International Civil Aviation Organization

The Twentieth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/20)

Bangkok, Thailand, 26-29 May 2015

Agenda Item 5: Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

REGIONAL SAFETY MONITORING ASSESSMENT

(Presented by the Secretariat)

SUMMARY

This paper presents an overview of safety assessment results from a regional perspective.

1. INTRODUCTION

1.1 Since APANPIRG/22, RASMAG has provided APANPIRG with an overall assessment of Asia/Pacific FIR RVSM TLS Compliance in order to meet Asia/Pacific Objective 1 (*Airspace Safety Monitoring to Achieve Regional TLS*).

1.2 At RASMAG17, the meeting agreed to focus much more on operational issues than technical capability. The following was an extract from the RASMAG/17 report:

> *The United States noted that it was important to consider an emphasis on risk mitigation procedures such as Strategic Lateral Offset Procedure (SLOP), which had been inconsistently applied in the Asia/Pacific. The Secretariat stated that this would be considered as part of the Seamless ATM development. He emphasized the need for RASMAG to support key infrastructure Seamless ATM improvements such as AIDC, ATS surveillance (particularly ADS-B), and data sharing.*
>
> *IATA expressed support for the operational emphasis and requested RMAs to provide material that could be used to assist pilot education. The meeting noted that ANSP education and information on detailed recommended operational responses was also necessary to reduce this form of risk. The meeting agreed that a strengthened focus on the minimization of operational risk was appropriate. AAMA and PARMO agreed to undertake an analysis on this matter and report to RASMAG.*

1.3 RASMAG/17 agreed to a new task (17/4), which required AAMA, PARMO, IATA, and IFALPA to conduct an analysis of material and processes required from RMAs to assist airline/ATC education and responses on minimisation of operational errors, including information on hot spots[1] and recommended operational responses. This WP also endeavours to assist that task by identification and analysis of regional 'hot spots' where operational errors appeared to be relevant.

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[1] Defined for the purposes of this paper as areas where there were more than one proximate (100NM or less) risk bearing occurrence.

2. DISCUSSION

Regional RVSM TLS Compliance

2.1 The state of Asia/Pacific regional RVSM Target Level of Safety (TLS) compliance is indicated as follows:

- **Figure 1** is as reported to RASMAG/19; and
- **Figure 2** is as reported to RASMAG/20.

