International Civil Aviation Organization
Regional Aviation Safety Group - Pan America (RASG-PA)

WORKING PAPER

PA-RAST/31 — WP/06
21/02/18

Thirty First Pan America — Regional Aviation Safety Team Meeting (PA-RAST/31) of the Regional Aviation Safety Group — Pan America (RASG-PA)
South Florida, United States, 20 to 22 February 2018

Agenda Item 9: **Topics for the Good of the PA-RAST**

ARCM Operational Safety information analysis

2016-2017 ARCM SDCPS Information analysis

(Presented by ARCM Technical Committee)

EXECUTIVE SUMMARY

This working paper presents to Thirty First Pan America – Regional Aviation Safety Team Meeting (PA-RAST/31), the analysis of the ARCM safety data collection and processing system (SDCPS) about Operational Safety, concerning accidents, serious incidents and incidents in the SAM Region by the AIG Regional Cooperation Mechanism -ARCM, in 2016-2017.

Action:	Suggested Actions are presented in Section 4.
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency • Economic Development of Air Transport • Environmental Protection
References:	• Report of the Third SAM AIG Authorities Meeting (AIG-SAM/3-AIG-SAM/4) • ARCM AIG Regulation • LAR 113 – *Aircraft accident and incident reporting requirements* • Annex 13 – *Aircraft accident and incident investigation* • Annex 19 – *Safety management* • Doc 9859 – *Safety management manual (SMM)*

1. Introduction

1.1 When an accident or serious incident occurs, the process of accident investigation is started to find any possible deficiency in the aviation system, its causes, and to develop measures as needed to prevent recurrence. Being a reactive component, accident investigation contributes to continuous improvement of the aviation system by identifying the causes of accidents/incidents and providing lessons learnt from the events.

1.2 In addition to producing findings and establishing the causes of accidents and incidents, most investigations also reveal hazards and threats. In the current proactive safety management environment, there is an important and necessary integration between the accident and incident investigation process and the hazard identification and reporting process of an organization.

1.3 Data-based decision-making is one of the most important facets of any management system. The type of safety data collected may include accidents and incidents, events, cases of non-compliance or deviations, and reports on hazards. The quality of the data must be taken into account in order to permit effective decision-making, since many databases lack the quality required to be reliable.

1.4 In this regard, the SAM Region has an important critical mass that makes standard use of the ADREP language and the ECCAIRS system as an aircraft accident and incident database.

1.5 When analysing the information contained in a database, safety deficiencies of interest are identified. Information about these deficiencies and mitigation measures should be exchanged among all ARCM States as soon as possible to enhance safety.

2. Analysis

2.1 For proper safety management, the ARCM established a **safety data collection and processing system (SDCPS)**. This system permits the collection of data from all ARCM States and its proper processing at regional level. At present, the ARCM SDCPS has collected data reported from most States, which needs to be updated and analysed in order to generate indicators and trends.

2.2 The establishment and maintenance of an SDCPS provides a fundamental and necessary tool that enables the ARCM to meet one of its objectives, namely making timely and effective recommendations at regional level so as to contribute to safety in the SAM Region.

3. Drafting of the safety report

3.1 This working paper is based on the ADREP/ECCAIRS system, and on an analysis of the data collected by the ARCM SDCPS in 2016 for the production of the first ARCM safety report.

3.2 Likewise, the following types of ARCM SDCPS data were analysed:

a) accident investigation data;
b) serious incident investigation data;
c) incident report data; and
d) other safety data, such as deficiencies, non-compliance with requirements, and irregularities, where available.

3.3 The report contains information about the results of the analysis of the data types listed in paragraph 3.2 for aircraft of any weight, dividing aircraft between those above 2.250 kg and those weighing 2.250 kg or less for the following operations:

a) scheduled and non-scheduled commercial air transport;
b) general aviation;
c) business aviation; and
d) aerial work.

3.4 The report will also provide information on indicators and trends for the different categories of accidents and serious incidents that have occurred in the South American Region.

3.5 It is important to note that this first 2016 ARCM safety report is based on preliminary safety data that has not been validated and has not been subject to a quality procedure. Consequently, the only purpose of this preliminary report is to show what the system could offer when validated safety information is available. It should also be noted that some SAM States have not yet reported their safety data, so the report does not cover the whole Region.

3.6 **Appendix A** to this working paper contains the analysis of data collected during 2010 - 2016 in the SAM Region, and **Appendix B** contains occurrences reported to SDCPS ARCM and safety data collected in SAM Region in 2017.

4 Suggested Actions

4.1 The AIG authorities of the SAM Region are invited to:

a) take notes and comment on the information provided in this working paper in Appendices A and B;

b) to consider ARCM to be part of RAGSPA, to include general aviation segment as a fundamental key in operational safety and to embrace all aviation segments; and

c) share this information with the team in charge of the RASGPA annual safety report.

APPENDIX A

SAFETY REPORT

ARCM - 2016

ARCM

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Acronyms

Flight phases

APR	Approach
ENR	En route
ICL	Initial climb
LDG	Landing
MNV	Maneuvering
PBT	Pushback/Tow
STD	On stand
TOF	Take-off
TXI	Taxiing

Occurrence categories

ADRM	Aerodrome
AMAN	Abrupt maneuver
ARC	Abnormal runway contact
ATM	ATM/CNS
BIRD	Bird strike
CABIN	Safety events in the cabin
CFIT	Controlled flight into terrain
CTOL	Collision with obstacle(s) during take-off and landing
EVAC	Evacuation
EXTL	External load related occurrences
F-NI	Fire/smoke (non-impact)
F-POST	Fire/smoke (post-impact)
FUEL	Fuel-related
GCOL	Ground collision
GTOW	Glider towing related events
ICE	Icing
LALT	Low altitude operations
LOC-G	Loss of control - ground
LOC-I	Loss of control in-flight
LOLI	Loss of lifting conditions en route
MAC	Airprox/TCAS alert/Loss of separation/(near) mid-air collisions
MED	Medical
NAV	Navigation errors
OTHR	Other
RAMP	Ground handling

RE	Runway excursion
RI	Runway incursion
SCF-NP	System component failure or malfunction (non-power plant)
SCF-PP	System component failure or malfunction (power plant)
SEC	Security-related
TURB	Turbulence encounter
UIMC	Unintended flight into IMC
UNK	Unknown or undetermined
USOS	Undershoot/Overshoot
WILD	Wildlife
WSTRW	Wind shear or thunderstorm

Other acronyms

ARCM	AIG Regional Cooperation Mechanism
CAST	Commercial Aviation Safety Team
CICTT	CAST/ICAO Common Taxonomy Team
ICAO	International Civil Aviation Organization
ISASI	International Society of Air Safety Investigators

Executive summary

In 2016, the term “Cooperation” meant taking one more step; along the path towards the development of safety in the Region, we have transformed the decisions made in the regional mechanism into actions.

It was a year with many civil aviation accidents and incidents all over the SAM Region, especially the major accident of CP-2933 in Antioquia - Colombia, the runway excursions (RE) that have increased significantly in 2016, in addition to occurrences with small aircraft or general aviation operations.

The ARCM came to be known in the world through international activities, such as ISASI 2016 and the 39th General Assembly of ICAO; with strategic objectives involving the training of multinational investigators, the implementation of data collection and database systems, and the standardisation and harmonisation of documents.

In this first *Safety Report*, which includes the analysis of occurrences reported to the ARCM for the period 2010-2016, our vision is to consolidate the ARCM as the South American AIG regional cooperation mechanism, conveying our responsibility, professionalism and commitment in the results of the tasks and technical studies conducted.

AIG organisations must become living, action entities. There is still much to be done. Let us make the ARCM objective our own:

“Save as many human lives as possible”.

Ana Pamela Suárez
Chairperson of the Executive Committee
ARCM

Policy and standardization

At the 3rd AIG Authorities Meetings AIG-SAM/3, we agreed to work with the AIG organizations of the Region in the adaptation of documents and specific manuals in order to standardize processes, procedures, and occurrence classification throughout the SAM Region. The objective is to create a regional cooperation environment for improving effective implementation in the AIG area and contribute to the reduction of the aircraft accident and incident rate of the SAM Region below the global rate in all segments of aviation.

According to working paper AIG-SAM3-WP07 on the establishment of the ARCM SDCPS, aircraft accident and incident safety data was collected for aircraft with a maximum take-off weight (MTOW) above 2,250 Kg and for aircraft with a MTOW of 2,250 Kg or less.

It is important to note that this first ARCM safety report of 2016 is based on preliminary safety data that has not been validated and has not undergone a quality procedure. Therefore, the only purpose of this preliminary report is to show what the system could offer when validated safety information is available. It should also be pointed out that some SAM States have not yet reported their safety data, so the report does not cover the whole Region.

The following aspects will be taken into account:

Occurrence class:

a) Accidents;

b) Serious incidents; and

c) Incident investigation data (in which AIG organizations participate)

Aircraft operations:

a) scheduled and non-scheduled commercial air transport;

b) general aviation;

c) business aviation;

d) aerial work; and

e) unmanned aircraft systems (remotely-piloted aircraft systems – RPAS)

Regarding occurrence categories, the ICAO CAST category classification will be applied.

SDCPS

In 2016, all ARCM member States implemented their ADREP/ECCAIRS platforms and the connection to the ARCM SDCPS, making reports and updates using the established procedures. However, not all States have reported all the occurrences that were investigated, or have not updated the information upon completion of the investigation, which negatively affects data analysis.

The implementation of the SDCPS and the reporting processes required adaptation, follow-up and integration during 2016, an effort that needs to be reinforced in 2017. The goal should be to have all SAM occurrences validated in the SDCPS.

The States that submit more reports do not necessarily have more occurrences than the rest of the States; rather, they have adopted the reporting procedures and comply with that established by the 3rd AIG Authorities Meeting AIG- SAM/3 (Lima-2016).

Source of data

The SDCPS is a safety data collection and processing system. Technically speaking, it is a *Data warehouse*, a corporate database for the integration and refinement of information from one or more sources, which will then be processed for analysis from different perspectives. The vision of the ARCM Technical Committee is to be able to consolidate the stored data and guide the analysis of the information towards *business intelligence.*

The data universe for this report consists of occurrences reported to the ARCM through the SDCPS during the period **2010-2016**; a total of ***2522 occurrences***. The data used for drafting this document was extracted from the SDCPS on 15/05/2017.

