
ICAO

# REPORT OF THE SECOND MEETING OF THE 13TH AFI RVSM COLLISION RISK ASSESSMENT (CRA 13)

*(Teams Microsoft, 23 July 2020)*

**PREPARED BY THE SECRETARIAT**



1 | P a g e

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# PART I:

# INTRODUCTION

***Place and duration***

1.1 The Second Meeting of the AFI RVSM Collision Risk Assessment on Teams Microsoft, 23 July 2020.

***Attendance***

1.2 The meetings were attended by 18 participants from AFI States, Regional / International Organizations and Industry. The list of participants is provided in **Appendix A** to this report.

***Officers and Secretariat***

1.3 This meeting was co-chaired by Albert Taylor and assisted by Keziah Ogutu and Mike Boyd.

***Working Languages***

1.5 The meetings' discussions were conducted in English.

***Opening of the meeting***

1.6 The opening of the meeting were introductions of the meeting attendees from the different parts of the world and organisations.

1.7 The meeting chair highlighted that the reasons for the meeting and the agenda as provided in Appendix **B.** The chair highlighted the alarmingly high target level safety for the AFI, which keeps increasing annually and wanted to understand what contributed to the increase and why are we so far away from the target of total risk of 5.0 x $10^{-9}$

| **AFI Airspace – estimated annual flying hours = 483 110.88 hours** *(note: estimated hours based on Dec 2018 traffic sample data)* | | | |
|---|---|---|---|
| **Source of Risk** | **Risk Estimation** | **TLS** | **Remarks** |
| *RMACG 13 Total Risk (PREVIOUS RMACG)* | *58.6 x $10^{-9}$* | *5.0 x $10^{-9}$* | *Above TLS* |
| Technical Risk | 2.4 x $10^{-11}$ | 2.5 x $10^{-9}$ | Below Technical TLS |
| Operational Risk | 70.2 x $10^{-9}$ | - | - |
| Total Risk | **75.4x $10^{-9}$** | 5.0 x $10^{-9}$ | **Above TLS** |

| CRA | $N_{az}^{total}$ | TOTAL VERTICAL TLS EXCEEDED BY A FACTOR OF |
|---|---|---|
| **CRA 13 2018** | $75.4 \times 10^{-9}$ | **15.0** |
| **CRA 12 2017** | $58.6 \times 10^{-9}$ | **11.7** |
| **CRA 11 2016** | $36.4 \times 10^{-9}$ | **7.3** |
| **CRA 10 2015** | $141.2 \times 10^{-9}$ | **28.2** |
| **CRA 9 2014** | $63.7 \times 10^{-9}$ | **12.7** |
| **CRA 8 2013** | $31.4 \times 10^{-9}$ | **6.3** |
| **CRA 7 2012** | $8.0 \times 10^{-9}$ | **1.6** |
| **CRA 6 2011** | $23.2 \times 10^{-9}$ | **4.7** |

| | | |
|---|---|---|
| **CRA 5 2010** | $33.0 \times 10^{-9}$ | **6.6** |
| **POSC CRA (2008-2009)** | $\mathbf{31.2 \times 10^{-9}}$ | **6.2** |

