:

Conclusions deal with matters, which in accordance with the Group's terms of reference require direct attention of States/Territories and/or International Organizations, or on which further action will be initiated by ICAO in accordance with established procedures.

Decisions deal with matters of concern only to the GREPECAS and its Contributory Bodies organization.

An executive summary of these conclusions/decisions is presented in **Appendix A** to this report.

ii.8 List of Draft Conclusions and Decisions

ii.9 List of Working and Information Papers and Presentations

Refer to the Meeting web page:
https://www.icao.int/NACC/Pages/meetings-2022-gte22.aspx

WORKING PAPERS

Number	Agenda Item	Title	Date	Prepared and Presented by
WP/01	1	Review and Approval of Provisional Agenda and Schedule	13/09/22	Secretariat
WP/02	2	Review of the previous CARSAMMA and Scrutiny Group meetings Conclusions and Recommendations	21/09/22	Secretariat
WP/03		Cancelled		
WP/04	3.3	Safety Assessment in the RVSM Airspace of the CAR/SAM Regions	02/09/22	CARSAMMA
WP/05	3.4	Identification of Trends	02/09/22	CARSAMMA
WP/06	4.2	2021 Aircraft ASE and RVSM Collision Risk Analyses (CRM) in the CAR/SAM Regions	02/09/22	CARSAMMA
WP/07	5	Digitalization of the LHD Report F4 Form	02/09/22	CARSAMMA
WP/08	3.6	Safety MitigatingMeasures to Reduce LHD Events and Associated Risks in the Barranquilla FIR	19/09/22	Colombia
WP/09	3.6	Progress and Achievements of SENEAM in Matter of LHD in the Mexico FIR	15/09/22	Mexico
WP/10	4.3	Formalization of Collaboration Methodology for the GTE/PA-RAST	19/09/22	IATA
WP/11	4.3	GTE/REGIONAL Aviation Safety Group–Pan America (PA-RAST) Cooperation	19/09/22	IATA
WP/12	5	New York West Airspace Horizontal Safety Monitoring Report -2021	26/09/22	NAARMO
WP/13	3	Vertical Safety Monitoring Report for Miami Oceanic, New York West, and San Juan Airspace - 2021	26/09/22	NAARMO

INFORMATION PAPERS

Number	Agenda Item	Title	Date	Prepared and Presented by
IP/01	--	List of Working, Information Papers and Presentations	14/09/22	Secretariat

INFORMATION PAPERS

Number	Agenda Item	Title	Date	Prepared and Presented by
IP/02	4.2	RVSM Airspace Audit in the CAR/SAM Regions	02/09/22	CARSAMMA
IP/03	5	Method of GMU ASE Processing	02/09/22	CARSAMMA
IP/04	3.6	Mitigating Risks Associated with Large Height Deviations Using Data Driven Decision Techniques	20/09/22	Trinidad and Tobago
IP/05	5	Long Term Height Monitoring Burden	20/09/22	NAARMO
IP/06	3	NAARMO RVSM Traffic Compliance Monitoring	20/09/22	NAARMO
IP/07	3.3	Mexico Airspace Vertical Safety Monitoring Report – 2021	20/09/22	NAARMO
IP/08	3.6	Avances en el Programa de Reduccion de Eventos LHD FIR-Bogota ***(available in Spanish only)***	19/09/22	Colombia

PRESENTATIONS

Number	Agenda Item	Title	Presented by
1	3.6	Avances y Logros de SENEAM en Materia de LHD ***(available in Spanish only)***	Mexico
2	3.3	Vertical Safety Monitoring Report Mexico/GOMEX Airspace 2021	NAARMO
3	5	Horizontal Safety Monitoring Report New York West FIR	NAARMO
4	3	Vertical Safety Monitoring Report – Miami Oceanic, New York West and San Juan FIRs	NAARMO
5	3.5	Update on CNS Infraestructure and Automation in the CAR Region	Secretariat
6	4.4	2021 Airspace Safety Assessment Caribbean/South America	CARSAMMA
7	3	RVSM Vertical Risk Estimates 2021 Canadian Domestic	Canada
8	3	NAARMO RVSM Annual Safety Review 2012	NAARMO

LIST OF PARTICIPANTS

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4. Aldo Stefanon
5. Atul Kumar

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Agenda Item 1 **Election of the Rapporteur and Adoption of the Provisional Agenda and Schedule**

1.1 **Election of the GTE Rapporteur**

1.1.1 Under this Agenda Item, the election of the rapporteur of the GTE was addressed. Two candidates were presented for this position. Colombia presented the candidacy of Mrs. Diana Luque Salcedo and Dominican Republic presented the candidacy of Mr. Luis Emilio Cabral Rivera.

1.1.2 The GTE opted for a secret ballot, resulting in the election of Mrs. Luque as Rapporteur of the GTE.

1.2 **Adoption of the Provisional Agenda and work schedule**

1.2.1 The Secretariat presented WP/01 and invited the Meeting to approve the Provisional Agenda and Schedule. The Meeting approved the Agenda and Schedule as presented.

Agenda Item 2 **Review of the Valid CARSAMMA and Scrutiny Group Meetings Conclusions and Recommendations**

2.1 Under this Agenda Item, the Secretariat presented WP/02 with an updated list of conclusions of the GTE. The status and follow-up comments for each conclusion are the result of a review made by the Secretariat, based on the available information before the meeting.

2.2 The Meeting agreed to consider completed the following Conclusions: GTE/14-2, GTE/14-3, GTE/14-4, GTE/16-1, GTE/16-3, GTE/16-4, GTE/16-5, GTE/17-1, GTE/17-2, GTE/17-3, GTE/17-4, GTE/17-5, GTE/18-1, GTE/18-3, GTE/18-4, GTE/19/1, and GTE/19-02.

2.3 The Meeting considered the following Conclusions as Valid: GTE/16-2, GTE/18-2, GTE/20/1, and GTE/20/2.

2.4 The Meeting took note the offer by United States to support the provision of a virtual orientation seminar on Performance-based Communication and Surveillance (PBCS) approval for CAR/SAM States. The Secretariat will take action to organize this activity.

Agenda Item 3 Review of the Results of Large Height Deviation (LHD) Analysis

2021 LHD Analysis

3.1 Under this Agenda Item, CARSAMMA presented WP/04 with a summary of the reports of Large Height Deviations (LHD) received by CARSAMMA, and the analysis with the Safety Management System methodology (SGSO)/Safety Management System (SMS) proposed by ICAO.

3.2 A series of LHD reports accumulated for a 12-month period, between January-February 2021, were used for this safety assessment. The Table below show the summary of the LHD occurrences validated by CARSAMMA and their duration (in minutes) associated with the LHD per month.

