International Civil Aviation Organization

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FIFTEENTH MEETING ON THE IMPROVEMENT OF AIR TRAFFIC SERVICES OVER THE SOUTH ATLANTIC

(Lisbon, Portugal, 19-21 May 2010)

Agenda Item 1: Air Traffic Management (ATM)

1.3 First Approach to 2009 Collision Risk Assessment within the EUR/SAM Corridor

(Presented by SATMA)

SUMMARY

This paper presents the preliminary conclusions obtained from the estimations of some safety related parameters within the EUR/SAM Corridor before the completed 2009 Collision Risk Assessment is presented by SATMA.

1. INTRODUCTION

SATMA was committed by SAT group to perform and present periodical studies to ensure a safe application of RVSM and RNP10 in the EUR/SAM Corridor, monitoring collision risk to check whether this value is held below the required Target Level of Safety.

Although SATMA has been working on the 2009 collision risk assessment, it has not been possible to finish it for its presentation in the SAT 15 Meeting.

Nevertheless, a preliminary analysis of some parameters will be presented in this report. It is important to remark that the present WP just introduces guidance on the way in which some parameters have evolved from last safety assessment.

2. DISCUSSION

2.1 DATA REQUIRED FOR 2009 COLLISION RISK ASSESSMENT

Data needed for 2009 collision risk assessment was indicated in SAT14/TF1-IP/04, from which next paragraph is extracted:

"(…) States concerned in the EUR/SAM Corridor should provide SATMA with traffic and deviations data regularly. (…) Particularly, for next assessment, data from January 2009 to December 2009 would be desirable and they should be sent to SATMA regularly as they become available. As far as the traffic samples are concerned, they should include traffic on the parallel routes and crossing traffic above FL290 (aircraft type, FL and crossing times in all waypoints of the trajectory are needed for each flight)."

As it is shown above, regular reception of traffic information and Large Height Deviations (LHDs) was expected. In particular, in order to adhere to schedule, for the 2009 collision risk assessment, it was expected to receive all 2009 traffic information from the States before the 15th of January 2010.

Nevertheless, traffic information available by the scheduled date was insufficient to correctly develop the study, being most of the traffic samples received after that date, with the latest update of traffic data received at the end of March 2010.

The following table summarizes the traffic information available for the study at the end of March 2010.

Locations	Available traffic information	Comments
Canaries UIR	1st January 2009-31st December 2009	-
SAL Oceanic UIR	1st January 2009-31st December 2009	-
Dakar Oceanic UIR	1st January 2009-30th June 2009 1st September 2009-31st October 2009	No crossing traffic No crossing traffic
Atlantic-Recife UIR	1st January 2009-31st December 2009	-

Table 1
Traffic information available on the 25th of March 2010

In view of the above, most of the required traffic data has been sent by the States and, despite the lack of some information, the samples are now considered to be adequate for the safety assessment.

Delay in the reception of the required data has implied a delay in the performance of the collision risk assessment, not being possible for SATMA to present it in the SAT 15 Meeting in May. This collision risk assessment will be available as soon as feasible, and in any case before the next SAT Meeting.

2.2 PRELIMINARY ANALYSIS OF SOME SAFETY RELATED PARAMETERS

As it has already been said, although it has not been possible to fulfill the collision risk assessment for this meeting, it has been possible to make an initial analysis of some safety related parameters.

In the previous collision risk assessment, it was pointed out that the total vertical risk (sum of the technical risk and the operational risk) was higher than the TLS, TLS = $5x10^{-9}$, if large height deviations due to coordination errors were considered, as the operational risk was already higher than that value, just considering the contribution to the risk of the deviations reported by Atlantic-Recife. Therefore, special attention has been paid to the parameters related to the operational risk.

First of all, it must be noticed that, making a comparison between data collected in 2009 and data used in the previous study (10th July 2007- 10th July 2008), traffic of the Corridor in Canaries UIR has decreased around 20%. In a first approach, it can be assumed that the same reduction of traffic, and therefore of flight hours, has occurred in the rest of the UIRs.