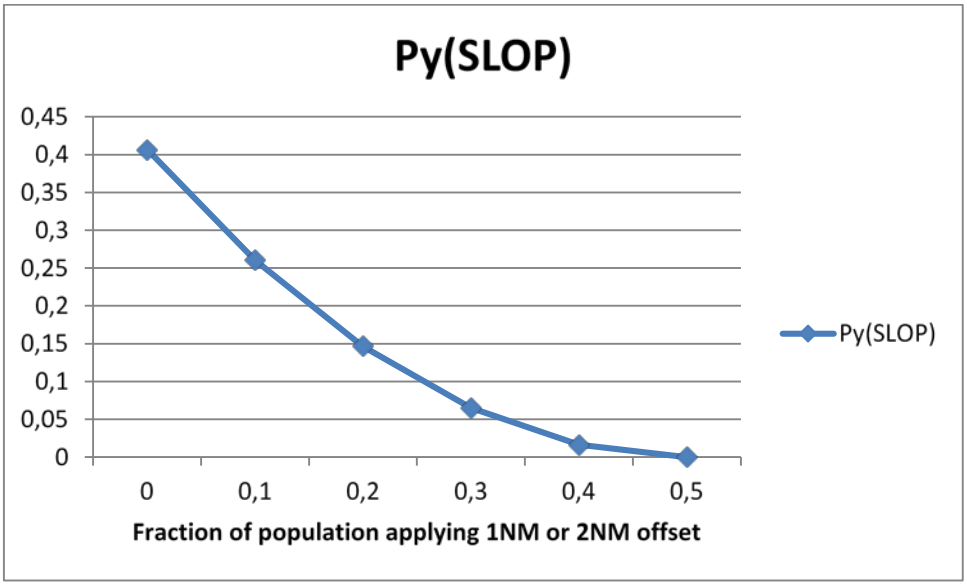
1.8 The Mathematicians from Royal NLR in the Netherlands explained how the assessment is conducted for the 27 AFI FIRs and emphasized on the importance of monthly data return from all FIR's. As for the 13th CRA ARMA only been received from a very limited number of FIR/UIRs. Only 15 FIR/UIRs provided data and the passing frequency and aircraft population could be determined from the submitted data which is not the full picture of the AFI RVSM operations. Only one FIR/UIR, namely Harare, provided ARMA Form 4 data for all 12 months. This constituted to approximately 42% of the total that should have been available from the 27 participating FIR/UIRs. This was the lowest percentage of provided data for all CRAs. The quality of the available information varied strongly.

1.9 Mr James Davis enquired about the equation used and how is used to calculate SLOP (Strategic Lateral Offset Procedure). How the equation $P_y(SLOP) = \beta_0 P_y(0\ \text{NM}) + \beta_1 P_y(1\ \text{NM}) + \beta_2 P_y(2\ \text{NM}) + \beta_3 P_y(3\ \text{NM}) + \beta_4 P_y(4\ \text{NM})$

1.10 The mathematicians explained the calculations of the $P_y(SLOP)$ and that within the AFI region, the SLOP is not fully implemented. According to a recent (28 August 2017) overview of the AFI RMA, 16 of the 27 FIRs in the AFI region (60%) have implemented the SLOP (**see Appendix C**). Unfortunately, in the AFI region no information is known about the aircraft population spread from centreline to 2 NM. When there is 100% implementation information of which offset is used by air operators in RVSM airspace will be required for inclusion in the equation.