MONTH	LHD RECEIVED	LHD VALIDATED	TOTAL DURATION (min.)	MEDIAN DURATION (min.)	MEDIAN RISK	HIGHER RISK
JANUARY	40	37	71,3	1,93	21,1	39
FEBRUARY	34	29	28,5	0,98	21,6	34
MARCH	33	28	32,0	1,14	22,1	39
APRIL	27	23	19,5	0,85	21,4	31
MAY	51	48	160,0	3,33	25,1	46
JUNE	39	39	45,6	1,17	22,9	46
JULY	65	58	54,0	0,93	21,5	41
AUGUST	64	55	96,0	1,75	21,6	51
SEPTEMBER	48	38	185,1	4,87	21,6	46
OCTOBER	44	36	81,0	2,25	22,6	41
NOVEMBER	69	59	523,6	8,87	20,1	51
DECEMBER	78	70	91,5	1,31	18,6	46
TOTAL	**592**	**520**	**1.388,1**	**2,67**	**21,5**	

Table 1. LHD occurrences, with duration, average duration, average risk, and highest risk per month

3.3 For the LHD reports in which the GUAYAQUIL Flight Information Region (FIR) is at risk due to failures of the adjacent FIRs, a total of 143 reports made. The BOGOTÁ FIR reported 120 failures. Attention is drawn to the Transfer control points (TCP) UGUPI with 65 reports and BOKAN with 25 reports, points between the GUAYAQUIL and BOGOTÁ FIRs because the largest number of LHD reports occurred in these TCPs.

3.4 For the LHD reports occurred in which the PANAMA FIR is at risk due to failures of the adjacent FIRs and a pilot failure, a total of 105 reports were made. 60 of these reports involved the BOGOTÁ FIR and 35 the BARRANQUILLA FIR.

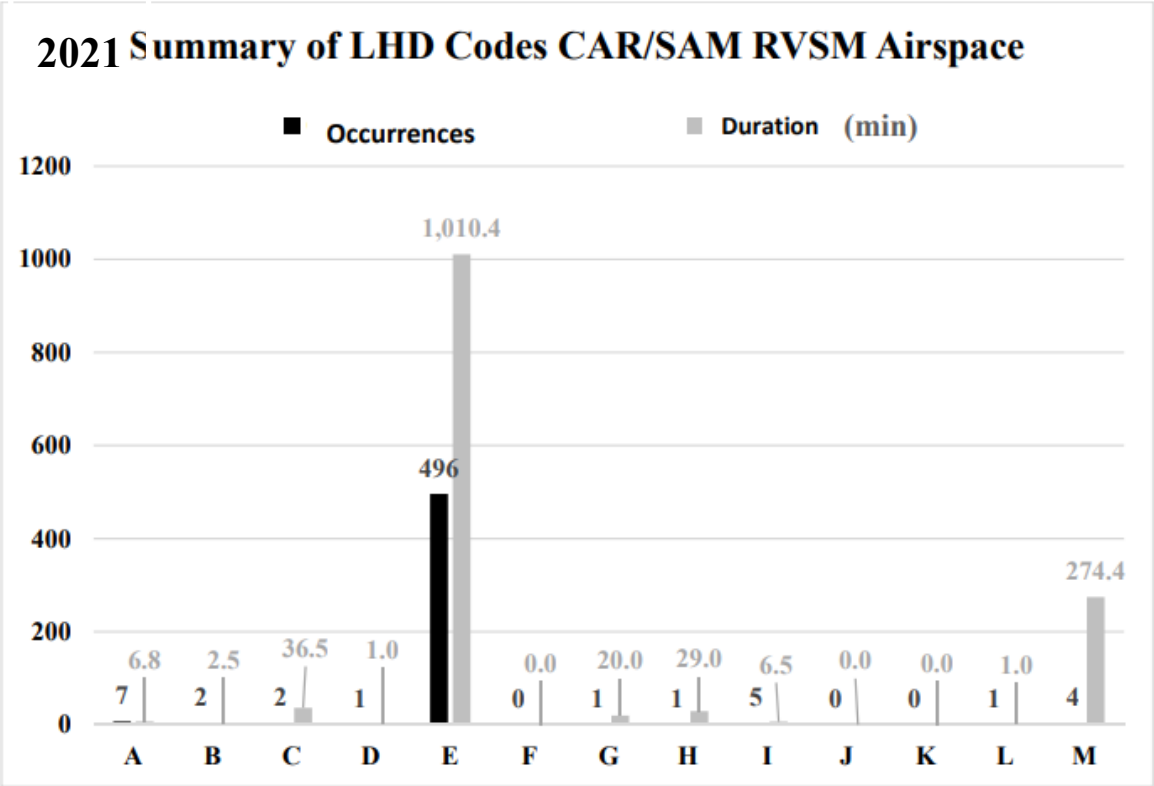
3.5 LHD reports occurred in which the BOGOTÁ FIR is at risk due to failures of the adjacent FIRs and a pilot failure. From a total of 40 reports made, 13 involved failures from the PANAMA FIR, 11 from the GUAYAQUIL FIR and 10 from the LIMA FIR.

Figure 3. LHD occurrences at the most reported points between the BOGOTÁ FIR and the neighboring FIRs.

3.6 There were LHD reports in which the CURAÇAO FIR was at risk due to failures of the adjacent FIRs, of a total of 33 reports made. From the BARRANQUILLA FIR, 13 reports; from the SANTO DOMINGO FIR, 12 reports; from the MAIQUETIA FIR, 4 reports, from the KINGSTON FIR, 2 reports and from the PORT AU PRINCE FIR, 2 reports.

3.7 For the 520 validated reports received by CARSAMMA, 315 reports involved 50 fixes from the BARRANQUILA and BOGOTÁ FIRs with their adjacent FIRs. These failures account for 60.6% of all validated reports which risk value (VR) added together obtain a total of 6,836 points and that represents 61.2% of the total VR obtained for the entire CAR/SAM Regions. Mitigating actions must be implemented in these FIRs as quickly as possible.

3.8 Once again, LHD reports with Code “E” {coordination error between Air Traffic Control (ATC) units} were the most frequent in 2021 with 496 events, representing 95.4% of all errors, followed by Codes “A” (7), “I” (5), “M” (4), “B” and “C” (2), “D”, “G”, “H” and “L” (all with 1). The high number of reports with Code “E” demonstrates the need for better coordination between adjacent ATC units, which could be achieved through awareness and coordination training between controllers.



