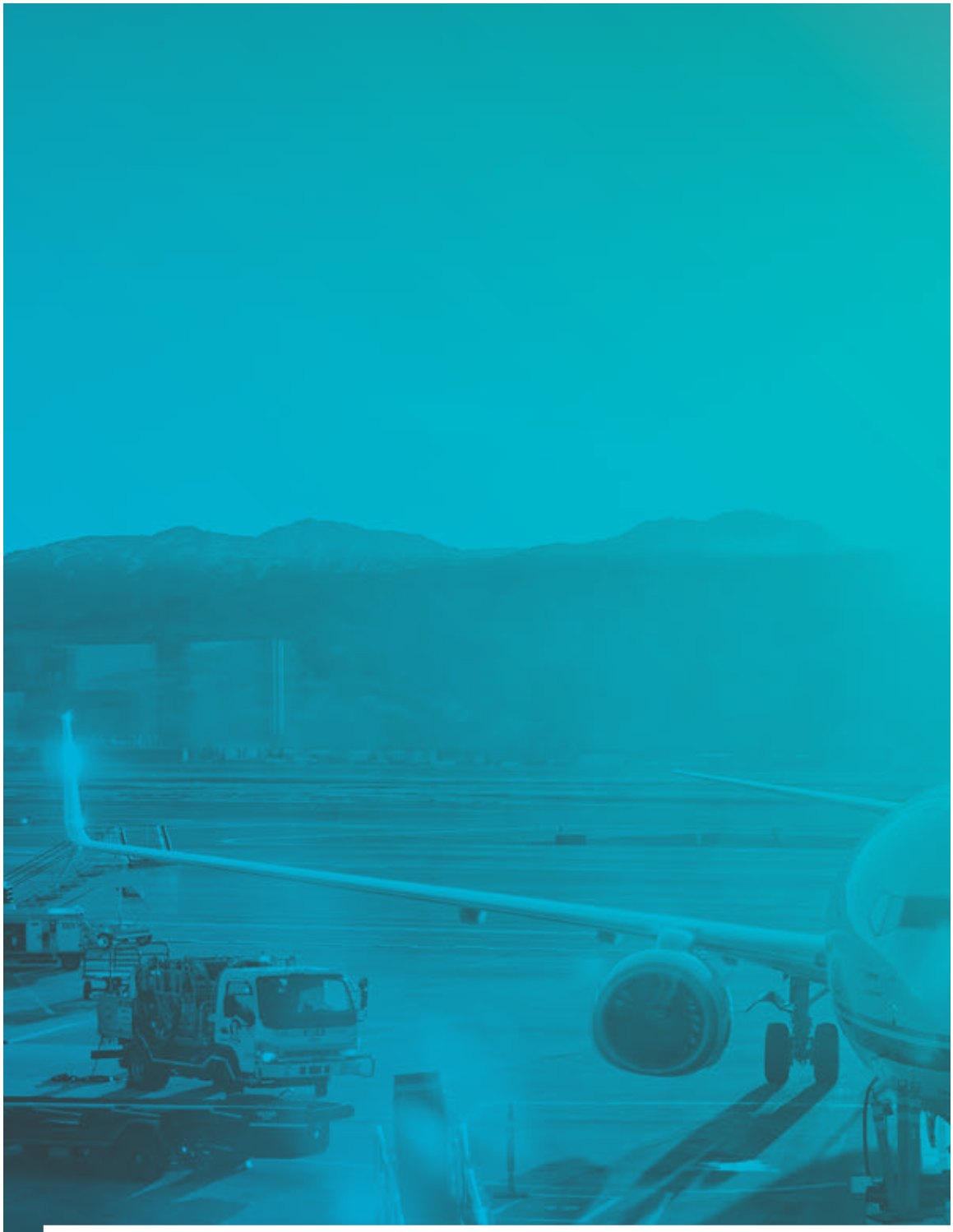
Annual Safety Report

Asia Pacific Region 2017



Acknowledgement to contributors

RASG-APAC thanks the members of the RASG-APAC Annual Safety Reporting and Program Working Group that contributed to the elaboration of this 2017 RASG-APAC Annual Safety Report: **ICAO** | **IATA** | **CAST**

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Foreword

Regional Aviation Safety Group–Asia Pacific (RASG-APAC) background

The establishment of the Regional Aviation Safety Group–Asia Pacific (RASG-APAC) was endorsed at the 47th Directorate General of Civil Aviation (DGCA) conference as a focal point to ensure harmonisation and coordination of efforts aimed at reducing aviation safety risks for the Asia Pacific region.

RASG-APAC supports implementation of the ICAO Global Aviation Safety Plan (GASP) and the Global Aviation Safety Roadmap (GASR).

RASG-APAC membership includes representatives from the 40 states/administrations associated with the ICAO Asia Pacific regional office.

RASG-APAC has established the Asia Pacific Regional Aviation Safety Team (APRAST) to implement its work program. The objectives of APRAST include recommending interventions to the RASG-APAC which will reduce aviation risks. To do so, APRAST will:

- review, for application within the Asia Pacific region, existing safety interventions which have already been developed through the efforts of well-established, multinational safety initiatives.
- review, for application within the Asia Pacific region, the best practices and metrics defined in the GASP/GASR.
- review regional accidents, significant incident trends and other areas of local concern to determine unique issues that may warrant locally developed interventions. The focus and priority for APRAST will be to introduce, support and develop actions that have the potential to effectively and economically reduce regional aviation risks.

Supporting the work of the APRAST, are three working groups

1. *Asia Pacific–Accident investigation working group (APAC–AIG)*
2. *Safety reporting program working group (SRP WG), and*
3. *Safety enhancement initiative working group (SEI WG).*

APAC–AIG

The APAC-AIG will review the Global Aviation Safety Plan/Roadmap (GASP/R) GSI 3/focus area 3, 'Impediments to reporting of errors and incidents', and GSI 4/focus area 4, 'Ineffective incident and accident investigation' and propose the necessary recommendations to address these two focus areas. The APAC-AIG will:

- review, for application within the Asia Pacific region, existing policies and procedures relating to accident investigation and the reporting of errors and incidents that have already been developed.
- review, for application within the Asia Pacific region, the best practices and metrics defined in Global Safety Initiative/focus areas 3 and 4 of the GASP/GASR.
- review regional accidents and significant incident trends and other areas of local concern to determine unique issues that may warrant locally developed policies and procedures to effectively capture information for study and for the development of recommendations. The focus and priority for APRAST-AIG WG will be to introduce, support and develop actions that have the potential to effectively and economically reduce the regional aviation accident risk.

SRP WG

The SRP WG will gather safety information from various sources to determine the main aviation safety risks in the Asia Pacific region. To be included in the Annual safety report are:

- reactive information
- proactive information.

The Information Analysis Team (IAT) formed within the SRP WG will analyse the available safety information to identify risk areas. Recommendations for safety enhancement initiatives will be made by the SRP WG to the RASG-APAC, through the APRAST, based on the identified risk areas.

SEI WG

The SEI WG is to assist APRAST in the development, implementation and review of SEI's to reduce aviation risks. These SEI's could be established based on the analysis of regional data, based on ICAO initiatives or the initiatives of other relevant organisations or regions or based on the risks and issues identified through the USOAP CMA process. The identified SEI's should be prioritised to ensure that those that have the greatest potential for reducing safety risk are examined first. To accomplish the objectives, the SEI WG will:

I assist APRAST in the identification and development of SEI's, for application within the Asia and Pacific regions, which are aligned with the regional priorities and targets. The focus of these SEI's is to effectively and economically mitigate regional safety risks identified by the SRP-WG.

II assist APRAST in the provision of generic implementation guidance related to the SEI's to guide members through the SEI implementation process.

III assist APRAST in the identification of assistance programs including, but not limited to, workshops and seminars to improve the level of implementation of developed SEI's, with the support of the secretariat.

IV develop and conduct a process to review existing SEI's and provide recommendations to improve the effectiveness and level of implementation.

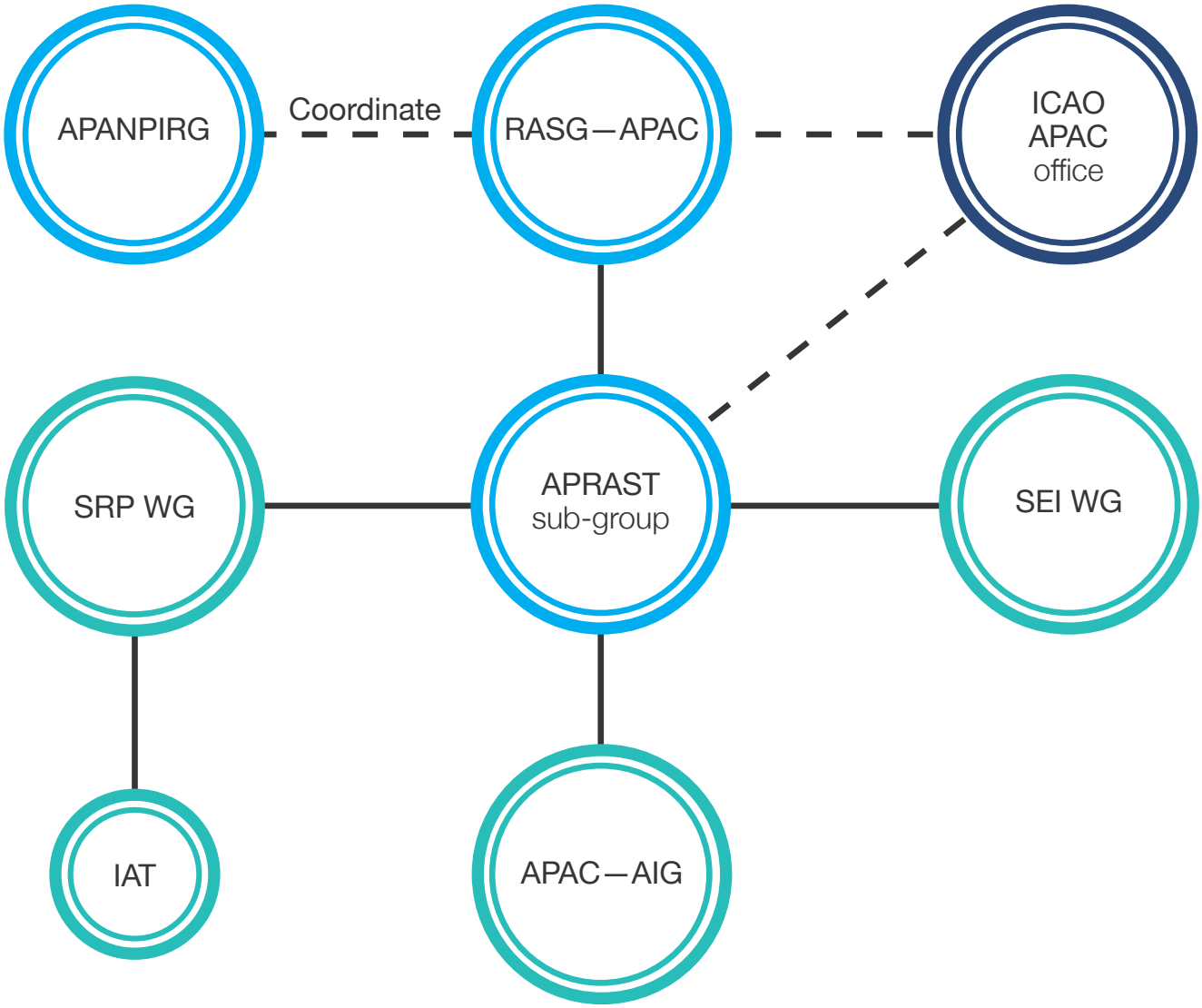
The organisational structure of the RASG-APAC and its subsidiary bodies is shown in Figure 1.1. The International Civil Aviation Organization (ICAO) Asia Pacific regional office in Bangkok provides the secretariat support necessary for the RASG-APAC to function.

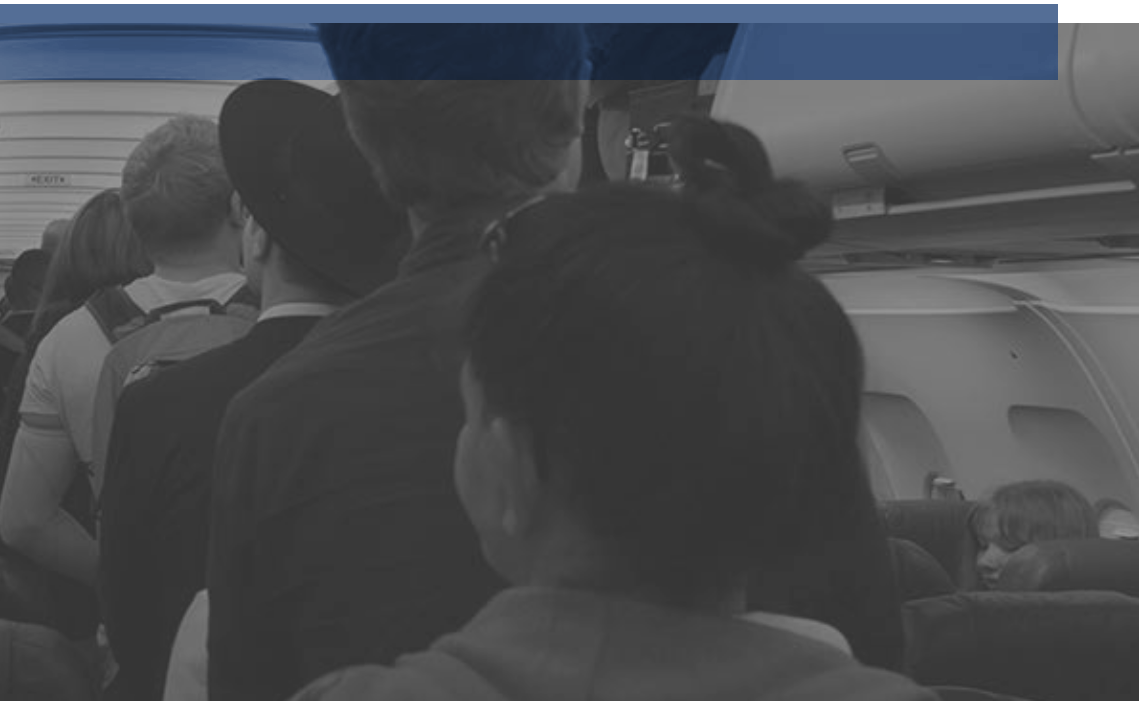
The 2017 Annual Safety Report, developed by the SRP WG and published by RASG-APAC, is the 5th successive edition of the exclusive safety report for the Asia Pacific region based on data provided by ICAO, CAST and IATA. Analysis of this aviation safety data was completed with the in-kind contributions of aviation safety personnel from RASG-APAC member states/administrations and industry partners. This report is envisioned to be an annual publication providing appropriately updated aviation safety information in the Asia Pacific Region.

Copies of this report can be downloaded from www.icao.bangkok.int

For clarification or additional information please email rasgapac@bangkok.icao.int

Figure 1.1 RASG—APAC Organisation Structure





02

Introduction

The objectives of this RASG-APAC Annual Safety Report are to gather safety data from various sources, analyse the main aviation safety risks in the Asia Pacific region and identify possible migratory measures for enhancing aviation safety in a coordinated manner.

The safety information presented in this report is based on the compilation and analysis of data provided by ICAO, the International Air Transport Association (IATA) and Commercial Aviation Safety Team (CAST).

This fifth edition of the RASG-APAC Annual Safety Report contains reactive information relating to hull loss and fatal accidents (both on the ground and in flight) involving commercial aeroplanes operated by (or registered with) the member states/administrations of the RASG-APAC i.e. states/administrations associated with the ICAO Asia Pacific Regional Office. It also includes proactive information for the Asia Pacific region based on USOAP Continuous Monitoring Approach (CMA).

In future, the Annual Safety Report will also include the compilation and analysis of predictive information so that effective mitigation measures can be developed and implemented to reduce/prevent accidents.

In this report, the most frequent accident categories, in accordance with ICAO/IATA/CAST taxonomies, relating to fatality risks, as well as other significant emerging safety categories in the Asia Pacific region, have been identified.