On the other hand, LHD reports sent by the States enable to develop an estimation of the operational vertical collision risk. To do this, it is necessary to know the magnitude of the different deviations reported, their cause and their duration in order to compute the total number of crossed levels and the total time spent at incorrect flight level, t_{wl}, in each of the UIRs. Only data from Atlantic-Recife include an estimation of the time at incorrect flight level, and therefore, it has been necessary to use default values for deviations from the rest of the UIRs. The criteria for these default values have been the following ones:

a) Coordination errors (no notification of the transfer or transfer at unexpected flight level) and detection of the aircraft when entering the UIR: 10 minutes

b) Coordination error (no notification of the transfer) and undetected aircraft in the UIR: the duration of the flight in that UIR, taking into account its speed.

With these considerations, the following tables summarize data obtained from LHDs reported by the involved States for 2009. Table 2 corresponds to deviations from January 2009 to June 2009, whilst Table 3 corresponds to deviations received from July 09, after SAT14/TF1 and the creation of the LHDs Monitoring Team.

Locations	Nº LHDs	Time spent wrong level	Nº levels crossed	Reasons
Canaries UIR	2	0.333 h.	0	Coordination errors
Sal UIR	1	1.162 h.	1	Coordination errors
Dakar UIR	8	2.379 h.	0	Coordination errors
Atlantic-Recife UIR	15	1.200 h.	0	Coordination errors

Table 2
LHDs reported from January 2009 to June 2009

Locations	Nº LHDs	Time spent wrong level	Nº levels crossed	Reasons
Canaries UIR	2	0.333 h.	0	Coordination errors
Sal UIR	7	1.167 h.	0	Coordination errors
Dakar UIR	19	6.908 h.	0	Coordination errors
Atlantic-Recife UIR	6	1.551 h.	0	Coordination errors

Table 3
LHDs reported from July 2009 to December 2009

With these data, total time spent at a wrong level in the Corridor has been 15.033 hours.

It is important to remark that all the required reports have been received since the LHDs monitoring team creation and that all the reported deviations are due to coordination errors between ATC units, and not related to RVSM operations. It can also be noticed that there has not been a reduction in the time spent at a wrong level after SAT14/TF1.

The main contribution to the operational risk will be the one due to the time spent at an incorrect flight level. Operational collision risk is directly proportional to the vertical overlap probability, and this one, in the case of the risk due to aircraft leveling off at a wrong level, is given by:

$$P_z^{wl}(S_z) = \frac{t_{wl}}{T} P_z(0)$$

This probability depends on the proportion of the total time spent at a wrong level in relation to the total flight time. Total time, as it has been previously introduced, has decreased and t_{wl} is higher than the one used in the last safety report (15.033 h. vs. 3.672 h.).

Therefore, it is estimated that the probability of vertical overlap due to aircraft levelling off at a wrong level will be higher than the one calculated in the previous collision risk assessment. As variations in the rest of the parameters affecting collision risk are not expected to be so important, the operational risk will also be higher than the previous one.

As it is was presented in the previous safety assessment, the contribution to the risk in the whole Corridor due only to large height deviations in Atlantic-Recife UIR was $4.7*10^{-8}$ based on 3.672 hours at incorrect flight level with 123985 flight hours in the whole Corridor.

$$N_{wl}^{CORRIDOR'09} >> TLS$$

With these premises and based on new values presented (time at wrong level, 15.033 h. and a significant decrease of the total flight time), it is expected that the operational collision risk will still be higher than the TLS.

$$N_{wl}^{CORRIDOR'10} >> TLS$$

Although detailed and exact calculations need to be performed (they will be presented before the next SAT Meeting), it can be anticipated that problems relating coordination errors and total vertical collision risk are not solved and that adequate corrective actions should be taken to reduce this type of errors.

3. ACTION BY THE MEETING

The SAT/15 Meeting is invited to:

a) Note the need of the implementation of corrective actions in order to reduce operational coordination errors affecting operational risk.

b) Take note of the new schedule for the presentation of the collision risk assessment.

c) Consider problems due to the delay in the reception of traffic information sent by the involved States. In order to avoid this situation for future safety assessments, it would be desirable that data were periodically received being due before the day 15th of the following month.

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