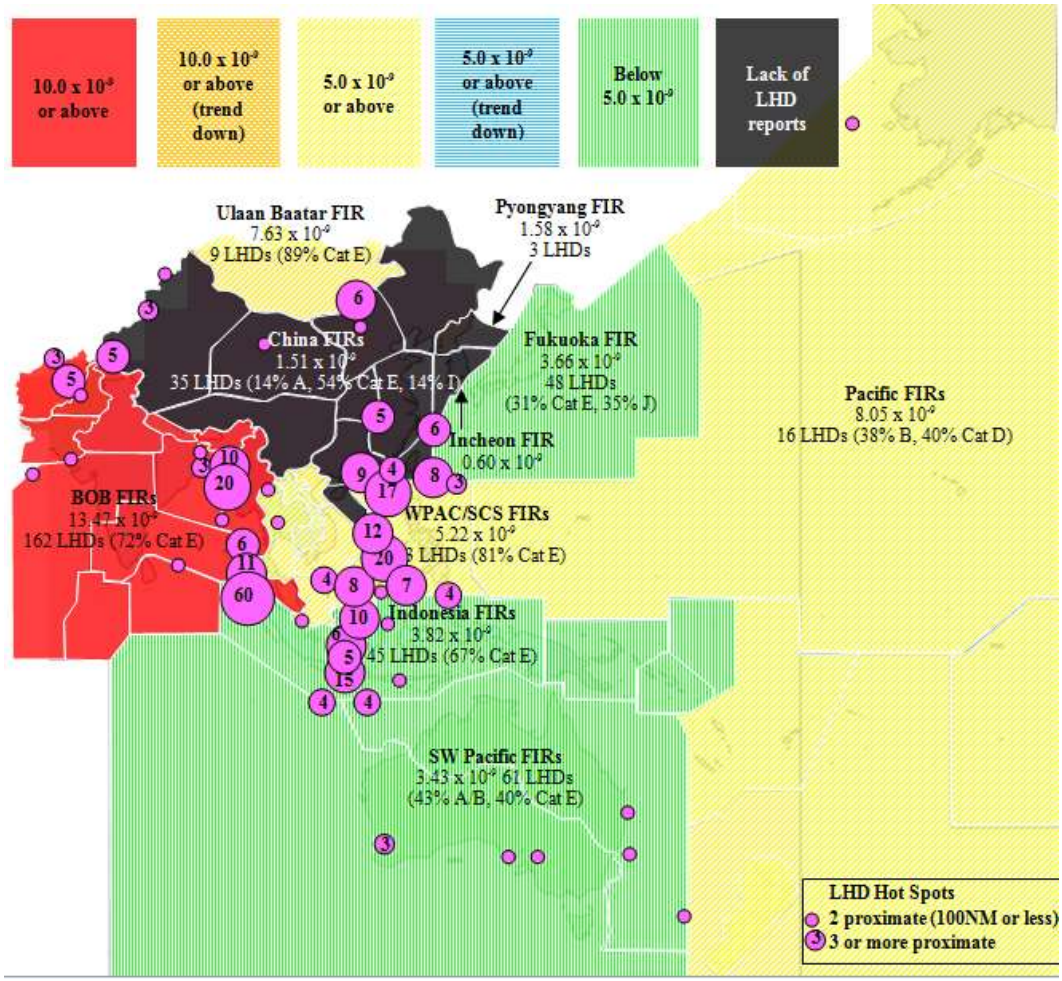

Figure 1: Asia/Pacific TLS compliance reported to RASMAG/19

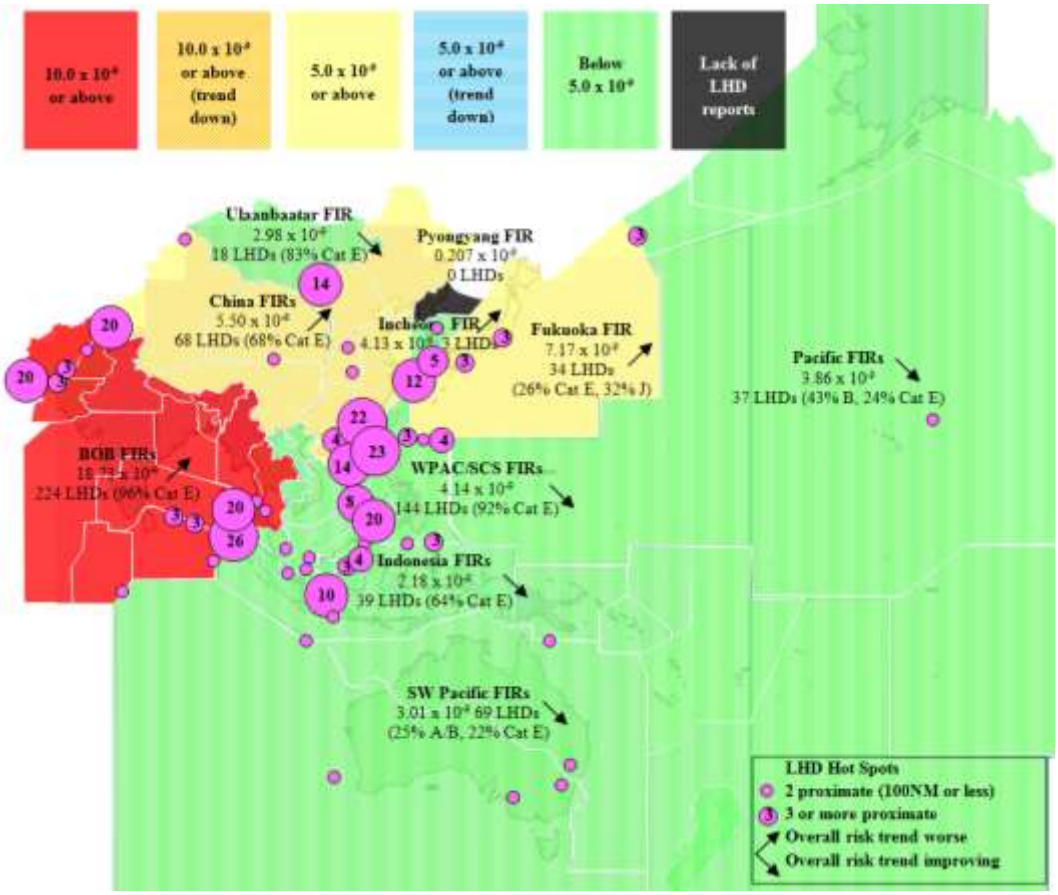

Figure 2: Asia/Pacific TLS compliance reported to RASMAG/20

2.2 **Figures 1 and 2** indicated the following sub-regional regional trends.