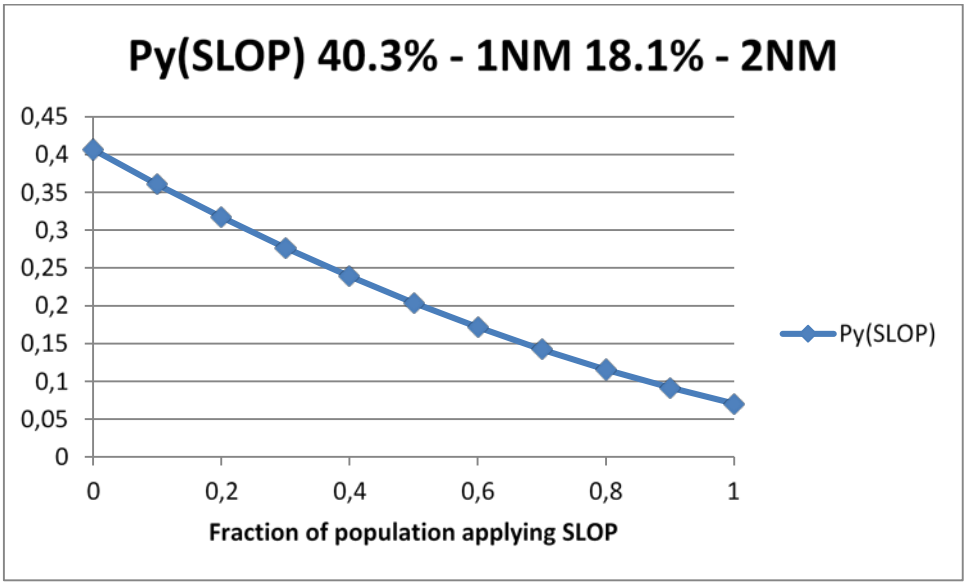
**Results**

Assuming that the same fraction of flight hours is applying 1 NM or 2 NM offset ($\alpha_1 = \alpha_2$), then the $P_y(SLOP)$ can be computed as a function of this fraction:




In an "ideal" SLOP application the distribution over the 3 offsets is equal: 1/3, 1/3, 1/3. This yields $P_y(SLOP) = 0.0452$.

In the NAT region it was estimated that in 2013 18.1% uses 2 NM offset, 40.3% uses 1 NM offset and 41.6% uses 0 NM offset (Ref. 3). Applying this distribution when the SLOP is applied, a plot can be made showing the $P_y(SLOP)$ as a function of the percentage of flight hours that the SLOP is applied.



1.11. Mike Boyd presented an upcoming amendment of Circular 331 which will see it change to Circular 354 which is yet to be edited and published. This circular provides guidance of SLOP implementation in terrestrial surveillance environments, it also promotes SLOP implementation in random routing areas.

1.12 ESAF and WACAF Regional Offices are working with Mogadishu to guide them with RVSM compliance and in meeting the requirements of changing from Class G to Class A airspace.

1.13 Mathematicians clarified that all data is considered whether from Class G or Class A airspace. All the submitted AFI FIR's are added and used into the assessment.

1.14 The chair asked the mathematicians if the forms used to collect the data were sufficient, was there a need to change them? The mathematicians advised that there is nothing with the forms used but it is the user of the form that doesn't complete the forms as required with all the necessary information.

1.15 Mathematicians also raised the importance of the use of the altimetry system error (ase), they use data they receive from Eurocontrol to determine the stability of the altimetry system error of the airframes that operate in the AFI Region. Height monitoring in the AFI region is not completed by all operators and only 46% of the AFI RVSM operators are compliant with Annex 6 for Long Term Minimum Height Monitoring.

1.16 In closing these actions were agreed upon.

***Action Required: RVSM Airspace Monitoring***

*That AFI States:*

a) *Submit RVSM Data to ARMA Office on a monthly basis;*
b) *Encourage Airlines and Operators to periodically height monitor their RVSM approved aircraft*
c) *Implement Strategic Lateral Offset Procedures and other recommended measures aimed to reduce AFI target level of safety (TLS).*
d) *States/ANSPs be urged to report all vertical events involving large height deviations and take the necessary corrective action to reduce the total vertical risk further down to below the total vertical Target Level of Safety;*
e) *AFI Trans-regional co-ordination failures between Sanaa FIR and Mogadishu, Asmara and Djibouti should be given immediate attention due to the number of events that have occurred;*
f) *States/FIRs which have not yet done so are urged to submit all the RVSM data from 2019 to 2020 and establish a mechanism for submission of monthly data to ARMA.*
*g) The use of AFI Air Navigation Deficiency Database (AANDD) will be beneficial in holding States accountable to the commitments they made at the AFI RAN Meeting as per ICAO Doc 9930.*
*h) AFI RVSM NPM Virtual Workshop to take place this year hosted by ARMA, ICAO advised they require 60 days to send out invitations to States.*
*i) ICAO will distribute letters to the States that have not submitted the 2019 data to ARMA as the assessment for the 2019 year has commenced and only 17 FIR's have submitted data which is currently with the mathematicians in the Netherlands*
*j) ARMA has to establish a way of getting the offset information in the AFI Region from pilots when SLOP implementation is 100% across the region.*
*k) ARMA to send research information to the ICAO technical team for the implementation and installation of a ground height monitoring unit for RVSM height keeping purposes so that the teams can work together.*
*l) Assist and guide the Mogadishu FIR to ensure safe RVSM operations continue and during after the transition from Class G to Class A.*
*m) ICAO Safety group highlight height monitoring, RVSM data returns and LHD to ARMA as part of SSP/SMS programme.*