Graph 2. Summary of LHD Occurrences by Code

3.9 The FIRs that suffered the most from failures of the adjacent FIRs were: GUAYAQUIL 143 times, PANAMÁ 105 times, BOGOTÁ 40 times, CURACAO 33 times, LIMA 31 times and SANTO DOMINGO 24 times, only those 6 FIRs presented a total of 276 LHD reports which represents 74.2% of all the reports received from the region.

3.10 The FIRs that most contributed to failures for the adjacent FIRs were: BOGOTÁ 206 times, BARRANQUILLA 59 times, LIMA 28 times, GUAYAQUIL 26 times, CURACAO 23 times and CENTRAL AMERICAN 22 times, only those 6 FIRs generated a total of 364 LHD reports which represents 74.0% of all the faults observed in the region. Failures of these FIRs are repeating in the last 3 years. Mitigating actions must be taken urgently.

3.11 After reviewing the data presented by CARSAMMA, the GTE agreed on the following Conclusion:

<table>
<tr><td colspan="2">DRAFT CONCLUSION
GTE/22/01 MITIGATION ACTIONS AMONG COLOMBIA, ECUADOR AND PANAMA</td></tr>
<tr><td>What:
That, after evaluating the information provided by the CARSAMMA regarding the LHD events reported in 2021, where a significant number of events involving the Bogotá, Barranquilla, Guayaquil and Panama FIRs are evidenced:

a) The GTE present to GREPECAS the situation of the LHD events that have occurred in the CAR/SAM Regions, paying attention to the FIRs where the greatest number of events were reported, including the FIRs Bogotá, Barranquilla, Guayaquil and Panama, requesting the support of the State authorities in the process of evaluation and mitigation of LHDs;

b) Colombia, Ecuador and Panama, with the support of the ICAO SAM Regional Office, hold a meeting in the short term for the analysis, preparation and subsequent implementation of an action plan for mitigation measures to address and reduce the recurrence of LHDs events reported in the FIRs under their responsibility; and
c) The SAM Regional Office present to the GTE/23 the outcomes of the implemented actions in b) for evaluation.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Operational/Technical</td></tr>
<tr><td colspan="2">Why:
To mitigate the identified safety failures that have occurred in the CAR/SAM Regions as reported in 2021</td></tr>
<tr><td>When: GTE/23 Meeting</td><td>Status: ☒ Valid / ☐ Superseded / ☐ Completed</td></tr>
<tr><td>Who: ☒ States ☐ ICAO ☒ Other:</td><td>GTE</td></tr>
</table>

3.12 CARSAMMA presented WP/05 to report trends of some of the LHD received by them, such as when the aircraft passes the TCP still in ascent or descent, when the aircraft calls at a different point from the coordinated, when the Air Traffic Service (ATS) does not check the flight level, point or time of transfer, and the transferring body does not perceive the error, including changes in the estimated time and errors related to transfer failures caused by technical issues of the equipment.

3.13 Some LHD reports for 2021 had as a coordination failure the final parameter at an intermediate level to the coordinated one, that is, the traffic was still ascending or descending when it called. The table below shows all the LHD reports that fall into this type of situation, the traffic is coordinated at one level and calls ascending or descending.

Reports 2021	Reporting FIR	FIR that makes the fault	Position	FL
65	LIMA	LA PAZ	ELAKO	FL340 ↗ FL380
84	CURAZAO	BARRANQUILLA	SELAN	FL295 ↗ FL330
121	PIARCO	PARAMARIBO	TRAPP	FL349 ↗ FL400
154	PIARCO	MAIQUETIA	DAREK	FL310 ↗ FL330
166	PANAMA	CENTRAL AMERICA	BUFEO	FL350 ↗ FL370
315	BOGOTA	GUAYAQUIL	ENSOL	FL310 ↗ FL320
342	CURAZAO	ST. DOMINGO	POKAK	FL360 ↗ FL370

Table 1 - Reports of LHD whose transfers are made with a level and calling in ascending or descending 2021

3.14 Some 2021 LHD reports had the final parameter as a coordination failure, a point different from the coordinated one, that is, the aircraft comes on an airway, changes airway or deviates from the route and that is not reviewed (coordinated again) with the adjacent FIR. Table below shows all the LHD reports that fit into this type of situation, the traffic is coordinated at one point and calls at another.

Reports 2021	Reporting FIR	FIR that makes the fault	Coordinated Position	Position that the AC calls
35	GUAYAQUIL	BOGOTA	UGUPI	30 NM "NW" UGUPI
59	GUAYAQUIL	BOGOTA	UGUPI	ENSOL
123	LIMA	LA PAZ	DOBNI	VOR JUL
137	BOGOTA	PANAMA	ILTUR	TOKUT
147	GUAYAQUIL	BOGOTA	UGUPI	ANRAX
184	GUAYAQUIL	BOGOTA	ANRAX	UGUPI
189	GUAYAQUIL	BOGOTA	UGUPI	ANRAX
210	GUAYAQUIL	BOGOTA	ANRAX	LIXAS
222	LA PAZ	AMAZONICA	RCO (Rio Branco)	AKVOR
303	PANAMA	CENTRAL AMERICA	BOLDO	PAPIN
320	BOGOTA	GUAYAQUIL	UGUPI	ENSOL
344	MAIQUETIA	BARRANQUILLA	ENPUT	AKNIL
359	GUAYAQUIL	BOGOTA	PLG (Puerto Leguizamo)	31 NM "N" BOKAN
366	AMAZONICA	BOGOTA	ABIDE	BRACO
369	AMAZONICA	BOGOTA	LET (Leticia)	BRACO
450	LIMA	GUAYAQUIL	VAKUD	MOXOM
474	CURAZAO	BARRANQUILLA	OROSA	SELAN
507	SAN JUAN	PIARCO	KEEKA	OPAUL

***Table 2** – 2021 LHD reports whose transfers are made at one point and called at another*

3.15 Some LHD reports of 2021 had as a coordination failure the parameter related to technical issues of the equipment used for the transfer, (AMHS = ATS MESSAGE HANDLING SYSTEM or AIDC = ATS INTER-FACILITY DATA COMMUNICATION) that is, the traffic calls at a flight level different from the coordinated one or it was not coordinated. This characterizes the code “F” and all the reports below were thus coded due to the description of the LHD report or because they are already coded as “F” by the reporting FIR. The FIRs that reported this type of failure the most in 2021 was: Guayaquil (89 times), Panama (14 times) and Bogotá (12 times). The most reported FIR was Bogotá (89 times). It should be noted that several points are repeated according to the pair of FIRs involved and it can also be seen that the pair of FIRs that most commits this type of failure is: Guayaquil x Bogotá (84 times).