- **South Asia**: the improved reporting by India has resulted in a further significant degradation in the Bay of Bengal (BOB) safety risk assessment to reflect the true safety performance that had been hidden – one that greatly exceeds the TLS and remains the Asia/Pacific's highest risk area. However; the States concerned were taking a number of ATM improvement actions that should substantially reduce risk during 2015 and 2016 when the new systems were implemented (however, there was no confirmation as to when the new communications and surveillance systems on Great Nicobar Island would be operational). While the increased reporting at Transfer of Control (TOC) points along Indian FIR boundaries was laudable, it appears unlikely that there could be no LHDs as reported within Indian continental airspace; thus further work is necessary to sensitise ATC to a proper reporting culture.

  There were a number of hot spots evident on the Kabul FIR boundary, most notably at position GADER, between the Tehran and Kabul FIRs; however since late 2014 these LHDs had markedly reduced after intervention by MAAR in coordination with the MID Region.

- **Southeast Asia** reflected an overall improvement in safety risk, even with an increase in reported LHDs. The Philippines airspace remained a major concern, with numerous LHDs evident at all points along the Manila FIR boundary. The greater use of AIDC and ATS surveillance in the South China Sea, and an ATM system upgrade for the Manila FIR continued to require a priority focus.

- **East Asia**: China recorded a dramatic increase in reporting, resulting in its airspace being well over TLS. This reflected a much improved reporting culture fostered by the efforts of the China RMA. Other than the known hot spots between Pakistan and Chinese airspace near PURPA and between Mongolia and China near NIXAL, new hot spots were revealed between Shanghai/Taibei, Guangzhou/Hong Kong, Sanya/Hong Kong, and Sanya/Manila FIRs. China had made significant progress in addressing the PURPA hot spot by improving the communication and surveillance capabilities in this area.

  Attention to the other hot spots in the congested airspace of Eastern China was also required, particularly as these were mainly operational ATC errors in general that could be improved with the use of AIDC and more robust procedures (note: the volume of occurrences between Hong Kong and the Sanya/ Guangzhou FIRs may require an urgent focus on such matters as airspace dimensions, ATS route structures, Flight Level Allocation Scheme (FLAS), ATS coordination procedures and the management of the aerodromes within the Pearl River Delta using a 'metroplex' planning methodology).

  Mongolian airspace observed a downward trend in risk, despite a doubling of the reported LHDs – mainly due to the improved intervention capability using ATS surveillance (note: there were several LHDs reported in MAAR's analysis of the Ulaanbaatar/Beijing FIR boundary at NIXAL and INTIK which do not appear to have been reported to the China RMA; thus the work on improving the reporting culture within China should continue)

  The Pyongyang FIR continued to record no LHDs, which was statistically possible, given the low estimated flight hours. However, no LHDs had been reported for many years; thus it was likely that there was a lack of reporting culture within this airspace, despite China's past efforts to sensitise Democratic People's Republic of Korea (DPRK) ATC.

  Japanese airspace had shown a marked upward (worsening) risk trend; despite the number of LHDs reducing (this was assumed to be due to the longer duration of the LHDs). The significant number of ATC interface errors with the Incheon FIR was concerning, as this was related to the 'AKARA' corridor. The corridor was, a complex airspace serving very high density traffic between China and Japan, and the Republic of Korea (ROK) and the Taibei FIR that used a FLAS, with multiple frequencies and control authorities in the same area. It would appear to be necessary for the involved administrations to urgently review this airspace and its associated procedures (note: AIDC was being used between the ROK and Japan).

- **Southwest Pacific**: all FIRs showed a downward trend, with significant improvement in the performance of Indonesian airspace. However some caution was necessary, as there had still been major interface issues between the Jakarta and Ujung Pandang FIRs, and reporting had been a problem in the past in this airspace. In summary, the result indicated a positive safety result from the efforts of the AAMA, regulators and ANSPs in the FIRs concerned, although Indonesia needed continued focus on its internal improvement programme (note: there were several LHDs reported in MAAR's analysis of the Kota Kinabalu/Jakarta FIR boundary which do not appear to have been reported to AAMA).

- **Pacific**: the Pacific showed a significant risk improvement, even though the number of LHDs more than doubled (mainly occurring in the high density North Pacific Organised Track System (NOPAC) and Hawaiian route system). Of concern was the failure by Fiji to provide a December Traffic Sample Data (TSD) for 2013 and 2014, limiting PARMO's ability to update key safety assessment parameters.