# Appendix A

| | |
|---|---|
| Mr. Arthemon Ndikumana | DRD, ESAF Office, Nairobi |
| Mr Mike Boyd | Technical Officer, ICAO HQ, Montreal |
| Mr. Milton Tumusiime | RO/FS, ESAF Office, Nairobi |
| Mr Papa Issa Mbengue, | RO/FS, ESAF Office, Nairobi |
| Mr Kebba Lamin, ICAO | RO/FS, WACAF Office, Dakar |
| Mr. Albert Aidoo Taylor | RO/ATM, WACAF Office, Dakar |
| Ms. Keziah Ogutu | RO/ATM, ESAF Office, Nairobi |
| Mr Aregawi Zewdu, ICAO | RO/SI, ESAF Office, Nairobi |
| Mrs. Sonia Freitas, ICAO | RO/SI, WACAF Office, Dakar |
| Mr Malick Babacar Kone, ICAO | RO/IT, WACAF Office, Dakar |
| Mrs. Nonjabulo Gumede | AFI Regional Monitoring Agency |
| Dr Geert Moek | Senior Mathematician Royal NLR |
| Dr Job Smeltink | Mathematician Royal NLR |
| Mr Simon Zwane | ATNS |
| Mr Colin Bryant | ATNS |
| Mr Sibusiso Nkabinde | ATNS |
| Mr Martin Cooper | ATNS |
| Mr James Davis | ATNS |
| Mr Dhipak Lalla | ATNS |

# Appendix B

**Review of RVSM Collision Risk Assessment 13 Report**
Microsoft Teams Meeting, 23 July 2020
**PROVISIONAL AGENDA**

| Item | Description | By | Remarks |
|---|---|---|---|
| **1.** | Introduction/Purpose | ICAO/ARMA | |
| | | | |
| **2.** | Highlights of CRA/13 Report and Trend Analysis | Mathematicians | |
| | | | |
| **3.** | Review of Identified Factors Contributing to high Total TLS | ALL | |
| | | | |
| **4.** | Review of Recommended Corrective Action | ALL | |
| | | | |
| **5.** | Update on SLOP | ICAO/Mike | |
| | | | |
| **6.** | Consolidate Plans of Action | ALL | |
| | | | |
| **7.** | Preparations for CRA/14 | ALL | |
| | | | |
| **8.** | Any Other Business | ALL | |

# Appendix C

| FIR | Implemented SLOP (Yes/No) |
|---|---|
| Accra | Yes |
| Addis Ababa | No |
| Antananarivo | Yes |
| Asmara | No |
| Beira | Yes |
| Brazzaville | Yes |
| Cape Town | No |
| Dakar Terrestrial | Yes |
| Dar Es Salaam | No |
| Entebbe | Pending |
| Gaborone | No |
| Harare | Yes |
| Johannesburg | Yes |
| Johannesburg Oceanic | Yes |
| Kano | Yes |
| Kinshasa | Yes |
| Lilongwe | No |
| Luanda | Yes |
| Lusaka | Pending |
| Mauritius | No |
| Mogadishu | Yes |
| Nairobi | No |
| N'djamena | Yes |
| Niamey | Yes |
| Roberts | Yes |
| Seychelles | Yes |
| Windhoek | No |
| | |
| **Total Not Implemented No Response or Evidence** | **9** |
| **Total Not Implemented With No Intention of Implementing** | **5** |
| **Total Implemented** | **16** |
| **Total Not Implemented** | **9** |
| **Pending Implementation Awaiting Evidence** | **2** |
| **Total FIR's** | **27** |