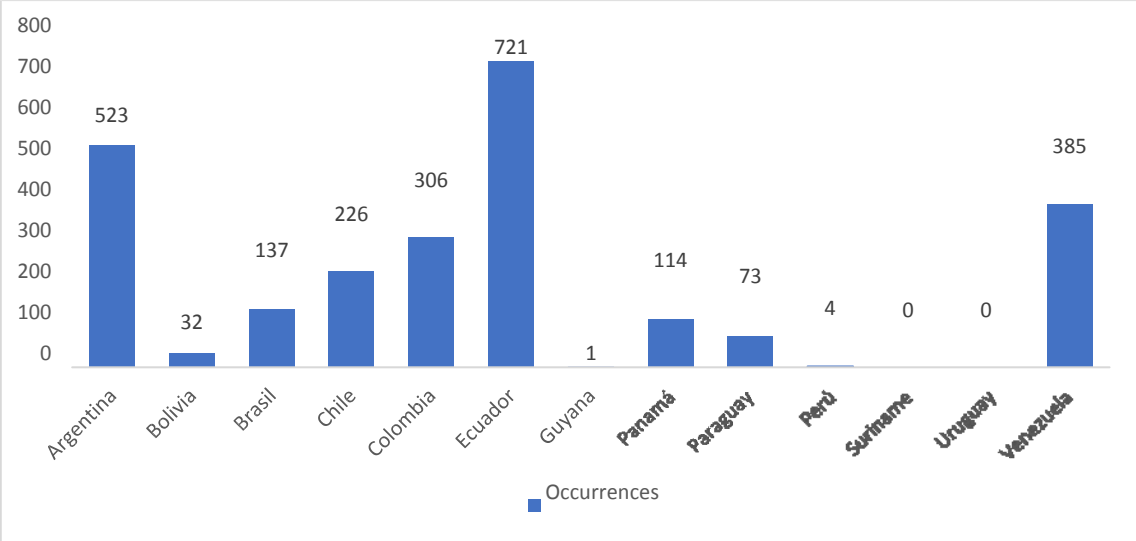
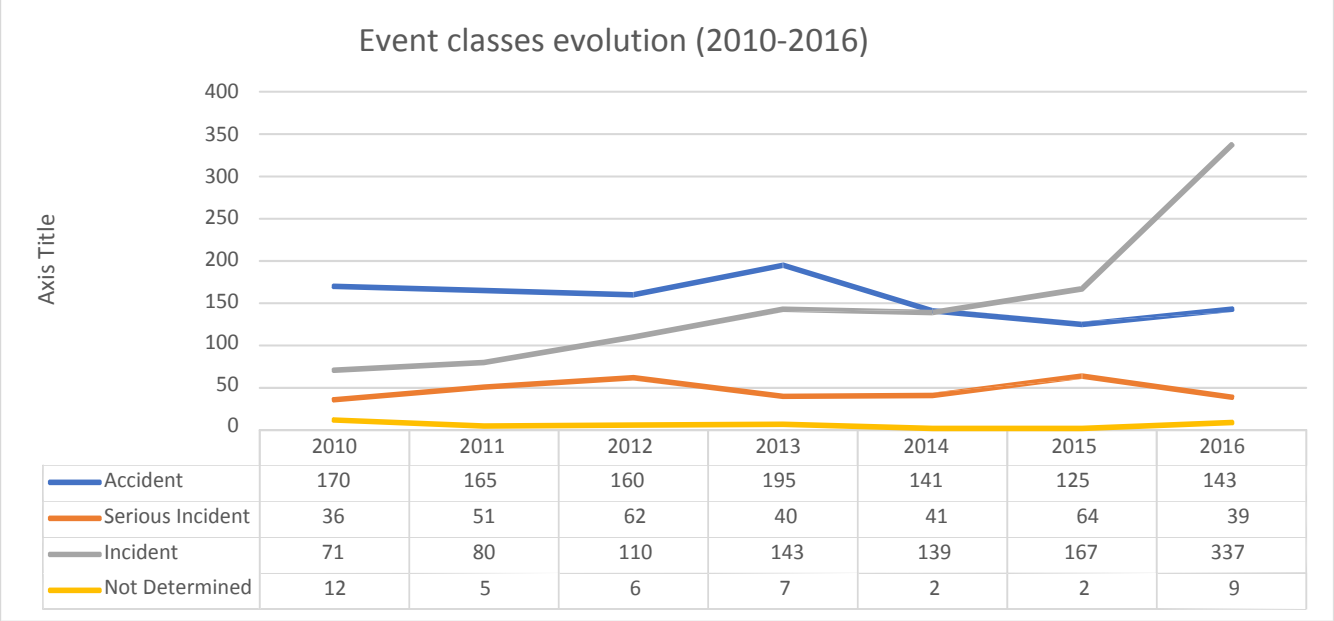


Fig. 1 – Occurrences reported to the ARCM (2010-2016)

Evolution of occurrences

Monitoring the evolution of occurrences is of great importance for aviation safety in the region. We may observe that there was an accident peak (195) in the SAM Region in 2013, a breaking point, but the extended analysis shows that the trend is decreasing, although incidents are increasing. 2016 was the year with the largest number of reported incidents (*337 incidents and 143 serious incidents*). This is due to the fact that many States started their coding and began reporting occurrences, starting with the most recent.



	2010	2011	2012	2013	2014	2015	2016
Accident	170	165	160	195	141	125	143
Serious Incident	36	51	62	40	41	64	39
Incident	71	80	110	143	139	167	337
Not Determined	12	5	6	7	2	2	9

Fig.2 – Evolution of occurrences (2010-2016)

Information analysis

One of the most important aspects in the statistical analysis of occurrences is their classification. To this end, the definitions established by the ICAO CAST are used.

If we apply the "*Paretto principle*", we note that, occasionally, 80% of occurrences correspond to 20% of the categories. In this specific case, 50% of reported occurrences are grouped in 4 categories (**BIRD, SCF-PP, SCF-NP and RE**) as shown by the "orange" line, which is the accumulated value.

Thus, the treatment of these categories is of vital importance to mitigate 50% of the problem.

Note: An occurrence may be associated to one or more categories.

Occurrence categories

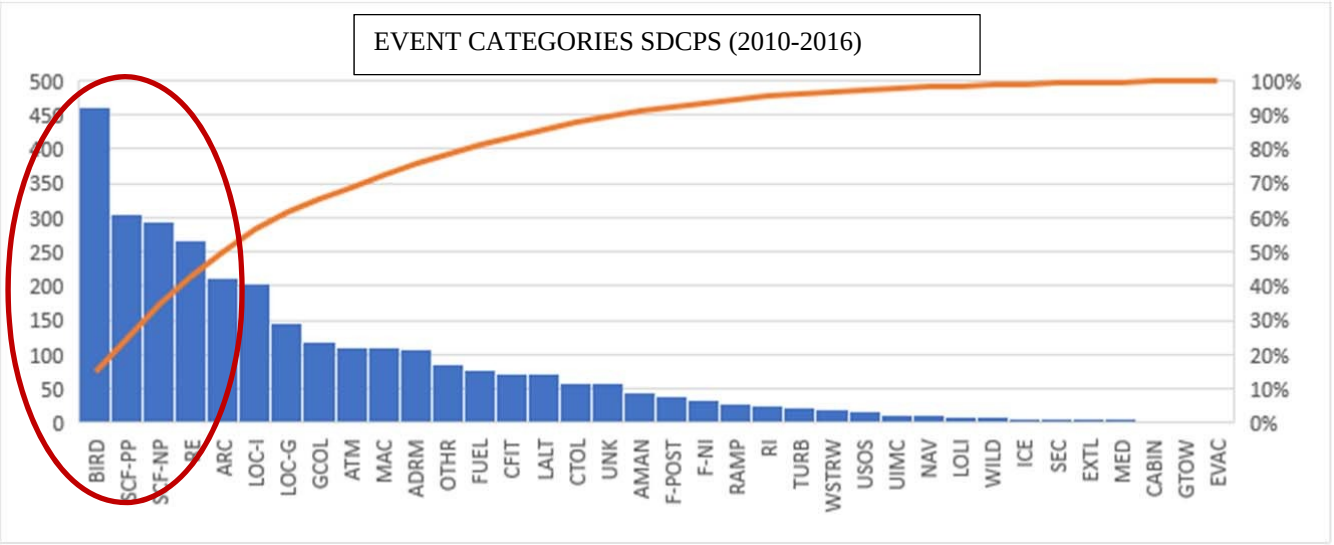


Fig. 3 – SDCPS occurrence categories

Accidents

Regarding accidents reported to the ARCM through the SDCPS, 1,099 were reported, maintaining the same proportion as occurrences, which does not show a regionalized proportion of accidents. Therefore, it would be necessary to analyze the volume of operations and flown hours in general aviation.

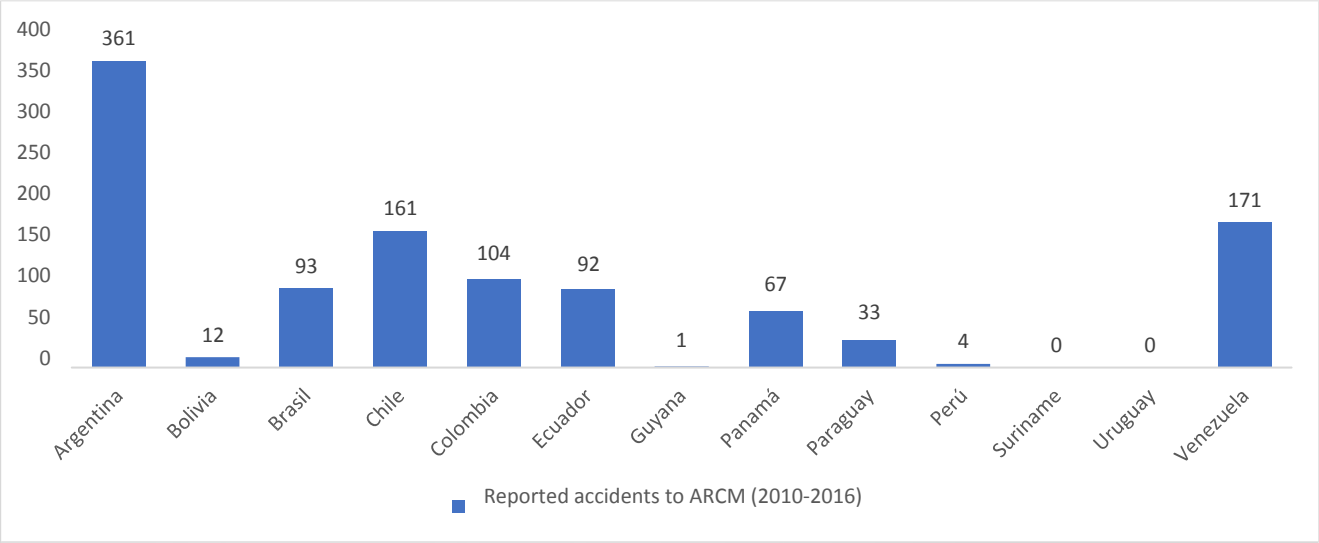


Fig. 4 – Accidents reported to the ARCM SDCPS

Fatal accidents

Evolution of aircraft accidents involving fatal injuries in the SAM Region (*207 accidents in total*)