3.16 Colombia presented WP/08 to report the development of the mitigating measures implemented in the Barranquilla FIR between 2019 and 2022 with the general objective of reducing LHD events and thus maintaining high standards of safety through the efficient management of risks associated with the operation of aircraft in Reduced Vertical Separation Minimum (RVSM) airspace.

3.17 In May 2022, during the meeting of the SAM Region focal points, it was highlighted the significant increase of the LHDs between Panama and Barranquilla at the BOGAL and AGUJA positions; these reports were unknown to Barranquilla and therefore they could not be analyzed and validated. In the analysis of cases received in June 2022, it was identified that aircrafts departing from airports near the border with Panama passing BOGAL or AGUJA are originally coordinated by Air Traffic Services Inter-facility Data Communication (AIDC) with the final authorized level; as they are ascending, a renegotiation between AIDC systems happens; calculating the crossing level and sending a new message that the Panama Area Control Centre (ACC) rejects. This situation has caused multiple LHD reports to the Barranquilla FIR.

3.18 Another situation is related to the problems with oral communications with Curaçao, which caused LHD events at OROSA and SELAN. Although the implementation of automated AIDC has not been possible, it was implemented as a contingency measure for oral systems failures, the automatic Aeronautical Fixed Telecommunication Network(AFTN)/ Aeronautical message handling system (AMHS) messages, so that all flights are coordinated using this without ceasing the oral coordination. Likewise, Standard Operating Procedures (SOP) were adjusted and included in the Letter of Agreement (LoA) between Barranquilla and Curacao, reducing the events between the FIRs. Communication and bilateral work has improved significantly between both control centres.

3.19 The oral coordination between Barranquilla and Kingston was out of service in June 2019 and could not be restored by the technical part of Colombia. The ICAO SAM Regional Office initiated a cooperative process between the technical areas of the States, ICAO Regional Offices, and the MEVA network system manager, restoring the oral coordination on 15 April 2021.

3.20 One of the lessons learned during the change of management process during the implementation of the AIDC system as a primary means of coordination is that an increase in LHD reports may occur due to ATCOs' unfamiliarity with the system and operational errors in programming the AIDC which are corrected as they are identified, being the LHD reports an essential means to detect and analyse this faults. The Barranquilla FIR understood that a continuous improvement in the work must be sought; testing new methods and forms of teamwork, making the most of available resources, always seeking to improve processes, design new interfaces, new protocols, and new procedures.

3.21 It was evidenced that several of the LHDs sent to the CARSAMMA had not been previously validated by the States/Service Providers involved, which prevents the adequate collection of data related to the events as well as the timely taking of corrective actions. In this sense, the GTE made the following Decision:

<table>
<tr><td colspan="3">DECISION
GTE/22/02 IMPROVED COORDINATION BETWEEN STATES´S AND INTERNATIONAL ORGANIZATIONS POINTS OF CONTACT AND CARSAMMA</td></tr>
<tr><td colspan="2">What:
That, taking into consideration the need to improve the analysis of data related to LHD events that are reported to the CARSAMMA:

a) The Points of Contact of the States and International Organizations accredited to CARSAMMA exchange information with the adjacent Area control centres (ACC) in order to validate with the respective Points of Contact each of the LHD events received before being reported to CASAMMA, ensuring that all information related to each event is preserved by each air traffic control centre involved;
b) The CARSAMMA organize quarterly teleconferences to provide feedback on the LHD events received in the previous period to verify their validity, as well as to identify trends or safety situations that warrant immediate action; and
c) The GTE amend its terms of reference and the manual of contact points accredited to the CARSAMMA to specify the validation period with the adjacent control centres for the LHDs received before being sent to CARSAMMA by the GTE/23 Meeting.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Operational/Technical</td></tr>
<tr><td colspan="3">Why:
To make the work of CARSAMMA more efficient and address emerging safety issues</td></tr>
<tr><td>When: GTE/23</td><td colspan="2">Status: ☒ Valid / ☐ Superseded / ☐ Completed</td></tr>
<tr><td>Who: ☐ States ☐ ICAO ☒ Other:</td><td colspan="2">CARSAMMA, GTE</td></tr>
</table>

3.22 Mexico presented WP/09 and P/01 to report the progress and achievements that SENEAM has had in the exercise of monitoring and mitigation of LHDs, as well as the annual analyses that are carried out and the mitigations that are applied, to increase safety. Since 2013, the ATS Headquarters of the Southeast Regional Management of SENEAM received the task of reviewing the analysis of LHD events with CARSAMMA, for this purpose, in 2014, a course was organized in Rio de Janeiro, Brazil, to obtain the necessary knowledge to be able to participate as a POC of Mexico.

3.23 The initial steps have always been the training of controllers through the review of reported events, for greater understanding. Supervisors have been trained in the same way, to identify events and have sufficient criteria to determine whether the report proceeds or not.

3.24 In April 2015, as an initial technological measure, the Belize radar signal was integrated into the Topsky V2 radar system of the Mérida Control Centre, which, although we already had it independently as evidence, had not been integrated into multitracking. In March 2021, the agreement was signed with the Cuban Civil Aeronautics Institute (IACC) for the establishment of ATS surveillance data exchange between the ATC facilities of both entities. In August 2022, COCESNA sent an official letter to SENEAM as follow-up to the collaboration talks between both agencies, which seeks to increase the exchange of surveillance data to improve coverage and redundancy within of the air traffic control areas, which both institutions are responsible for. Regarding the above, an integral exchange of the San José radar/Automatic dependent surveillance - broadcast (ADS-B) signals and the Visual reference to the ground (VSA) radar is sought for their strategic positions that seek to cover areas without surveillance coverage in each region.

3.25 NAARMO presented WP/13 and P/04 to provide the vertical safety monitoring report for the continued safe use of the Reduced Vertical Separation Minimum (RVSM) in Miami Oceanic, New York West, and San Juan airspace. The purpose of this report is to compare actual performance to safety goals related to continued use of the RVSM in Miami Oceanic, New York West, and San Juan Airspace. There are 29 reported events accounting for 62 minutes spent at an unexpected/incorrect Flight Level (FL) during calendar year 2021. This report also contains an estimate of the vertical collision risk. The vertical collision risk estimate for the airspace exceeds the Target Level of Safety (TLS) value of 5.0×10^{-9} fatal accidents per flight hour.

