



International Civil Aviation Organization

**The Twenty-First Meeting of the Regional Airspace Safety Monitoring
Advisory Group (RASMAG/21)**

Bangkok, Thailand, 14-17 June 2016

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

PARMO VERTICAL SAFETY REPORT

(Presented by the United States/PARMO)

SUMMARY

This paper compares actual performance to safety goals that support the continued use of reduced vertical separation minimum (RVSM) in Pacific and North East Asia airspace. This report contains a summary of large height deviation reports received by the Pacific Approvals Registry and Monitoring Organization (PARMO) for the most recent reporting period of 1 January to 31 December 2015. There are a total of 61 reported large height deviations (LHDs) accounting for over 202 minutes of operation at incorrect flight level in Pacific RVSM airspace. This report also contains an update of the vertical collision risk. The vertical collision risk estimate for Pacific airspace meets the target level of safety (TLS) value of 5.0×10^{-9} fatal accidents per flight hour. The vertical collision risk estimate for a portion of North East Asia airspace exceeds the TLS value of 5.0×10^{-9} fatal accidents per flight hour.

1. INTRODUCTION

1.1 The Pacific Approvals Registry and Monitoring Organization (PARMO) produces a periodic report which is distributed twice annually to Pacific and North East Asia air traffic service (ATS) providers and airspace users. The report presented in this paper fulfills the ICAO emphasis on safety management systems; such reporting for international airspace is a component of safety management systems.

1.2 This working paper contains the PARMO safety monitoring report for the time period 1 January to 31 December 2015. It contains a summary of large height deviation reports, and estimates of vertical risk for Pacific and North East Asia airspace.

2. DISCUSSION

2.1 **Attachment A** contains the PARMO Vertical Safety Monitoring Report for January to December 2015.

Executive Summary

2.2 **Table 1** summarizes Pacific airspace RVSM technical, operational, and total risks. **Figure 1** presents collision risk estimate trends during the period from January 2015 to December 2015.

Pacific Airspace – estimated annual flying hours = 1,670,790 hours <i>(note: estimated hours based on Dec 2015 traffic sample data)</i>			
Source of Risk	Risk Estimation	TLS	Remarks
<i>RASMAG/20 Total Risk</i>	3.86×10^{-9}	5.0×10^{-9}	Below TLS
Technical Risk	0.03×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	4.26×10^{-9}	-	-
Total Risk	4.30×10^{-9}	5.0×10^{-9}	Above TLS

Table 1: Pacific Airspace RVSM Risk Estimates

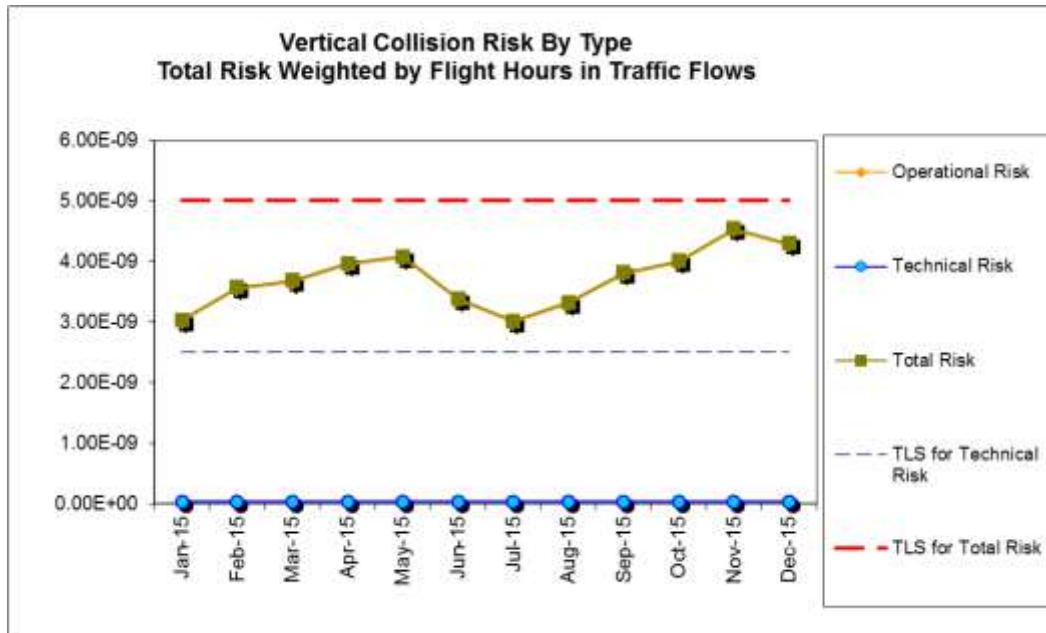


Figure 1: Pacific Airspace RVSM Risk Estimate Trends

2.3 **Table 2** presents a summary of the LHD causes within Pacific airspace from January 2015 until December 2015.