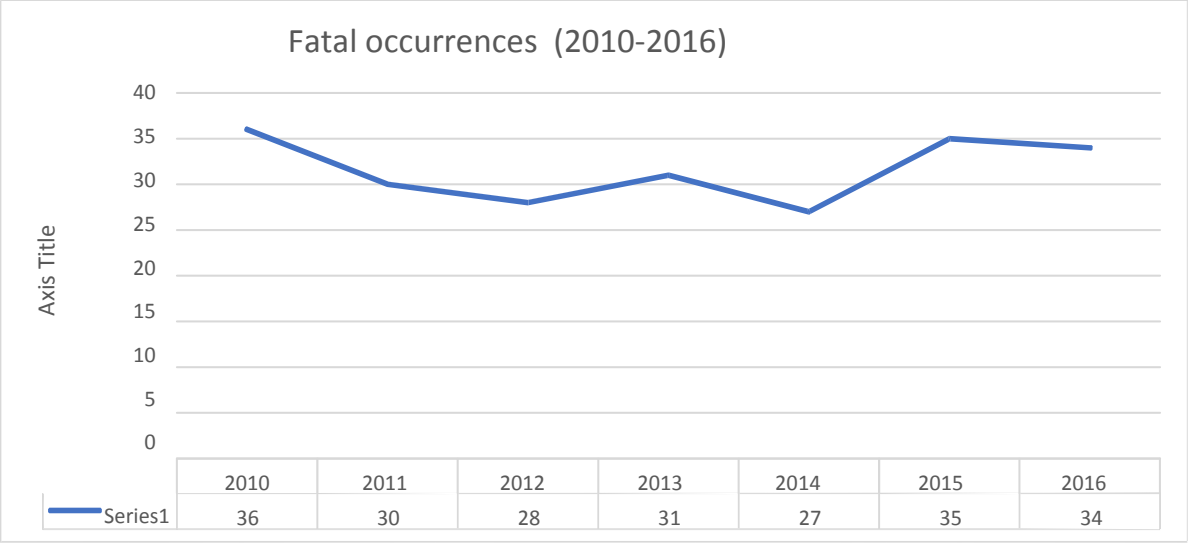


Fig. 5 – Evolution of fatal accidents (2010-2016)

Fatal accidents show a clear tendency towards the loss of control in-flight (LOC-I) category, mainly due to incorrect operation or decision (*many times associated to an incorrect response to an abnormal flight regime or situation*) or incorrect risk analysis, followed by loss of situational awareness, distraction, incorrect flight planning, and limited experience. Nevertheless, technical failure of aircraft components and meteorological conditions can be contributing factors.

Controlled flight into terrain (CFIT), fire post-impact (F-POST) and system component failure - power plant (SCF-PP) cause the largest number of fatal injuries.

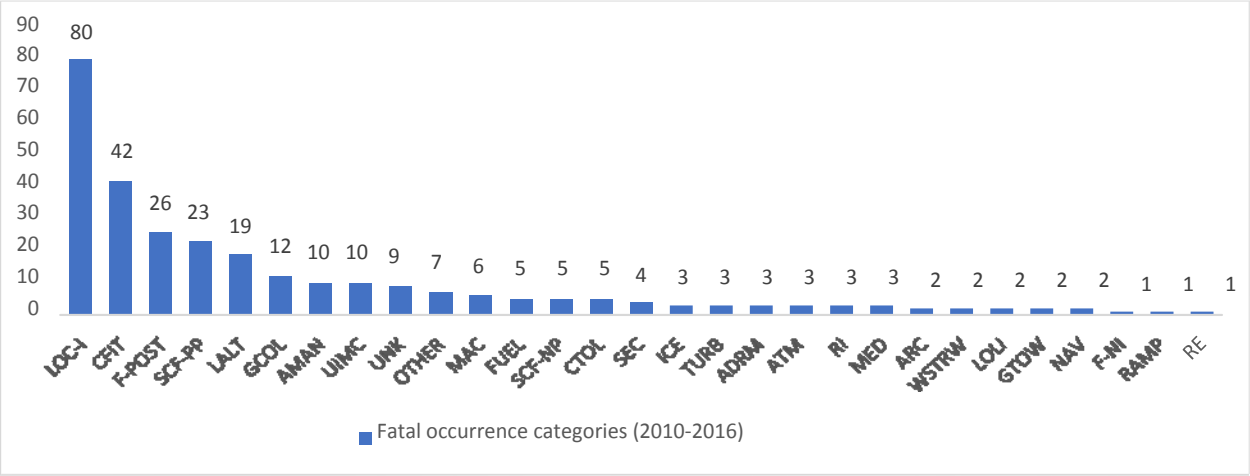


Fig. 6 – Accident categories reported to the SDCPS

Commercial aviation categories

Regarding commercial aviation occurrence categories, system component failure – non-power plant (SCF-NP) is the most recurrent, since failures are generally associated to other events in the same occurrence, either because the system failure is the cause, or because the failure occurs due to a previous event. Likewise, occurrence categories related to aerodromes (ADRM), runway excursions (RE), and bird strike hazard (BIRD) are frequent in this type of operation.

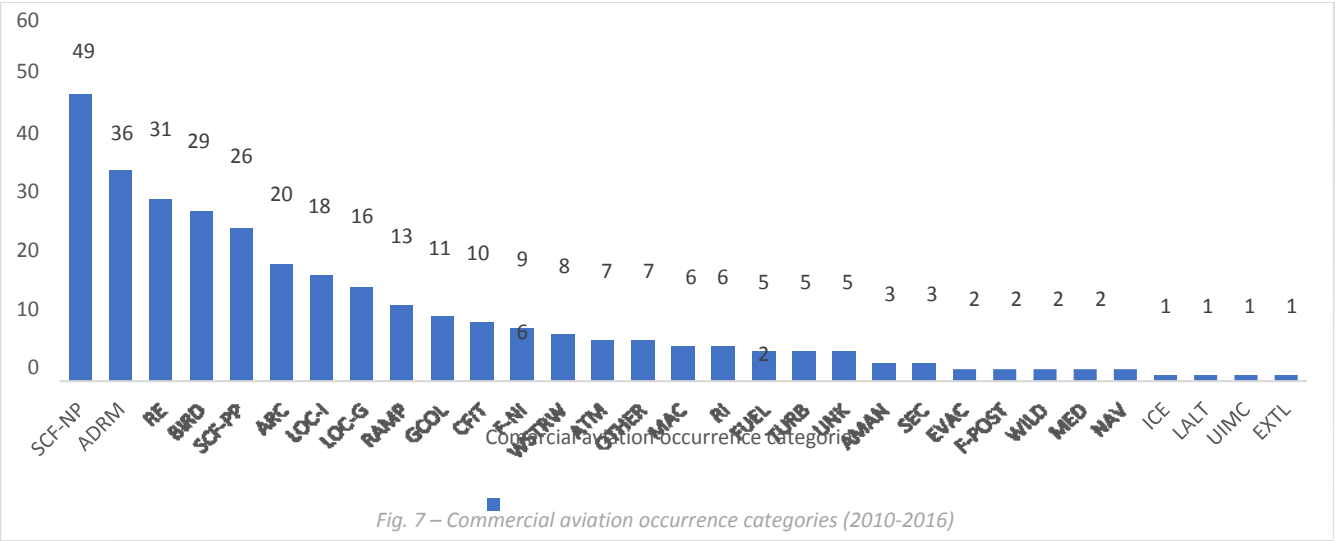


Fig. 7 – Commercial aviation occurrence categories (2010-2016)

General aviation categories

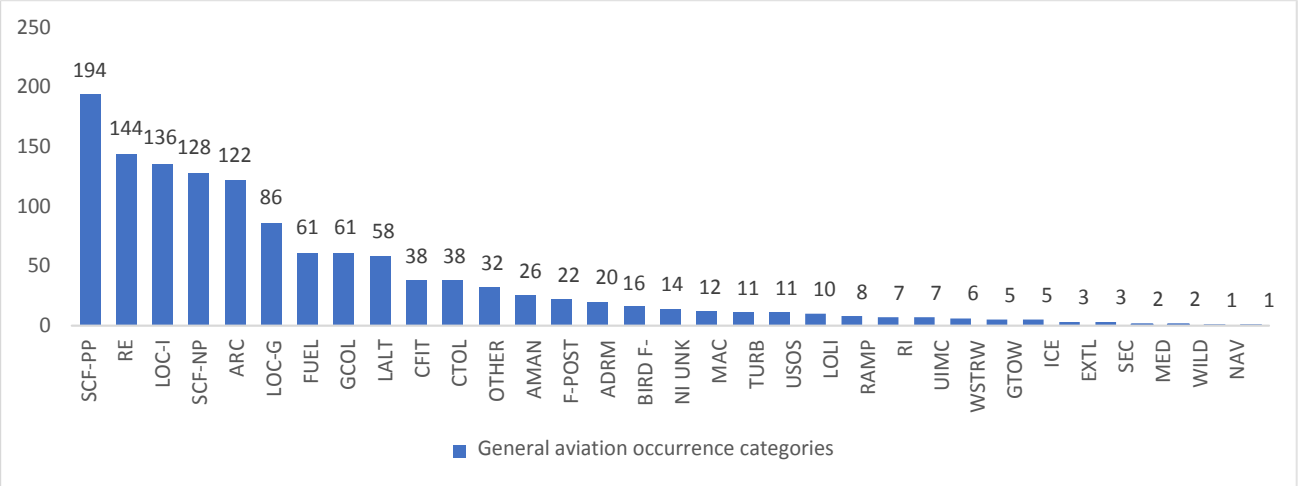


Fig. 8 – General aviation occurrence categories

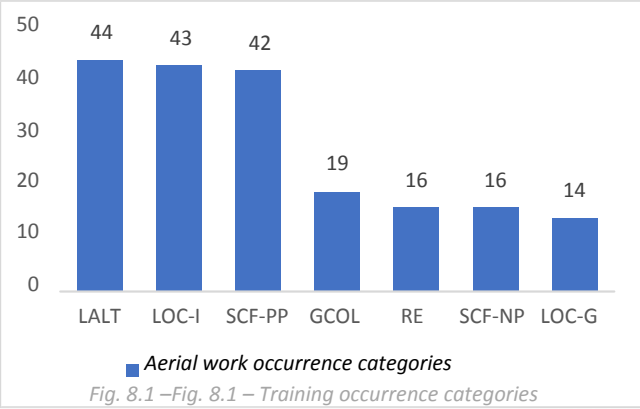
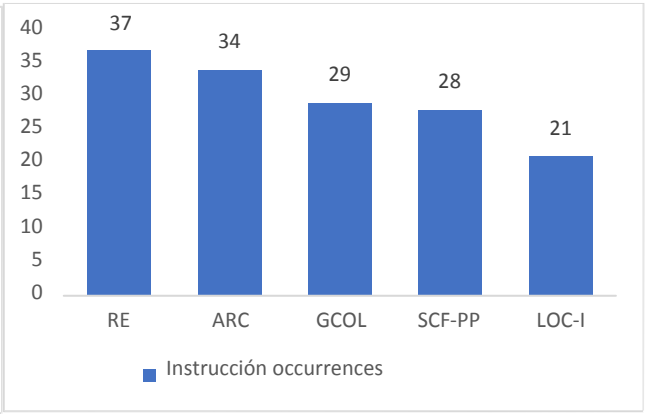


Fig. 8.1 –Fig. 8.1 – Training occurrence categories



In general aviation operations, as shown in *Fig. 8*, the most recurrent categories vary (*SCF-PP, RE, LOC-I and SCF-NP*). However, it depends on the operation sub-type being analyzed. In the case of aerial work, shown in *Fig 8.1*, the most recurrent categories are low-altitude operations (LALT), loss of control in flight (LOC-I) and (SCF-PP). Regarding training flights, shown in *Fig. 8.2*, the most recurrent categories are runway excursions (RE), abnormal runway contact (ARC), and loss of control - ground (LOC-G). These categories are often associated to a single accident and, in most cases, occur during landing.