Figure 2.1 Asia Pacific Region—countries associated with the ICAO Asia Pacific Regional Office

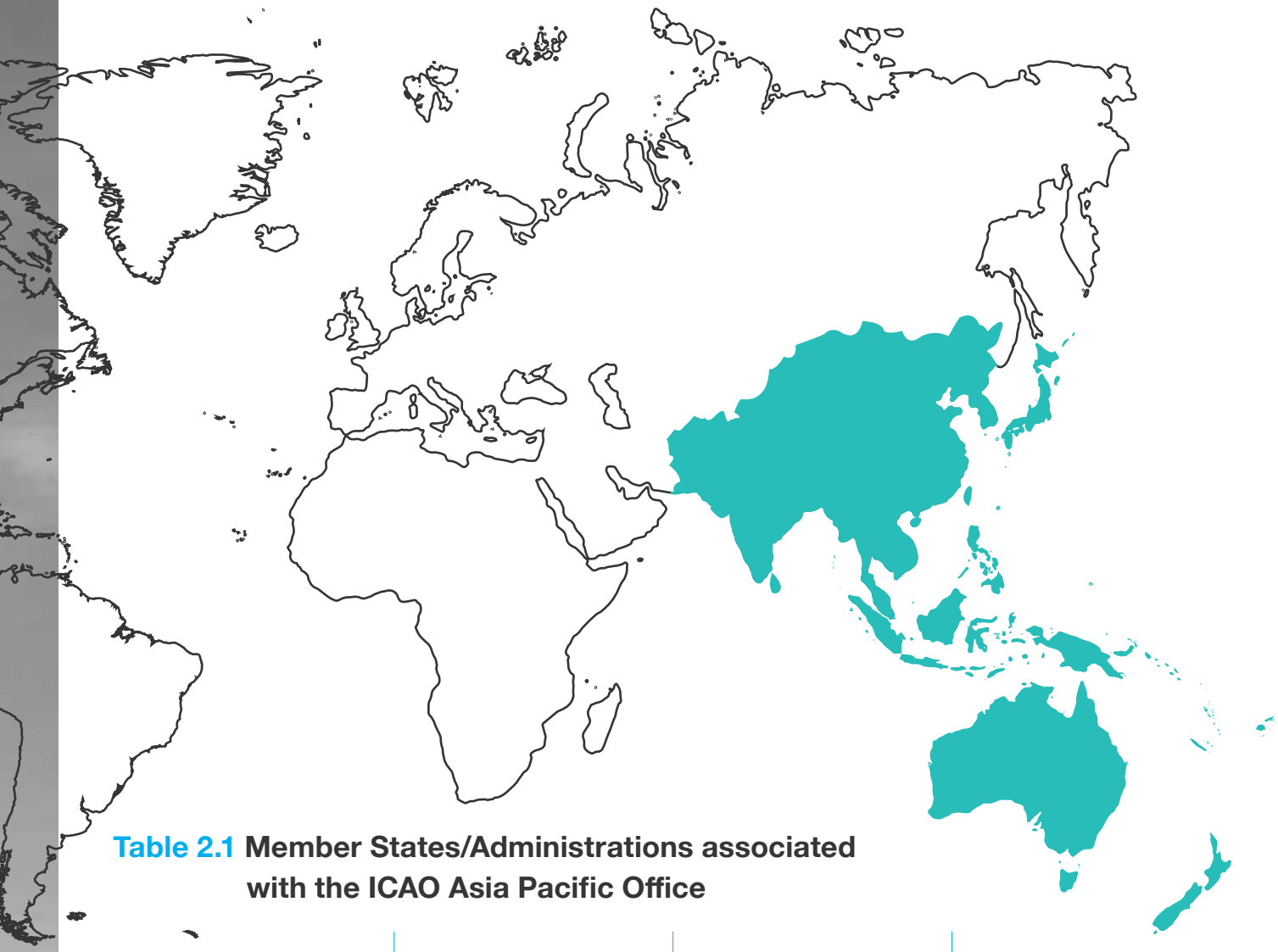


Table 2.1 Member States/Administrations associated with the ICAO Asia Pacific Office

Afghanistan	Australia	Bangladesh	Bhutan
Brunei Darussalam	Cambodia	China	Cook Islands
Democratic People's Republic of Korea	Lao People's Democratic Republic	Fiji	Hong Kong, China
India	Indonesia	Japan	Kiribati
Macao, China	Malaysia	Maldives	Marshall Islands
Micronesia (Federated States of)	Mongolia	Myanmar	Nauru
Nepal	New Zealand	Pakistan	Palau
Papua New Guinea	Philippines	Republic of Korea	Samoa
Singapore	Solomon Islands	Sri Lanka	Thailand
Timor Leste	Tonga	Vanuatu	Vietnam

03

Executive summary

This edition of the RASG-APAC Annual Safety Report collates and presents the results of analysis carried out by members of the Information Analysis Team on aviation accidents data in the Asia Pacific (APAC) region. The safety information was collected from ICAO, IATA and CAST.

Reactive information analysis

The number of accidents attributable to states/ administrations in the RASG-APAC region in 2016 was 17[1], compared to 23 in 2015. In terms of fatalities, there were two fatal accidents in 2016, which was the same as 2015. The 2016 fatal accidents resulted in 50 fatalities.

The decrease in the number of accidents and APAC's growing air traffic volume (from 9.41 to 10.05 million departures) led to the lowering of RASG-APAC region's accident rate from 2.44 in 2015 to 1.69 accidents per million departures in 2016. This was lower than the global accident rate of 2.22 per million departures in 2016. The RASG-APAC's five-year sliding average accident rate of 2.37 per million departures continues to be lower than the global average rate of 2.80 accidents per million departures.

The top two most frequent accident categories for RASG-APAC region in 2016 were:

1. runway safety which includes runway excursion, runway incursion, hard landings and tail strikes on landing
2. system component failure (powerplant/non-powerplant).

In terms of fatality risk, the top two most frequent fatal accidents were attributed to:

1. system/component failure—powerplant (SCF-PP)
2. loss of control in-flight (LOC-I).

Proactive information analysis

The RASG-APAC region had an overall USOAP effective implementation (EI) score of 59.26 per cent in 2017, which represents a slight improvement from 59.17 per cent in 2016. However, this result is lower than the global level of 64.40 per cent.

In terms of critical element (CE), the APAC region had lower EI scores for all categories compared to the global average. By CE, CE-4 on *Technical personnel qualifications and training* and CE-8 on *Resolution of safety concerns (CE-8)* had the lowest EI scores within RASG-APAC, at 46.5 per cent each. By area, accident and incident investigation (AIG) and aerodrome and ground aids (AGA) had the lowest EI scores of 44.8 per cent and 54.7 per cent respectively.

[1] A landing accident involving a China Airlines Airbus 333 (registration no. B-18307) is not included in the total accident count.

04

Safety data

Safety data is an important input for any safety management process. With adequate and accurate safety data, hazards can be identified through robust processing and critical analysis of this safety data. Identified hazards and their associated risk can then be prioritised and appropriate mitigation actions taken.

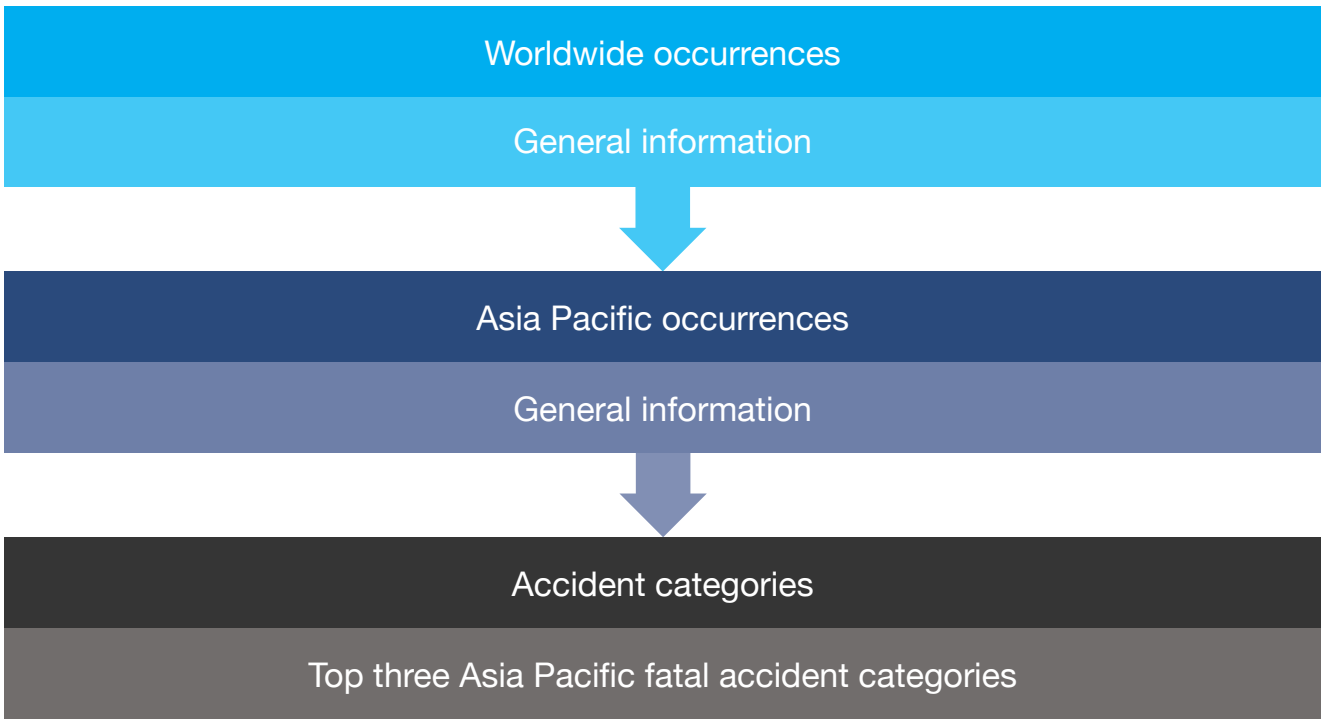
RASG-APAC can be viewed as a high-level regional safety management process or a regional safety program (RSP) with many similarities as in a state safety program (SSP) which is a national safety management process. Using safety data and information provided by ICAO, IATA and CAST helps the region to identify the areas of greater safety concerns and therefore be able to collectively focus on addressing these areas.

05

Approach for analysis

Our approach for the analysis is to process the accident information, provided by ICAO, IATA and CAST, involving commercial aircraft of MTOW greater than 5700 kg operated by (or registered with) the member states/administrations of RASG-APAC. All reported information is for aircraft involved in scheduled commercial activities which are either validated or under validation. The analysis initially focuses on accident rates from a global perspective, then on the APAC region and finally on the sub-regions of North Asia, South Asia, Southeast Asia and the Pacific. The next step is to identify accident categories that are prevalent in the APAC region. **The process is illustrated in Figure 5.1.**

Figure 5.1 Approach for analysis



The grouping of states/administrations into the four APAC sub-regions will firstly be based on their membership with the respective cooperative development of operational safety and continuing airworthiness program (COSCAP) or, if there is no affiliated membership with any sub-regional group or geographical association. The results of the analysis for each of the sub-regions can therefore be used by the various COSCAP or sub-regional groupings to identify work programs. Moreover, each of the COSCAPs will be able to provide assistance in implementation and training in areas that are more relevant to their sub-regions.

The grouping of the states/administrations in the four RASG-APAC sub-regions is as follows:

North Asia (NA) region

States/administrations that are members of COSCAP-NA:

- China
- Democratic People's Republic of Korea
- Hong Kong, China
- Japan
- Macao, China
- Mongolia
- Republic of Korea

South Asia (SA) region

States/administrations that are members of COSCAP-SA:

- Afghanistan
- Bangladesh
- Bhutan
- India
- Maldives
- Nepal
- Pakistan
- Sri Lanka

Southeast Asia (SEA) region

States/administrations that are members of COSCAP-SEA:

- Brunei Darussalam
- Cambodia
- Indonesia
- Lao People's Democratic Republic
- Malaysia
- Myanmar
- Philippines
- Singapore
- Thailand
- Timor Leste
- Vietnam

Pacific region

States/administrations that are members of the Pacific Aviation Safety Office (PASO):

- Australia
- Cook Islands
- Fiji
- Kiribati
- Marshall Islands
- Micronesia (Federated States of)
- Nauru
- New Zealand
- Palau
- Papua New Guinea
- Samoa
- Solomon Islands
- Tonga
- Vanuatu

06

Reporting culture and accidents

This report does not focus on any analysis of the reporting culture of the RASG-APAC region, but it may be included in future editions.

07

Reactive safety information

As defined in the third edition of the ICAO Document 9859, a reactive analysis method responds to events (such as incidents and accidents) that have already happened and about which data has been collected. In the context of this report, all the reactive safety data analysed relates to accidents involving aircraft operated by (or registered with) the member states/administrations within the RASG-APAC region.

The reactive safety data analysed in this report has been obtained from ICAO, IATA and CAST, and the organisation of this information will take these sources into account.

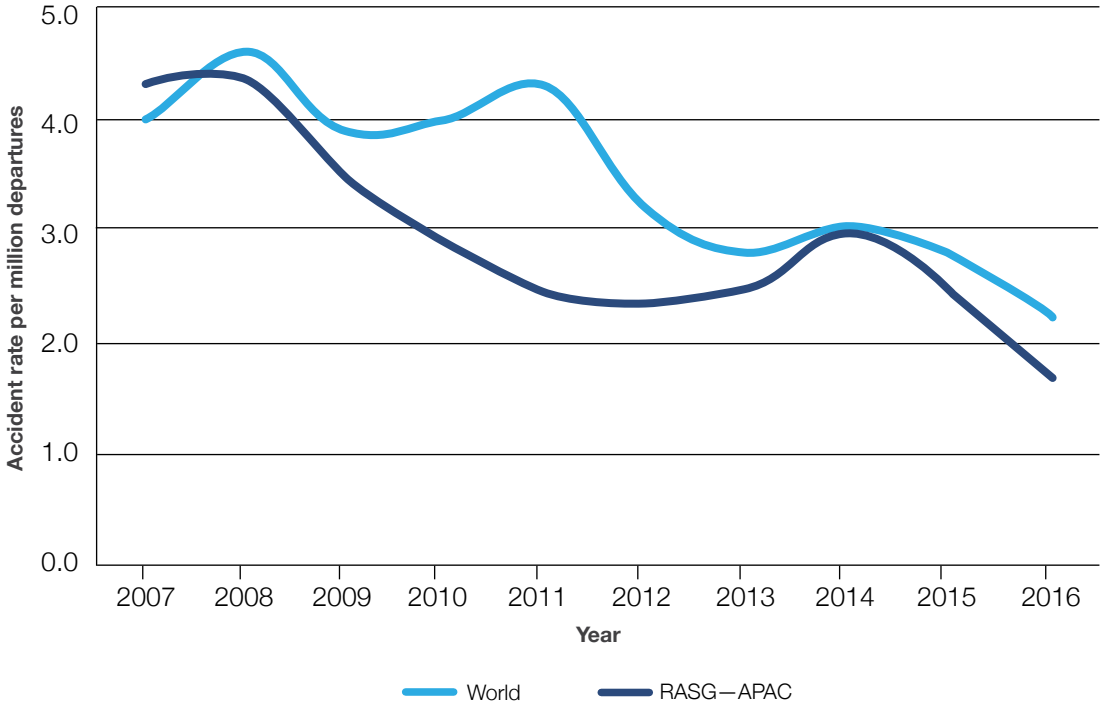
Please note:

1. ICAO's reactive safety information is derived from the Integrated Safety Trend Analysis and Reporting System (iSTARS), which are essentially repositories of accident data supplied by member states' investigative bodies. The definition of an 'accident' is based on ICAO Annex 13. For accidents recorded in 2016, only those incidents that are flagged as official information are used.
2. IATA's reactive safety information relates to accidents that result in hull loss, fatalities and substantial damage to aircraft.

7.1 Worldwide/regional accident information

Global accident rates, APAC accident rates and the accident rates for the four RASG-APAC sub-regions were compiled and charts were prepared based on information extracted from the ICAO iSTARS database. All the information presented was extracted directly from iSTARS without manipulation and is dependent on accuracy of information supplied by the respective member states.