2.3 **Table 1** provides a comparison of Asia/Pacific RVSM risk as a measure against the TLS, either by RMA 'sub-region[2]' (Conclusion 20/4 − *Asia/Pacific Performance Metrics* refers), or by FIRs. There had been significant improvement in the region meeting the TLS overall, but three 'sub-regions' – BOB, Chinese and Japanese airspace recorded marked increases in risk assessment.

	RASMAG17	**RASMAG18**	**RASMAG19**	**RASMAG20**
RMA 'sub-regions'	78%	89%	22%	67%
FIRs	73%	90%	16%	53%

Table 1: Comparison of Sub-Regional and Regional RVSM TLS Achievement

LHD Reporting

2.4 **Table 2** provides a comparison of the estimated flight hours for airspace analysed by an RMA, divided by the reported LHDs at RASMAG/18 and RASMAG/19, in order to assess reporting.

Airspace	**RASMAG 19 LHDs**	**RASMAG 20 LHDs**	**RASMAG 20 Flight Hours**	**RASMAG 19 Reporting Ratio**	**RASMAG 20 Reporting Ratio**
SW Pacific	61	69	(+33%) 795,450	1:9,835	1:11,528
Mongolia	9	18	(NC) 108,773	1:10,876	1: 6,042
India/BOB	162	(+38%) 224	(+13%) 2,110,809	1:11,540	1: 9,423
WPAC/SCS	133	(+8%) 144	(-5%) 1,511,839	1:11,889	1: 10,498
Indonesia	45	39	(NC) 761,390	1:18,570	1: 19,522
China	35	(+47%) 103	(-56%) 2,124,690	1:137,221	1:20,628
Japan	48	(-31%) 34	(NC) 1,101,469	1:22,947	1: 32,396
ROK	3	3	492,360	1:164,120	1:164,120
Pyongyang	0	0	(-16%) 5,012	0	0
Total	496	634	-20% 9,011,792	1: 22,829	1:14,214
Pacific	16	37	+33% 1,669,658	1:78,130	1:45,125

Table 2: Comparison of Estimated Flight Hours and Reported LHDs (NC = no change)

2.5 There appears to be several inconsistencies and gaps in the data provided by RMAs to RASMAG/20. AAMA and JASMA both advised they were using a 2012 TSD for Indonesian and Japanese airspace respectively. MAAR advised that they were using a 2014 TSD for Mongolian airspace, but the estimated flight hours had remained the same as 2013. China RMA reported a substantial decline of 56% in flying hours, placing their figure near that of BOB airspace, which does not seem plausible. PARMO also submitted an implausible value of 99,984 hours for the Incheon FIR, less than 10% of Japan's figure (in 2014 492,360 hours was used).

2.6 This regional assessment used the China RMA figure in the meantime but used the 2014 Incheon FIR value instead, as this was discussed previously. The average reporting ratio in **Table 2** (separating the Pacific portion of airspace because it was largely oceanic in nature and not directly comparable) was now much closer at 14,214 to high reporting cultures such as in the SW Pacific (1:11,528). The number of LHDs reported had rapidly increased by 28% which had mainly come from a substantial increase in the Chinese and Indian FIRs. As approximately 68% and 98% respectively of these LHDs were category E ATC coordination errors, this could be largely attributed to a major improvement in reporting.

[2] (1) Melbourne, Brisbane, Nauru, Honiara FIRs (AAMA); (2) Port Moresby FIR (AAMA); (3) Indonesian FIRs (AAMA); (4) Sovereign airspaces of China (China RMA); (5) Fukuoka FIR (JASMA); (6) Bay of Bengal FIRs (MAAR); (7) Western Pacific/South China Sea FIRs (MAAR); (8) Pacific Area (PARMO); and (9) North-East Asia Incheon FIR (PARMO).

2.7 China should be congratulated for their efforts in promoting a higher reporting culture, which has revealed a much more accurate picture of the safety problems that need urgent attention.

2.8 An analysis of the rate of LHD reporting in Chinese, Indian, Indonesian and ROK airspace indicated that despite an improvement in reporting, there may be further improvements required to paint a true picture of the risk-bearing incidents, particularly by implementation of all elements of a 'just culture' environment. The indications included a lack of reporting over an entire continental airspace, very low reporting ratios such as is evident in ROK airspace, and the reporting of LHDs by one RMA that are not reported by another on the RMA boundary.