3.26 There were 48 reported occurrences reviewed by the scrutiny group for the Miami Oceanic, New York West, and San Juan airspace. The scrutiny group consists of operational experts from each air traffic control facility, representatives from FAA Flight Standards and Airspace Safety, and safety analyses experts from the NAARMO. The scrutiny group met virtually several times and reviewed all forty-eight reported occurrences from calendar year 2021. Resulting from the work of the scrutiny group, there were twenty-nine validated LHD occurrences during calendar year 2021. An increase in both the number of reported LHDs and duration spent at the unexpected/incorrect FL was observed in 2021 compared to the previous years. This result was expected due to the ongoing recovery from the COVID-19 pandemic and associated increase in flight activity. There was an increase in the number of reported LHDs involving the transfer of ATC control. There were eleven category E events in 2021.

In 2020, there were six reported occurrences with a total of nine minutes duration that involved the transfer of ATC control. During the scrutiny reviews, ATC operational experts indicated these category E occurrences are discussed during routine teleconferences attended by representatives from the adjacent facilities. For example, the Miami, Houston, and Havana ATC centres have a weekly Automatic Data exchange (ADE) teleconference that provides opportunities to discuss related issues.

Table 2-3. Validated operational LHDs by area – 2021

Airspace	Number of LHD	Duration at unexpected FL (min)	Number of unexpected FLs crossed
Miami Oceanic/San Juan FIRs and New York West boundary	9	9	3
New York West FIR	11	53	20
Total	**20**	**62**	**23**

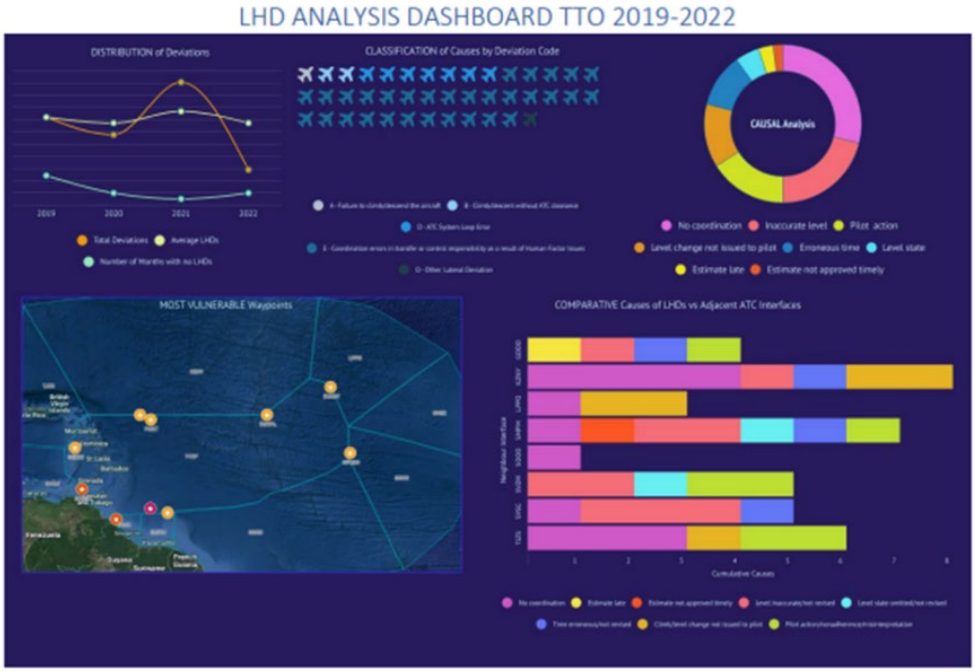
3.27 Based on the December 2021 traffic data, the NAARMO estimates approximately 618,437 annual flying hours for 2021 in Miami Oceanic, New York West, and San Juan airspace where the RVSM is applied. This represents an average 54 percent increase in flying hours compared to 2020.

3.28 With respect to the airspaces of the CAR Region accredited to the CARSAMMA, and that are contiguous to the airspaces in which the United States provides air traffic control services, accredited to the NAARMO, it was identified and opportunity for improvement regarding the validation and sharing of information for the LHDs. Consequently, the GTE agreed the following conclusion:

DRAFT CONCLUSION GTE/22/03	**VALIDATION AND SHARING OF LHD DATA FOR AIRSPACES OF THE CAR REGION CONTIGUOUS TO THE UNITED STATES**
What: That,in order to ensure validation and adequate coordination for LHD events in the CAR Region occurred in the TCPs with United States: a) The Points of Contact that receive notification of possible LHD events, which occurred in the TCPs with the ATS facilities of United States, take actions to validate such events by sending the notification to the facilities ATS points of contact and to NAARMO; b) After the validation actions have been carried out, the LHD information be sent to CARSAMMA as specified in the established procedures and times. The validated LHD information is also sent to NAARMO; and	**Expected impact:** ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Operational/Technical

c) The GTE amend its terms of reference and the manual of contact points accredited to the CARSAMMA to include guidelines for validation of LHD events occurred in the TCPs with United States by the GTE/23 meeting.	
Why: To enhance data analysis and sharing between NAARMO and CARSAMMA accredited States/ANSPs	
When: GTE/23 Meeting	**Status:** ☒ Valid / ☐ Superseded / ☐ Completed
Who: ☒ States ☐ ICAO ☒ Other:	NAARMO, GTE

3.29 Under this Agenda Item Trinidad and Tobago presented IP/04 to inform the adoption of a Dashboard by the Air Traffic Services and Air Navigation Services (ATS & ANS) Safety Department of the Trinidad and Tobago Air Navigation Services provider (ANSP) as a visual progress report and data driven decision platform in the mitigation of the risks associated with the occurrence of LHDs. Data is collected and analyzed for descriptive features such as trends in LHD distribution and the most vulnerable Waypoints. The investigative aspects focus on comparative and causal analyses of the risks and prioritizing the adjacent ATC interfaces that require urgent collaborative dialogue about mitigation strategies. The Dashboard will feature a predictive analysis or forecast of LHDs when the data set and period are sufficiently large. The Dashboard is an example of using data driven decision techniques in the risk mitigation of LHDs.



3.30 NAARMO presented IP/ 06 with an assessment of non-State-approved operators using the RVSM airspace overseen by NAARMO in North American and New York West airspace. The assessment process is described and the results for period December 2021 are presented.

3.31 NAARMO did not receive a traffic sample from Mexico for this assessment period; therefore, no scrutiny work was completed for this airspace. NAARMO is currently working with Mexico to obtain traffic data. Experience has shown that the primary systematic reason for failure to match operations and approvals is a delay in State notification of the approval status of some operators to the appropriate Regional Monitoring Agency (RMA). Thus, the importance of timely notification by States of operator approval status to RMAs is emphasized by these results. The NAARMO is implementing a new process for more frequent traffic compliance checks. More frequent compliance checks will help identify repeat operations that file an RVSM approval, without having an approval.

