International Civil Aviation Organization
Third Meeting of the Regional Aviation Safety Group – Pan America (RASG-PA/03)

(Punta Cana, Dominican Republic, 27-29 October 2010)

RASG-PA/03 – WP/05
15/10/10

Agenda Item 5: RASG-PA Annual Safety Report Team Presentation

RASG-PA ANNUAL SAFETY REPORT

(Presented by the Secretariat)

SUMMARY

This working paper presents the first RASG-PA Annual Safety Report including safety information available from different sources to assist RASG-PA in making data-driven decisions as recommended by the ICAO Global Aviation Safety Plan (GASP).

References:

This working paper is related to the following focus area objectives of Global Safety Initiative (GSI) # 3 of the GASP:

Objective # 3 "Collate regional safety data."
Objective # 4 "Implement international sharing of data/global data reporting system."

It is also related to GSI # 12, "*Use of technology to enhance safety"* Best Practice (BP) 12 a-1 a: "Establish data-driven, prioritized list of known and highly likely regional aviation safety threats" and BP 12 a-1-b "Use consensus-based process to provide qualitative threat assessment as appropriate."

Strategic Objectives	*This working paper is related to Strategic Objective A: Safety – Programme # 3.*

1. Introduction

1.1 As indicated in the ICAO Global Aviation Safety Plan, safety is a "performance expectation," which raises the issue of the best way to measure risk. The GASP highlights that "*a most effective quantitative risk management programme would be one in which information sharing is the norm.*"

1.2 RASG-PA has the challenge to develop a proactive or predictive approach to risk assessment, which requires an innovative safety-related data collection and analysis approach to formulate safety strategies.

1.3 Objective 3c of the Global Aviation Safety Roadmap (GASR) highlights that in many States, the level of activity is too low to permit reliable safety analysis. In addition, it is more difficult to establish an open reporting system in smaller States where the aviation community is made up of a small group of individuals who know each other personally. The collation of data at the regional level overcomes this problem. Moreover, many of the safety problems are regional in nature and are best addressed at the regional level.

1.4 Best Practices (BPs) 3C-1 to 3 call for an entity to be designated in each region as the focal point for collating safety data using common methodologies analyzing and taking action at regional and State levels to correct deficiencies and categorizing safety data based on the ICAO common taxonomy.

1.5 Also, BP 12a-1 calls for the establishment of a data-driven, prioritized list of known and highly likely regional aviation safety threats and for the use of a consensus-based process to provide qualitative threat assessment as appropriate and includes as metrics "*Data-driven current list of prioritized regional safety threats.*"

1.6 During the beginning it was agreed to prepare a working paper with a safety data analysis available from different sources to be analyzed by the RASG-PA Executive Steering Committee. The objective would be to illustrate a method that could be used to analyze and categorize safety data and provide RASG-PA with a valuable tool for decision-making.

1.7 A working paper was presented to the RASG-PA ESC/2 Meeting (Lima, Peru, 24-25 March 2009) and the ESC adopted conclusion RASG-PA ESC/2/10 as follows:

Conclusion RASG-PA ESC/2/10 Working Paper on Safety Information

That:

a) the working paper should continue as a "living document" to assist RASG-PA in the development of future work programmes and to prioritize RASG-PA efforts based upon data-driven identified risks. ***Moreover, this document will form the basis for a future RASG-PA annual safety report****;*

b) in the future, the data gathered and analyzed should create a more proactive and predictive approach towards risk analysis;

c) the Regions should increase the rate of reporting accidents and serious incidents through the use of ECCAIRS; and

d) RASG-PA members will use the CAST/ICAO Taxonomy.

1.8 This working paper is presented to RASG-PA in line with the above conclusion and shows the main aviation hazards identified by the RASG-PA ESC/2 supported by different data-driven sources. The data is only forensic; however, it is expected that in the future proactive and predictive data could be incorporated.

1.9 Subsequently, the RASG-PA/2 Meeting agreed that the next step for RASG-PA was to determine mitigation strategies for these risk areas and prioritize the implementation of these strategies, which is being developed by the RAST-PA Working Group.

1.10 Afterwards, the meeting considered a proposed layout for the RASG-PA Annual Safety Report. The meeting noticed the importance of adding regional accident and incident data in a standardized format and the need to migrate from the use of forensic data only to a combination of forensic, proactive and predictive data and agreed to develop a RASG-PA Annual Safety Report to be presented to RASG-PA regular annual meetings in order to support a data based approach, using forensic, proactive and predictive information for the identification, prioritization and implementation of measures to mitigate safety within the region, using an agreed format.

2. Discussion

2.1 The **Appendix** to this working paper presents the first RASG-PA Annual Safety Report for 2009, which was developed with the information obtained from ICAO, IATA and BOEING.

2.2 The reactive information section focused on fatal incidents to be consistent with the approach used by RASG-PA/02. From the analysis of this information, it was concluded that the most common accident categories in our Region are:

- Loss of Control In-flight (LOC-I)
- Runway Excursion (RE)
- Controlled Flight Into Terrain (CFIT)

2.3 Statistics in CFIT show an important improvement in the last five years; therefore, RASG-PA should confirm this trend in the next year, ensure the sustainability of the implemented mitigation actions and determine if it would be necessary to implement additional mitigation actions.

2.4 On the other hand, and considering that accuracy of mitigation actions of a performance-based approach to improve safety depends mostly on the quality of the data available, and also when noting that there is much scope to improve the State's obligations with regard to Annex 13, the report suggests RASG-PA to consider starting actions with regard to global safety initiative #4 (GSI # 4) of the Global Aviation Safety Plan (GASP).

3. Suggested Action

3.1 The Meeting is invited to:

a) approve the first RASG-PA Annual Safety Report for 2009; and

b) identify improvement opportunities for the RASG-PA Annual Safety Report to be considered in the next version.

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RASG-PA/03 –WP/05
APPENDIX

2009

RASG-PA

SAFETY REPORT

Issued

September 2010

Regional Aviation Safety Group – Pan America

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1. Introduction

The objective of the Regional Aviation Safety Group – Pan America (RASG-PA) Annual Safety Report is to gather safety information from different sources and determine the main aviation safety risks in the Pan American Region for the purpose of deploying mitigation actions to enhance aviation safety in a coordinated manner.

Every entity involved in aviation safety collects safety data and produces safety information with different perspectives. To ensure that all safety efforts are properly coordinated, the region must first agree on the main safety concerns.

The safety information presented in this report is based on the compilation and analysis of data provided by: Boeing, the International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO).

The report is aimed at safety directors and managers of States, international organizations, airlines, air navigation service providers, airports, manufacturers, safety organizations and other key stakeholders.

The RASG-PA Annual Safety Report comprises three main sections, one for each safety information category:

1. Reactive Information
2. Proactive Information
3. Predictive Information

The results of the ICAO Universal Safety Oversight Audit Program (USOAP) are also presented in the report with the objective of showing the lack of effective implementation (LEI) by the States in reference to the eight critical elements[i] that ICAO considers essential for a State to establish, maintain and improve in order to have an effective safety oversight system.

RASG-PA is the first initiative in civil aviation worldwide designed to address the gaps between air navigation and operational safety implementation activities. These activities involve States, international organizations, airlines, air navigation service providers, airports, manufacturers and regional aviation safety organizations throughout the Americas. The foundation for RASG-PA's work is the ICAO Global Aviation Safety Plan (GASP) and the associated Industry Safety Strategy Group (ISSG) Global Aviation Safety Roadmap (GASR). RASG-PA serves as a focal point to ensure harmonization and coordination of safety efforts aimed at reducing aviation safety hazards and risks in the Pan American Region.

RASG-PA is a regional performance approach for improving aviation safety. The work of Regional Safety Oversight Organizations such as ACSA, CASSOS and SRVSOP is oriented towards strengthening the safety oversight capabilities of States based on a prescriptive approach for improving safety. Both approaches for improving safety are necessary and complementary.

RASG-PA will continue to work on mitigation strategies to address the top safety risk areas for the Pan American Region identified in this report through the Safety Enhancement Initiatives (SEIs) and their associated Detailed Implementation Plans (DIPs) that were

developed by the Regional Aviation Safety Team – Pan America (RAST-PA), which is the RASG-PA working group charged with developing the strategy to address the safety risk areas.

The RASG-PA process is depicted in Figure # 1 below.

The participation of all stakeholders is essential for RASG-PA to accomplish its objective of enhancing safety in the Pan American Region.

For additional information about the report and RASG-PA activities please visit the RASG-PA website: http://www.mexico.icao.int/RASGPA.html

Figure # 1

RASG-PA Process

2. Executive Summary

The Regional Aviation Safety Group – Pan America (RASG-PA) 2009 Safety Report presents - the Group´s analysis of fatal accidents in the Pan American Region.

In accordance with the Sixth Meeting of the RASG-PA Executive Steering Committee (ESC/6), reactive safety data analysis includes fatal accidents only. Nevertheless, non-fatal accident and incident data remains available for future analysis.

RASG-PA extracted information collected from the ICAO Accident/Incident Data Reporting (ADREP[ii]) System and the European Co-ordination Centre for Aviation Incident Reporting System (ECCAIRS[iii]), from the year 2000 until 2009, inclusive, in the Pan American Region as mandated by RASG-PA.

Although different models were used for the analysis of reactive safety information, data provided by different sources, such as Boeing and IATA, showed a strong correlation in categories of the most frequent occurrences in the Pan American Region, which are:

1. Loss of Control In-flight (LOC-I)
2. Controlled Flight Into Terrain (CFIT)
3. Runway Excursion (RE)

It should be noted that the trend shows that CFIT events have notably decreased over the years. Nevertheless, it is recommended that RASG-PA continue its work on the mitigation strategies for all three safety risk areas, as determined by the Group in 2009, as they match the categories of most frequent occurrences previously referred.

In 2009, the number of fatalities in the Pan American Region equalled 252 in 56 accidents involving aircraft with Maximum Take-off Mass above 2,250 kilograms. In the period from 2000 until 2009, the number of fatalities equalled 3,962.

In addition, the results of ICAO Universal Safety Oversight Audit Program (USOAP) showed a high number of States in the Pan American Region having a lack of effective implementation (LEI) level over 30%. The information presented is de-identified but useful for States as a benchmark when implementing regional programs to improve compliance with ICAO Standards and Recommended Practices (SARPs).

In line with ICAO State Safety Programme (SSP) and ICAO Continuous Monitoring Approach (CMA), the implementation of systems to capture and analyze information by the States, such as ADREP/ECCAIRS, will allow appropriate application of Safety Strategies appropriate to the region and, in particular, to each State. However, this will only be possible by improving the quality and quantity of reporting by States. Currently, approximately only 30% of the States in the Pan American region contribute significant amounts of data.

Global Safety Initiative # 4 (GSI #4) of the GASP addresses effective incident and accident investigation. It could be worthwhile for RASG-PA to assess the need to improve the rate of reporting and conducting effective incident and accident investigations and develop implementation actions for State implementation.

3. Safety Information

3.1 Reactive Safety Information

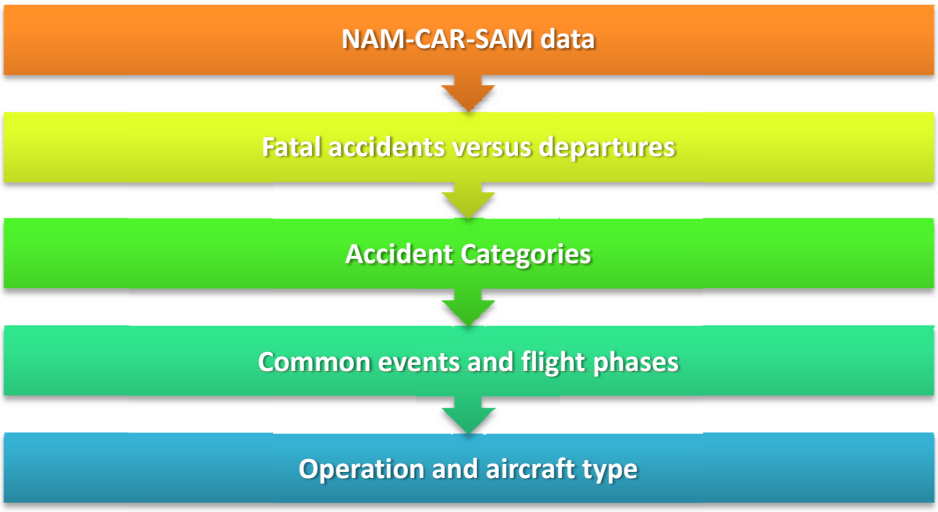
3.1.1 ICAO ADREP/ECCAIRS

The process followed by the group to analyze reactive information consisted of retrieving worldwide data from the ADREP/ECCAIRS System and then narrowing the search to include the States of ICAO's NAM/CAR/SAM Regions.