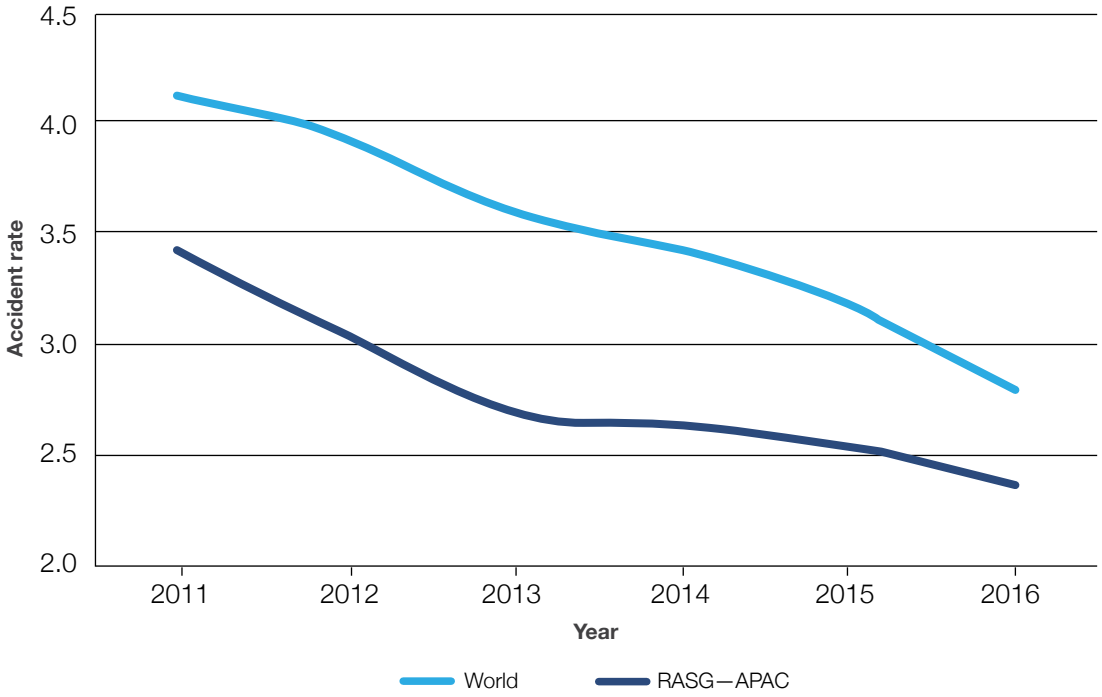
Chart 7.1.1 Global accident rate versus APAC accident rate (2007–2016)



The accident rate for the RASG-APAC region was 1.69 per million departures in 2016, showing a positive improvement compared with the accident rate in 2015 which was 2.44 per million departures. The lower accident rate was due to the decrease in number of accidents attributable to APAC member states/administrations from 23 in 2015 to 17 in 2016.

There was also an increase in APAC's air traffic volume from 9.4 million departures in 2015 to 10.05 million departures in 2016. It can be observed that the RASG-APAC's accident rate has generally been trending down over the past ten years and has primarily remained lower than the global accident rate for the same timeframe.

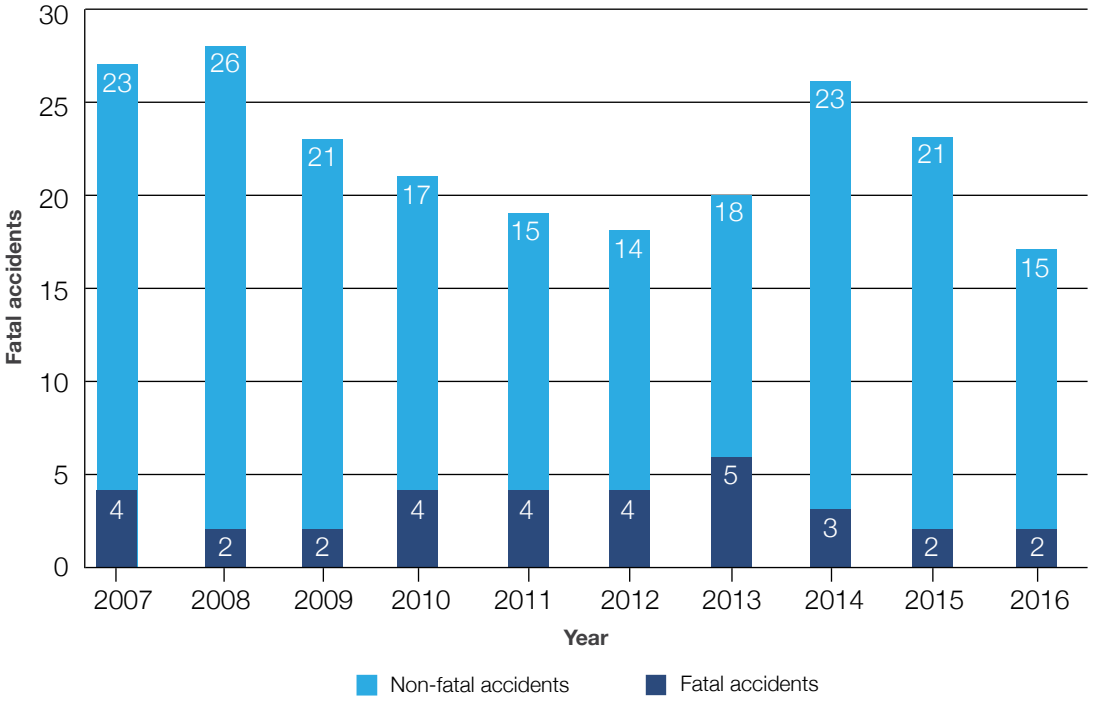
Chart 7.1.2 Five-year sliding average of global accident rate versus APAC accident rate (2011–2016)



The RASG-APAC five-year sliding average accident rate decreased from 2.54 per million departures in 2015 to 2.37 per million departures in 2016. Over the last five years, the global and RASG-APAC's sliding average accident rate have been trending down.

While the RASG-APAC's five-year sliding average accident rate has been lower than the global average rate over the last five years, it can be observed that the RASG-APAC's rate of improvement has been slower than the global rate.

Chart 7.1.3 Number of APAC accidents—fatal/non-fatal distribution (2007–2016)



There were two fatal accidents attributable to RASG-APAC member states/administrations in 2016, unchanged from 2015. The number of fatalities decreased from 55 in 2015 to 50 in 2016.

Over the last three years, the number of accidents attributable to RASG-APAC member states/administrations has been trending downwards while the number of fatal accidents remained stable.

Chart 7.1.4 APAC sub-regions accident rate (2007–2016)

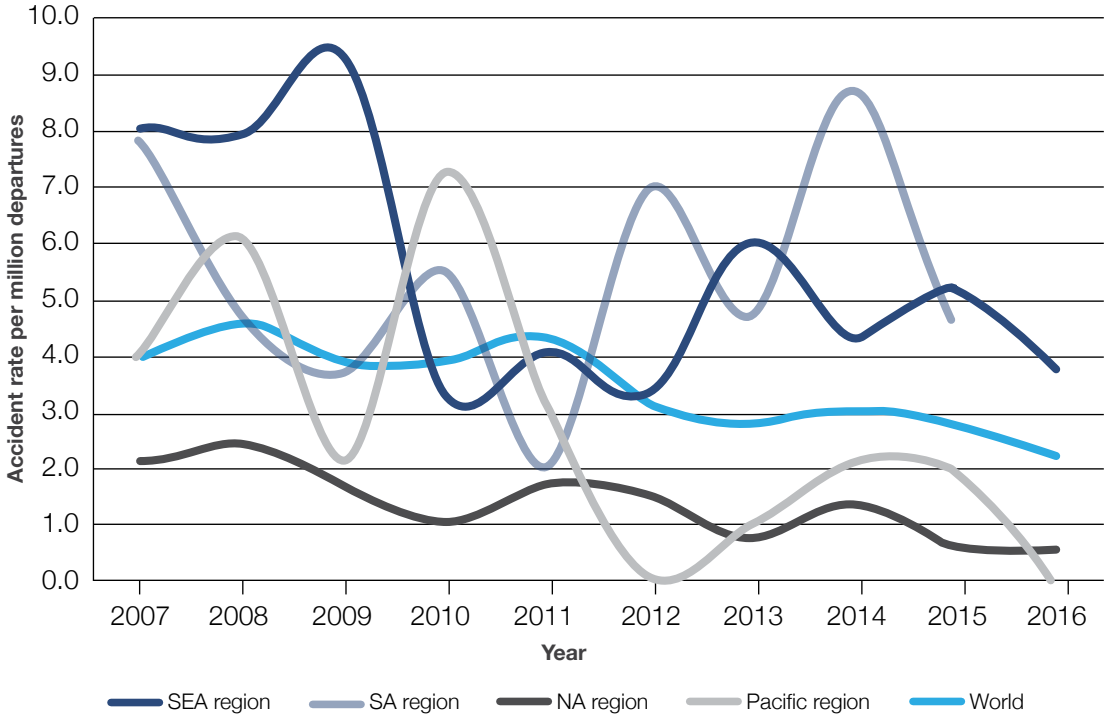
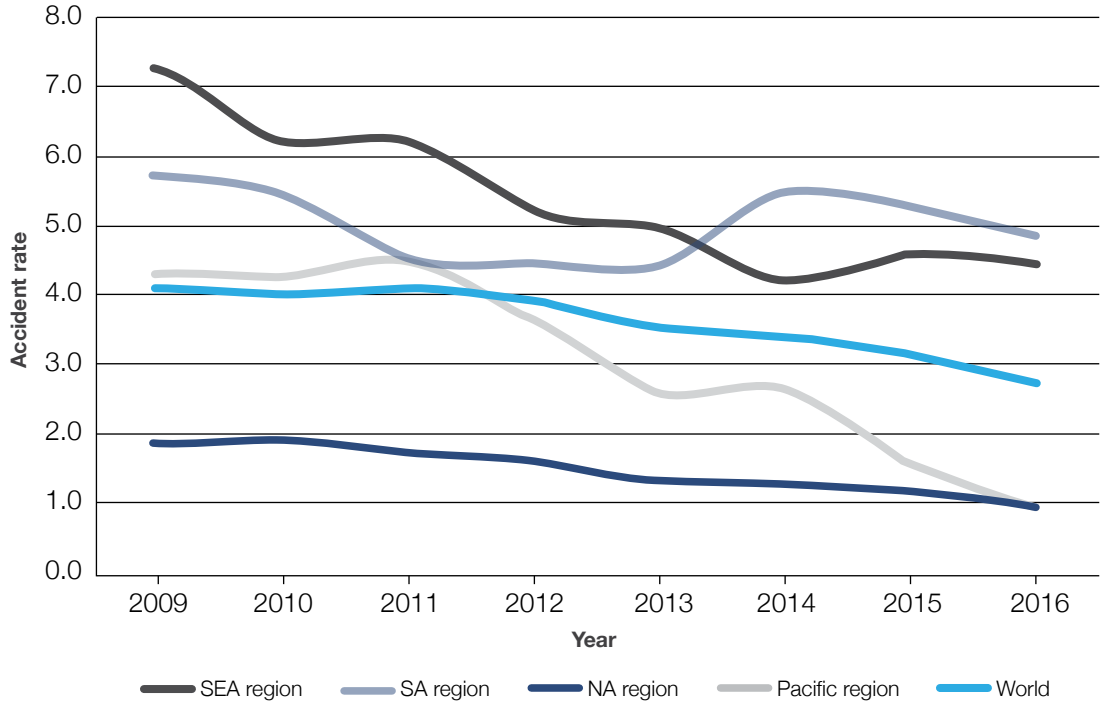


Chart 7.1.4 provides an illustration of the accidents rates within APAC by sub-region. In line with the global trend, all the sub-regional accident rates have generally trended down since 2014. In particular, the South Asia (SA) sub-region has more than halved its accident rate from 8.66 per million departures in 2014 to 3.30 per million departures in 2016. From the chart, it can be seen that the accident rates for the Southeast Asia (SEA) and SA sub-regions has consistently been above global average rates, while North Asia (NA) and the Pacific sub-region has remained below global average rates.

Chart 7.1.5 APAC sub-regions five-year sliding average accident rate (2009–2016)



As indicated by Chart 7.1.5, all the APAC sub-regions have generally recorded a decreasing trend for the five-year sliding average accident rates. However, the SA and SEA sub-region accident rates were above the global rates since 2009 while the Pacific sub-region has been lower since 2012. The NA sub-region remains the only sub-region that has consistently been better than the global average.

Chart 7.1.6 APAC sub-regions accident numbers (2007–2016)

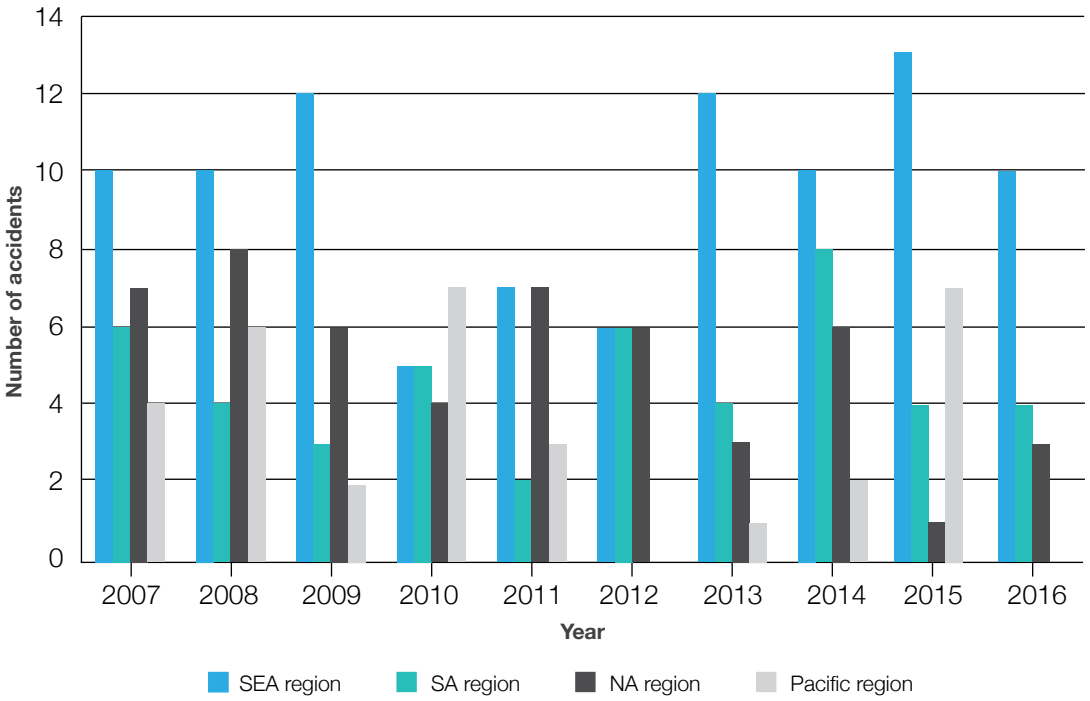
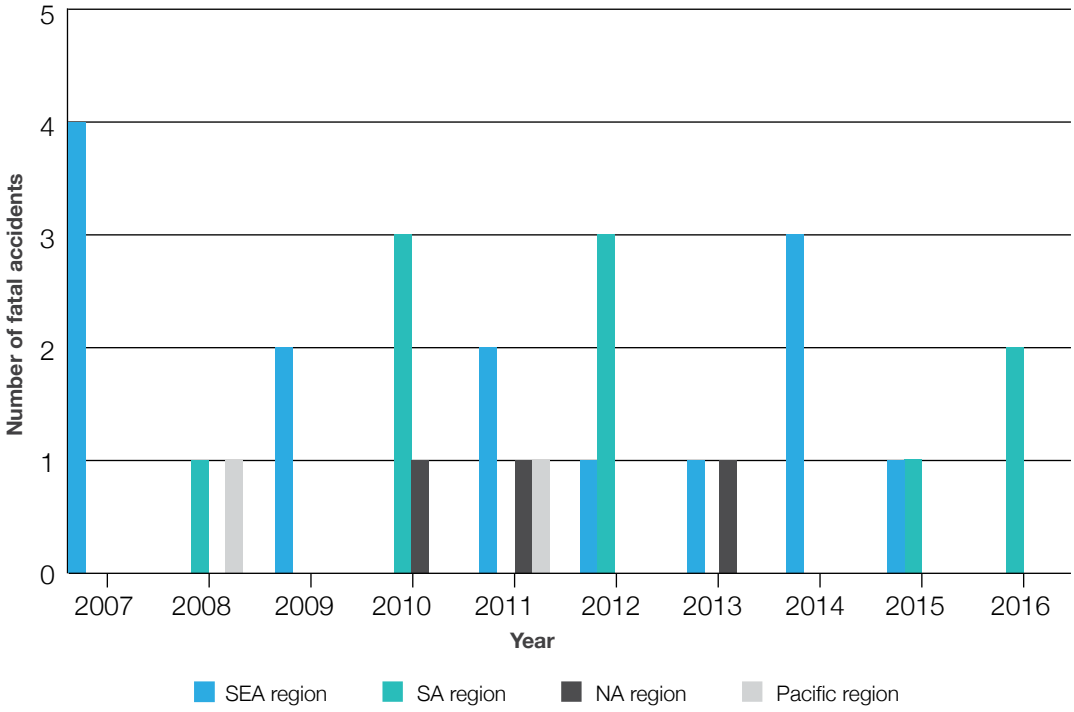


Chart 7.1.7 APAC sub-regions fatal accident numbers (2007–2016)



The frequency of the accidents illustrated in Chart 7.1.6 indicates that the SEA sub-region had the highest number of accidents (95) over the last ten years. Chart 7.1.7 also shows that the SEA sub-region also recorded the highest number of fatal accidents (14) over the same period.