This analysis should be complemented with an analysis of aircraft, their condition and maintenance, and the age and training of the pilots-in-command.

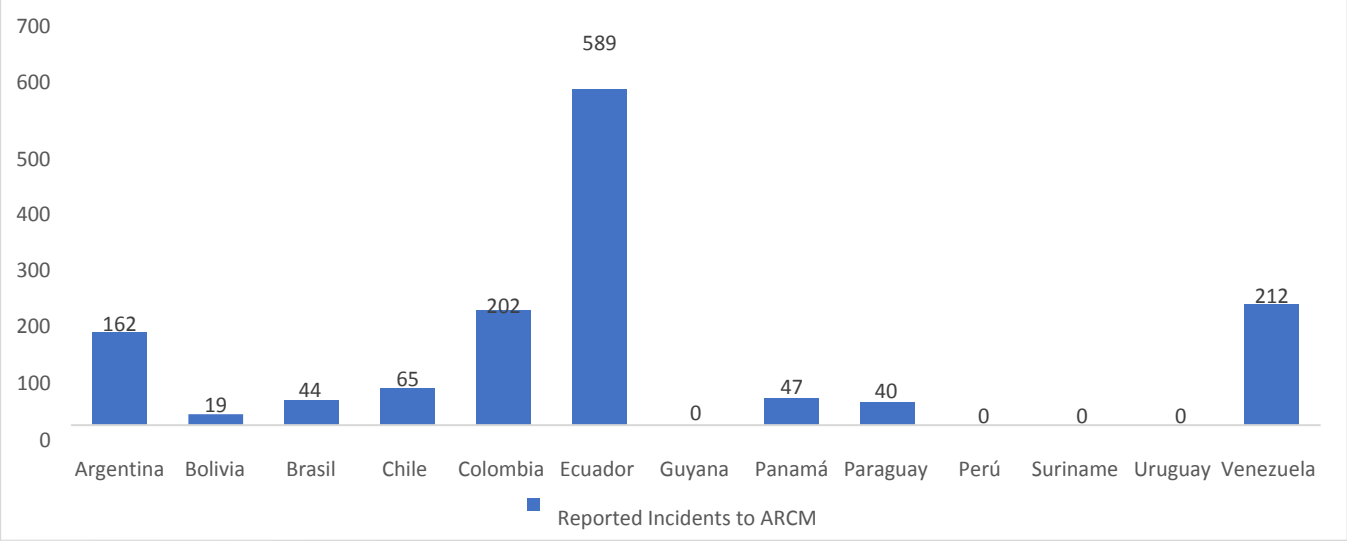


Fig. 9 – Incidents reported to the ARCM SDCPS (2010-2016)

Aircraft

In order to appreciate the context in which aircraft occurrences take place in the SAM Region, the information is analysed from the general to the particular. The aircraft types in the occurrences recorded in the SDCPS are detailed below. This does not mean that aircraft types with more occurrences are more accident-prone; this must be analysed within a socioeconomic context in terms of the number of registered aircraft, operating costs, etc.

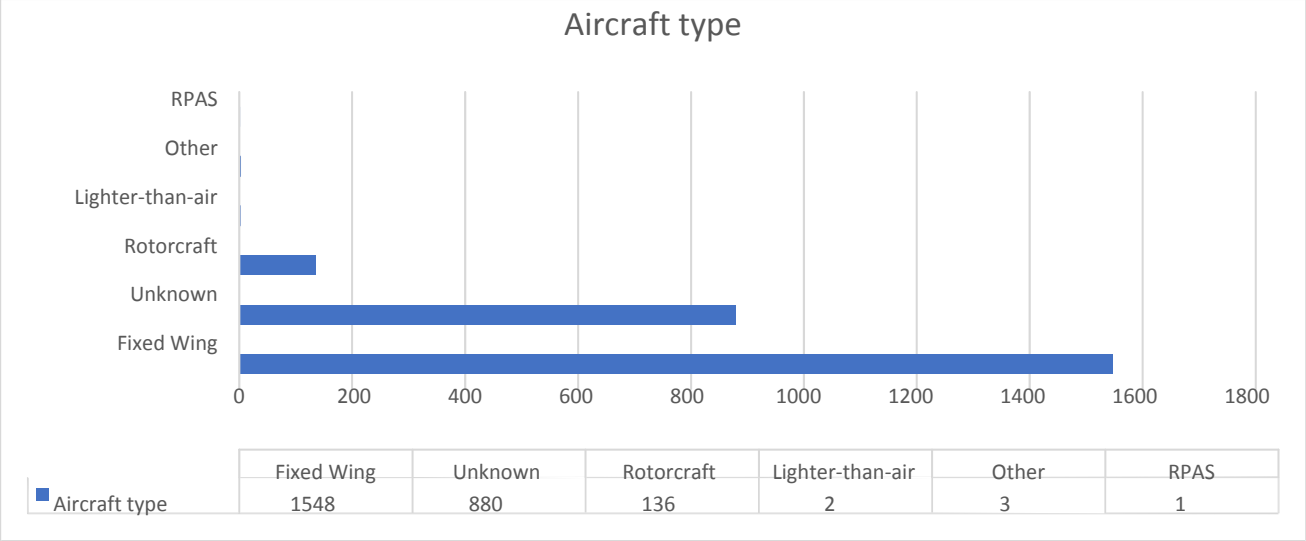


Fig. 10 – Aircraft types recorded in SDCPS occurrences

Mass group

The system shows that occurrences involving aircraft with an MTOW of 0-2250 kg accounted for 30% of reported occurrences during the period 2010-2016. ***Note: (48% of 1,218 recorded occurrences do not especify this attribute).***

It should be noted that 48% of occurrences do not specify the mass group attribute. This constitutes a weakness of the system, since this piece of information is extremely important for analyzing the safety context of the Region.

Mass Group

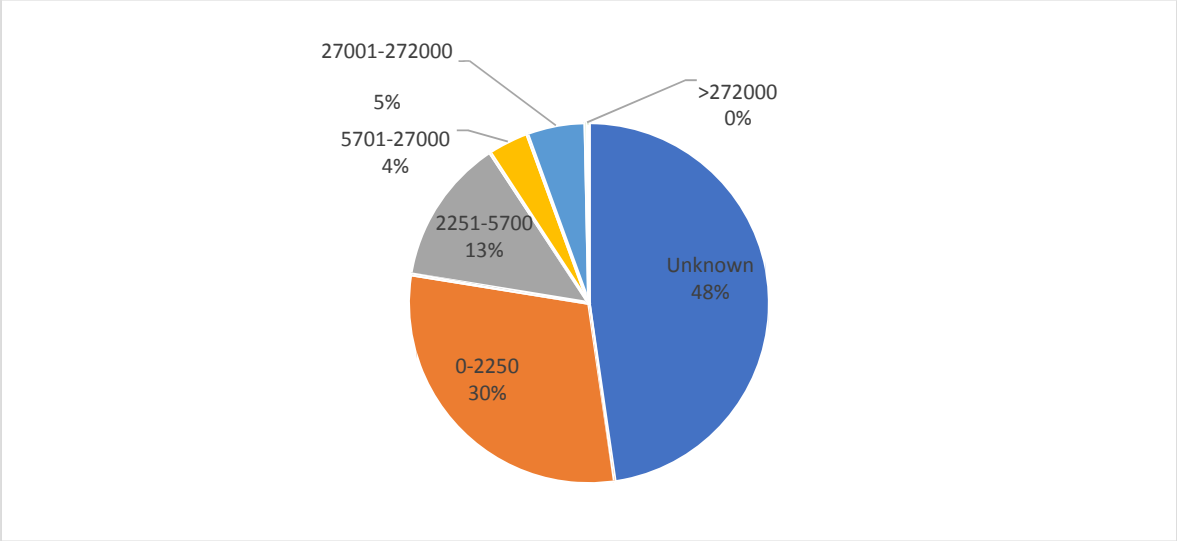


Fig. 11 – Occurrence distribution by mass group

Flight phases

Regarding flight phases, most occurrences take place during the landing (LDG) phase. Unlike take-off (TOF) or other flight phases, landing involves a strict control of more variables, with the resulting addition to crew workload, making it more vulnerable to an aircraft accident. When performing flight speed, descent rate, aircraft configuration, or directional control, a slight variation in any of them will result in a bad landing and, therefore, in an accident.

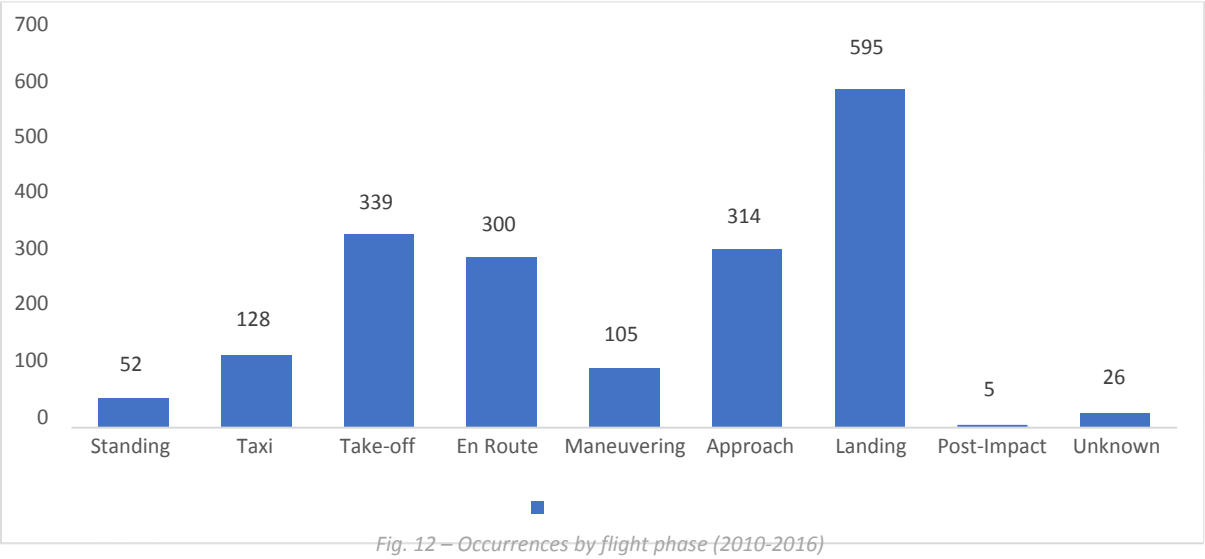


Fig. 12 – Occurrences by flight phase (2010-2016)

Occurrences

For study purposes, aviation occurrences can be seen as a succession of events associated to given flight phases. We have already seen that most occurrences take place during the landing phase. We will now analyze the events of the reported occurrences during the landing phase.