For this analysis, the main parameters used were:

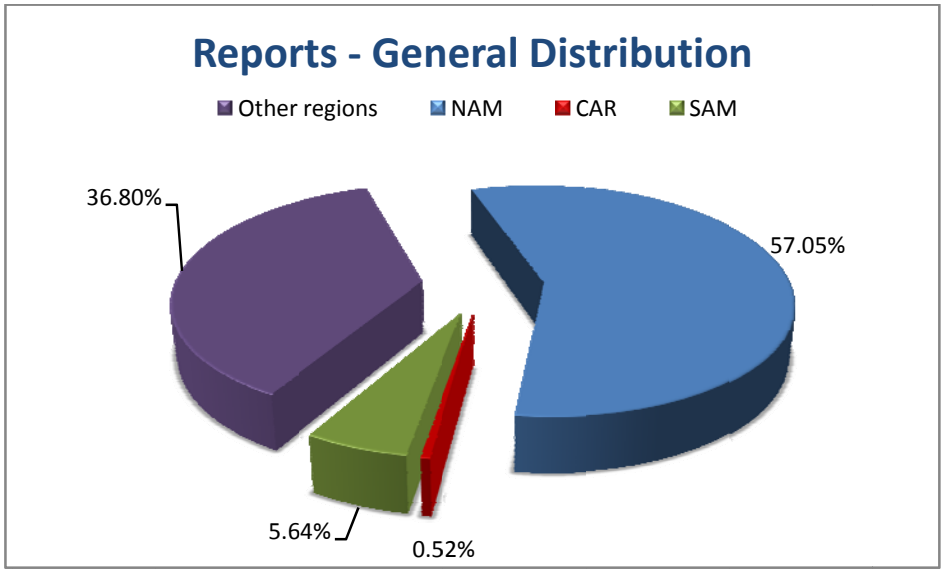
- Timeframe: 01 January 2000 - 31 December 2009
- Aircraft Maximum Take-off Mass (MTOM) above 2,250 kg
- All types of operations
- State/area of occurrence
- The following States/Territories are included:
  - NAM Region: Bermuda, Canada, Mexico, United States.
  - CAR Region: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guadeloupe, Guatemala, Haiti, Honduras, Jamaica, Martinique, Montserrat, Netherlands Antilles, Nicaragua, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Saint Pierre and Miquelon, Trinidad and Tobago, Turks and Caicos Islands, Virgin Islands.
  - SAM Region: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana, Guyana, Panama, Paraguay, Peru, Suriname, Uruguay, Venezuela.
- All classes and categories of occurrence, according to CAST/ICAO Common Taxonomy Team (CICTT), were included.

The structure of the analysis consists of an approach from Global to Regional and to State level, highlighting the areas of interest at different levels, which is depicted in the following diagram.

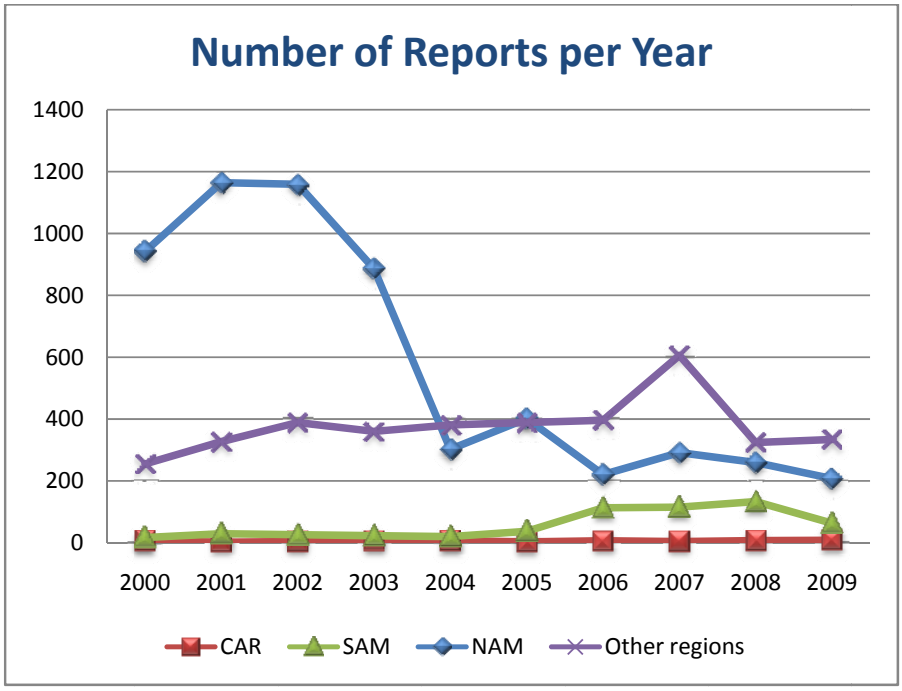


3.1.1.1 Findings in the NAM/CAR/SAM Regions

There were 10,220 official reports in the ADREP/ECCAIRS database for the period from 2000-2009: 5,830 from the NAM Region, 53 from the CAR Region, and 576 from the SAM Region, which is shown in the following figure:

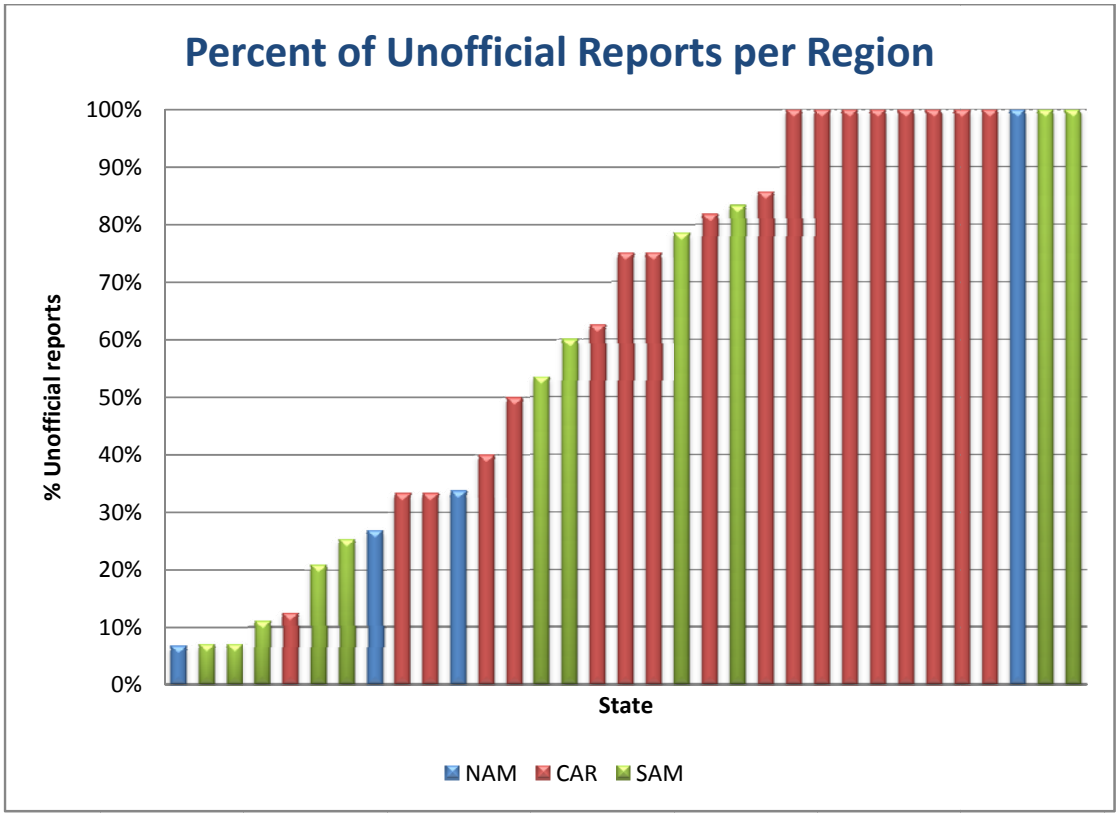


The registered occurrences showed the following variations across the same period:



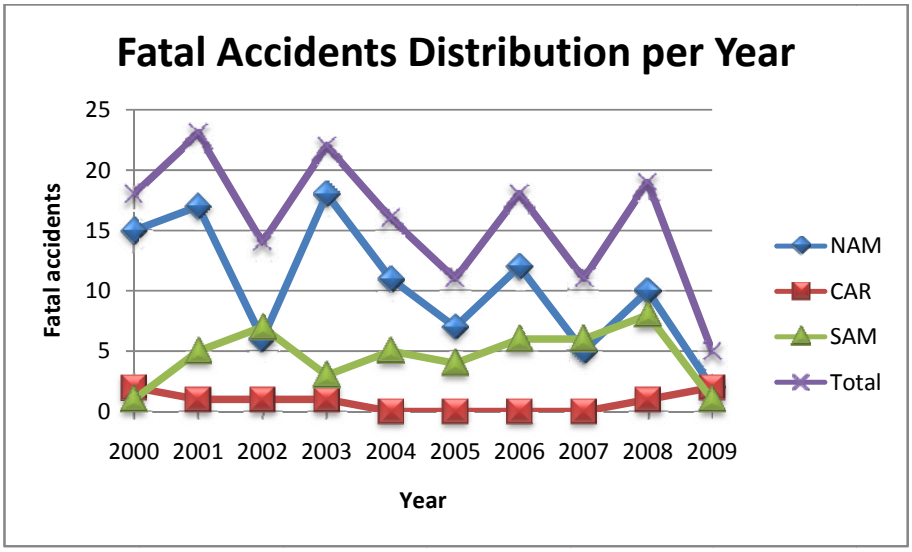
The most significant variation was registered in one of the States of NAM Region due to the reduction of the number of occurrences reported (from 519 in the year 2000 to 5 in the year 2009). It should be noted that the number of reports over the period does not necessarily mean high rates of accidents or other occurrences. They would be associated with the level of the aeronautical activity and reporting policies, especially those related to incident reporting.

In order to get a general idea of the safety culture in Pan American Region, the database was queried to retrieve official and unofficial records. Official reports are based on information provided by the States according to ICAO Annex 13. Unofficial reports include occurrences where there is sufficient information to code them, but are not provided by the competent authority according to ICAO Annex 13. From this query on, the only occurrences included are those involving aircraft with Maximum Take-off Mass (MTOM) above 5,700 kilograms in order to allow rate analysis in association with departure data.



3.1.1.2 Fatal Accidents

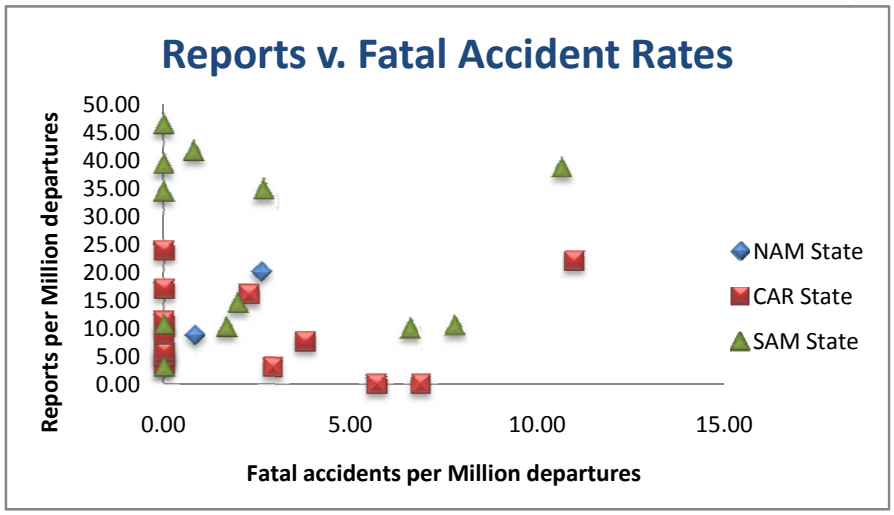
The ADREP/ECCAIRS database was queried in order to determine fatal accident distribution across the period. Only fatal accidents involving aircraft with Maximum Take-off Mass (MTOM) above 5,700 kilograms were included. 157 fatal accidents matching these criteria were found, 8 belonging to CAR Region, 46 to SAM Region and 103 to NAM Region.