In 2016, the SEA sub-region accounted for around 58 per cent of the total number of accidents in the APAC region while the SA and NA sub-region accounted for about 24 per cent and 18 per cent. Both of the fatal accidents recorded in 2016, which resulted in 50 fatalities, were attributed to the SA sub-region.

7.2 Worldwide/regional accident information

This segment contains statistics on accidents classified by IATA's Accident Classification Task Force (ACTF). It uses the same definitions used for the IATA Annual Safety Report. All regional rates are based on the operator's state of registry and rates are always based on per 1 million sectors (flights).

The 'all accident rate' relates to all accidents (hull loss and substantial damage) for the type of analysis being performed. For example, 'all accident rate' in the general context means all accidents, of all aircraft types that meet the ACTF criteria (commercial operation, jet or turboprop and MTOW >5700 kg) and of all accident categories. The 'all accident rate' in the context of jet/hard landing means all jet accidents (hull loss and substantial damage) that had a hard landing.

Only accidents of the following categories are part of the database:

- controlled flight into terrain (CFIT)
- gear-up landing/gear collapse ground damage
- hard landing
- in-flight damage
- loss of control in-flight
- mid-air collision
- off airport landing/ditching
- other end state
- runway/taxiway excursion
- runway collision
- tailstrike
- undershoot.

Notes

IATA defines 'sector' as the operation of an aircraft between take-off at one location and landing at another location (other than a diversion)

IATA's North Asia (NASIA) and Asia Pacific (ASPAC) regions are equivalent to ICAO's APAC region.

7.2.1 General

Table 7.2.1 Number of accidents—region of occurrence vs region of operator (2012–2016)

	2012	2013	2014	2015	2016	Total
APAC operators accidents	18	21	22	24	15	**100**
Accidents occurring in APAC	20	19	22	27	17	**105**
APAC operators accidents in APAC	18	18	20	24	15	**95**
Non-APAC operators accidents in APAC	2	1	2	3	2	**10**

Table 7.2.2 Accident types by region (2012 –2016)

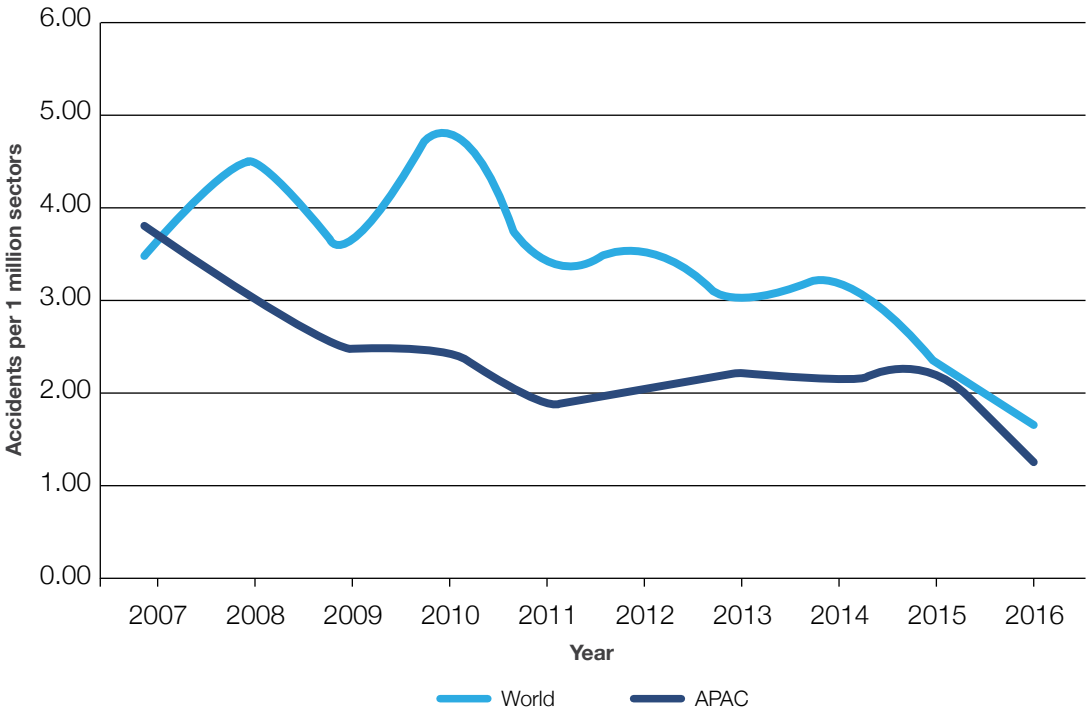
	AFI	APAC	EUR	MID	PA	World
Hull loss	29	27	32	8	33	**129**
Substantial damage	16	73	70	16	70	**245**
Sector count (millions)	5.9	51.8	50.4	6.9	72.7	**187.7**
Hull loss rate*	4.93	0.52	0.64	1.17	0.45	**0.69**
Substantial damage rate*	2.72	1.41	1.39	2.33	0.96	**1.31**

***Accident rate: accidents per 1 million sectors**

The number of accidents attributable to APAC operators decreased from 24 in 2015 to 15 in 2016. The number of accidents that occurred in the APAC region (which include non-APAC operators) also dipped from 27 in 2015 to 17 in 2016. Both accident counts in 2016 were the lowest recorded over the past five years.

In terms of hull losses, the APAC region fared better than the global average with a five-year average rate of 0.52 per million sectors. However, in terms of substantial damage, the APAC region's five-year average rate of 1.41 per million sectors was higher than the global average.

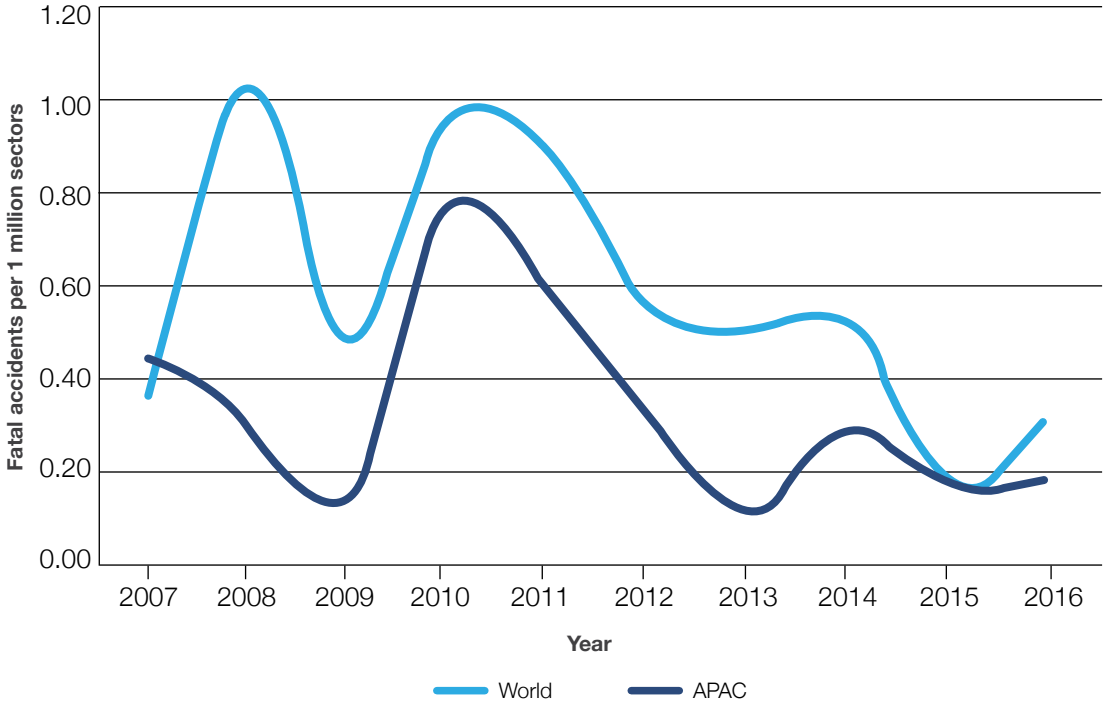
Chart 7.2.1 Annual accident rate–APAC versus World (2007-2016)



Over the last ten years, the APAC region's annual accident rate has been mainly lower than the global rate.

Chart 7.2.1 indicates a decreasing trend for the APAC accident rate with the ratio dropping from 2.18 per million sectors in 2015 to 1.23 per million sectors in 2016.

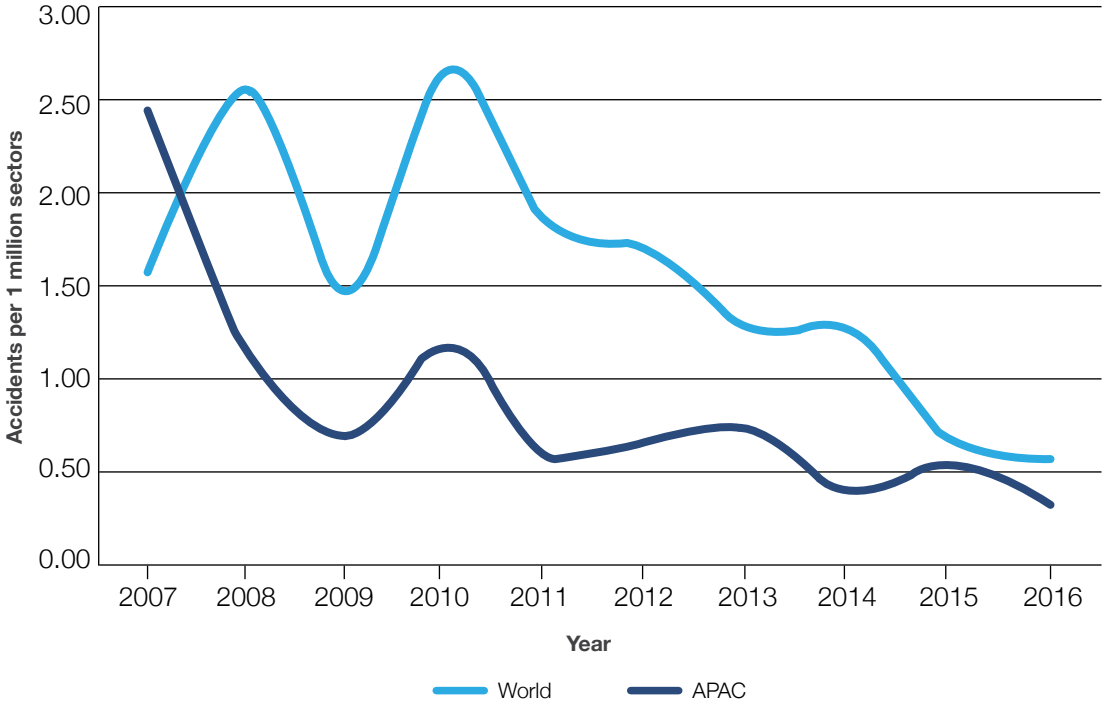
Chart 7.2.2 Annual fatal accident rate–APAC versus World (2007–2016)



There were two fatal accidents in the APAC region in 2016, with a total number of 50 fatalities.

APAC's fatal accident rate of 0.15 per million sectors in 2016 was lower than the global rate at 0.29 per million sectors.

Chart 7.2.3 Annual hull loss rate–APAC versus World (2007–2016)



Over the last ten years, the APAC region's annual hull loss rate has been mainly lower than the global rate. The APAC region's hull loss rate also indicated a decreasing trend (Chart 7.2.3) with the rate dropping from 0.54 per million sectors in 2015 to 0.33 per million sectors in 2016.

7.2.4 High-risk accident categories

Controlled flight into terrain (CFIT), loss of control in-flight (LOC-I) and runway/taxiway excursion were identified by IATA as the top three accident categories globally. Charts 7.2.10, 7.2.11 and 7.2.12 show the performance of each of these categories in the APAC region for the last ten years.

- The CFIT category continued its downtrend from 2014 and recorded 0.08 accidents per million sectors in 2016, down from 0.09 accidents per million sectors in 2015.
- Accidents attributable to LOC-I also recorded a decrease in 2016 compared to 2015. The rate of occurrence in 2016 was 0.08 accidents per million sectors, down from 0.09 accidents per million sectors.
- Runway/taxiway excursion recorded the steepest decrease among the top three accident categories in 2016. In 2016, there were 0.18 accidents per million sectors attributable to runway/taxiway excursion, down from 0.54 accidents per million sectors in 2015.

Chart 7.2.10 Annual controlled flight into terrain (CFIT) accident rate —APAC versus World (2007–2016)

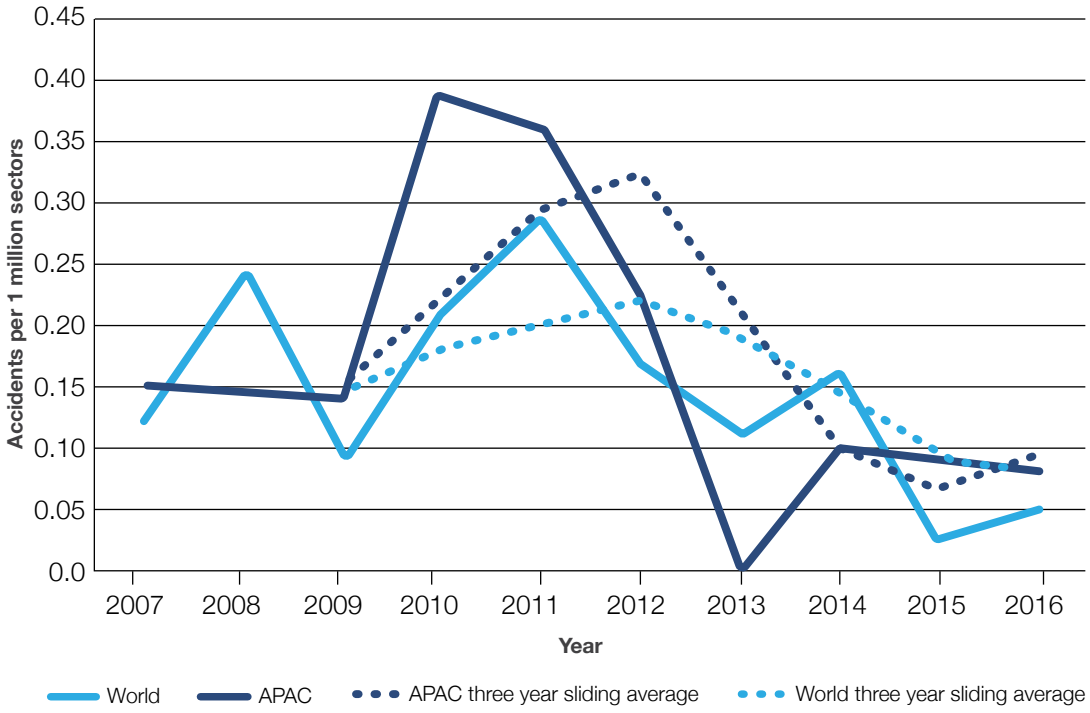


Chart 7.2.11 Annual loss of control in-flight accident rate —APAC versus World (2007–2016)