3.32 NAARMO provided the results of the Traffic Compliance Monitoring to the relevant RMAs.

3.33 NAARMO presented IP/07 and P/02 to provide the vertical safety monitoring report for the continued-safe use of the RVSM in Mexico Airspace. This work makes use of LHD reports and traffic data for Mexico and Gulf of Mexico (GOMEX) airspace for calendar year 2021. The purpose of this report is to compare actual performance to safety goals related to continued use of the RVSM in Mexico airspace. This report contains a summary of LHD reports received by the NAARMO for the calendar year 2021. There are thirty-five reported LHDs in calendar year 2021 for Mexico airspace. This report also contains an estimate of the vertical collision risk. The vertical collision risk estimate for Mexico airspace exceeds the target level of safety (TLS) value of 5.0×10^{-9} fatal accidents per flight hour.

3.34 Thirty-four of the thirty-five LHD reports involve coordination errors in the ATC transfer (LHD categories E and F).

3.35 Colombia presented IP/08 with information of the actions that are being taken in the FIR Bogotá, to mitigate the Operational Risk due to LHD events. Colombia, through the LHD team of the FIR BOGOTA, presents a list of the topics and recommendations that through the training of the ATC personnel of the BOGOTA ACC, on the LHD topic, are being strengthened in order to raise the situational awareness of ATC and thus comply with the operational safety standards in the FIR BOGOTA.

3.36 The Secretariat presented P/05 to provide an update on Communications, Navigation and Surveillance (CNS) infrastructure and automation in the CAR Region. This presentation included information on the implementation status of the ATS surveillance systems in the CAR Region, an update on the MEVA III communication network, and the automated data exchange protocols between control centres, as well as key aspects to ensure their adequate integration to the provision of ATS.

Agenda Item 4: Activities and tasks to be reported to GREPECAS

Technical risk of the RVSM airspace of the CAR/SAM Regions

4.1 Under this Agenda Item CARSAMMA presented WP/06 to provide the summary of the calculation of the vertical collision risk in the CAR/SAM Regions for 2021, using the Collision Risk Model (CRM) methodology and to show that the safety criteria defined in ICAO Doc 9574 and Doc 9937 continue to be met in the CAR/SAM Regions.

4.2 The sample data to estimate the pass frequency and physical parameters, as well as the dynamics of a typical aircraft for the assessment of vertical collision risk were collected from 1 to 31 December 2021. Upon receiving the aircraft movement data, CARSAMMA proceeded to filter and process the data received from the 29 CAR/SAM FIRs, which were processed and used to assess the safety of the RVSM airspace, as recommended by the ICAO. The data from 5 FIRs of the CAR/SAM Region were not received or considered unusable for this analysis.

4.3 The table below shows the consolidated collision risk in the CAR/SAM FIRs in for 2021, showing the estimated vertical collision risk by FIR.

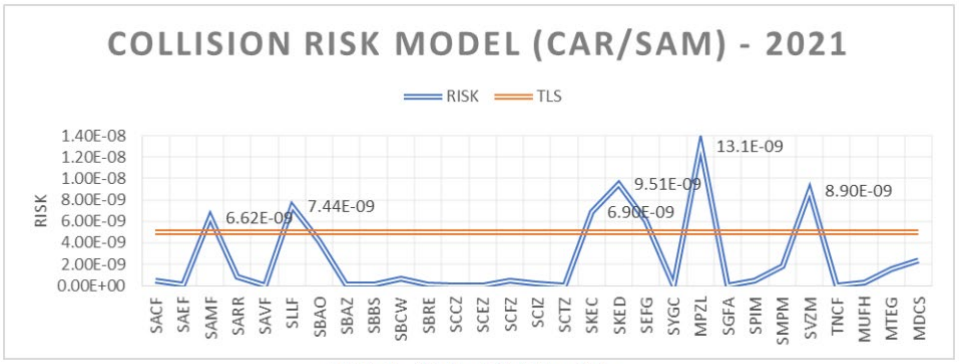


Table 7 – Vertical Collision Risk

4.4 The technical risk of the CAR/SAM Regions RVSM airspace meets the Target Level of Safety(TLS) value, not exceeding 2.5 x 10^{-9} fatal accidents per flight our due to loss of the standard vertical separation of 1,000 ft and all other causes. The operational risk does not have a predefined limit, in accordance with ICAO Doc 9574. The estimated total risk for the CAR/SAM FIR is 2.76 x 10^{-9} below the TLS (5.0 x 10^{-9}). The graph below shows the results of the last six years of vertical collision risk in these regions, in which an increase trend has been noticed.

Table 9

RASG_PA – GREPECAS Coordination

4.5 IATA presented WP/10 to discuss the Terms of Reference (ToRs) for formalization of the collaboration methodology on safety data/information review between the GTE and the Pan America Regional Aviation Safety Team (PA-RAST, specifically data related to LHDs and Traffic Collision and Avoidance System-Resolution Advisories (TCAS- RAs).

4.6 The cooperation between the Planning and Implementation Regional Groups (PIRGs) and Regional Aviation Safety Groups (RASGs) stems from the ICAO's Council resolve for working groups to optimize results and avoid duplication of efforts for States and the Secretariat. The Joint GTE and Regional Aviation Safety Team – Pan America (RASG-PA) collaboration aims to strengthen the coordination of reported occurrences for the purpose of safety risk mitigation in the NAM/CAR/SAM Regions.

4.7 In order to formalize the working structure of the group, the Meeting agreed to endorse the adoption the ToRs shown in Appendix to WP/10 in support of the formalization of the cooperative work between the GREPECAS and RASG-PA, so the Meeting formulated the following draft conclusion:

DRAFT CONCLUSION GTE/22/04	**SUPPORT FOR GREPECAS/RASG-PA COLLABORATION**
What: That, In order to strengthen the collaboration between GREPECAS and RASG-PA, promoting the exchange of information that supports the mitigation of safety events identified in the CAR/SAM Regions a) GTE endorse the adoption of the Terms of Reference for the collaboration between the GREPECAS and the RASG-PA as presented in the Appendix of GTE/22 — WP/10; and	**Expected impact:** ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Operational/Technical

	b) the rapporteur of the GTE inform GREPECAS/20 meeting of the favourable opinion on the aforementioned terms of reference.	
Why: To promote the sharing of information to enhance safety in the CAR/SAM Regions		
When:	GREPECAS/20	**Status:** ☒ Valid / ☐ Superseded / ☐ Completed
Who:	☒ States ☐ ICAO ☒ Other:	GTE Rapporteur

4.8 With WP/11 IATA provided more details on the cooperation on safety data/information review between the GTE and the PA RAST, specifically data related to LHDs and TCAS RAs. Conclusions from the GTE continue to support a collaborative approach for the data exchange process for airspace improvements, with a clear mandate to review data in compliance with the data confidentially framework.