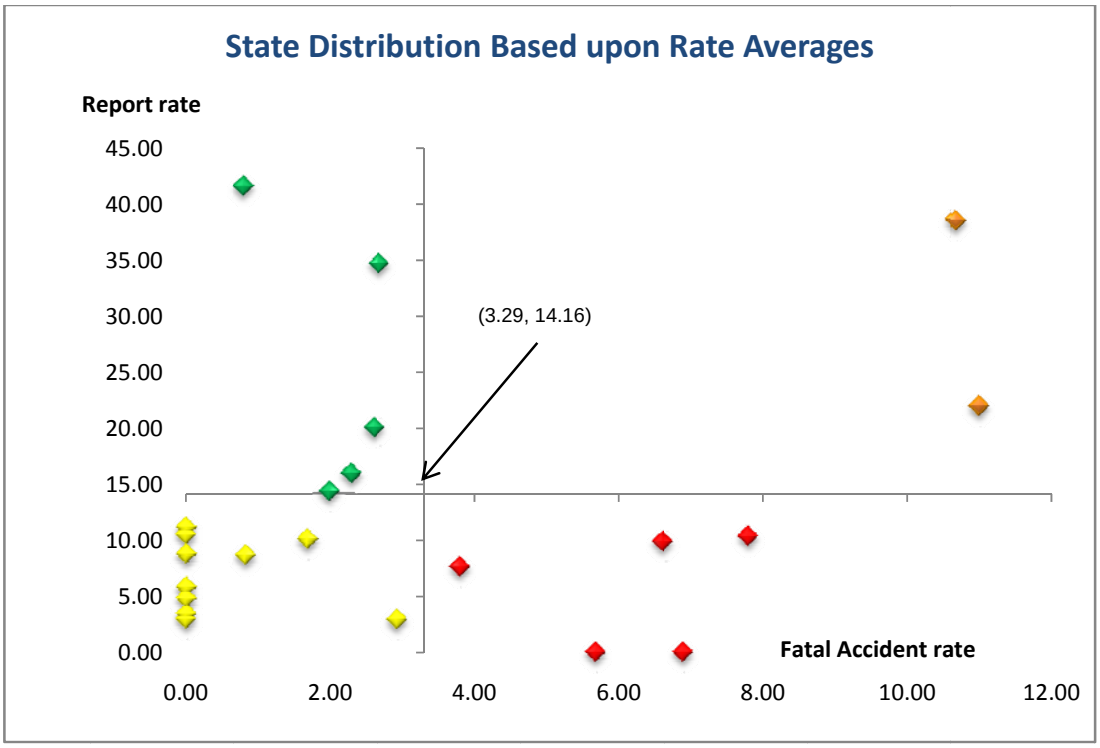
3.1.1.3 Fatal Accidents and Reports per Million Departures

With the purpose of establishing a relationship between reports and fatal accidents per million departures, a more in-depth analysis was conducted considering aircraft with Maximum Take-off Mass (MTOM) above 5,700 kilograms.

The analysis determined that one State belonging to NAM Region showed a report rate of 244.17 reports per million departures while one of the SAM States was found to show a fatal accident rate of 92.81 fatal accidents per million departures. Both States were excluded from the following graphs to avoid statistical dispersion.



The Pan American Region averages for reports and fatal accident rates were 14.16 and 3.29 per million departures respectively. A new breakdown was created defining four quadrants over the averages as presented in the following graph.



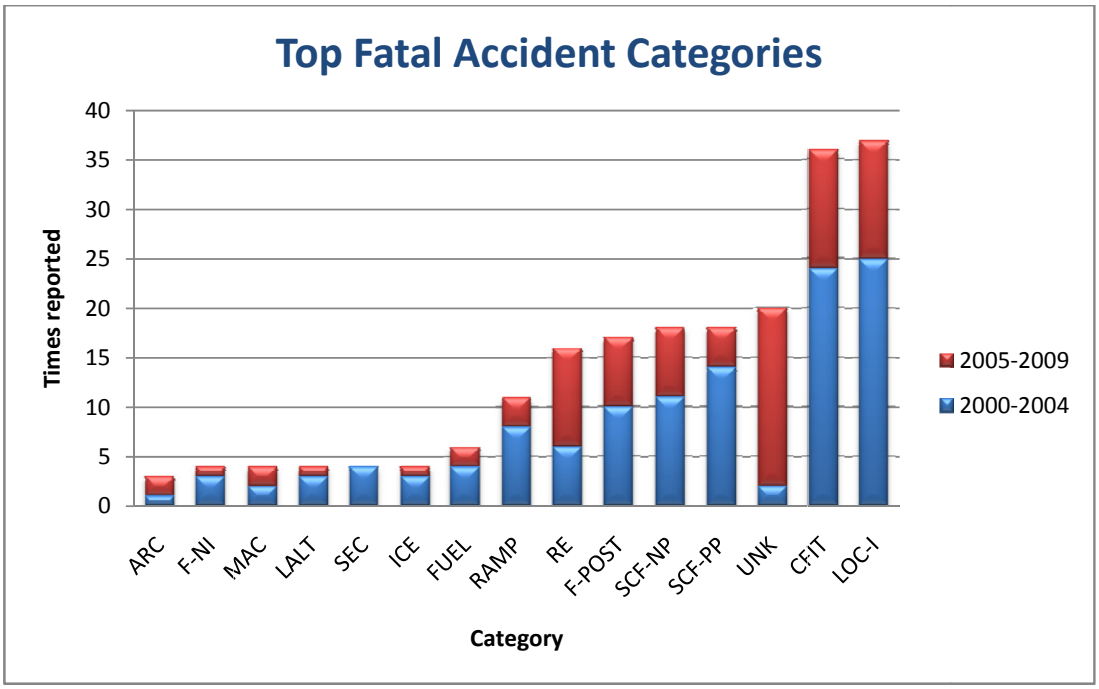
The colors used in the above graph are explained as follows:

- Green: report rate is above the average; fatal Accident rate is below the average.
- Yellow: report and fatal accident rates are below the average.
- Orange: report and fatal accident rates are above the average.
- Red: report rate is below the average; fatal accident rate is above the average.

Note: Ideally, a State should develop and implement reporting practices and mitigation measures in order to reach the upper left quadrant.

3.1.1.4 Analysis per Category

In order to determine the most relevant categories for each region according to CICTT taxonomy, a further analysis was conducted including the official and unofficial accident reports in ADREP/ECCAIRS database. A breakdown of the 15 categories (from the 29 available) showing the highest values was prepared. The distribution according to value is presented in the following graph.



The analysis of the graph above shows increasing values for the ARC, RE and UNK categories for the second period. The most significant decrease was the SEC category, with no records for the second period. The categories showing the highest values were LOC-I (37) and CFIT (36).

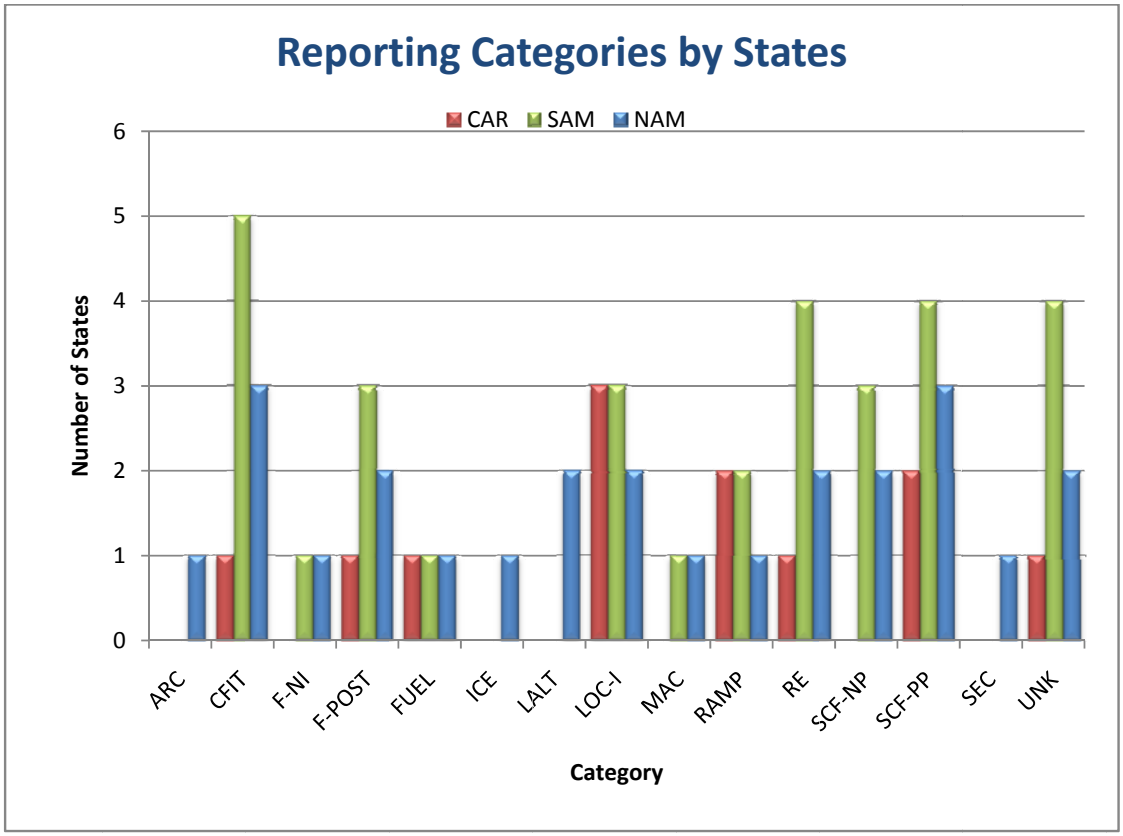
The categories listed in the graph above are defined according to CICTT taxonomy as:

- ARC: Any landing or takeoff involving abnormal runway or landing surface contact.
- F-NI: Fire or smoke in or on the aircraft, in flight or on the ground, which is not the result of impact.
- MAC: AIRPROX/loss of separation/near miss/midair collision.
- LALT: Collision or near collision with obstacles/objects/terrain while intentionally operating near the surface (excludes takeoff or landing phases).
- SEC: Criminal/Security acts which result in accidents or incidents (per the International Civil Aviation Organization [ICAO] Annex 13).
- ICE: Accumulation of snow, ice, freezing rain, or frost on aircraft surfaces that adversely affects aircraft control or performance.
- FUEL: One or more power plants experienced reduced or no power output due to fuel exhaustion, fuel starvation/mismanagement, fuel contamination/wrong fuel, or carburetor and/or induction icing.

- RAMP: Occurrences during (or as a result of) ground handling operations.
- RE: A veer off or overrun off the runway surface.
- F-POST: Fire/Smoke resulting from impact.
- SCF-NP: Failure or malfunction of an aircraft system or component - other than the power plant.
- SCF-PP: Failure or malfunction of an aircraft system or component - power plant.
- UNK: Insufficient information exists to categorize the occurrence.
- CFIT: In-flight collision or near collision with terrain, water, or obstacle without indication of loss of control.
- LOC-I: Loss of aircraft control while in-flight.

A breakdown of category distribution among States was completed. The data was spread over 3 States for the NAM Region, with CFIT and SCF-PP as the highest value categories. In the CAR Region, the most significant categories were LOC-I, RAMP and SCF-PP. In the SAM Region, CFIT was present in 5 States, followed by the RE, SCF-PP and UNK categories.

The following graph presents the number of States per Region affected by the different categories.

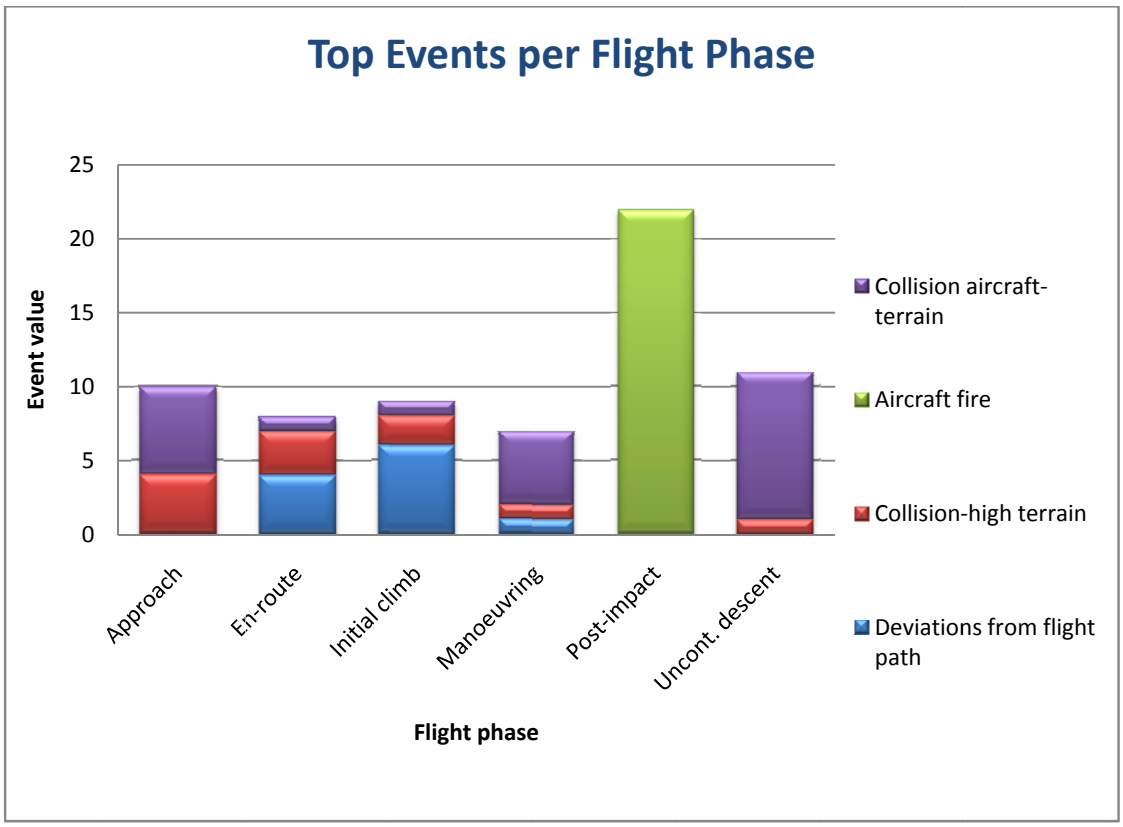


3.1.1.5 Common Events

The most common events (CICTT taxonomy), for the previously analyzed categories were:

1. Collision aircraft-terrain
2. Aircraft collision-level terrain
3. Aircraft fire
4. Aircraft collision- high terrain
5. Aeroplane-deviations from flight path
6. Aircraft overrun
7. Aircraft collision-both aircraft aloft
8. Turbine engine-generally

The following graph illustrates the top 4 events for the most common flight phases (approach, en route, initial climb, manoeuvring, post impact and uncontrolled descent during enroute).