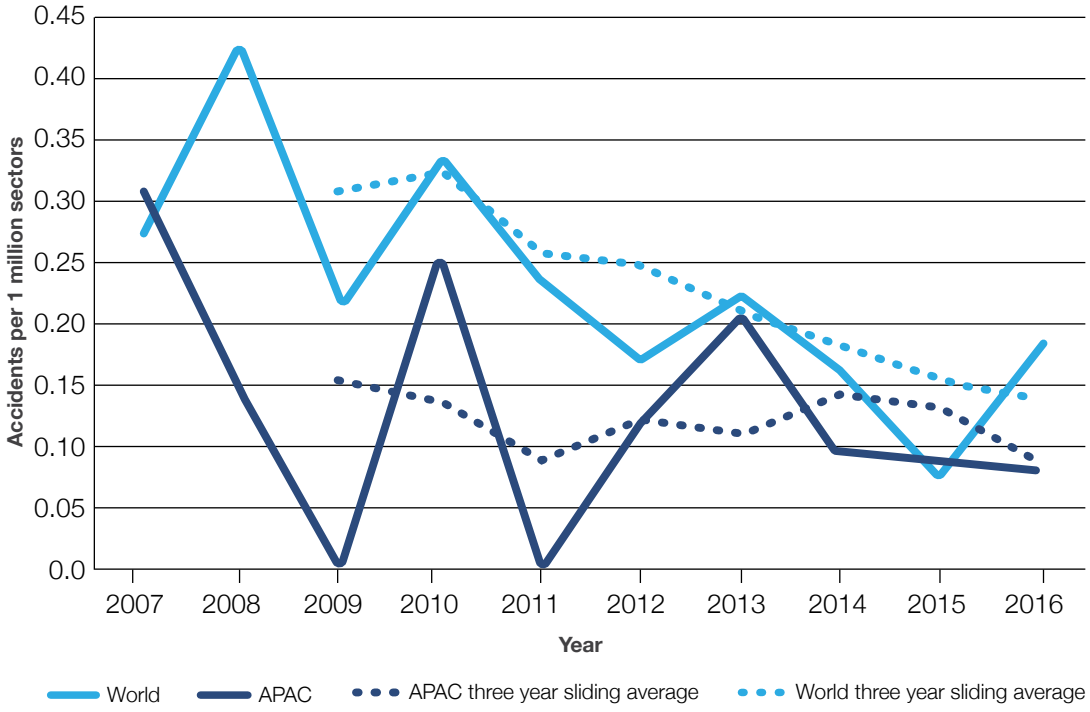
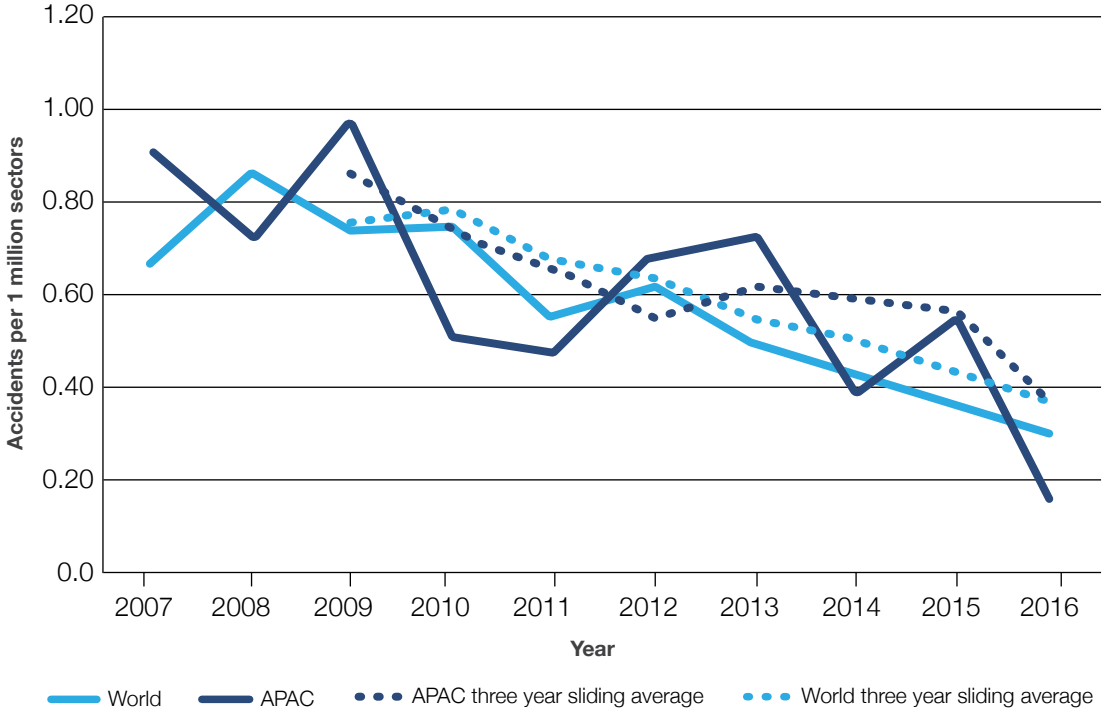


Chart 7.2.12 Annual runway/taxiway excursion accident rate —APAC versus World (2007–2016)



7.2.5 Accidents by phase of flight

Over the 2012–2016 period, most of the accidents in the APAC region occurred in the landing (LND) phase of flight and were non-fatal. While there were relatively fewer accidents in the other phases such as approach (APR), descent (DST), cruise (CRZ) and go around (GOA), a substantial number of those accidents were fatal.

Particularly, three out of four accidents during the cruise phase were fatal and from the six accidents recorded during the approach phase, half were fatal.

Chart 7.2.13 Number of accidents per phase of flight —fatal/non-fatal distribution (2012–2016)

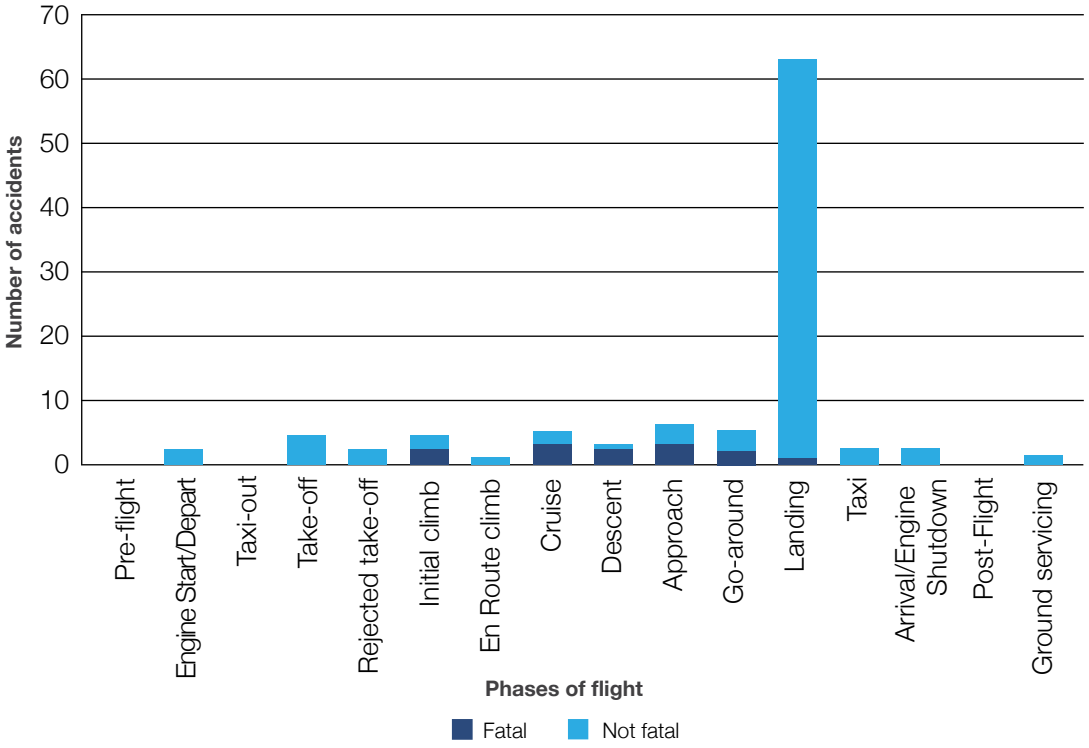
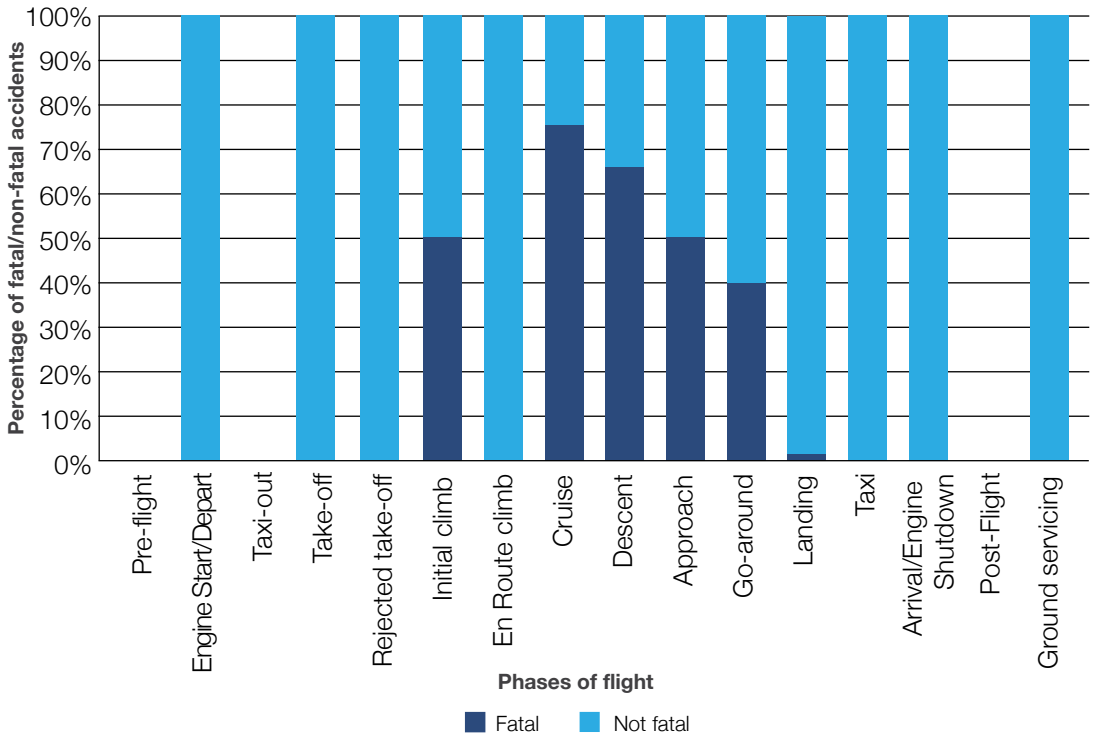


Chart 7.2.14 Proportion of accidents per phase of flight —fatal/non-fatal distribution (2012–2016)



7.3 APAC accident information

CAST was founded in 1998 and has developed an integrated, data-driven strategy to reduce commercial aviation fatality risk in the United States and to work with airlines and international aviation organisations to reduce the worldwide commercial aviation fatal accident rate. CAST has representatives from the following government organisations, industry associations and aerospace companies:

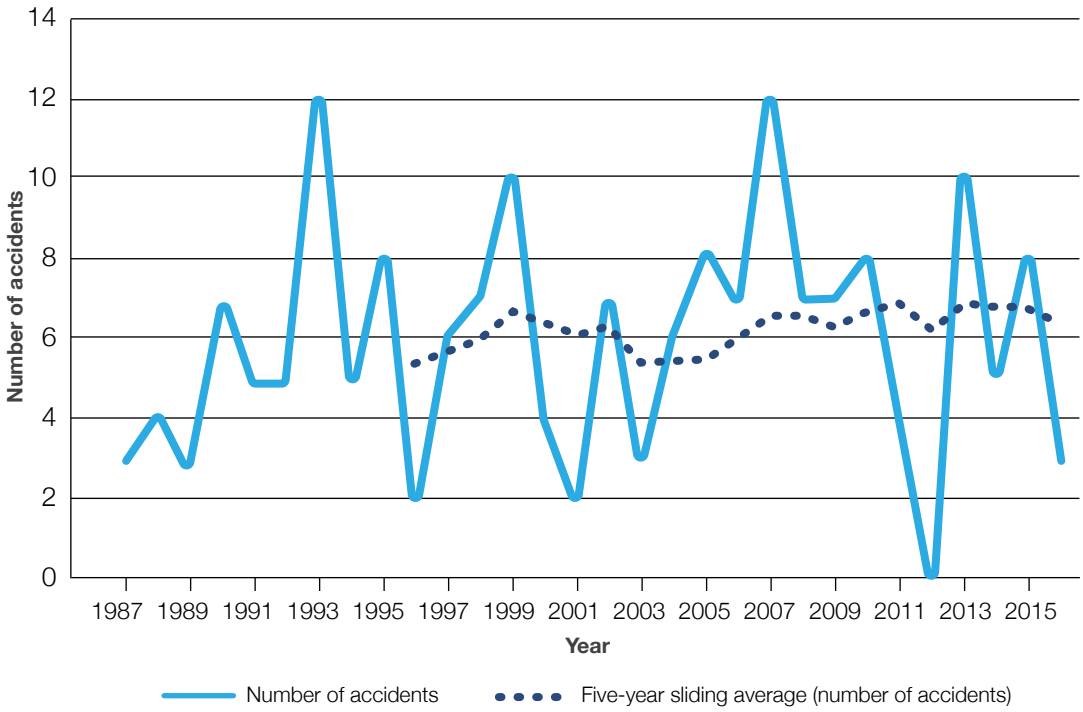
Government

- Federal Aviation Administration
- National Aeronautics and Space Administration
- U.S. Department of Defense
- European Joint Aviation Authorities
- International Civil Aviation Organization

Industry

- Aerospace Industries Association
- Airbus Industrie
- Air Line Pilots Association
- Allied Pilots Association
- Air Transport Association
- The Boeing Company
- Flight Safety Foundation
- International Air Transport Association
- Pratt & Whitney (also representing General Electric and Rolls Royce)
- Regional Airline Association

Chart 7.3.1 Number of hull loss or fatal accidents for operators based in APAC (1987–2016)



Note: Western-built aeroplanes, Part 121 equivalent operations

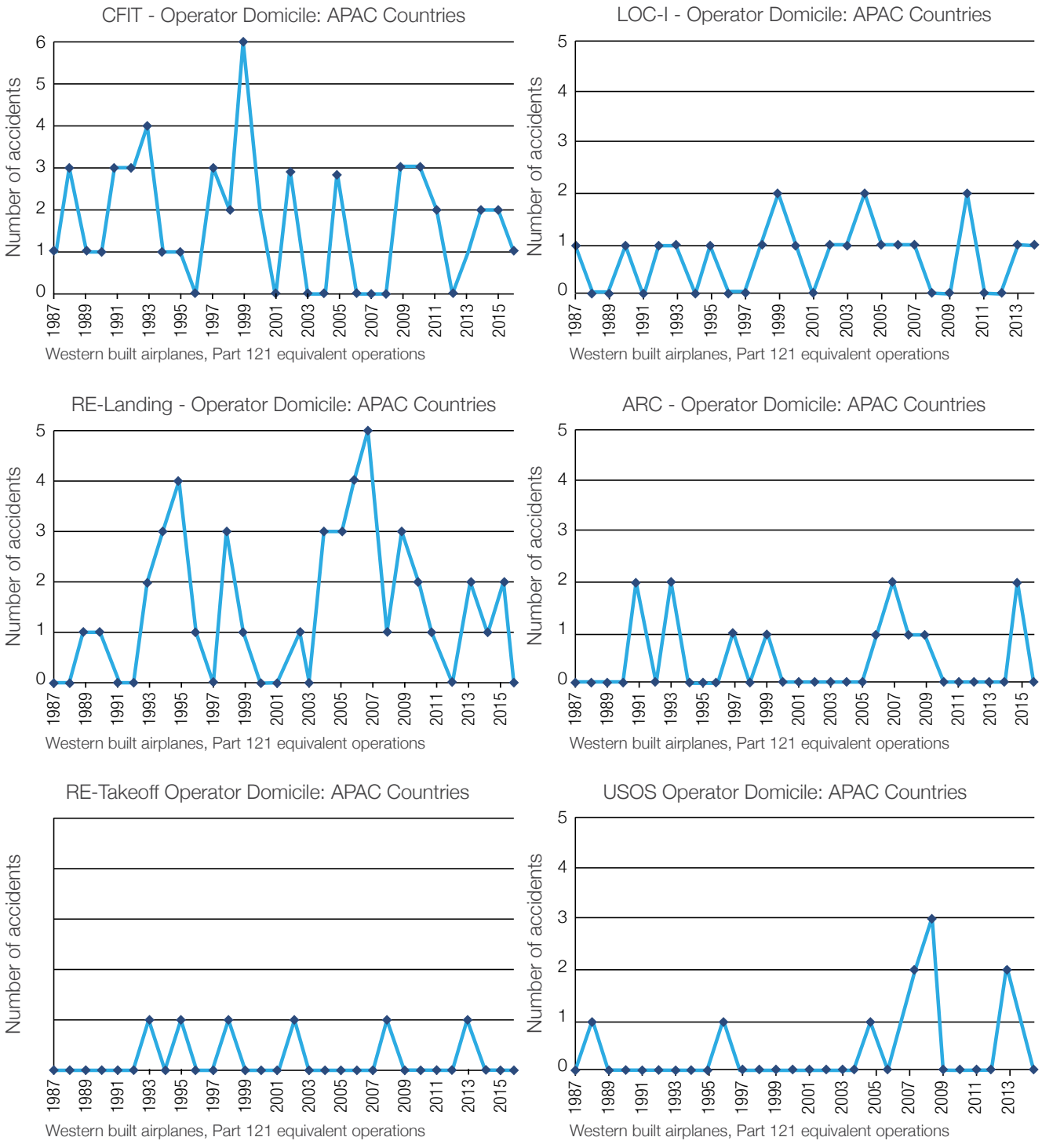
Chart 7.3.1 shows the number of accidents involving western-built aeroplanes flown by operators based in APAC countries which resulted in hull loss or fatalities from 1987 to 2016.