Code	LHD Category Description	No.
A	Flight crew fails to climb or descend the aircraft as cleared	9
B	Flight crew climbing or descending without ATC clearance	12
C	Incorrect operation or interpretation of airborne equipment	0
D	ATC system loop error	2
E	ATC transfer of control coordination errors due to human factors	16
F	ATC transfer of control coordination errors due to technical issues	1
G	Aircraft contingency leading to sudden inability to maintain level	1
H	Airborne equipment failure and unintentional or undetected level change	0
I	Turbulence or other weather related cause	1
J	TCAS resolution advisory and flight crew correctly responds	0
K	TCAS resolution advisory and flight crew incorrectly responds	0
L	Non-approved aircraft is provided with RVSM separation	0
M	Other	0
Total		42

Table 2: Summary of LHD Causes within Pacific Airspace

2.4 **Figure 2** provides the geographic location of risk bearing LHD reports within Pacific Airspace during the assessment period.

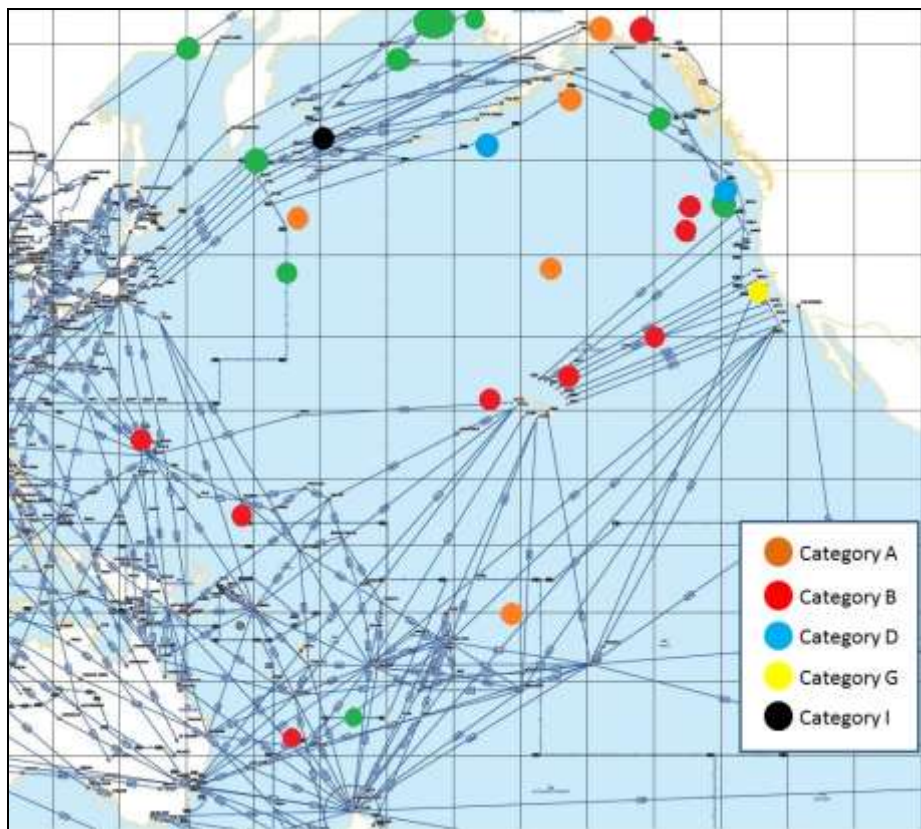


Figure 2: Pacific Airspace – Risk Bearing LHD

2.5 The estimate of overall vertical risk for 2015 increased from the estimated provided for calendar year 2014. This result was primarily due to the increased number of event reports received by PARMO and the associated time spent at incorrect flight level. In calendar year 2014 there was a total of 88 minutes spent at incorrect level, in calendar year 2015 the number of minutes more than doubled to over 202 minutes spent at incorrect level. In addition, there were significant re-estimations of collision risk model (CRM) parameters that directly affect the results presented in this report. The effect of the new estimates reduces the risk estimates slightly from the estimates calculated using the previous parameter estimates.