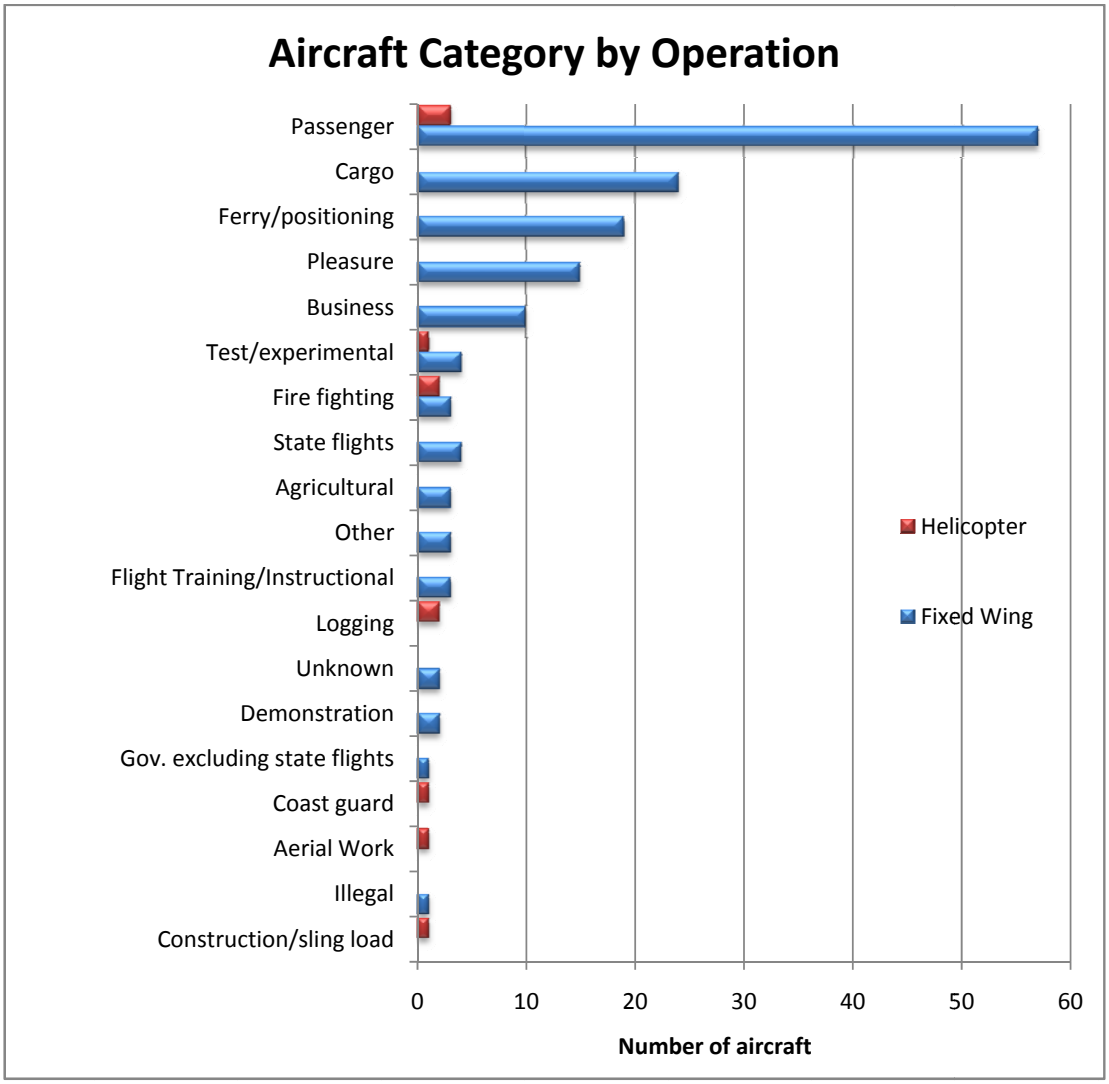


3.1.1.6 Fatal Accidents by Aircraft Category/Operation Type

The dataset was queried with relation to the aircraft categories above 5,700 kg MTOM involved in fatal accidents in the Pan American Region and operation types for the time period. The data analyzed indicates:

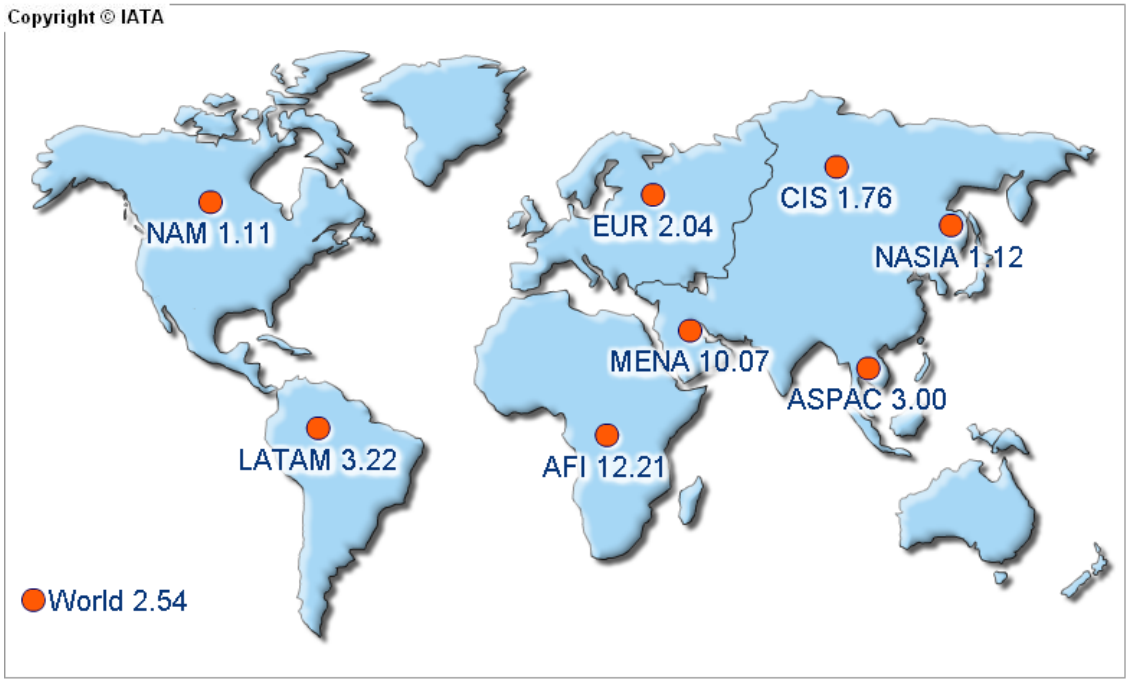
- For the 157 fatal accidents, there were a total of 162 aircraft involved.
- 93.2% of the aircraft involved were fixed-wing and 6.8% were helicopters.
- 79.01% of the accidents occurred during operations related to passenger, cargo, ferry/positioning, pleasure or business.

The graph below represents the abovementioned findings:



3.1.2 IATA Safety Information

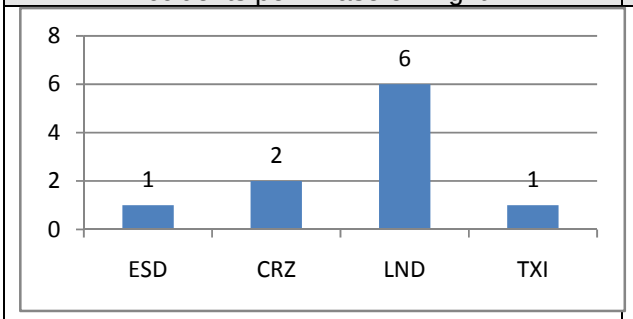
Regional Accident Rates 2009



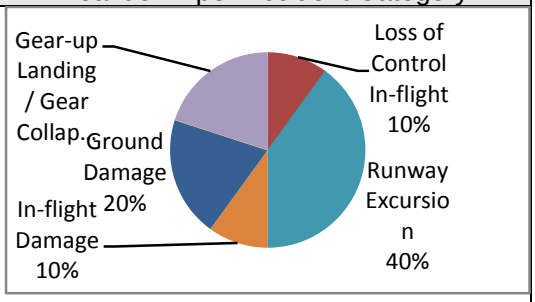
The above graph represents accident rate per million departures of Western and Eastern built aircraft, including jets and turboprops.

Latin America & the Caribbean 10 Accidents (2009)		IATA Members		**10%**
		Hull Losses		**30%**
		Fatal		**10%**
Passenger	Cargo	Ferry	Jet	Turboprop
90%	**10%**	**0%**	**40%**	**60%**

Accidents per Phase of Flight*



Breakdown per Accident Category



Top Contributing Factors**			
Latent Conditions (Deficiencies in…)	Threats	Flight Crew Errors (relating to…)	Undesired Aircraft States (UAS)
20% Regulatory oversight **20%** Safety management **20%** Management decisions **10%** Flight operations: SOPs & checking **10%** Flight operations: Training systems	Environmental **10%** Meteorology: Thunderstorms Airline **30%** Aircraft malfunction **10%** Operational pressure	**30%** Manual handling / flight controls **10%** SOP adherence / SOP cross-verification: Intentional non-compliance	**20%** Incorrect aircraft configuration **10%** Operation outside aircraft limitations

Correlations of Interest		
25% of runway excursions were linked with errors in manual handling / flight controls.		

Contributing factor definitions:

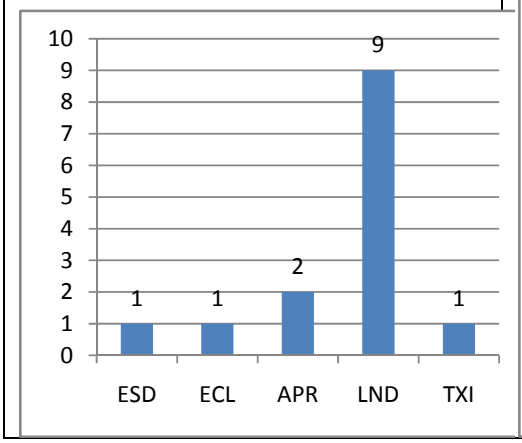
- Latent Conditions: conditions present in the system before the accident and triggered by various possible factors.
- Threats: an event or error that occurs outside the influence of the flight crew, but which requires crew attention and management if safety margins are to be maintained.
- Flight Crew Errors: an observed flight crew deviation from organizational expectations or crew intentions.
- Undesired Aircraft States (UAS): a flight-crew induced aircraft state that clearly reduces safety margins; a safety-compromising situation that results from ineffective error management. An undesired aircraft state is recoverable.

Note: IATA determines the accident region based on the operator's country. Moreover, the operator's country is specified in the operator's Air Operator Certificate (AOC).

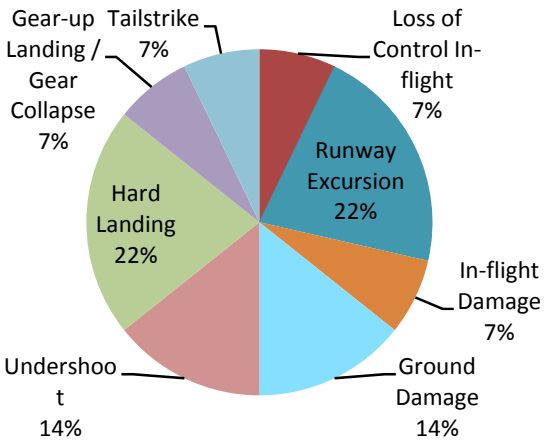
North America 14 Accidents (2009)		IATA Members	**29%**
		Hull Losses	**43%**
		Fatal	**14%**