The number of accidents decreased significantly from eight in 2015 to three in 2016. While the accident numbers fluctuate considerably on an annual basis, the five-year sliding average has been relatively stable, hovering around six accidents, since 2007.

7.3.2 Breakdown in accident categories

The main accident categories, as seen in Chart 7.3.2, mostly showed a downward or unchanged trend in 2016 compared to 2015. In particular, there were no accidents attributable to undershoot/overshoot (USOS), (ARC) and runway excursion (RE)—landing compared to the two recorded for each category the previous year.

Chart 7.3.2 CAST accident category trends (1987-2016)



7.4 Most frequent accident categories within Asia Pacific

Table 7.4.1 illustrates the distribution of various accident categories from 2007 to 2016 in the APAC region.

Runway safety (RS), controlled flight into terrain (CFIT) and loss of control in-flight (LOC-I) were the top three fatal accident categories in the APAC region based on ICAO iSTARS data. These three categories accounted for close to 70 per cent of the total number of fatal accidents in the APAC region.

Table 7.4.1 APAC fatal accident categories (2007–2016)

Year	TURB	F-NI	UNK	OTH	SCF	RS	LOC-I	CFIT	Total
2007	0	0	0	0	0	1	2	1	**4**
2008	0	0	0	0	0	1	0	1	**2**
2009	0	0	0	0	0	1	0	1	**2**
2010	0	0	0	0	0	1	0	3	**4**
2011	0	1	2	1	0	0	0	0	**4**
2012	0	0	1	0	1	0	0	2	**4**
2013	0	0	0	0	0	1	1	0	**2**
2014	0	0	1	1	0	0	1	0	**3**
2015	1	0	0	0	0	1	0	0	**2**
2016	0	0	0	0	1	0	1	0	**2**
Total	**1**	**1**	**4**	**2**	**2**	**6**	**5**	**8**	**29**

Two fatal accidents were recorded in the APAC region in 2016. One accident involved an ATR aircraft that was classified as system component failure-powerplant (SCF-PP) while the other accident involved an Antonov aircraft that was classified as loss of control in-flight (LOC-I).

Over the last ten years, fatal accidents associated with these three accident categories in the SEA sub-region, accounted for about 70 per cent of fatal accidents in the APAC. However, most of these occurred in the first half of the ten-year period, with only three occurring in the last five years. Notably, there were no fatal accidents attributed to RS and CFIT in 2016. There were also no fatal accidents attributed to CFIT over the past four years.

Table 7.4.2 APAC sub-regions top three fatal accident categories (2007–2016)

SEA region					SA region			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2007	1	2	1	**4**	0	0	0	**0**
2008	0	0	0	**0**	1	0	0	**1**
2009	1	0	1	**2**	0	0	0	**0**
2010	0	0	0	**0**	1	0	2	**3**
2011	0	0	0	**0**	0	0	0	**0**
2012	0	0	1	**1**	0	0	1	**1**
2013	0	1	0	**1**	0	0	0	**0**
2014	0	1	0	**1**	0	0	0	**0**
2015	0	0	0	**0**	0	0	0	**0**
2016	0	0	0	**0**	0	1	0	**1**
Total	**2**	**4**	**3**	**9**	**2**	**1**	**3**	**6**

NA region					Pacific region			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2007	0	0	0	**0**	0	0	0	**0**
2008	0	0	0	**0**	0	0	1	**1**
2009	0	0	0	**0**	0	0	0	**0**
2010	0	0	1	**1**	0	0	0	**0**
2011	0	0	0	**0**	0	0	0	**0**
2012	0	0	0	**0**	0	0	0	**0**
2013	1	0	0	**1**	0	0	0	**0**
2014	0	0	0	**0**	0	0	0	**0**
2015	0	0	0	**0**	0	0	0	**0**
2016	0	0	0	**0**	0	0	0	**0**
Total	**1**	**0**	**1**	**2**	**0**	**0**	**1**	**1**

Table 7.4.2 shows the breakdown of the top three fatal accident categories by APAC sub-regions. The SEA sub-region recorded the most LOC-I fatal accidents (4) over the last ten years while the SA sub-region recorded the most CFIT fatal accidents (3). Both the SEA and SA sub-regions recorded two runway safety-related fatal accidents over the same time period.

Table 7.4.3 APAC accident categories (2014–2016)

Year	TURB	F-NI	UNK	OTH	SCF	RS	LOC-I	CFIT	Total
2014	5	0	2	2	4	12	1	0	**26**
2015	4	1	2	4	2	10	0	0	**23**
2016	2	0	0	3	4	7	1	0	**17**
Total	**11**	**1**	**4**	**9**	**10**	**29**	**2**	**0**	**66**

The top two accident categories for the APAC region in 2016 were: (i) runway safety (RS) and (ii) system component failure (SCF). Runway safety related accidents, which include runway incursions/excursions, tailstrikes and hard landings, were the most frequently occurring accident category in the APAC region over the last three years (2014–2016), as indicated in Table 7.4.3.

This is followed by the turbulence (TURB) accident category which recorded 11 occurrences and the system/component failure (SCF) category which recorded ten occurrences over the same timeframe. Given the high number of occurrences in these categories, RASG-APAC may potentially place additional focus on the TURB and SCF related accidents.

Table 7.4.4 APAC sub-regions accident categories (RS, LOC-I, CFIT) (2014–2016)

SEA region					SA region			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2014	3	1	0	**4**	7	0	0	**7**
2015	6	0	0	**6**	1	0	0	**1**
2016	5	0	0	**5**	1	1	0	**2**
Total	**14**	**1**	**0**	**15**	**9**	**1**	**0**	**10**
NA region					**Pacific region**			
Year	RS	LOC-I	CFIT	Total	RS	LOC-I	CFIT	Total
2014	2	0	0	**2**	0	0	0	**0**
2015	3	0	0	**3**	0	0	0	**0**
2016	1	0	0	**1**	0	0	0	**0**
Total	**6**	**0**	**0**	**6**	**0**	**0**	**0**	**0**

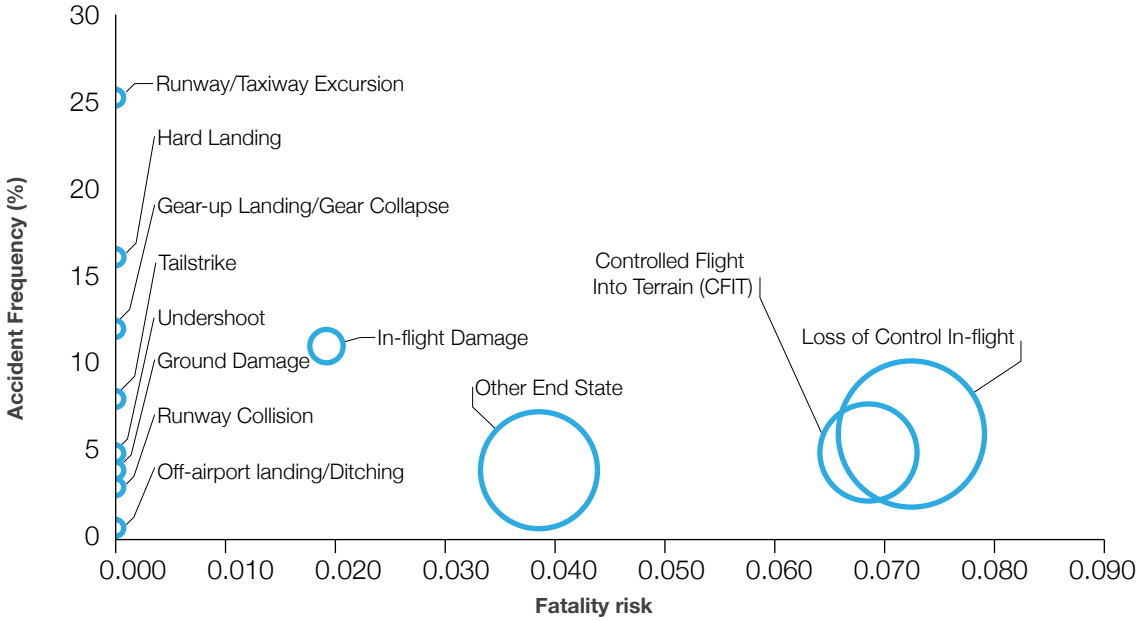
Table 7.4.4 shows that the SEA sub-region had the highest number of accidents related to RS between the 2014–2016 timeframe.

All of the accidents recorded in 2016 were associated with runway safety events. RS was also the top accident category for the SA and NA sub-regions.

7.5 Most frequent accident categories within Asia Pacific region

According to data provided by IATA, runway/taxiway excursion was the top accident category in 2016 accounting for close to one-quarter of the total number of accidents, followed by hard landing (16%) and gear-up landing/gear collapse (14%), respectively. In terms of fatality risk, LOC-I was the accident category that contributed to the most fatalities, followed by CFIT, 'other end state' and in-flight damage respectively.

Chart 7.5.1 Accident risk in the APAC region (2016)



As can be seen in Chart 7.5.2, ovevr the last five years (2012–2016), runway/taxiway excursion, hard landing and gear-up landing/gear collapse were the top three accident categories in the APAC region.

Notably, due to the higher number of accidents attributable to gear-up landing/gear collapse in 2016, this category overtook in-flight damage to be the third most frequent accident type recorded. For fatal accidents, the top two categories for the same period were LOC-I and CFIT respectively (Chart 7.5.3).

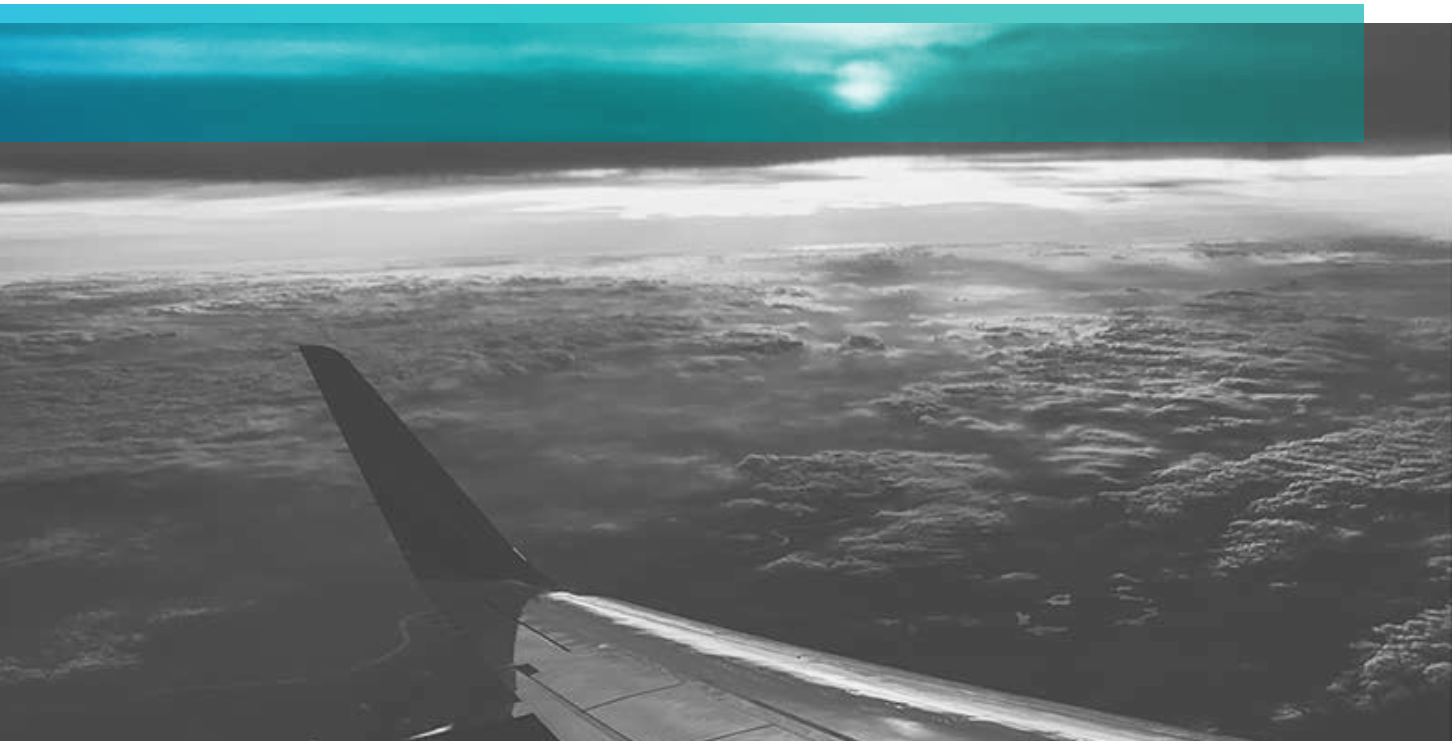


Chart 7.5.2 APAC accident category distribution (2012-2016)

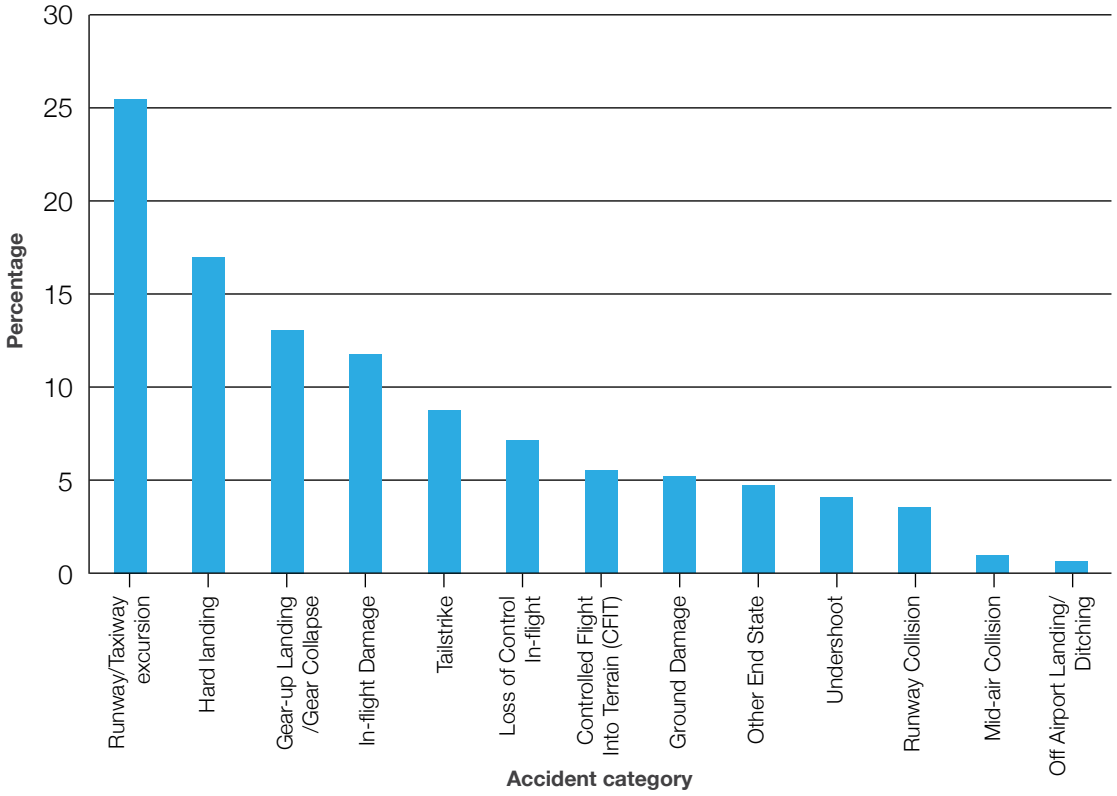
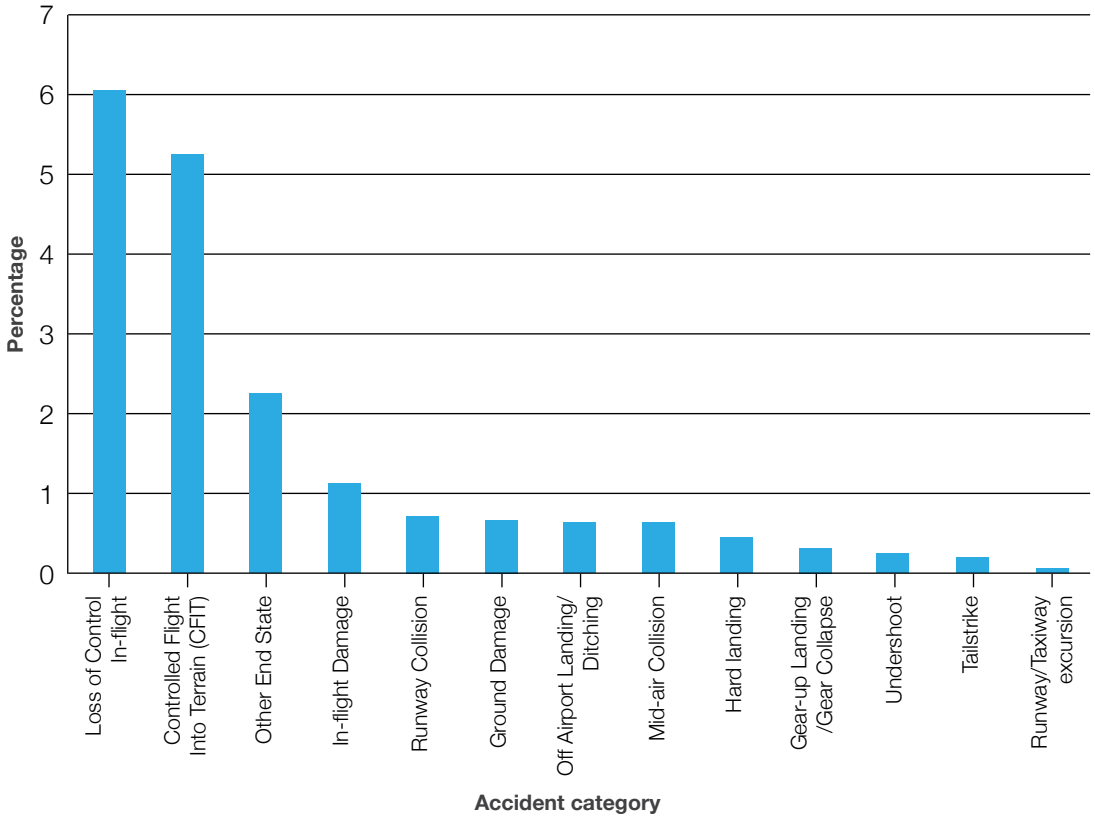