2.6 **Table 3** summarizes a portion of North East Asia airspace RVSM technical, operational, and total risks. **Figure 3** presents collision risk estimate trends during the period from January 2015 to December 2015.

North East Asia Airspace – estimated annual flying hours = 178,800 hours <i>(note: estimated hours based on Dec 2015 traffic sample data)</i>			
Source of Risk	Risk Estimation	TLS	Remarks
RASMAG/20 Total Risk	4.13×10^{-9}	5.0×10^{-9}	Below TLS
Technical Risk	0.08×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	6.35×10^{-9}	-	-
Total Risk	6.43×10^{-9}	5.0×10^{-9}	Above TLS

Table 3: Portion of North East Asia Airspace RVSM Risk Estimates

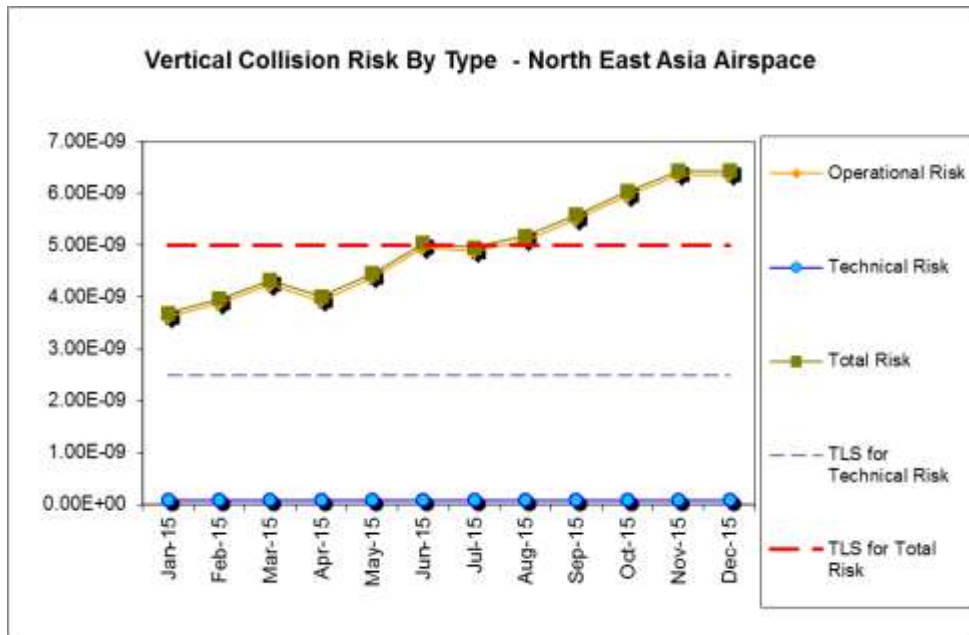


Figure 3: North East Asia Airspace RVSM Risk Estimate Trends

2.7 **Table 4** presents a summary of the LHD causes within a portion of North East Asia airspace from January 2015 until December 2015.

Code	LHD Category Description	No.
A	Flight crew fails to climb or descend the aircraft as cleared	0
B	Flight crew climbing or descending without ATC clearance	0
C	Incorrect operation or interpretation of airborne equipment	0
D	ATC system loop error	0
E	ATC transfer of control coordination errors due to human factors	19
F	ATC transfer of control coordination errors due to technical issues	0
G	Aircraft contingency leading to sudden inability to maintain level	0
H	Airborne equipment failure and unintentional or undetected level change	0
I	Turbulence or other weather related cause	0
J	TCAS resolution advisory and flight crew correctly responds	0
K	TCAS resolution advisory and flight crew incorrectly responds	0
L	Non-approved aircraft is provided with RVSM separation	0
M	Other	0
Total		19

Table 4: Summary of LHD Causes within a portion of North East Asia Airspace

2.8 **Figure 4** provides the geographic location of risk bearing LHD reports within a portion of North East Asia Airspace during the assessment period.



Figure 4: North East Asia Airspace – Risk Bearing LHD

2.9 The estimate of overall vertical risk for the North East Asia airspace 2015 increased from the estimated provided for calendar year 2014. This result was primarily due to the increased number of event reports received by PARMO and the associated time spent at incorrect flight level. In calendar year 2014 there was a total of 2 minutes spent at incorrect level, in calendar year 2015 the number of minutes more than doubled to over 11 minutes spent at incorrect level. In addition, there were significant re-estimations of collision risk model (CRM) parameters that directly affect the results presented in this report. The effect of the new estimates reduces the risk estimates slightly from the estimates calculated using the previous parameter estimates.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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