Passenger	Cargo	Ferry	Jet	Turboprop
64%	**36%**	**0%**	**64%**	**36%**

Accidents per Phase of Flight*

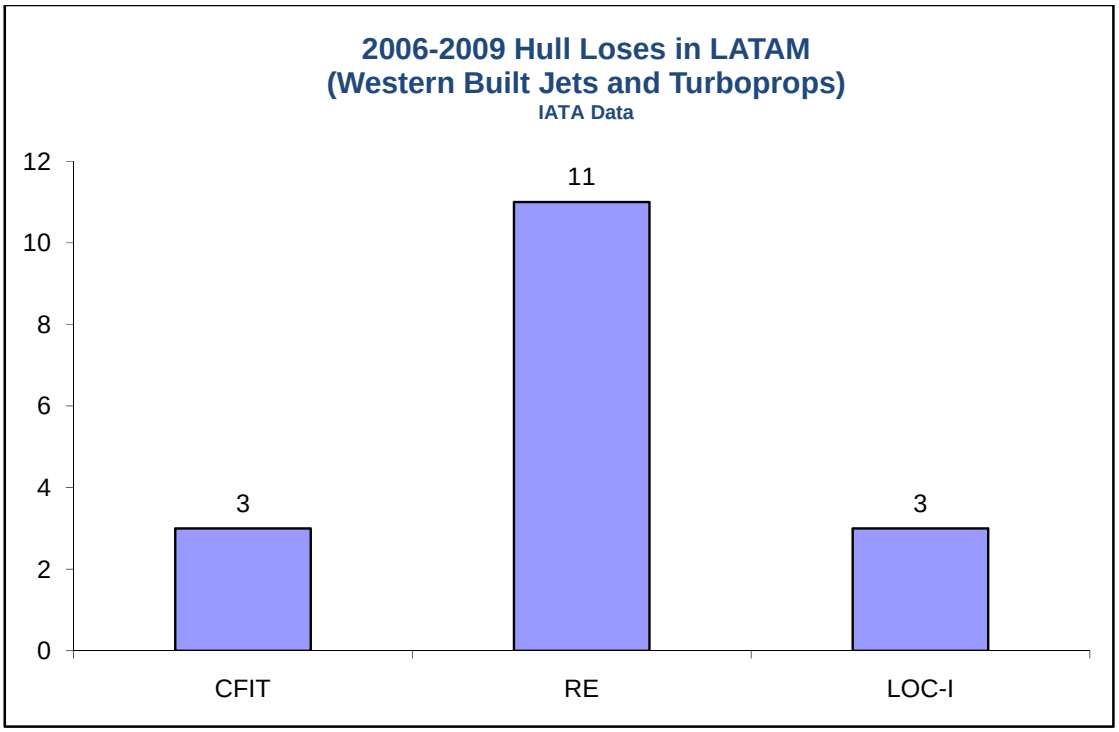


Breakdown per Accident Category



Top Contributing Factors**			
Latent Conditions (Deficiencies in…)	Threats	Flight Crew Errors (relating to…)	Undesired Aircraft States (UAS)
36% Regulatory oversight **29%** Safety management **29%** Management decisions **29%** Flight operations: Training systems **14%** Operations planning & scheduling	Environmental **50%** Meteorology Poor visibility/IMC (**43%** of all these events) Wind / Windshear / Gusty wind (**43%** of all these events) **14%** Lack of visual reference **14%** Ground-based navigation aids malfunctioning or not available Airline **21%** Aircraft malfunction **14%** Maintenance events	**50%** SOP adherence / SOP cross-verification Unintentional non-compliance (29% of all these events) Intentional non-compliance (29% of all these events) **43%** Manual handling / flight controls **29%** Failure to go-around after destabilisation during approach **14%** Callouts	**36%** Long / floated / bounced / firm / off-centreline / crabbed landing **21%** Vertical, lateral or speed deviations **14%** Unnecessary weather penetration

Correlations of Interest		
In **50%** of cases where the crew failed to go-around after a destabilized approach, deficient training systems at the operator were also noted.	In all undershoot accidents, vertical / lateral / speed deviations, non-compliance to SOPs and poor visibility / IMC conditions were factors.	Flight crew training deficiencies were noted in **60%** of accidents where a long / floated / bounced / firm / off-centerline / crabbed landing occurred.


2006-2009 Hull Loses in LATAM
(Western Built Jets and Turboprops)
IATA Data
12
10
8
6
4
2
0
3
11
3
CFIT
RE
LOC-I

Accident Scenarios of Interest (worldwide)

LOC-I

Scenario 1:

The operator in question has deficiencies with regards to safety management and was in an area of weak regulatory oversight. The flight crew faces operational pressures from their airline. They commit SOP adherence and cross-verification errors leading to the aircraft operating outside its limitations or in an incorrect configuration. The flight crew loses control and the aircraft is destroyed.

This scenario is common for 33% of all the loss of control in-flight accidents.

Scenario 2:

While operating in adverse weather, the flight crew commits errors relating to manual handling / flight controls and does not adhere to SOPs. The aircraft undergoes vertical, lateral or speed deviations and subsequently loses control. The aircraft is destroyed.

This scenario is common for 22% of all the loss of control in-flight accidents.

Scenario 3:

The crew encounters an aircraft malfunction during the flight. They commit manual handling / flight control errors and do not adhere to SOPs or perform cross checks. The aircraft is operated outside of its limitations. The crew lose control of the aircraft and it is destroyed.

This scenario is common for 33% of all the loss of control in-flight accidents.

RE

Scenario 1:

The flight crew originates from an airline where training has been identified as an issue and commits manual handling / flight control errors. The aircraft lands long, bounces, or touches down off the centerline on a runway with poor breaking action. The flight departs the runway and is substantially damaged or destroyed.

This scenario is common for 13% of all runway excursion accidents.

Scenario 2:

The flight is operating in a thunderstorm or windy / windshear or gusty wind conditions. The flight crew commits manual handling / flight control errors and loses control of the aircraft. It exits the runway and is substantially damaged or destroyed.

This scenario is common for 17% of all runway excursion accidents.

Scenario 3:

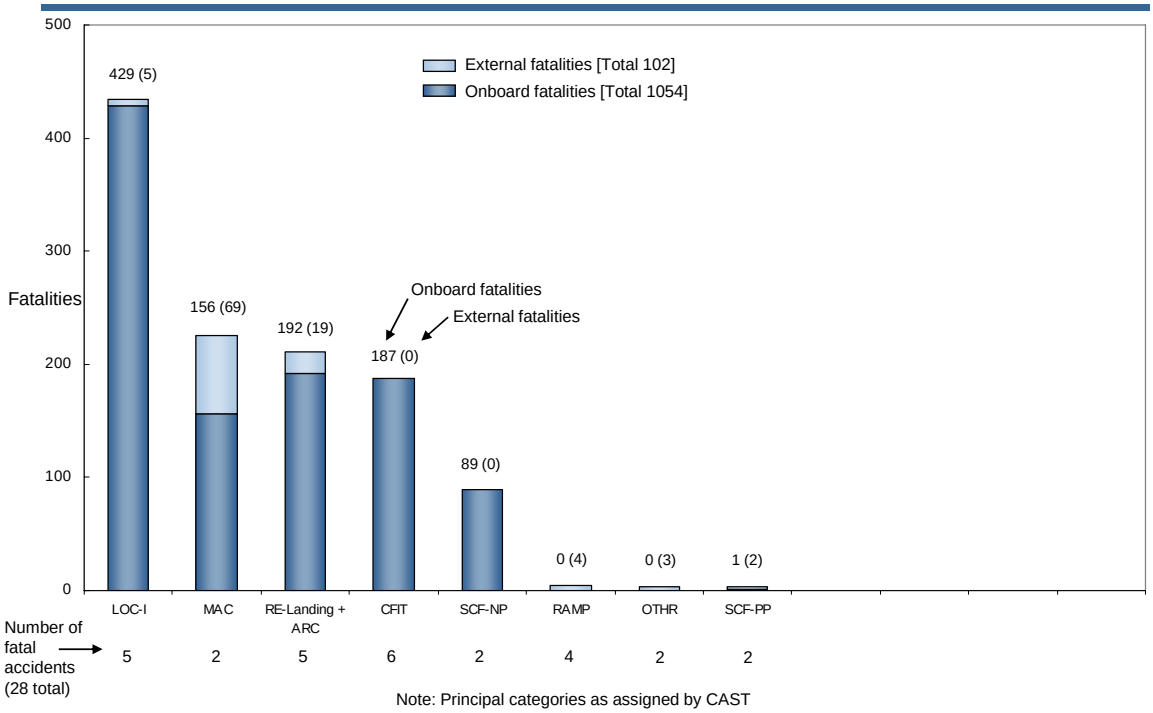
The destination airport in question has weak regulatory oversight and inadequate overrun areas, ditches or structures in close proximity to the runway. The aircraft departs the runway without any notable error by the crew and is substantially damaged or destroyed.

This scenario is common for 9% of all runway excursion accidents

3.1.3 BOEING Safety Information

Fatalities by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories

Fatal Accidents by Airline Domicile – Pan American* Commercial Jet Fleet 2000 Through 2009



Note: Principal categories as assigned by CAST

* Includes: United States, Canada, Latin America and Caribbean

BOEING

April 14th, 2010

Fatal Accidents by CAST/ICAO Taxonomy Accident Category
Pan American* Airline Domicile – 2000 through 2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
CFIT			☐	☐		☐	☐		☐☐		6
LOC-I	☐	☐☐		☐		☐					5
RE-Landing + ARC	☐					☐		☐	☐	☐	5
RAMP			☐	☐			☐			☐	4
MAC			☐				☐				2
SCF-NP	☐☐										2
OTHR		☐						☐			2
SCF-PP		☐							☐		2

ARC	Abnormal Runway Contact	RE	Runway Excursion
CFIT	Controlled Flight into or Toward Terrain	SCF-PP	System/Component Failure or Malfunction (Powerplant)
LOC-I	Loss of Control – In flight	SCF-NP	System/Component Failure or Malfunction (Non-Powerplant)
MAC	Midair/Near Midair Collision	OTHR	Other
RAMP	Ground Handling		

No accidents were noted with the following principal categories:

AMAN	Abrupt Maneuver	F-NI	Fire/Smoke (Non-Impact)	RI-A	Runway Incursion – Animal
ADRM	Aerodrome	F-POST	Fire/Smoke (Post-Impact)	RI-VAP	Runway Incursion – Vehicle, Aircraft or Person
ATM	Air Traffic Management/Communications, Navigation, Surveillance	FUEL	Fuel Related	SEC	Security Related
		GCOL	Ground Collision	TURB	Turbulence Encounter
BIRD	Bird	ICE	Icing	UNK	Unknown or Undetermined
CABIN	Cabin Safety Events	LALT	Low Altitude Operations	USOS	Undershoot –Overshoot
EVAC	Evacuation	LOC-G	Loss of Control – Ground	WSTRW	Wind shear or Thunderstorm