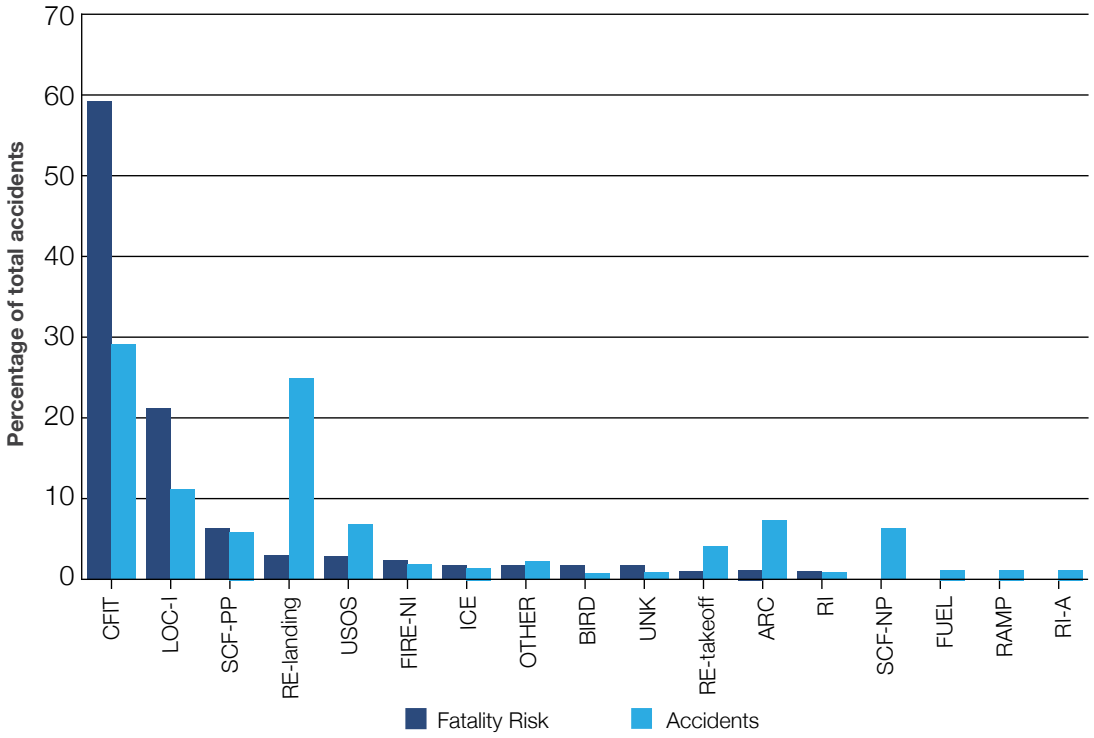
Chart 7.5.3 APAC fatal accident category distribution (2012–2016)



7.6 Most frequent accident categories within Asia Pacific region

Data from CAST, as shown in Chart 7.6.1, identified CFIT, LOC-I and SCF-PP as the three most common accident categories resulting in hull loss or fatalities within the APAC region for the period between 1987 and 2016.

Chart 7.6.1 Accident categories by percentage of APAC region total (1987–2016)

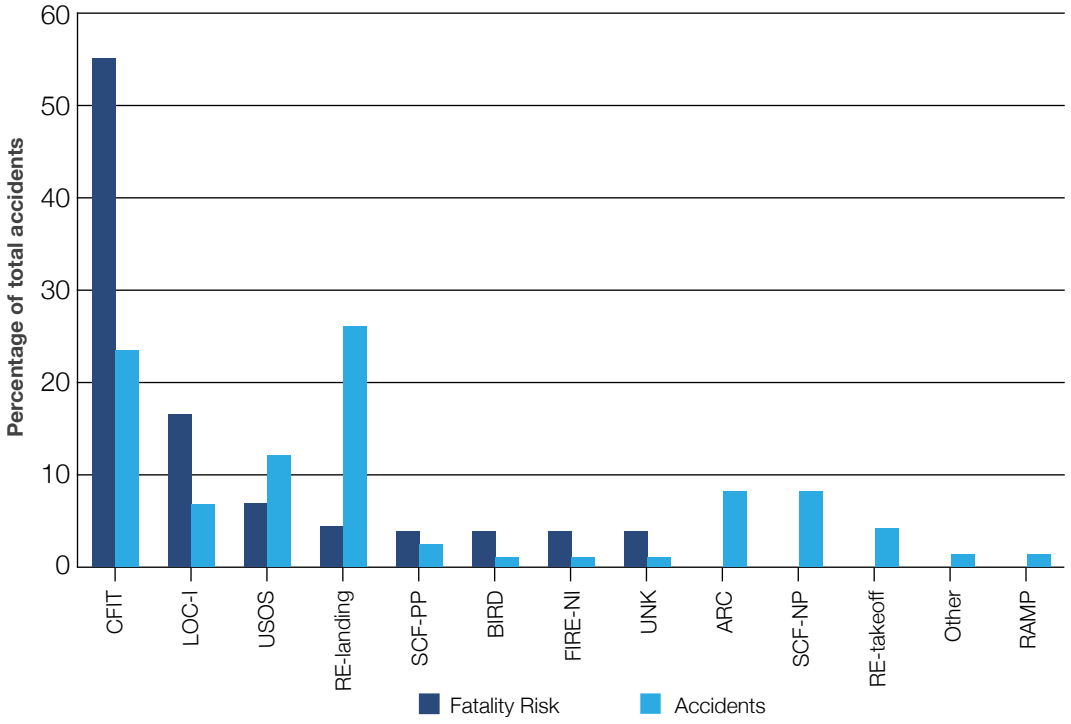


***Western built airplane, Part 121 equivalent operations | 187 Accidents Total, 73.3 Full Loss Equivalents**

From 2007 to 2016, CFIT and re-landing continue to be the top two occurrence accident categories while USOS (undershoot/overshoot) was the third most frequent.

In terms of fatality risk, CFIT, LOC-I and USOS were the top three accident categories.

Chart 7.6.2 Accidents categories by percentage of APAC region total (2007–2016)



***Western built airplane, Part 121 equivalent operations**

72 Accidents Total, 24.4 Full Loss Equivalents

08

Proactive safety information

Proactive safety information is gathered through analysis of existing or real-time situations, a primary function of the safety assurance team with its audits, evaluations, employee reporting and associated analysis, and assessment processes. These involve actively seeking hazards in the existing processes (ICAO Doc 9859).

This information can be obtained from a number of sources, but this report focuses on the information obtained from ICAO universal safety oversight audit program continuous monitoring approach (USOAP CMA).

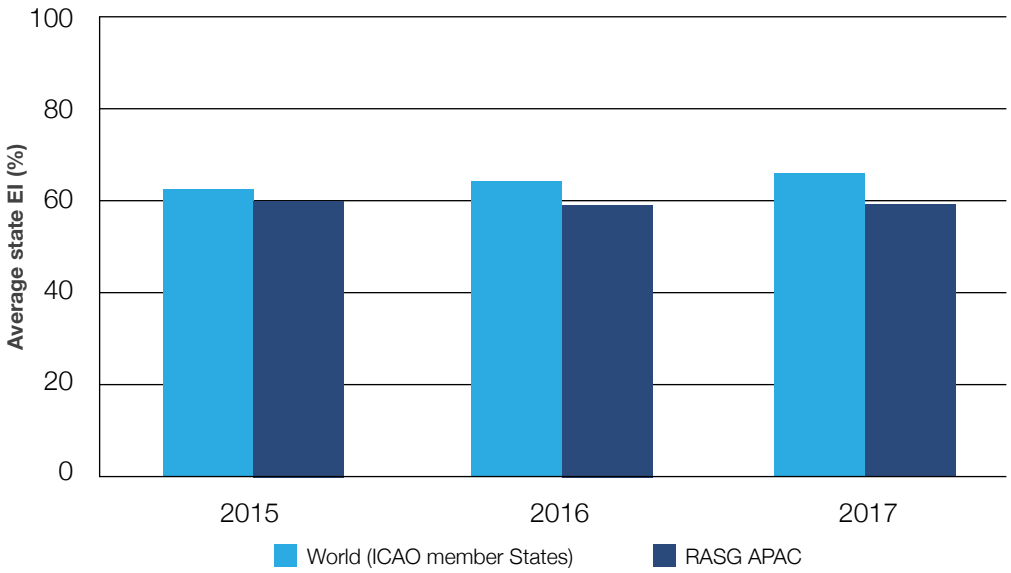
8.1 ICAO universal oversight audit program continuous monitoring approach (USOAP CMA)

USOAP audits focus on a state's capability to provide safety oversight by assessing whether it has effectively and consistently implemented the critical elements of a safety oversight system and determining the state's level of implementation of ICAO's safety-related standards and recommended practices (SARPs), associated procedures and guidance material. Eight critical elements (CI) are evaluated:

1. primary aviation legislation
2. specific operating regulations
3. state civil aviation system and safety oversight functions
4. technical personnel qualifications and training
5. technical guidance, tools and the provision of safety-critical information
6. licensing, certification, authorisation and approval obligations
7. surveillance obligations
8. resolution of safety concerns.

The USOAP CMA program was launched in January 2013. Comprehensive information relating to USOAP CMA is available on the USOAP CMA online framework at **www.icao.int/usoap**

Chart 8.1.1 RASG-APAC Overall implementation



The overall effective implementation (EI) for the RASG-APAC region in 2017 was 59.26 per cent (as shown in Chart 8.1.1).

The EI score has been fairly stable for the past few years and reasonably below the global level which was 64.44 per cent in 2017.

Chart 8.1.2 Overall EI for RASG-APAC states 2017[2]

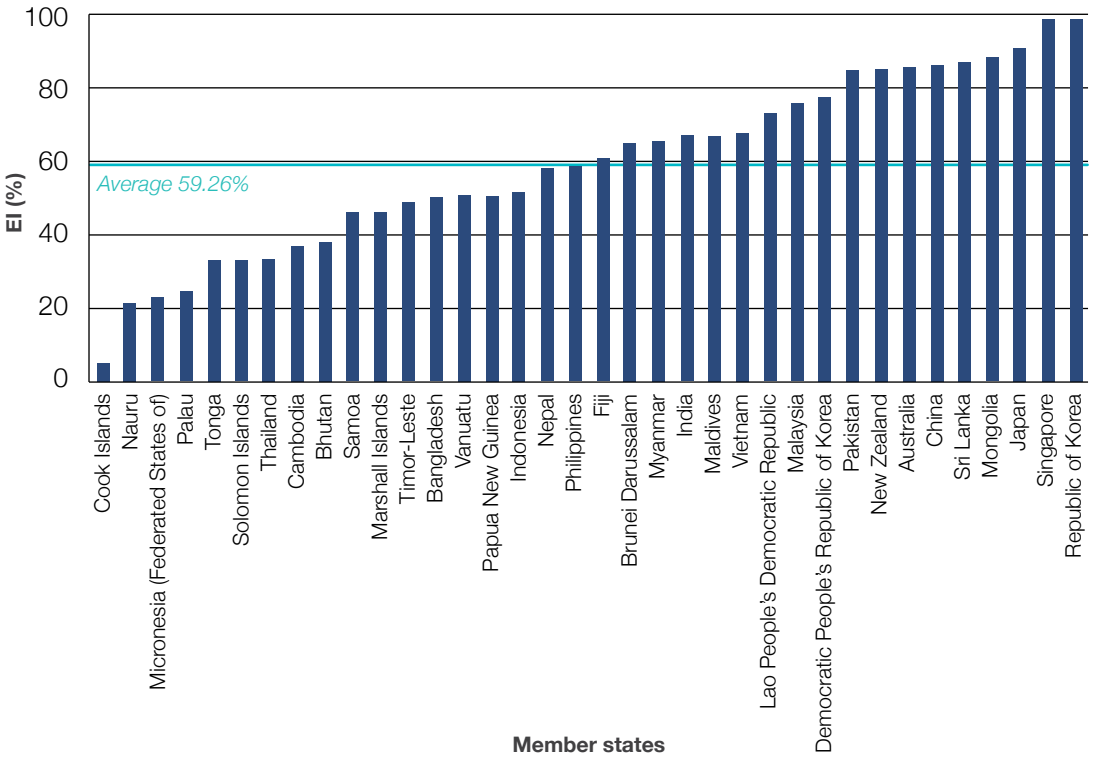
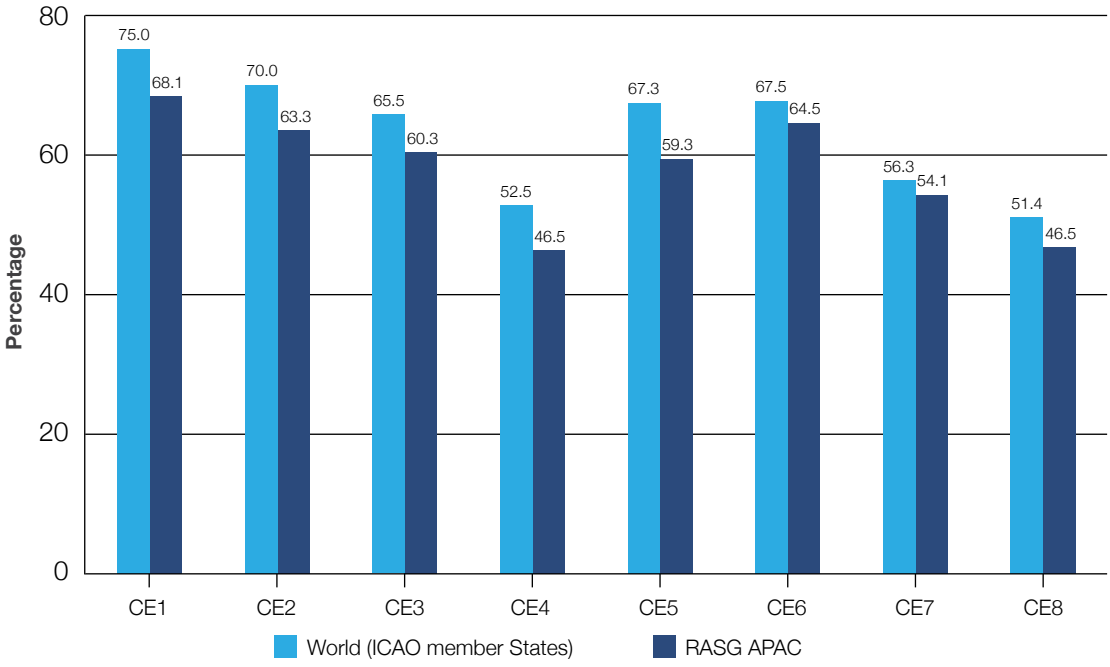


Chart 8.1.2 illustrates the overall EI by state. It should be noted that any changes or improvements to a state's EI can only be reflected after one of the following is conducted:

- comprehensive systems approach (CSA) audit
- ICAO coordinated validated mission
- integrated validated mission
- off-site monitoring activity
- off-site safety system concern (SSC) protocol questions management activity.