4.9 The PA-RAST concludes to continue to emphasize the need for this type of collaboration to identify opportunities for improvements in the lower and upper airspaces including boarder transfer areas where such opportunities exist in compliance with data confidentiality rules.

4.10 To further advance the work of the group, the team has met virtually with members from the NACC and SAM Regions invited to support development of the strategic framework. This framework is aimed at the identification of safety opportunities and development/implementation of applicable Safety Enhancement Initiatives by stakeholders.

4.11 Preliminary review of the trend information for TCAS RAs from 2019 through 2021 provides insights on the position/points where higher risk values where generally identified by the CARSAMMA analysis and from IATA Global Aviation Data Management (GADM) analysis. In reviewing LHD events especially TCAS RA events the data show less captured TCAS RA events in the analysis, with the understanding that LHD's report are mainly focused on RVSM airspace. Therefore, States are encouraged to inform through the safety groups or applicable mechanism, TCAS RA events that are captured in their airspace as part of this process to enable better correlation of the data/information.

4.12 The group will further evaluate the preliminary information with applicable States/Air Navigation Services Providers (ANSP's) during in-person meetings proposed to take place during each GTE and PA-RAST meetings at least once a year as part of the work program to progress the work.

4.13 CARSAMMA presented IP/02 with information related to the work of the aircraft audit of the RVSM Airspace in the year 2021 and the estimated workload to comply with the Minimum Monitoring Requirements (MMRs). CARSAMMA verifies the status of approved aircraft in RVSM airspace on a monthly basis, analysing the data contained in the flight plans, in particular the "equipment" and "other data" fields. Until 2020, of all the relevant States for CARSAMMA, provided for in Doc 9937, the only State that provided the necessary flight plans for data verification was Brazil. In 2021, the GTE agreed to provide data to CARSAMMA to expand the audit process, starting to receive data from other States of the CAR/SAM Regions, as shown in the table below, where a monthly average of 2 and 3% of flights belonging to registrations not catalogued as RVSM approved.

	JAN	FEB	MAR	APR	MAY	JUN
ARG		6.341		6.050	4.773	4.033
BOL	9.195	9.860	11.205	8.260	9.699	9.774
BRA	65.414	54.888	55.520	86.025	96.414	133.193
CHL	8.806		6.774	5.042	6.443	4.426
CUB	17.818					21.403
ECU						841
HTI	1.154	954	1.228	1.263	1.132	1.154
VEN		264	237		270	254
TOTAL	**102.387**	**72.307**	**74.964**	**106.640**	**118.731**	**175.078**
Identified FPL's	2.949	2.053	1.986	2.541	2.739	3.302
Identified Records	346	258	234	276	269	384
Percentage	2,88%	2,83%	2,64%	2,38%	2,3%	1,89%

	JUL	AUG	SEP	OCT	NOV	DEC
ARG	6.373	7.049	7.312	8.534	10.475	
BOL	10.614	9.633	6.078	9.210	6.336	
BRA	106.276	104.336	102.580	100.098	102.264	
CHL	8.888		10.556	11.886	12.235	
CUB	22.890	21.269	19.788	21.208	23.539	
ECU		1.752	1.678	1.874	1.762	
HTI	1.168	1.166		1.176	1.246	
VEN	231		391	494	497	
TOTAL	**156.440**	**145.205**	**148.383**	**154.480**	**158.354**	
Identified FPL's	4.197	3.262	3.534	3.755	5.652	
Identified Records	431	357	408	249	481	
Percentage	2,68%	2,25%	2,50%	2,43%	3,57%	

Table 1 – Air movement and aircraft without RVSM certification

4.14 In mid-2021, in order to comply with the MMR, CARSAMMA began a review process of the RVSM approvals contained in its database. In July 2021, CARSAMMA had 1,106 aircraft with an approval date of more than two years. Until April 2022, CARSAMMA, in parallel to normal activities, maintained a constant dialogue with the Civil Aviation Authorities of the States and territories of the Caribbean and South America to verify approval records.

Agenda Item 5: Other Business

5.1 Under other business, CARSAMMA presented WP/07 to report the progress in the implementation of the digitization of the F4 form of LHD reports.

5.2 The LHD is a descriptive report form, with 22 fields currently, completed by the Air Traffic Controller (ATCO), of any operational and/or technical error that presents a vertical deviation of 90 meters (300 feet) or more with respect to the flight level that the aircraft should occupy. Considering the advances in information technology (IT), the possibility of integrating LHD reports with other systems, studies on the future reduction of vertical and horizontal separations between aircraft, investments in the quality of services provided, it seems that the development of a digitized system for reporting LHD will provide essential benefits to increase safety in RVSM airspace. Among the main expected advances, the following stand out: a more solid and reliable database, a more simplified process (the easier it is to fill out the LHD, the greater the motivation to report it), less intervention of the PoC in the aspect of controlling the sending of LHD reports (they will be able to concentrate their efforts on promoting Operational Safety) and for the future creation of indicators (Dashboard).

5.3 CARSAMMA presented the results of the tests carried out with the use of the electronic form for notification of LHD events (eF4), during the presentation the progress that has been made in the use of this electronic means for reporting events was demonstrated. As part of this presentation, several States expressed their queries regarding the use of the eF4, including the consideration of establishing restricted access to the electronic form so that it can only be used by the PoC; likewise, ensure that the validation process of the events between the PoCs is maintained. The NAARMO representatives requested that in the use of the eF4 specifically regarding the validation of the events reported in the Caribbean border with the Region under NAARMO's responsibility, they be included in the validation process.

5.4 The Secretariat recognized that the use of the electronic form represents an important step in the monitoring of RVSM airspace, however, there are still several opportunities for improvement in its use, it is recommended that the tests continue until the end of March 2023 to hold a meeting to analyse the test results, and present it to GTE/23 for consideration of their results.

5.5 NAARMO presented WP/12 with the horizontal safety monitoring report for the continued-safe use of the reduced lateral and longitudinal separation minima in New York West Airspace. This work makes use of reported Large Lateral Deviations (LLDs) and Large Longitudinal Errors (LLEs) and Traffic Sample Data (TSD) for calendar year 2021.

5.6 Overall, there is an increase in the number of reported LLDs/LLEs for calendar year 2021 compared to 2020. There were forty-eight reported occurrences from calendar year 2021 reviewed. Thirteen of these occurrences were determined to be risk-bearing LLDs/LLEs.