For a complete description go to: http://www.intlaviationstandards.org/

Note: Principal categories as assigned by CAST

* Includes: United States, Canada, Latin America and Caribbean

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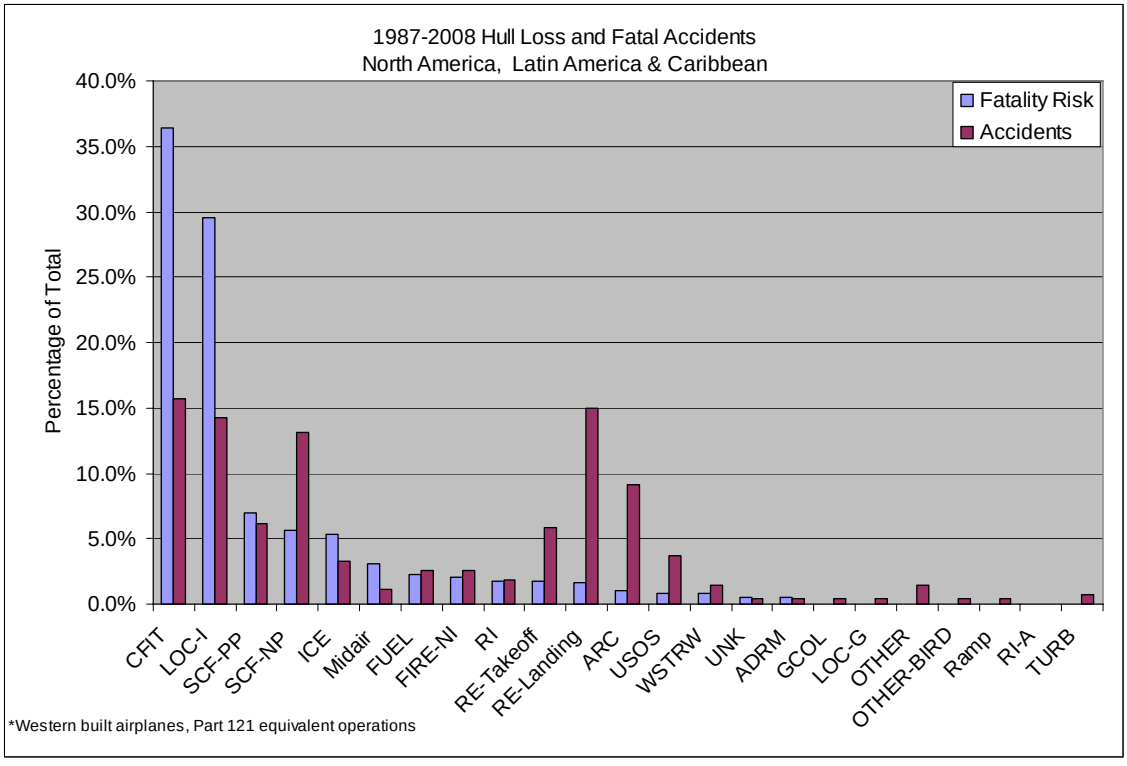
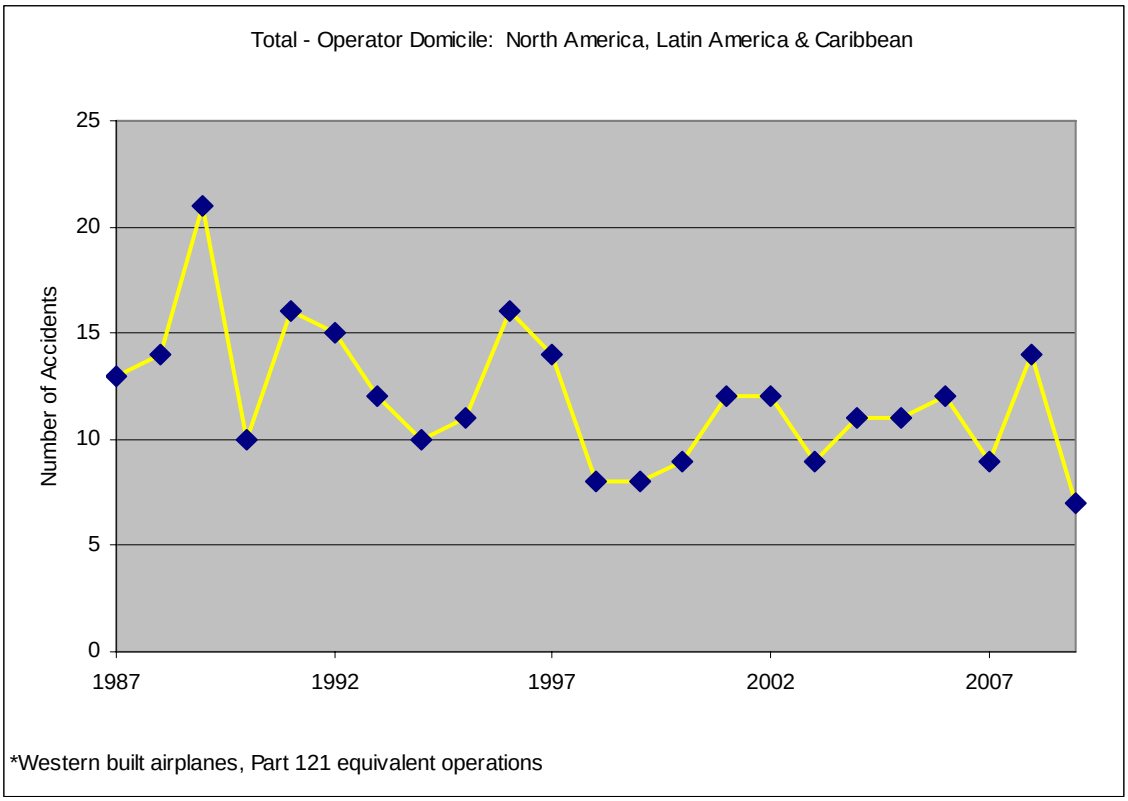
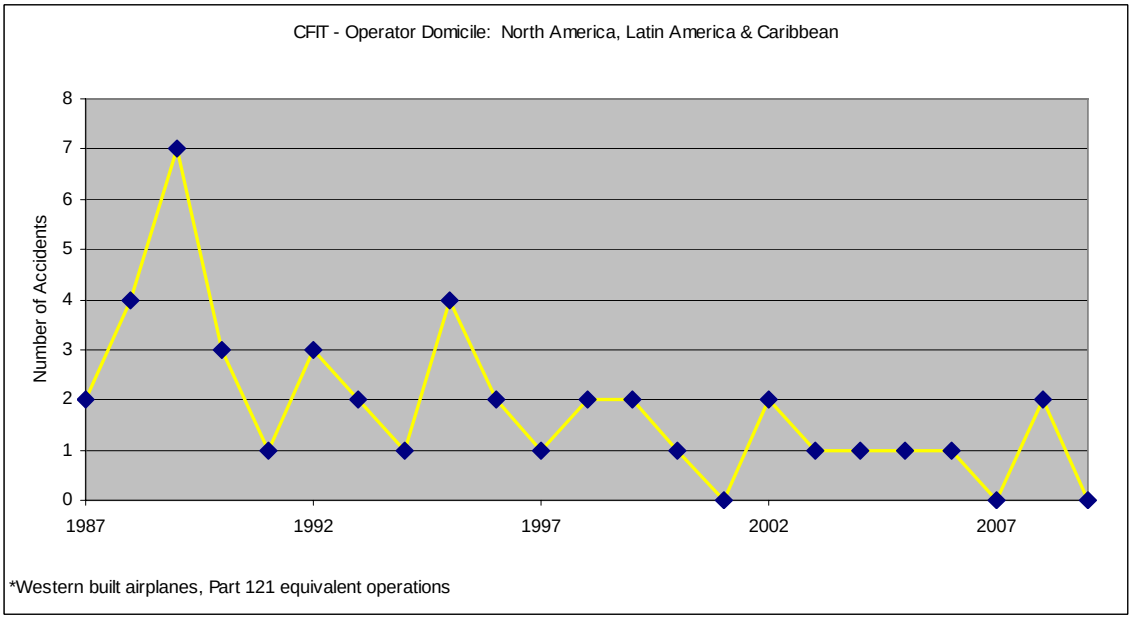


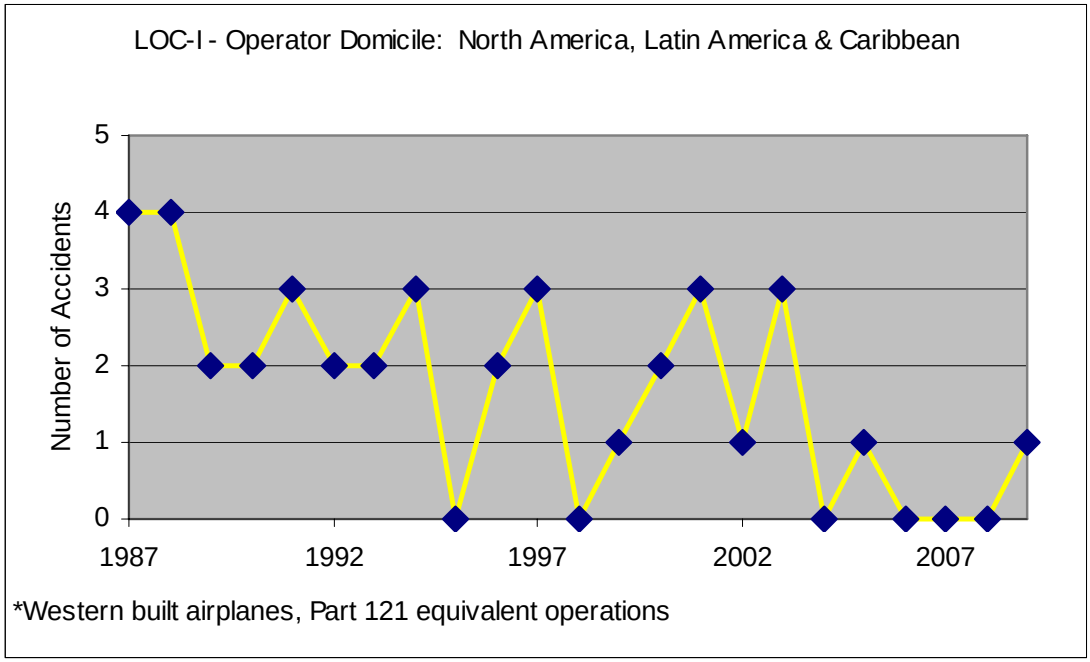
*Western built airplanes, Part 121 equivalent operations

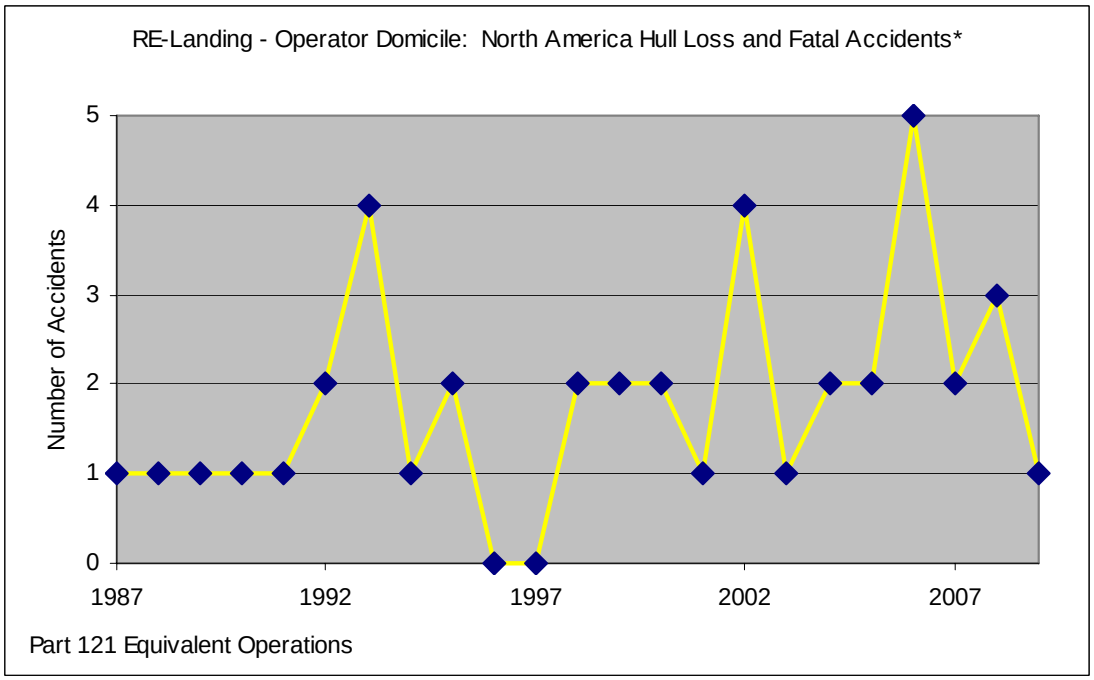


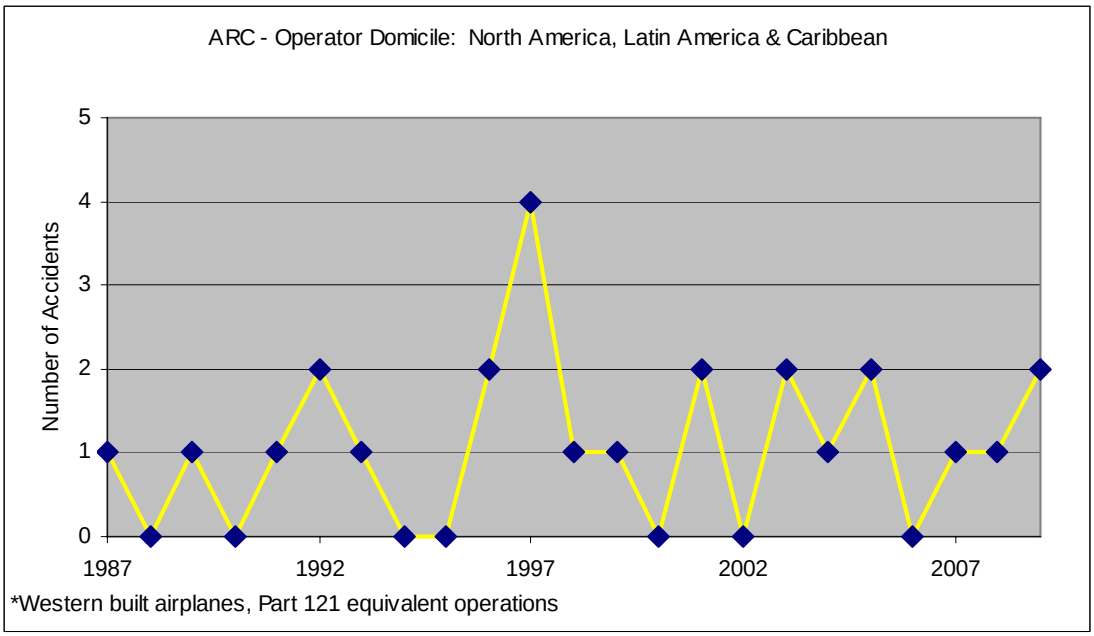
*Western built airplanes, Part 121 equivalent operations