It is important to point out that, given the dynamics of the investigation process, events are not generally uploaded to collection and processing systems during the reporting stage but rather during the update stage. Consequently, the analysis is conducted on the basis of occurrences that have a higher level of information.

The following graph shows the most recurrent events in the *accident* dynamic at regional level.

Note.- For better visualization, given the volume of information and the large number of events, 30 (thirty) events were selected for inclusion in the graph; the rest are available in the SDCPS.

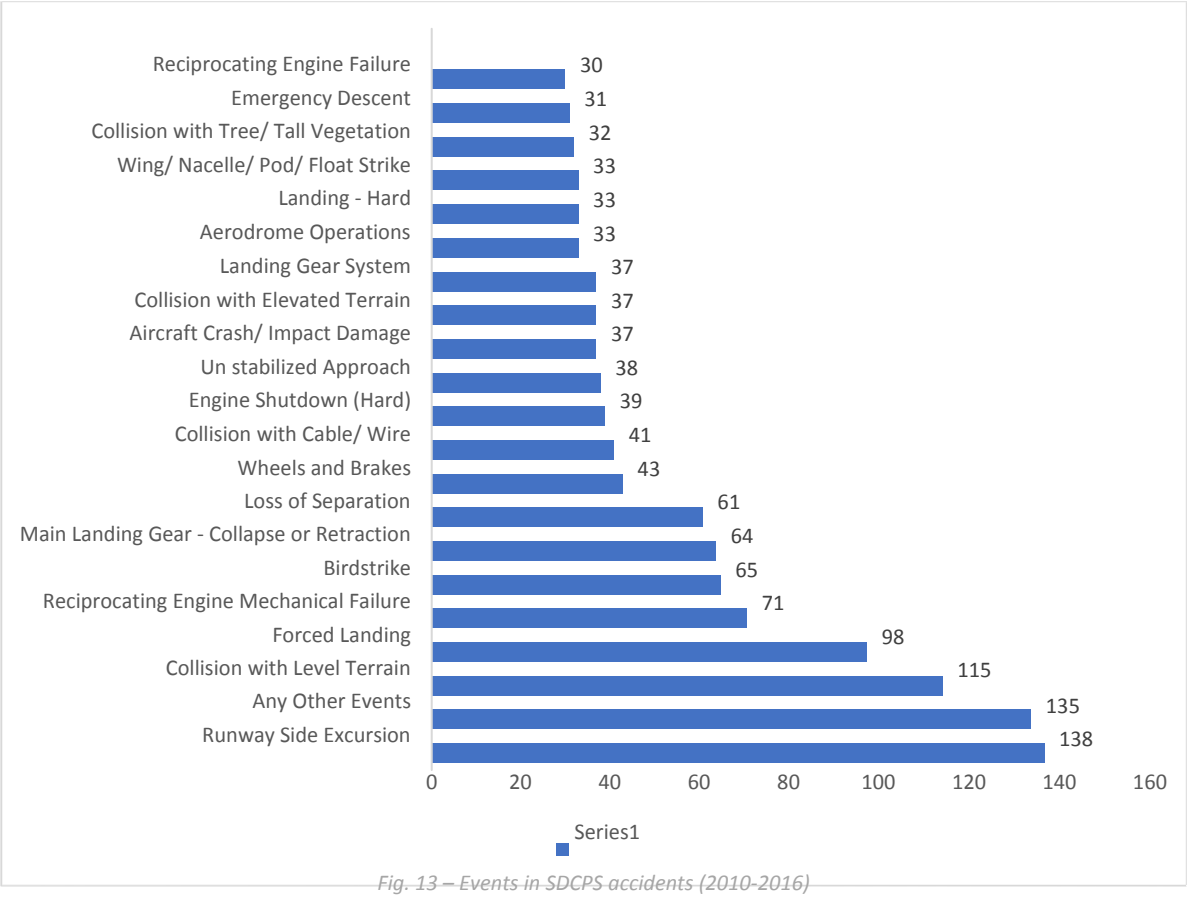


Fig. 13 – Events in SDCPS accidents (2010-2016)

For more information on taxonomy, visit: http://www.icao.int/safety/airnavigation/AIG/Pages/ADREP-Taxonomies.aspx

Events are always associated to a flight phase. As an example, the *runway side excursion* event is largely associated to the landing phase, while some events shown in the previous graph are associated to other flight phases, reason why new events appear, such as *Un stabilized Approach* and *Main Landing Gear - Collapse or Retraction.*

For an in-depth analysis, each flight phase and the events associated to it should be examined in order to identify potential factors and safety issues.

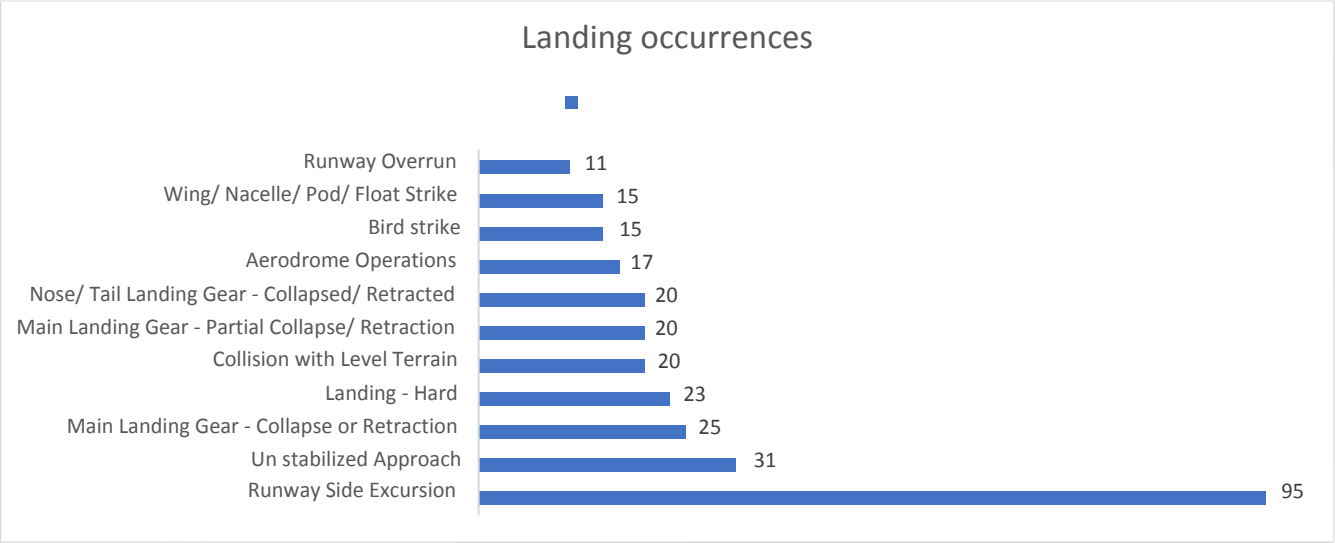


Fig. 14 – Events during the landing phase

Trends

Although each occurrence investigated by AIG organizations is unique, given the large number of variables and conditions involved, and based on the information surveyed, it is possible to establish a trend towards a given occurrence, that is, to group the most frequent conditions in order to identify the most common risks and hazards.

This piece of information is very important in case we need to analyze the reported occurrences in depth. The following graph shows the trend in each SDCPS occurrence category for the period 2010-2016.

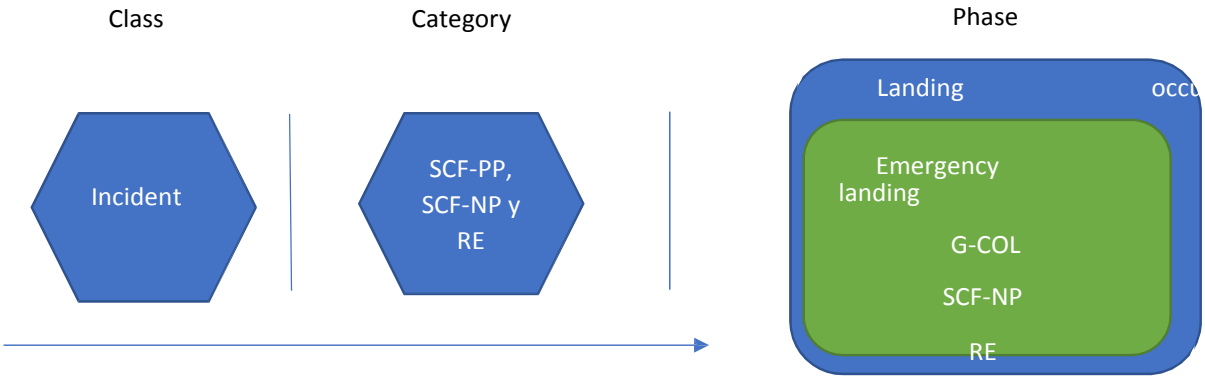


Fig. 15 – Frequent occurrence types in the SDCPS

Safety recommendations

In accordance with ICAO Annex 13, each signatory State is entitled to formulate as many recommendations as it deems appropriate in order to prevent the recurrence of an accident, thus preserving the safety of civil aviation operations in its airspace. In general, these actions translate into **safety recommendations**. *Safety*

recommendations seek to ensure that identified risks are made known to those entities and organizations that are in the best position to

make changes, convincing them to take the required corrective action. In this sense, the safety recommendations of the investigation entity may be considered as the most important output of the investigation. The capacity of recommendations to prevent new accidents can only be fully realized if the entity to which the recommendation is addressed applies the appropriate measures to mitigate the identified risks. In order to measure the efficacy of recommendations in making a positive change, it is necessary to assess the measures taken against the parameter of the results expected from the recommendation [1].

For the period under study (2010-2016), there are 1,874 safety recommendations recorded in the SDCPS.