5.7 CARSAMMA presented IP/03 to provide information regarding the Training Course in Techniques for Monitoring the Height Maintenance Performance of Aircraft in the Federal Aviation Administration (FAA). From the 18 to 22 August, three representatives of CARSAMMA: Luiz Barreto, Hévelin Borges and Renata Gonçalves went to the FAA, in Atlantic City, United States, to attend the training "Method of GMU ASE Processing". An FAA team led by Mr. John Warburton, Coordinator of the Sector Analysis and Separation Standards of the North American Approvals Registry and Monitoring Organization – NAARMO, received the CARSAMMA team and provided the training. By the end of the training, the three members of CARSAMMA were able to perform the ASE Calculation by the GMU method of aircraft in the Caribbean and South America region. All of the classes were very efficient and CARSAMMA is grateful for the FAA's cooperation, hospitality and the high level of the course.

5.8 NAARMO presented IP/05 with an assessment of the monitoring burden associated with the long-term height monitoring requirements for airframes for which the NAARMO is the responsible Regional Monitoring Agency (RMA). NAARMO approvals and global monitoring records as of 30 June 2022 were used to assess the monitoring burden.

5.9 The total number of unique airframes identified as having a full RVSM approval from a state of registry under NAARMO responsibility as of 30 June 2022 was 23,093, with a resultant monitoring burden of 15,155 and a total of 837 aircraft not successfully monitored within the past two years (or 1,000 flight hours, whichever interval was longer). Table 2 provides a summation by State of Registry of airframes that require monitoring due to having no successful monitoring record within two years as of 30 June 2022.

Table 2. Summary of NAARMO monitoring burden

State	Total # of Approved Airframes	Resultant Monitoring Burden (# Airframes)	Total # of Airframes Not Monitored within two years as of 30/06/2022
CANADA	1557	878	300
MEXICO	529	209	22
US – Section 3	21,007	14,068	515
NAARMO Total	**23,093**	**15,155**	**837**

5.10 CARSAMMA and NAARMO presented P/06 with the 2021 Airspace Safety Assessment Caribbean/South America. NAARMO presented an overview of the 2021 reported LHDs for the CAR/SAM Regions. CARSAMMA and NAARMO provided the reported LHD information. The presentation included a live demonstration of NAARMO's LHD dashboard application highlighting several features and customizations to further view, analyse and have a deeper understanding of the data. The dashboard is currently under development.

5.11 Since code E events constitute 95% of the LHDs reported in the CAR/SAM Regions, the meeting requested CARSAMMA and the Secretariat to work on improving the presentation and analysis of these events, considering establishing additional guidelines for the evaluation of the root cause for code type E events. The Secretariat will act according to this improvement.

5.12 NAARMO presented the 2021 North America RVSM Airspace Review during the GTE/22 meeting, which included participants from Canada, Mexico and United States. States were updated on the RVSM approvals audit, aircraft height-monitoring capabilities, reported LHDs, and annual vertical risk estimates.

APPENDIX A
EXECUTIVE LIST OF CONCLUSIONS/DECISIONS

Number	Conclusion/Decision	Responsible for action	Deadline
C/1	MITIGATION ACTIONS AMONG COLOMBIA, ECUADOR AND PANAMA		
	That, after evaluating the information provided by the CARSAMMA regarding the LHD events reported in 2021, where a significant number of events involving the Bogotá, Barranquilla, Guayaquil and Panama FIRs are evidenced:		
	a) The GTE present to GREPECAS the situation of the LHD events that have occurred in the CAR/SAM Regions, paying attention to the FIRs where the greatest number of events were reported, including the FIRs Bogotá, Barranquilla, Guayaquil and Panama, requesting the support of the State authorities in the process of evaluation and mitigation of LHDs;	States, GTE	GTE/23
	b) Colombia, Ecuador and Panama, with the support of the ICAO SAM Regional Office, hold a meeting in the short term for the analysis, preparation and subsequent implementation of an action plan for mitigation measures to address and reduce the recurrence of LHDs events reported in the FIRs under their responsibility; and		
	c) The SAM Regional Office present to the GTE/23 the outcomes of the implemented actions in b) for evaluation.		
D/2	IMPROVED COORDINATION BETWEEN STATES´S AND INTERNATIONAL ORGANIZATIONS POINTS OF CONTACT AND CARSAMMA		
	That, taking into consideration the need to improve the analysis of data related to LHD events that are reported to the CARSAMMA:		
	a) The Points of Contact of the States and International Organizations accredited to CARSAMMA exchange information with the adjacent Area control centres (ACC) in order to validate with the respective Points of Contact each of the LHD events received before being reported to CASAMMA, ensuring that all information related to each event is preserved by each air traffic control centre involved;	CARSAMMA, GTE	GTE/23

Number	Conclusion/Decision	Responsible for action	Deadline
	b) The CARSAMMA organize quarterly teleconferences to provide feedback on the LHD events received in the previous period to verify their validity, as well as to identify trends or safety situations that warrant immediate action; and		
	c) The GTE amend its terms of reference and the manual of contact points accredited to the CARSAMMA to specify the validation period with the adjacent control centres for the LHDs received before being sent to CARSAMMA by the GTE/23 Meeting.		
C/3	VALIDATION AND SHARING OF LHD DATA FOR AIRSPACES OF THE CAR REGION CONTIGUOUS TO THE UNITED STATES		
	That,in order to ensure validation and adequate coordination for LHD events in the CAR Region occurred in the TCPs with United States:		
	a) The Points of Contact that receive notification of possible LHD events, which occurred in the TCPs with the ATS facilities of United States, take actions to validate such events by sending the notification to the facilities ATS points of contact and to NAARMO;	States, NAARMO	GTE/23 Meeting
	b) After the validation actions have been carried out, the LHD information be sent to CARSAMMA as specified in the established procedures and times. The validated LHD information is also sent to NAARMO; and		
	c) The GTE amend its terms of reference and the manual of contact points accredited to the CARSAMMA to include guidelines for validation of LHD events occurred in the TCPs with United States by the GTE/23 meeting.		
C/4	SUPPORT FOR GREPECAS/RASG-PA COLLABORATION		
	That, In order to strengthen the collaboration between GREPECAS and RASG-PA, promoting the exchange of information that supports the mitigation of safety events identified in the CAR/SAM Regions		
	a) GTE endorse the adoption of the Terms of Reference for the collaboration between the GREPECAS and the RASG-PA as presented in the Appendix of GTE/22 — WP/10; and	States, GTE Rapporteur	GREPECAS/20 Meeting

Number	Conclusion/Decision	Responsible for action	Deadline
	b) the rapporteur of the GTE inform GREPECAS/20 meeting of the favourable opinion on the aforementioned terms of reference		