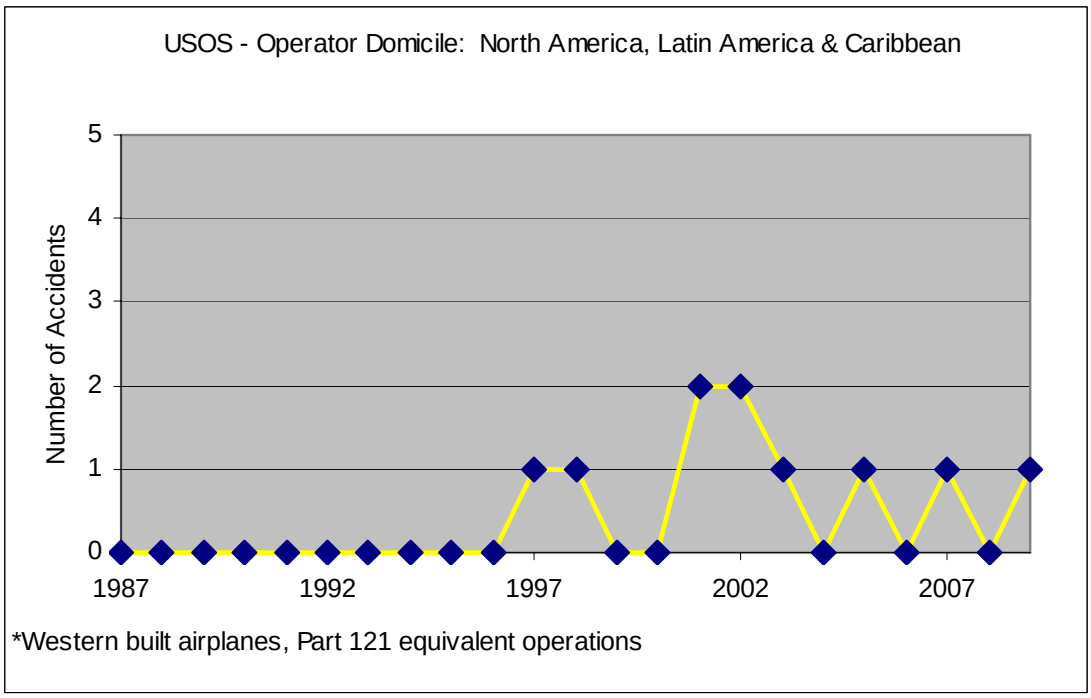


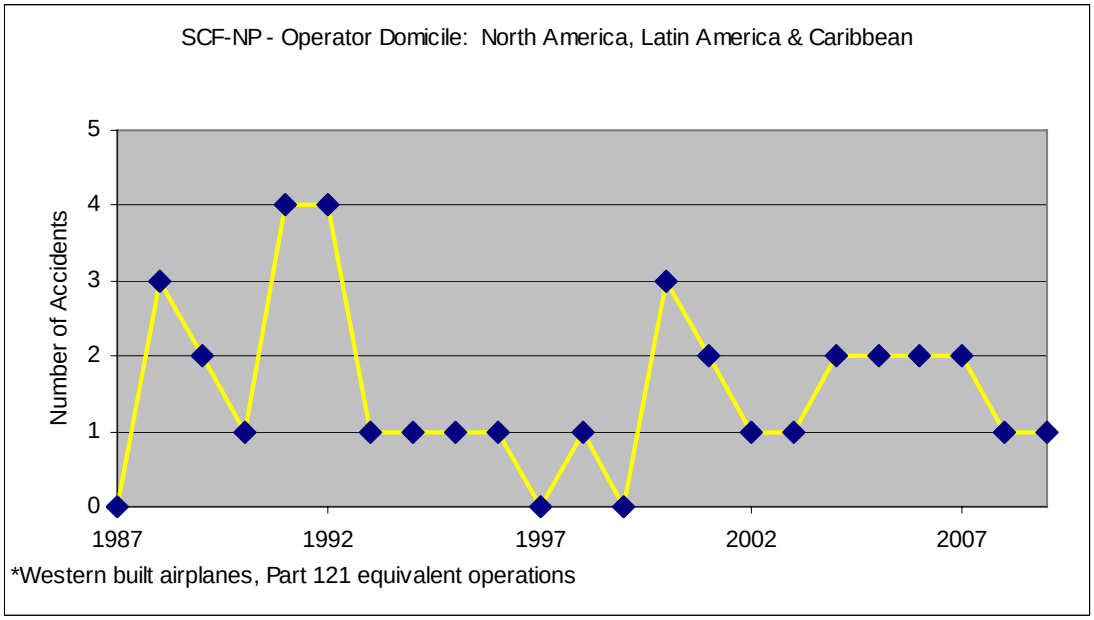
*Western built airplanes, Part 121 equivalent operations

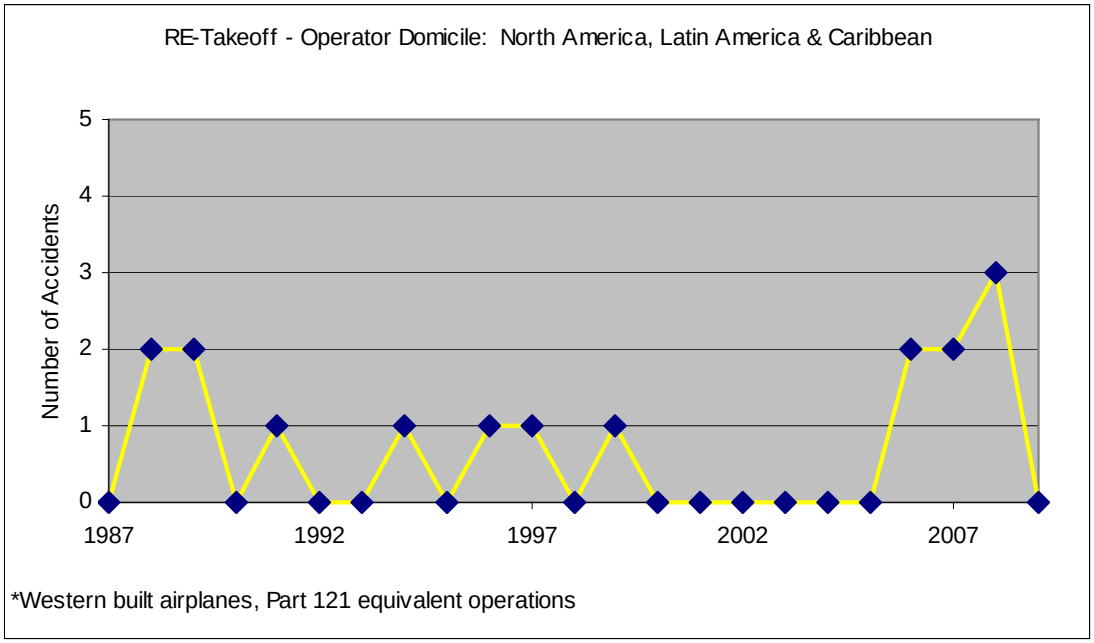

LOC-I - Operator Domicile: North America, Latin America & Caribbean
Number of Accidents
0
1
2
3
4
5
1987
1992
1997
2002
2007
*Western built airplanes, Part 121 equivalent operations


RE-Landing - Operator Domicile: North America Hull Loss and Fatal Accidents*
Number of Accidents
0
1
2
3
4
5
1987
1992
1997
2002
2007
Part 121 Equivalent Operations


ARC - Operator Domicile: North America, Latin America & Caribbean
Number of Accidents
0
1
2
3
4
5
1987
1992
1997
2002
2007
*Western built airplanes, Part 121 equivalent operations


USOS - Operator Domicile: North America, Latin America & Caribbean
Number of Accidents
0
1
2
3
4
5
1987
1992
1997
2002
2007
*Western built airplanes, Part 121 equivalent operations


SCF-NP - Operator Domicile: North America, Latin America & Caribbean
Number of Accidents
0
1
2
3
4
5
1987
1992
1997
2002
2007
*Western built airplanes, Part 121 equivalent operations

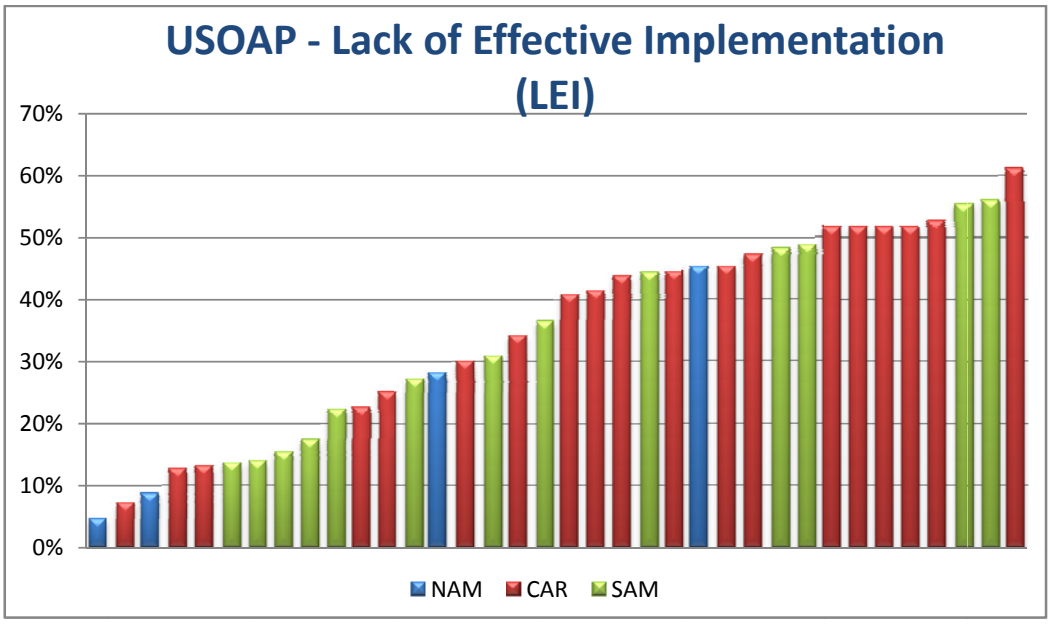

RE-Takeoff - Operator Domicile: North America, Latin America & Caribbean
Number of Accidents
0
1
2
3
4
5
1987
1992
1997
2002
2007
*Western built airplanes, Part 121 equivalent operations

3.2 Proactive Safety Information

3.2.1 ICAO Universal Safety Oversight Audit Programme (USOAP) Results Summary in NAM/CAR/SAM Regions

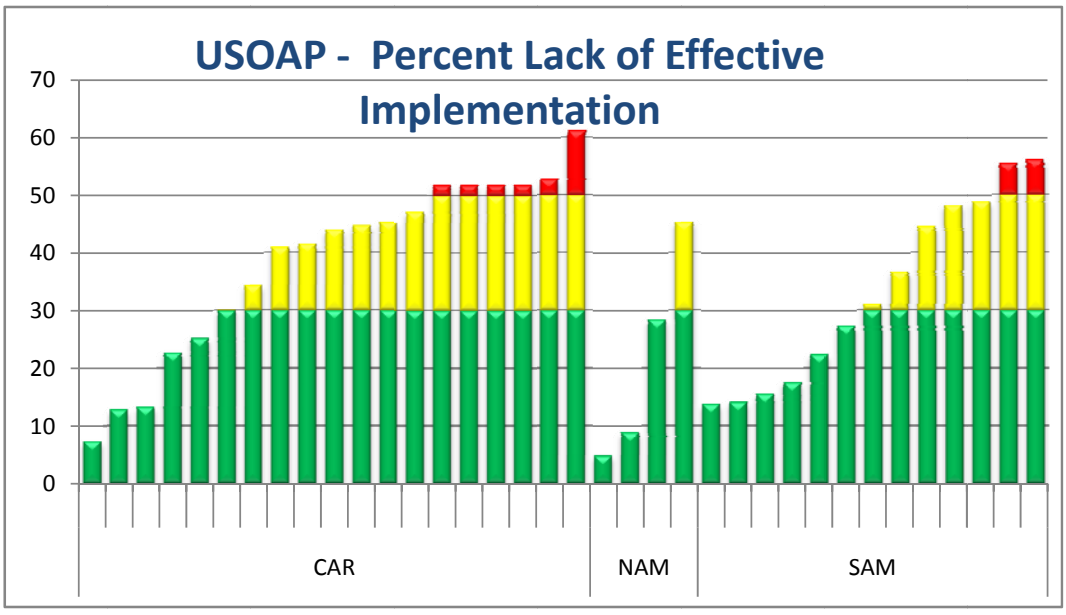
Information on the results of ICAO Universal Safety Oversight Audit Programme (USOAP) in the Pan American Region is presented below:

The following graph indicates the lack of effective implementation rate (LEI), differentiated by color for the NAM, CAR and SAM regions.



The next graph presents the same information based on the following classification bands:

- Green Area: LEI below 30%
- Yellow Area: LEI between 30% and 50%
- Red Area: LEI above 50%



3.2.2 IOSA Results Summary in the NAM/CAR/SAM Regions

IOSA Program

Concept

- Global program, built on ICAO standards and industry best practices
- Internationally recognized and accepted evaluation system implemented consistently

Goal

- Improve safety worldwide
- Reduce number of audits

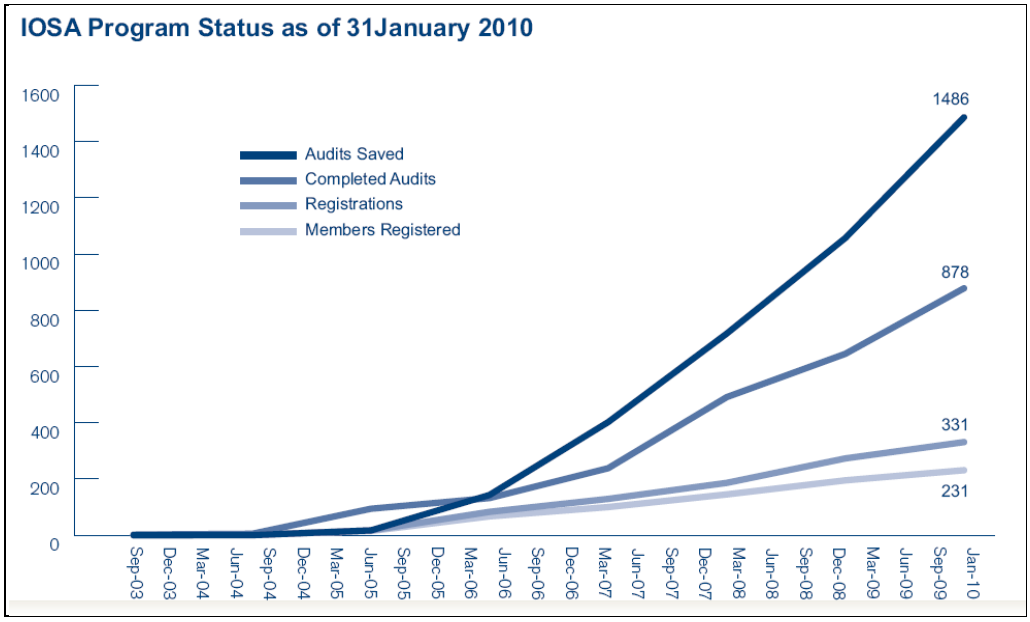
What are the IOSA Audit Standards?