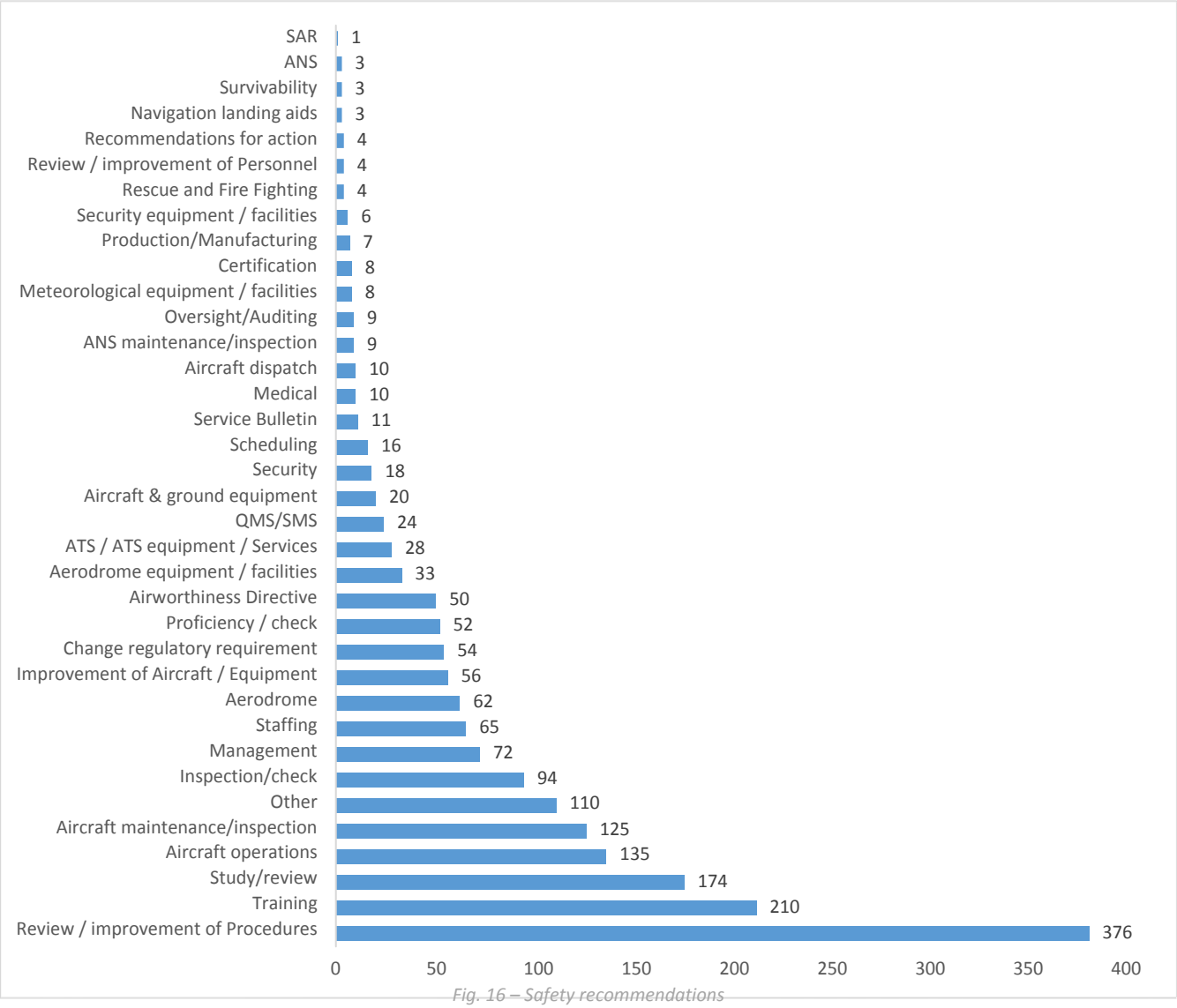


Fig. 16 – Safety recommendations

[1] *ICAO 9756 (Manual of aircraft accident and incident investigation)*

It is clear that most safety recommendations issued by AIG organizations of the SAM Region are aimed at *reviewing and improving procedures and training*. The Aviation Authority and the AIG Authority, as the main actors of the aviation system, take the necessary measures to ensure that safety recommendations have a positive impact on the aviation system, with the ultimate goal of preventing aircraft accidents.

Conclusions

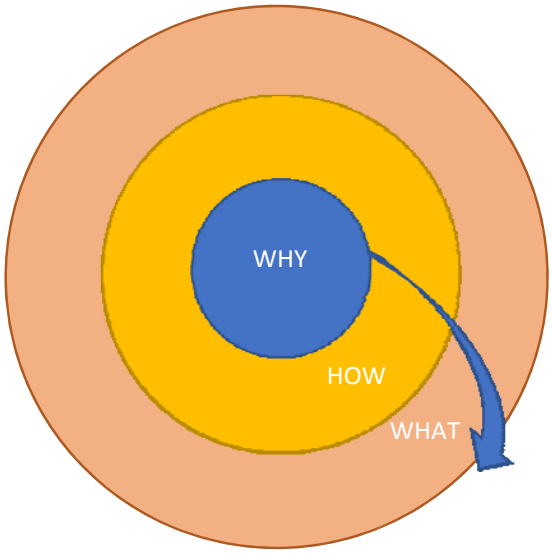


Fig. 17 – SDCPS implementation

Technical and operational training on ADREP-based technological tools started in 2008, but it was only in 2016 that the ARCM was able to establish a regional database (SDCPS). This is a very important step, and although we still do not have 100% occurrence reporting and the quality of reported data is not 100% either, we know what to do and how to do it. But in order to produce quality work that is useful and reliable, we need to know ***"why"*** we do it.

With this report, we want to change the approach

Through implementation and training plans, the ARCM instructed States to report their occurrences to the ARCM. That would be the *Why*. Likewise, the SDCPS was implemented with software containing the ADREP taxonomy, and reporting procedures and specific workshops were established. That would be the *How*. With this first report, we want to share with ARCM States an analysis of the preliminary information that was collected in the ARCM SDCPS during 2016 and the status of occurrences for the period 2010-2016 within a general context, in order to produce safety information. That would be the *Why*.

If we are capable of understanding and visualizing the *why*, we can overcome the barriers and have a very powerful and useful tool for the Region: **safety information**.

The ARCM has made a great effort to implement collection systems in the AIG organizations of the SAM Region. But we need to go deeper into, and consolidate, the information of the investigations, and update and validate the sources of information. This task behoves all of us involved in safety if we want to attain the expected success.

The ARCM Technical Committee understands the need to incorporate the following external information in order to conduct a **"*safety intelligence*"** analysis:

-Registered aircraft, by State (type, quantity, year)

-Volume of operations

-Controlled aerodromes

-Licenses (type, quantity)

The main objective of this report is to give an overview of the scope of the ARCM SDCPS, provide feedback on the reporting processes of the States, and encourage those that are not doing it yet.

* The SDCPS must become integrated with other information systems.

* General aviation accounts for more than 50% of investigation activities

* Regarding occurrence categories, mitigation actions should focus on SCF-PP, SCF-NP and RE, since these are present in all the graphs shown above. However, the leading categories in accidents with fatal injuries must be identified and treated as major categories to be mitigated, such as accidents due to loss of control in-flight (LOC-I) and controlled flight into terrain (CFIT).

Information is dynamic, but shows that general aviation is a study universe in its own right and different from commercial aviation. This first report is our baseline, **"*where we are*"** as an AIG Regional Cooperation Mechanism. Let us together define **"*where are we going*"**.

Summary

2522 occurrences

221 accidents with fatal injuries

107 destroyed aircraft

647 fatalities

List of accidents with fatal injuries (2010-2016)

Registration	Year	State	Fatalities
CC-AAN	2010	Chile	1
CC-CDC	2010	Chile	1
CC-CZD	2010	Chile	1
CC-PGY	2010	Chile	6
CC-PRM	2010	Chile	4
HC-AQK	2010	Ecuador	1
HC-BCF	2010	Ecuador	1
HC-U-006	2010	Ecuador	1
HK1548	2010	Colombia	4
HK1952	2010	Colombia	1
HK2423	2010	Colombia	2
HK2933	2010	Colombia	4
HK3262 / FAC4255	2010	Colombia	11
HK4326	2010	Colombia	4
HK4429	2010	Colombia	6
HK4631	2010	Colombia	4
LV-JEW	2010	Argentina	1
LV-JEY	2010	Argentina	1
LV-LDP	2010	Argentina	2
LV-LGJ	2010	Argentina	1
LV-MNO	2010	Argentina	2
LV-WHM	2010	Argentina	2
LV-WJX	2010	Argentina	2
LV-WJX	2010	Argentina	2
LV-X314	2010	Argentina	1
PR-EBM	2010	Brazil	2
PT-LEU	2010	Brazil	4
PT-OID	2010	Brazil	2
PT-TAF	2010	Brazil	2
XA-UNI	2010	Colombia	3
YV100X	2010	Venezuela	1
YV1010	2010	Venezuela	17
YV158E	2010	Venezuela	2
YV2191	2010	Venezuela	4
CC-ACX	2011	Chile	1
CC-CID	2011	Chile	1
CC-CTT	2011	Chile	2
CC-PTP	2011	Chile	1
EC-IOE	2011	Chile	1
HC-BJA	2011	Ecuador	2
HC-CLH	2011	Ecuador	1
HK1084	2011	Colombia	1
HK2579	2011	Colombia	2
HK3934	2011	Venezuela	2
HK4448	2011	Colombia	2
HK4594	2011	Colombia	4
LV-CEJ	2011	Argentina	22
LV-OOF / PG-449	2011	Argentina	2
LV-YLO	2011	Argentina	1

N810AG	2011	Colombia	2
PP-KST	2011	Brazil	3
PR-NOB	2011	Brazil	16
PT-HNA	2011	Brazil	3
S/D	2011	Panama	2
YV2717	2011	Venezuela	1
YV-UL-015	2011	Ecuador	1
CC-AEB	2012	Chile	8
CC-CGX	2012	Chile	2
CC-CYM	2012	Chile	8
CC-K20W	2012	Chile	2
HK1441	2012	Colombia	3
HK1477	2012	Colombia	1
HK2210	2012	Colombia	1
HK4318	2012	Colombia	1
HK4477	2012	Colombia	4
HK4890	2012	Colombia	1
HK588	2012	Colombia	1
LV-GTF	2012	Argentina	1
LV-HCP	2012	Argentina	1
LV-LEO	2012	Argentina	1
LV-X243	2012	Argentina	2
LV-X433	2012	Argentina	2
OB-1887-P	2012	Peru	4
PP-WCA	2012	Brazil	1
PR-DOC	2012	Brazil	8
PT-LOU	2012	Brazil	4
PT-OQR	2012	Brazil	1
PT-PTB	2012	Brazil	1
XB-MPL	2012	Ecuador	2
YV105E	2012	Venezuela	1
YV1985	2012	Venezuela	5
CC-AGC	2013	Chile	1
CC-CNB	2013	Chile	1
CC-CNW	2013	Chile	2
CC-KUJ	2013	Chile	4
CC-PXC	2013	Chile	5
HJ317	2013	Colombia	2
HK1822	2013	Colombia	1
HK4866	2013	Colombia	5
LV-AZG	2013	Argentina	2
LV-BPP	2013	Argentina	2
LV-DGC	2013	Argentina	1
LV-EII	2013	Argentina	2
LV-GEU	2013	Argentina	4
LV-NYM	2013	Argentina	3
LV-RTS	2013	Argentina	2
LV-X313	2013	Argentina	2
LV-YRN	2013	Argentina	2
N119FD	2013	Venezuela	2
N241CH	2013	Peru	7
OB-1916-P	2013	Peru	13
PR-VAR	2013	Brazil	1
PT-VAQ	2013	Brazil	10
YV236A	2013	Venezuela	1