Regional Horizontal TLS Compliance

2.9 The following Asia/Pacific En-Route Monitoring Agency (EMAs) reported horizontal risk assessments as follows, which all met the TLS of 5.0×10^{-9} (**Table 3**):

Separation Standard	EMA	Estimated Risk
50NM Lateral Risk	BOBASMA	1.07856×10^{-9}
	JASMA	0.751×10^{-9}
	PARMO	1.35×10^{-9}
	SEASMA	0.045×10^{-9}
30NM Lateral Risk	PARMO	0.53×10^{-9}
50NM Longitudinal Risk	BOBASMA	1.59734×10^{-9}
	PARMO	2.32×10^{-9}
	SEASMA	0.034×10^{-9}
30NM Longitudinal Risk	BOBASMA	0.127551×10^{-9}
	JASMA	0.000578×10^{-9}
	PARMO	3.74×10^{-9}

Table 3: Comparison of Horizontal Risk Assessments

2.10 The application of these horizontal standards met the TLS. The risk for 50NM lateral and 50NM longitudinal separation as calculated by SEASMA was notably lower than other implementations, while the risk for 30NM longitudinal separation was noticeably lower than other EMAs as calculated by JASMA.

Non-RVSM Approved Aircraft

2.11 **Table 4** compared the number of non-RVSM airframes reported by each RMA (note: the RASMAG/20 figures should be checked by RMAs as each agency used a different reporting format, meaning that it was difficult to cross check and interpret in some cases):

Report	AAMA	China RMA	JASMA	MAAR	PARMO
RASMAG/18	98	43	47	118	15
RASMAG/19	90	33	40	130	19
RASMAG/20	8	45	15	234	26

Table 4: Trend of Non-RVSM airframes Observed by Asia/Pacific RMAs

2.12 Overall, the number of non-RVSM aircraft had increased by 5% in the past year. This indicated that there was considerable work to do and APANPIRG Conclusion 24/6 (*Repetitive Non-RVSM Approved Aircraft Operating as RVSM Approved Flights* which encouraged States to deny entry to operate within RVSM airspace for aircraft that have been confirmed as non-RVSM approved over a significant length of time, or by intensive checking, except where a specific non-RVSM operation was authorized), had not yet been effective (RASMAG/20/WP26 refers).

2.13 Of note was the significant reduction in rouge airframes detected by AAMA and JASMA, but this was unfortunately offset by a large increase in non-RVSM aircraft identified by MAAR. This was probably because the most prominent nations featured in the list of non-RVSM aircraft all came from the MAAR area of responsibility: India, Thailand, Malaysia, Indonesia and the Philippines. MAAR found that of the 234 aircraft registrations operating within the RVSM airspace without proof of valid RVSM Approval, 32 were detected in previous flight plans and nine were State/Military aircraft.

2.14 Given the large disparity in work (in terms of States/FIRs and aircraft monitored, and problems identified) between the MAAR and the other RMAs, special consideration should be made at RASMAG/20 of support mechanisms for MAAR. While it is accepted that the RMAs work together collaboratively, additional support for MAAR should be considered by RASMAG.

APANPIRG Deficiencies

2.15 At present, only Bangladesh has a RASMAG-related APANPIRG Deficiency recorded regarding the requirement of Paragraph 3.3.5.1 of Annex 11 (provision of data for monitoring the height-keeping performance of aircraft). This should be reviewed as Bangladesh apparently provided data in the past year as required.

2.16 However, the failure by Fiji to provide a December Traffic Sample Data (TSD) for 2013 and 2014 and the failure of India and the Philippines to provide a summary of RVSM Approval Data submission in accordance with APANPIRG Conclusion 20/22 requires RASMAG to consider whether Fiji, India and the Philippines should be recommended to APANPIRG for an Annex 11 Deficiency.

2.17 It should be noted that the FIT-Asia was considering potential APANPIRG Deficiencies for several States due to a lack of Annex 11 monitoring processes for the application of data link.

RMA Monitoring Burden

2.18 **Table 5** compares the outstanding monitoring burden reported by each RMA:

Report	AAMA	China RMA	JASMA	MAAR	PARMO
RASMAG/18	102	141	29	189	118
RASMAG/19	79	87	16	200	37
RASMAG/20	113	105	14	176	20

Table 5: Outstanding Monitoring Burden of Asia/Pacific RMAs

2.19 **Table 5** indicates that the monitoring burden for all the RMAs had remained relatively steady, although PARMO significantly reduced its burden for a second year in a row. MAAR carried 41% of all Asia/Pacific's monitoring burden.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) discuss any relevant matters as appropriate.

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