Chart 8.1.3 Overall EI by critical element RASG-APAC states compared to all ICAO member states 2017[2]



The EI by critical elements (CE) in Chart 8.1.3 revealed that CE4 and CE8 had the lowest implementation scores within RASG-APAC, with 46.5 per cent for both elements.

In comparison to all ICAO member states, RASG-APAC had lower scores for all CEs with CE6 being the closest in comparison.

[2] **Information accurate as on 5 May 2017**

Chart 8.1.4 Overall EI by area RASG-APAC states compared to all ICAO member states 2017[2]

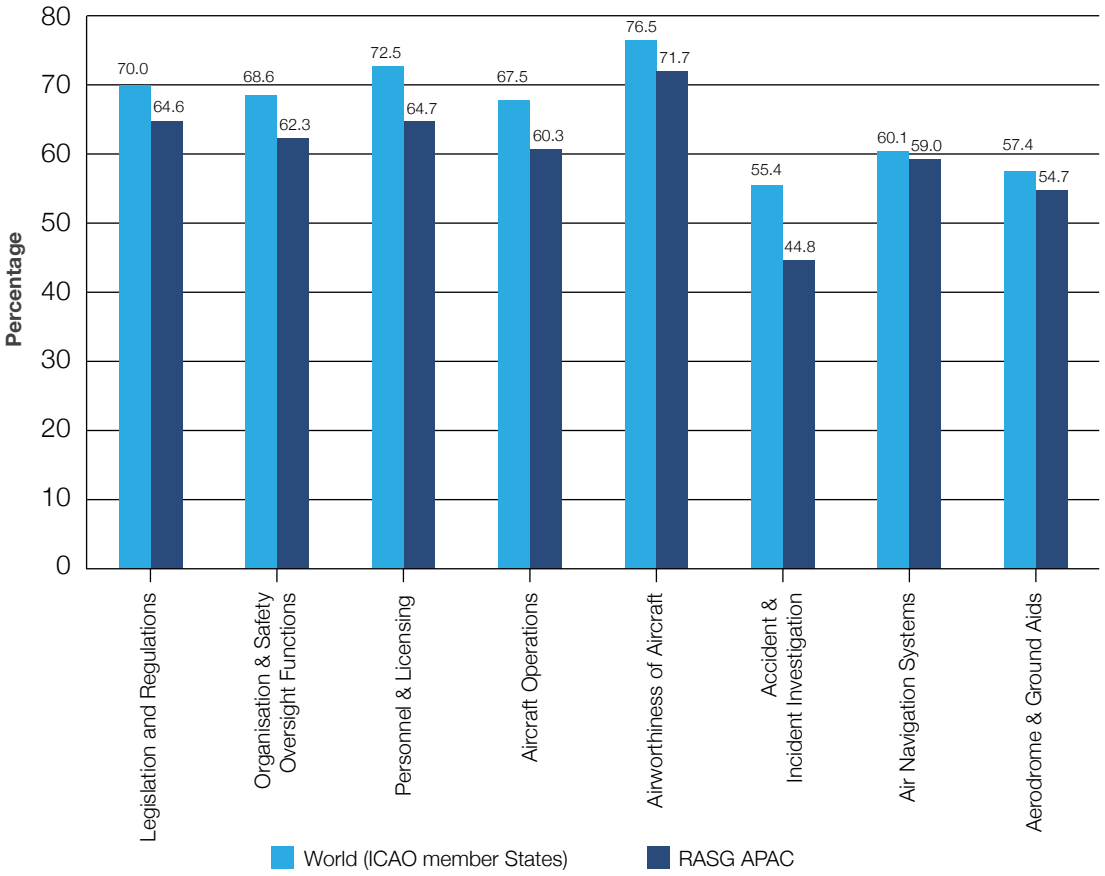


Chart 8.1.4 displays the overall EI by area compared to all ICAO member states. It can be seen that RASG-APAC is lower for all categories, with aerodrome and ground aids being the category with the closest score compared to all ICAO member states.

[2] **Information accurate as on 5 May 2017**

09

Conclusions

Reactive safety information

From analysis of the reactive safety information provided by ICAO, IATA and CAST, the most common fatal accident categories in the APAC region between 2012 and 2016 were:

- loss of control in-flight (LOC-I)
- controlled flight Into terrain (CFIT), and
- runway safety.

Safety information from IATA and CAST also revealed that CFIT and LOC-I were the accident categories with the highest fatality risks in the APAC region, while runway excursions, hard landing and gear-up landing/collapse accounted for the highest number of accidents. It should also be noted that the landing phase of flight continues to be the most common stage linked with the number of accidents followed by the approach and go-around phases. The APAC region should continue to focus its efforts on mitigating and minimising occurrences relating to these categories and phases.

Based on ICAO information, the accident category of system component failure (SCF) has been increasing in trend. Effort could be channelled into promoting mitigation measures to reduce such occurrences as well.

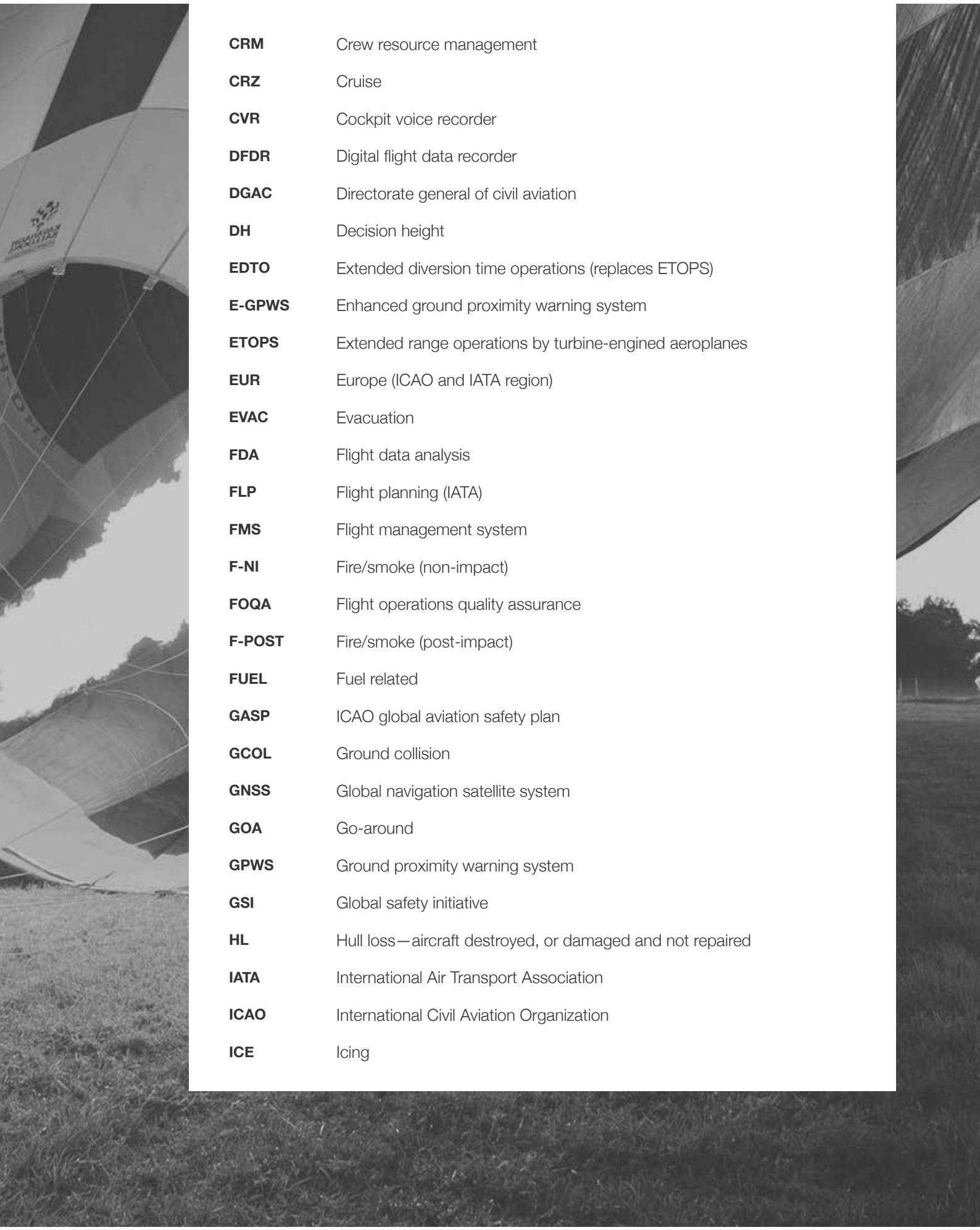
Proactive safety information

The effective implementation (EI) score for the RASG-APAC region increased slightly in 2017 (59.26) compared to 2016 (59.17). The EI for the RASG-APAC region was lower than global average for all the critical elements (CE). Of these, technical personnel qualifications and training (CE4) and resolution of safety concerns (CE-8) were lowest at 46.5 per cent. Both of these critical elements also contained the lowest scores across the global averages, suggesting that they appear to be a consistent issue across the world.

10

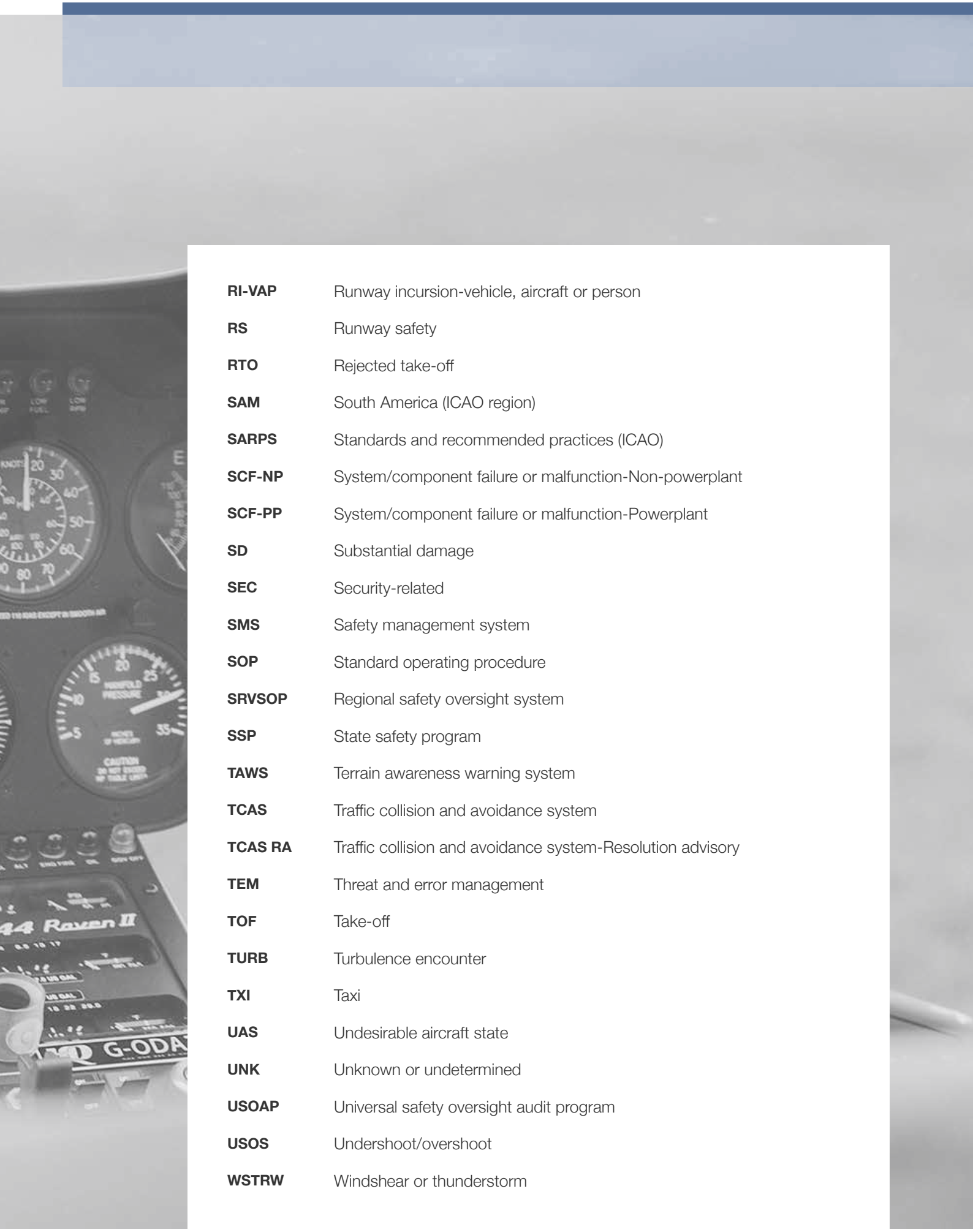
List of acronyms

ACAS	Airborne collision avoidance systems
ADRM	Aerodrome
AFI	Africa (IATA region)
AIS	Aeronautical information service
AMAN	Abrupt manoeuver
ANSP	Air navigation service provider
AOC	Air operator certificate
APAC	Asia Pacific
APR	Approach
ARC	Abnormal runway contact
ASIA PAC	Asia/Pacific (ICAO region)
ASPAC	Asia/Pacific (IATA region)
ATC	Air traffic control
ATM	Air traffic management
BIRD	Birdstrike
CABIN	Cabin safety events
CAST	Commercial aviation safety team
CFIT	Controlled flight into terrain
CICTT	CAST/ICAO common taxonomy team
CIS	Commonwealth of independent states (IATA region)
CMA	Continuous monitoring approach



CRM	Crew resource management
CRZ	Cruise
CVR	Cockpit voice recorder
DFDR	Digital flight data recorder
DGAC	Directorate general of civil aviation
DH	Decision height
EDTO	Extended diversion time operations (replaces ETOPS)
E-GPWS	Enhanced ground proximity warning system
ETOPS	Extended range operations by turbine-engined aeroplanes
EUR	Europe (ICAO and IATA region)
EVAC	Evacuation
FDA	Flight data analysis
FLP	Flight planning (IATA)
FMS	Flight management system
F-NI	Fire/smoke (non-impact)
FOQA	Flight operations quality assurance
F-POST	Fire/smoke (post-impact)
FUEL	Fuel related
GASP	ICAO global aviation safety plan
GCOL	Ground collision
GNSS	Global navigation satellite system
GOA	Go-around
GPWS	Ground proximity warning system
GSI	Global safety initiative
HL	Hull loss—aircraft destroyed, or damaged and not repaired
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICE	Icing

ICL	Initial Climb
IMC	Instrument meteorological conditions
INOP	Inoperative
IOSA	IATA operational safety audit
LALT	Low altitude operations
LATAM	Latin America and the Caribbean (IATA region)
LEI	Lack of effective implementation
LND	Landing
LOC-G	Loss of control-ground
LOC-I	Loss of control in-flight
LOSA	Line operations safety audit
MAC	AIRPROX/TCAS alert/loss of separation/near miss collision/mid-air collisions
MDA	Minimum descent altitude
MEL	Minimum equipment list
MENA	Middle East and North Africa (IATA region)
NAM	North America (ICAO and IATA region)
NASIA	North Asia (IATA region)
NAVAIDS	Navigational aids
NOTAM	Notice to airman
OTH	Other
RA	Resolution advisory
RAMP	Ground handling operations
RE	Runway excursion (departure or landing)
RE-landing	Runway excursion-landing
Re-take-off	Runway excursion-take-off
RI	Runway incursion
RI-A	Runway incursion-animal



RI-VAP	Runway incursion-vehicle, aircraft or person
RS	Runway safety
RTO	Rejected take-off
SAM	South America (ICAO region)
SARPS	Standards and recommended practices (ICAO)
SCF-NP	System/component failure or malfunction-Non-powerplant
SCF-PP	System/component failure or malfunction-Powerplant
SD	Substantial damage
SEC	Security-related
SMS	Safety management system
SOP	Standard operating procedure
SRVSOP	Regional safety oversight system
SSP	State safety program
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
TURB	Turbulence encounter
TXI	Taxi
UAS	Undesirable aircraft state
UNK	Unknown or undetermined
USOAP	Universal safety oversight audit program
USOS	Undershoot/overshoot
WSTRW	Windshear or thunderstorm