ZP-BAM	2013	Argentina	3
ZP-BDV	2013	Paraguay	6
8R-GHS	2014	Guyana	2
CC-KMF	2014	Chile	2
C-GSVM	2014	Colombia	2
FAE601	2014	Ecuador	0
HC-CAB	2014	Ecuador	1
HC-CLO	2014	Ecuador	1
HC-CLO	2014	Ecuador	6
HK1921	2014	Colombia	1
HK4462	2014	Colombia	5
HK4464	2014	Colombia	10
HK4700	2014	Colombia	5
HK4745	2014	Colombia	1
HK4755	2014	Colombia	10
HK4892	2014	Colombia	7
HK4921	2014	Colombia	5
LV-DOA	2014	Argentina	1
LV-HAF	2014	Argentina	1
LV-OHD	2014	Argentina	1
LV-WLT	2014	Argentina	2
LV-X463	2014	Argentina	1
LV-ZHW	2014	Argentina	1
N4258	2014	Colombia	3
YV1706	2014	Venezuela	1
YV1997	2014	Venezuela	2
YV2537	2014	Venezuela	2
CC-AMY	2015	Chile	1
CC-APP	2015	Chile	4
CC-CLD	2015	Chile	1
CC-PHY	2015	Chile	3
CC-THL	2015	Chile	1
HK1364	2015	Colombia	1
HK1912	2015	Colombia	3
HK2327	2015	Colombia	2
HK2372	2015	Colombia	1
HK3909	2015	Colombia	2
HK3917	2015	Colombia	9
HK4677	2015	Colombia	1
HK4918	2015	Colombia	2
HK4990	2015	Colombia	3
HK5064	2015	Colombia	3
LQ-BHT	2015	Argentina	1
LQ-FJQ / LQ-CGK	2015	Argentina	10
LV-CDV	2015	Argentina	2
LV-CXM	2015	Argentina	2
LV-DOC	2015	Argentina	1
LV-FJK	2015	Argentina	1
LV-FZV / LV-GYV	2015	Argentina	1
LV-VFD	2015	Argentina	1
N164HH	2015	Colombia	3
PP-LLS	2015	Brazil	5
PR-ADA	2015	Brazil	5
PR-AVG	2015	Brazil	3
PR-MIC	2015	Colombia	3

PR-RSA	2015	Brazil	1
PT-DKO	2015	Brazil	1
PT-WQH	2015	Brazil	4
YV1174	2015	Venezuela	2
YV1625	2015	Venezuela	1
YV1811	2015	Venezuela	1
YV2376	2015	Venezuela	1
CC AFW	2016	Chile	1
CC-CCJ	2016	Chile	1
CC-POK	2016	Chile	2
CP-2871	2016	Bolivia	6
CP-2933	2016	Colombia	71
CP-2953	2016	Bolivia	6
HK1328 /HK2092	2016	Colombia	2
LV-CQJ / LV-BSH	2016	Argentina	3
LV-EDB	2016	Argentina	1
LV-FHQ	2016	Argentina	1
LV-NHS	2016	Argentina	1
LV-X566	2016	Argentina	2
N5532G	2016	Chile	1
PP-LMM	2016	Brazil	2
PR-AJF	2016	Brazil	1
PR-CBB	2016	Brazil	5
PR-DTA	2016	Brazil	4
PR-SLV	2016	Brazil	2
PR-ZRA	2016	Brazil	7
PT-EFQ	2016	Brazil	8
PT-ICU	2016	Brazil	3
PT-WFX	2016	Brazil	6
PT-WMV	2016	Bolivia	1
YV1091	2016	Venezuela	1
YV1583	2016	Venezuela	6
YV1637	2016	Venezuela	2
YV1822	2016	Venezuela	2
YV2274	2016	Venezuela	2
YV250T	2016	Venezuela	1
YV3051	2016	Venezuela	2
YV607T	2016	Venezuela	2
ZP-BCP	2016	Paraguay	1

APPENDIX B

Accident/Incident DATA

ARCM - 2017

ARCM

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Acronyms

Flight phases

APR	Approach
ENR	En route
ICL	Initial climb
LDG	Landing
MNV	Maneuvering
PBT	Pushback/Tow
STD	On stand
TOF	Take-off
TXI	Taxiing

Occurrence categories

ADRM	Aerodrome
AMAN	Abrupt maneuver
ARC	Abnormal runway contact
ATM	ATM/CNS
BIRD	Bird strike
CABIN	Safety events in the cabin
CFIT	Controlled flight into terrain
CTOL	Collision with obstacle(s) during take-off and landing
EVAC	Evacuation
EXTL	External load related occurrences
F-NI	Fire/smoke (non-impact)
F-POST	Fire/smoke (post-impact)
FUEL	Fuel-related
GCOL	Ground collision
GTOW	Glider towing related events
ICE	Icing
LALT	Low altitude operations
LOC-G	Loss of control - ground
LOC-I	Loss of control in-flight
LOLI	Loss of lifting conditions en route
MAC	Airprox/TCAS alert/Loss of separation/(near) mid-air collisions
MED	Medical
NAV	Navigation errors
OTHR	Other
RAMP	Ground handling

RE	Runway excursion
RI	Runway incursion
SCF-NP	System component failure or malfunction (non-power plant)
SCF-PP	System component failure or malfunction (power plant)
SEC	Security-related
TURB	Turbulence encounter
UIMC	Unintended flight into IMC
UNK	Unknown or undetermined
USOS	Undershoot/Overshoot
WILD	Wildlife
WSTRW	Wind shear or thunderstorm

Other acronyms

ARCM	AIG Regional Cooperation Mechanism
CAST	Commercial Aviation Safety Team
CICTT	CAST/ICAO Common Taxonomy Team
ICAO	International Civil Aviation Organization
ISASI	International Society of Air Safety Investigators

Policy and standardization

At the 3rd AIG Authorities Meetings AIG-SAM/3, we agreed to work with the AIG organizations of the Region in the adaptation of documents and specific manuals in order to standardize processes, procedures, and occurrence classification throughout the SAM Region. The objective is to create a regional cooperation environment for improving effective implementation in the AIG area and contribute to the reduction of the aircraft accident and incident rate of the SAM Region below the global rate in all segments of aviation.

According to working paper AIG-SAM3-WP07 on the establishment of the ARCM SDCPS, aircraft accident and incident safety data was collected for aircraft with a maximum take-off weight (MTOW) above 2,250 Kg and for aircraft with a MTOW of 2,250 Kg or less.

It is important to note that the data collected of 2017 is based on preliminary safety data that has not been validated and has not undergone a quality procedure.

The following aspects will be taken into account:

Occurrence class:

a) Accidents;

b) Serious incidents; and

c) Incident investigation data (in which AIG organizations participate)

Aircraft operations:

a) scheduled and non-scheduled commercial air transport;

b) general aviation;

c) business aviation;

d) aerial work; and

e) unmanned aircraft systems (remotely-piloted aircraft systems – RPAS)

4 ;arding occurrence categories, the ICAO CAST category classification will be applied.

Safety Data Collection and Processing System

In 2016, all ARCM member States implemented their ADREP/ECCAIRS platforms and the connection to the ARCM SDCPS, making reports and updates using the established procedures. However, at present, not all States have reported all the occurrences that were investigated, or have not updated the information upon completion of the investigation, which negatively affects data analysis.

The implementation of the SDCPS and the reporting processes required adaptation, follow-up and integration during 2016, an effort that was reinforced in 2017 and must be continuously updated for the next 3 years to achieve the information quality required during validating process of the SDCPS.

The States that submit more reports do not necessarily have more occurrences than the rest of the States; rather, they have adopted the reporting procedures and comply with that established by the 3rd AIG Authorities Meeting AIG- SAM/3 (Lima-2016).

Data source

The SDCPS is a safety data collection and processing system. Technically speaking, it is a *Data warehouse*, a corporate database for the integration and refinement of information from one or more sources, which will then be processed for analysis from different perspectives. The vision of the ARCM Technical Committee is to be able to consolidate the stored data and guide the analysis of the information towards *business intelligence.*

The data universe for this report consists of occurrences reported to the ARCM through the SDCPS during the period **2017**; a total of ***118 occurrences***. The data used for drafting this document was extracted from the SDCPS on 18/02/18.*

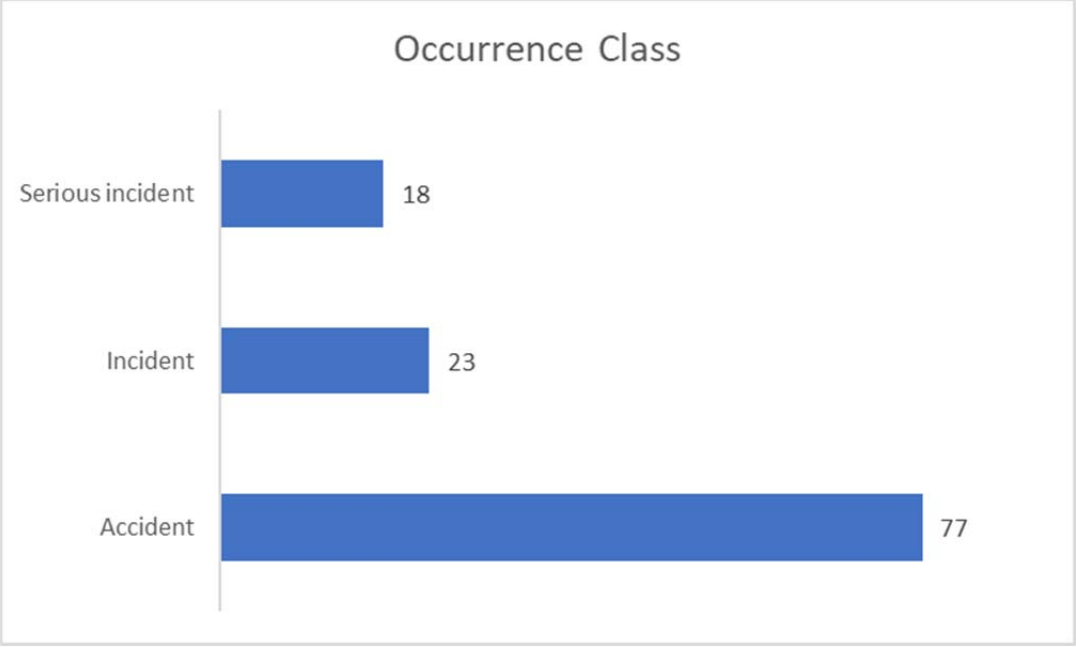

Figure 1 Occurrences reported to the ARCM (2017)

*Note: data charts content shows the reported occurrences to the SDCPS ARCM, which does not reflect the total amount of occurrences of each ARCM Member State.

Information analysis

One of the most important aspects in the statistical analysis of occurrences is their classification. To this end, the definitions established by the ICAO CAST are used.

Note: An occurrence may be associated to one or more categories.