- Approximately 900 published operational standards and recommended practices
- Focus: operational quality/safety management and oversight
- Applicable to audits only; not regulations
- Include requirements from ICAO, DoD; also industry best practices

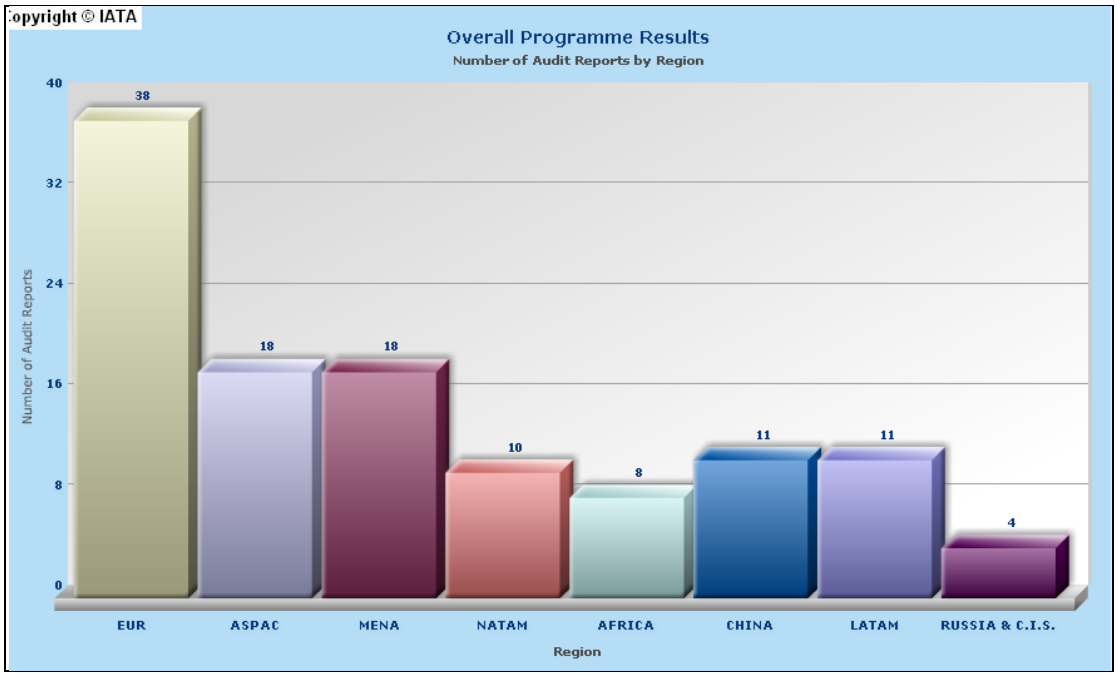
- Audit Scope

IOSA
ORG – *Organization & Management System*
FLT – *Flight Operations*
DSP – *Flight Dispatch*
MNT – *A/C Engineering & Maintenance*
CAB – *Cabin Operations*
GRH – *Ground Handling*
CGO – *Cargo Operations*
SEC – *Operational Security*

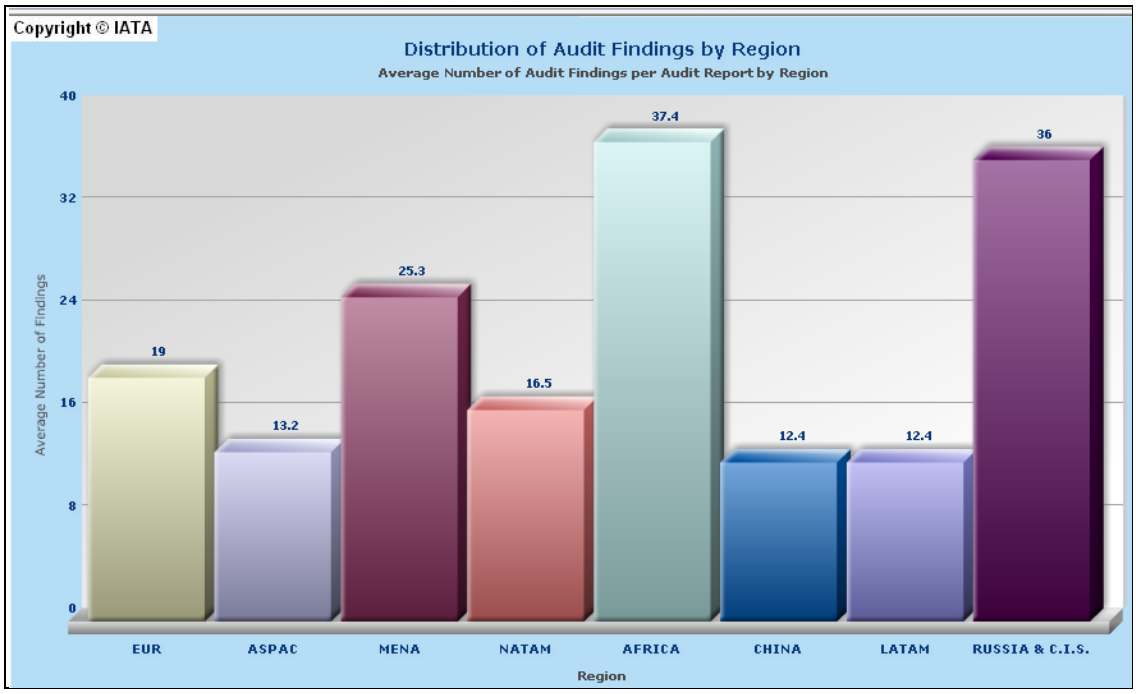
Audits completed and saved



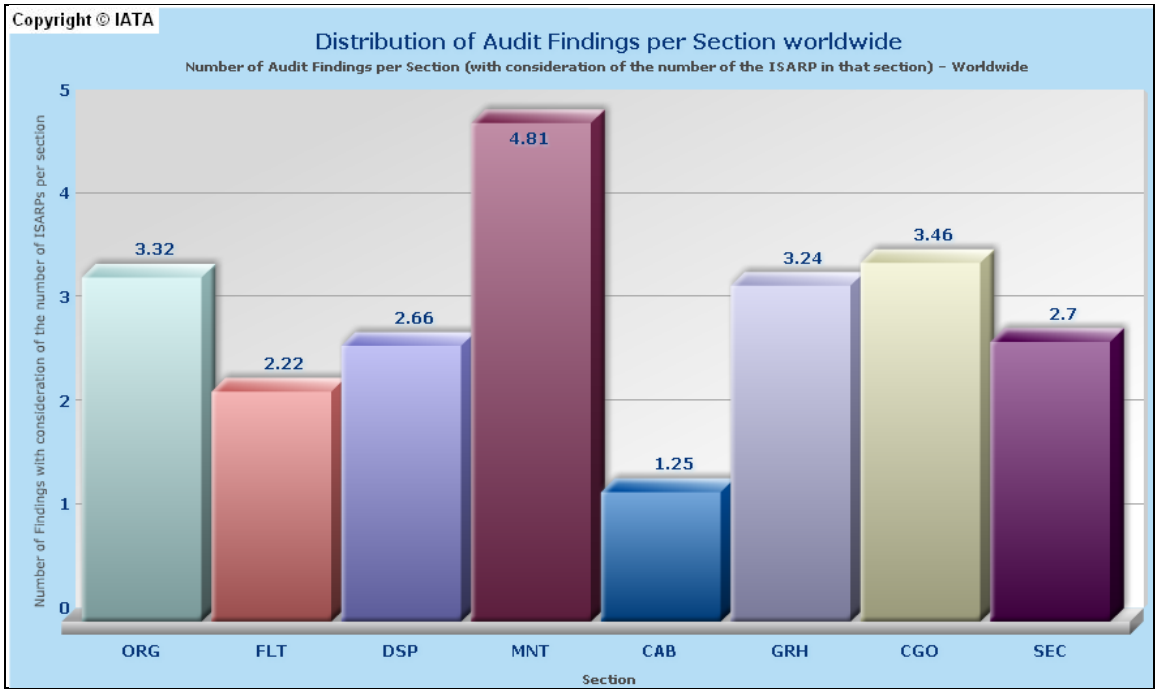
Overall Programme Results



Distribution of Audit Findings by Region



Distribution of Audits Findings per Section Worldwide



3.3 Predictive Safety Information

The Region has not yet fully developed mechanisms for gathering and processing predictive safety information. However, initiatives are currently underway, that will advance capabilities to produce predictive safety information. For example, in Costa Rica the local international air commercial operator has signed a Memorandum of Understanding with the DGCA to share FOQA safety information.

In addition, under Global Safety Initiative (GSI #3) of the GASP, a plan for amending States´ civil aviation laws in the regions has been established and RASG-PA has produced a model framework that can be used for making legislative changes. The plan requires the establishment of a national team in charge of drafting the amendment proposal and pursuing approval at the congressional level.

4. Final Conclusions

Although different models were used for the analysis of reactive safety information, data provided by different sources, showed a strong correlation in categories of the most frequent occurrences in the Pan American Region, which are:

1. Loss of Control In-flight (LOC-I)
2. Controlled Flight Into Terrain (CFIT)
3. Runway Excursion (RE)

It should be noted that the trend shows that CFIT events have notably decreased over the years. Nevertheless, it is recommended that RASG-PA continue its work on the mitigation strategies for all three safety risk areas, as determined by the Group in 2009, as they match the categories of most frequent occurrences previously referred.

The implementation of systems to capture and analyze information by the States, such as ADREP/ECCAIRS, will allow appropriate application of Safety Strategies appropriate to the region and, in particular, to each State. However, this will only be possible by improving the quality and quantity of reporting by States.

Global Safety Initiative # 4 (GSI #4) of the GASP addresses effective incident and accident investigation. It could be worthwhile for RASG-PA to assess the need to improve the rate of reporting and conducting effective incident and accident investigations and develop implementation actions for State implementation.

List of Acronyms

ACAS	Airborne Collision Avoidance Systems
AES	Arrival/Engine Shutdown (ATA)
ANSP	Air Navigation Service Provider
AOC	Air Operator Certificate
APR	Approach (ATA)
ATA	Air Transport Association
ATC	Air Traffic Control
CFIT	Controlled Flight Into Terrain
CRM	Crew Resource Management
CRZ	Cruise (ATA)
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DH	Decision Height
DST	Descent (ATA)
ECL	En Route Climb (ATA)
E-GPWS	Enhance Ground Proximity Warning System
ESD	Engine Start/Depart (ATA)
ETOPS	Extended-Range Twin-Engine Operations
FDA	Flight Data Analysis
FLC	Flight Close (ATA)
FLP	Flight Planning (ATA)
FMS	Flight Management System
FOQA	Flight Operations Quality Assurance
GDS	Ground Servicing (ATA)
GNSS	Global Navigation Satellite System
GOA	Go-around (ATA)
GPWS	Ground Proximity Warning System
HL	Hull Loss
ICL	Initial Climb (ATA)
INOP	Inoperative
IOSA	IATA Operational Safety Audit
ISAGO	IATA Safety Audit for Ground Operations
LND	Landing (ATA)
LOC-I	Loss of Control In-flight
LOSA	Line Operations Safety Audit
MDA	Minimum Descent Altitude

MEL	Minimum Equipment List
NAVAIDS	Navigational Aids
NOTAM	Notice to Airman
PRF	Pre-Flight (ATA)
PSF	Post-Flight (ATA)
RA	Resolution Advisory
RTO	Rejected Take-off (ATA)
SD	Substantial Damage
SMS	Safety Management System
SOP	Standard Operating Procedure
TAWS	Terrain Awareness Warning System
TCAS	Traffic Collision and Avoidance System
TCAS RA	Traffic Collision and Avoidance System Resolution Advisory
TEM	Threat and Error Management
TOF	Take-off (ATA)
TXI	Taxi-in (ATA)
TXO	Taxi-out (ATA)
UAS	Undesirable Aircraft State

[i] The eight critical elements are related to: Primary Legislation, Operating Regulations, Organization & Safety Oversight Functions, Technical Experts Training, Guidance, Procedures & Information, Licensing & Certification Obligations, Surveillance & Inspection Obligations and Resolution of Safety Concerns.

[ii] ADREP: Accident/Incident Data Reporting System is operated and maintained by ICAO and receives, stores and provide States with occurrence data that will assist them in validating safety.

[iii] ECCAIRS is a system developed and maintained by the European Co-ordination Centre to assist organizations in collecting, sharing and analyzing safety information. This system was adopted by ICAO for reporting according ADREP requirements.