Occurrence categories

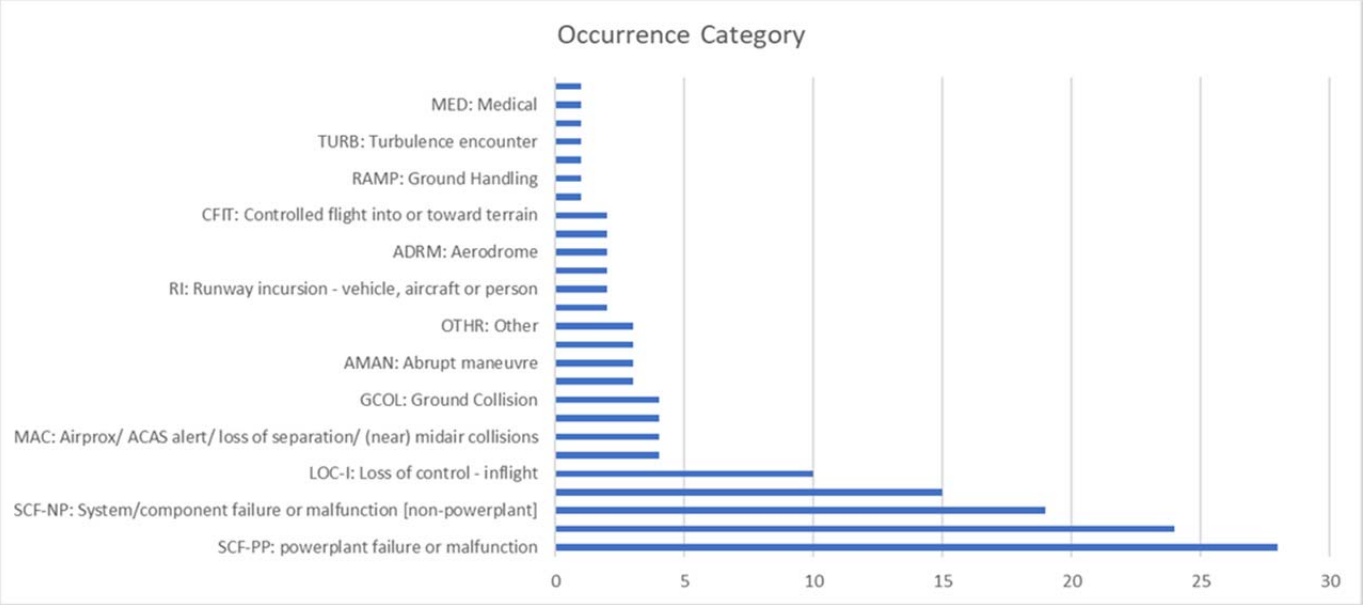

Figure 2 Occurrence category

Notifications

Regarding accidents reported to the ARCM through the SDCPS, 118 were reported.

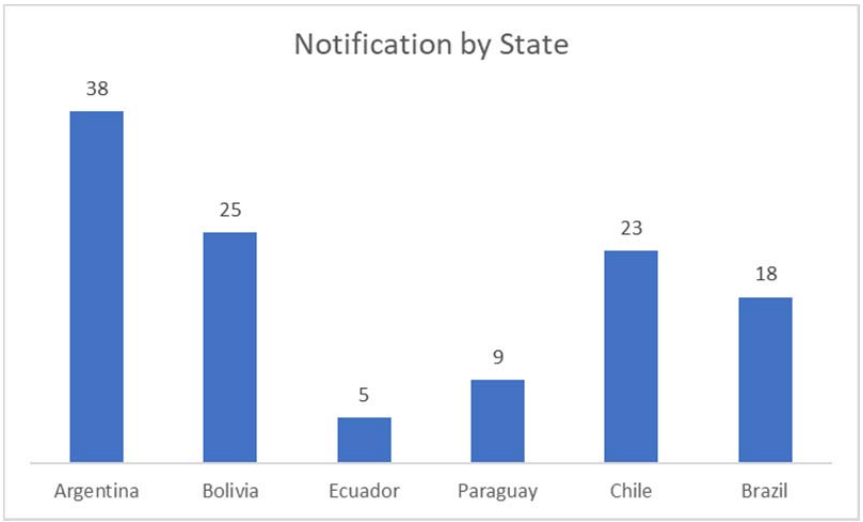

Figure 2 Accident reported

Statistic by operations

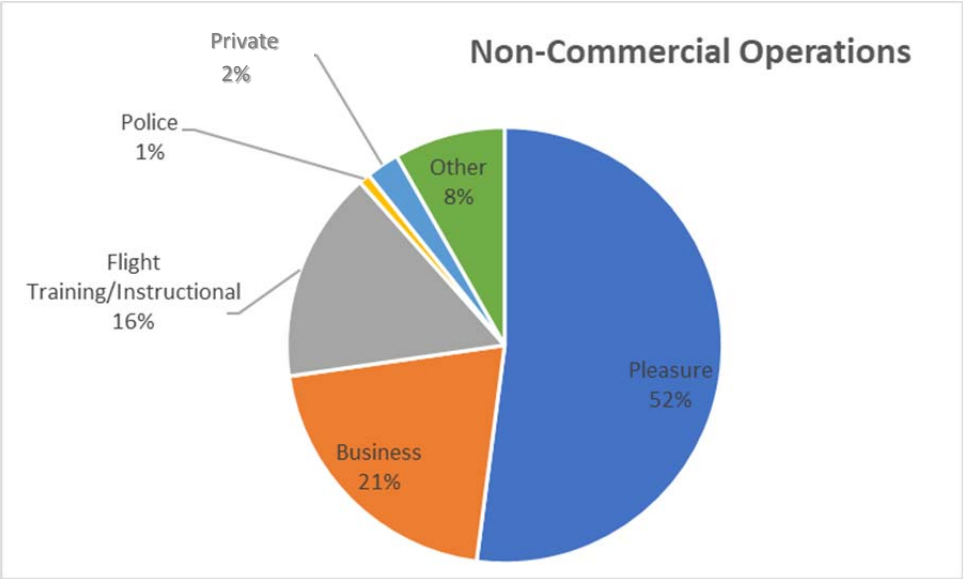

Figure 3 Occurrence by operation

Mass group

The system shows that occurrences involving aircraft with an MTOW of 0-2250 kg accounted for 69% of reported occurrences during the period 2017. This shows the importance of consider this segment and its problematic. Opposite from Commercial Aviation (27001-272000kg) which reflects the less percentage of occurrences (2%).

Therefore, this information suggest that the 69% (MTOW 0-2250kg) represents mainly Pleasure and Flight training operations.

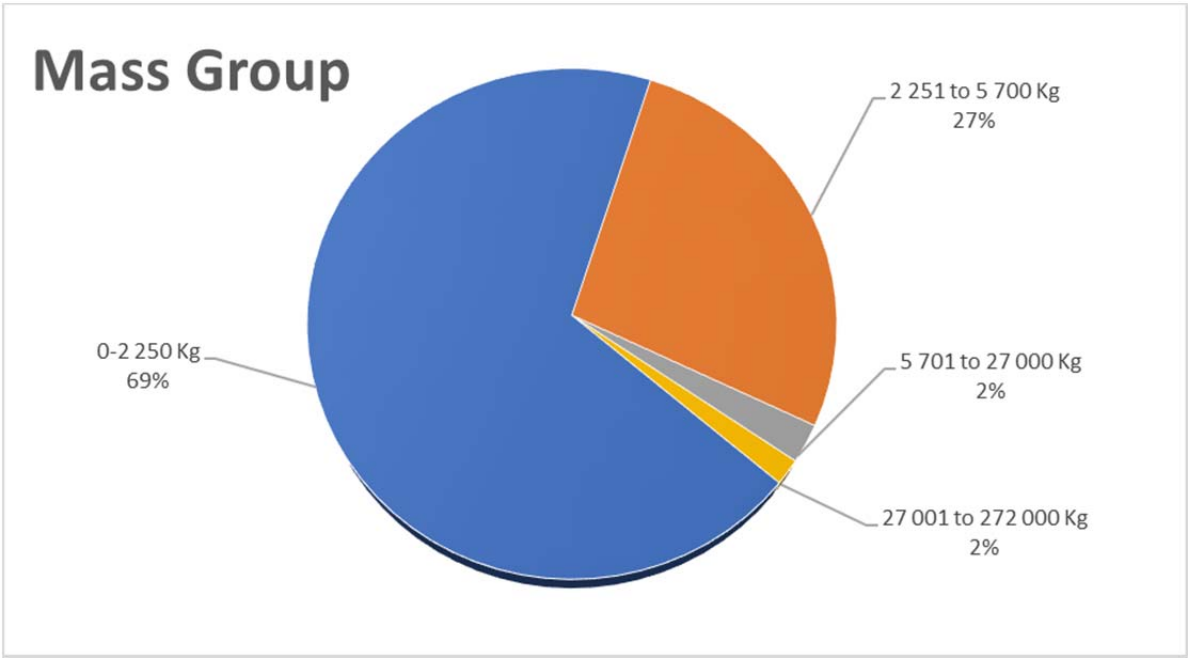

Figure 4 Occurrence by mass group

Flight phases

Regarding flight phases, most occurrences take place during the landing (LDG) phase. Unlike En route (ENR) or other flight phases, landing involves a strict control of more variables, with the resulting addition to crew workload, making this phase more vulnerable. When performing flight speed, descent rate, aircraft configuration, or directional control, a slight variation in any of them will result in a bad landing and, therefore, in an accident/ incident.

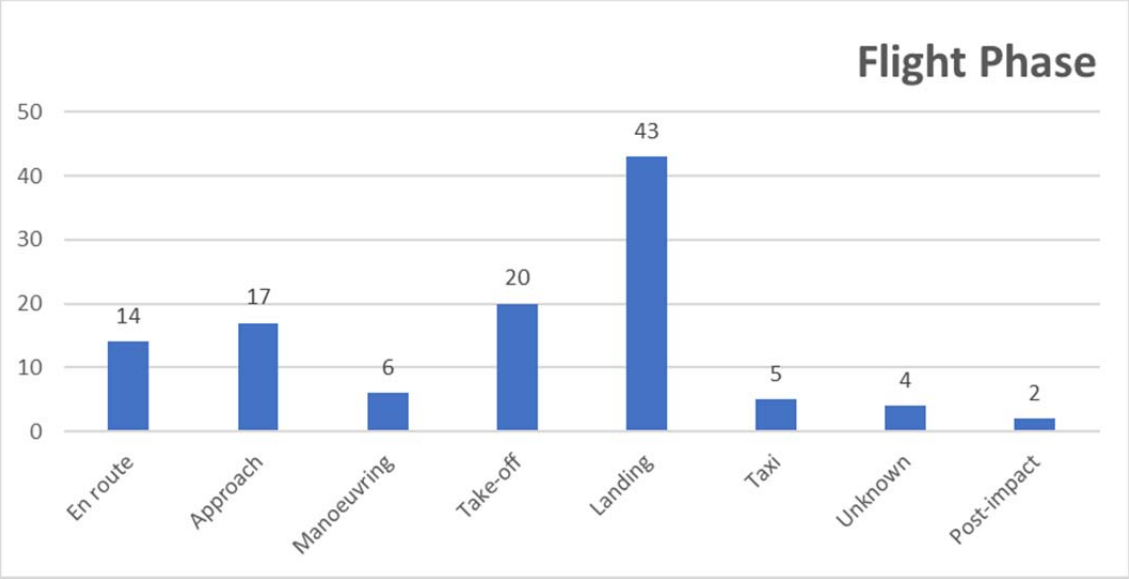

Figure 5 Occurrence by flight phase