



ICAO

International Civil Aviation Organization

Eleventh Meeting of the South China Sea Traffic Flow Review Group (SCSTFRG/11)

Bangkok Thailand, 04 – 06 July 2023

Agenda Item 4: Discussion on PBN Routes Development and FLAS/FLOS Optimisation

REVIEW OF THE EXISTING FLAS/FLOS IN SOUTH CHINA SEA AIRSPACE

(Presented by the Secretariat)

SUMMARY

This paper presents the considerations when reviewing the existing FLAS/FLOS operation and No-PDC FL in various FIRs of the South China Sea area. All Member States are invited to review the data and provide feedback on their current FLAS/FLOS operations to the ICAO Secretariat to improve the capacity, efficiency and safety.

1. INTRODUCTION

1.1 Since the inception of the South China Sea FLAS/FLOS operation in 2002 by the Asia-Pacific RVSM Implementation Task Force and amendment in 2007 by the South China Sea RVSM Scrutiny Group, circumstances have been a lot changed over the last 20 years.

1.2 Whilst the traffic flow demand has evolved, particularly the traffic increase on the secondary crossing routes, and the improvement of communication and surveillance coverage within the area; aircraft navigation capabilities; and Air Traffic Management systems, higher capacity and efficiency are expected from the airspace users to maximize the benefits from investment in ANS systems.

1.3 AT the SCSTFRG/7 meeting, to assist SCSTFRG in reviewing and improving the existing FLAS/FLOA in the SCS airspace, the ICAO APAC Regional Sub-Office presented the FLAS/FLOS Chart of the South China Sea Airspace (**Attachment A**). The chart gives the levels for each entry/exit point between the adjacent FIRs, the blue for westbound traffic and the red for eastbound traffic. It also provides information on levels at crossing points of major traffic and the crossing traffic. The density of traffic is indicated in the chart by lines with different thicknesses, which come from the analysis of TSD visualization conducted by MAAR in 2016. Thereafter the SCSTFRG/7 meeting agreed to review the existing FLAS/FLOA operation within the SCS area with a view to enhancing efficiencies, to be accorded as Priority Area 4 of the SCSTFRG.

1.4 At SCSTFRG/10 meeting, to facilitate the discussion on the existing FLAS/FLOS to promote the long-term consideration of post-pandemic scenarios, the group agreed to the **Decision SCSTFRG/10-1: Review of the existing South China Sea Flight Level Allocation Scheme (FLAS) and Flight Level Orientation Scheme (FLOS)**

2. DISCUSSION

Observation of FLAS/FLOS among the ATS Routes

2.1 Through the updated data submitted by South China Sea States prior to the meeting, the ICAO APAC Regional Sub-Office has corrected the data from the previous version of the Chart to provide an overview of the FLAS currently operating in the South China Sea airspace among the major routes, as illustrated in **Chart 1**.

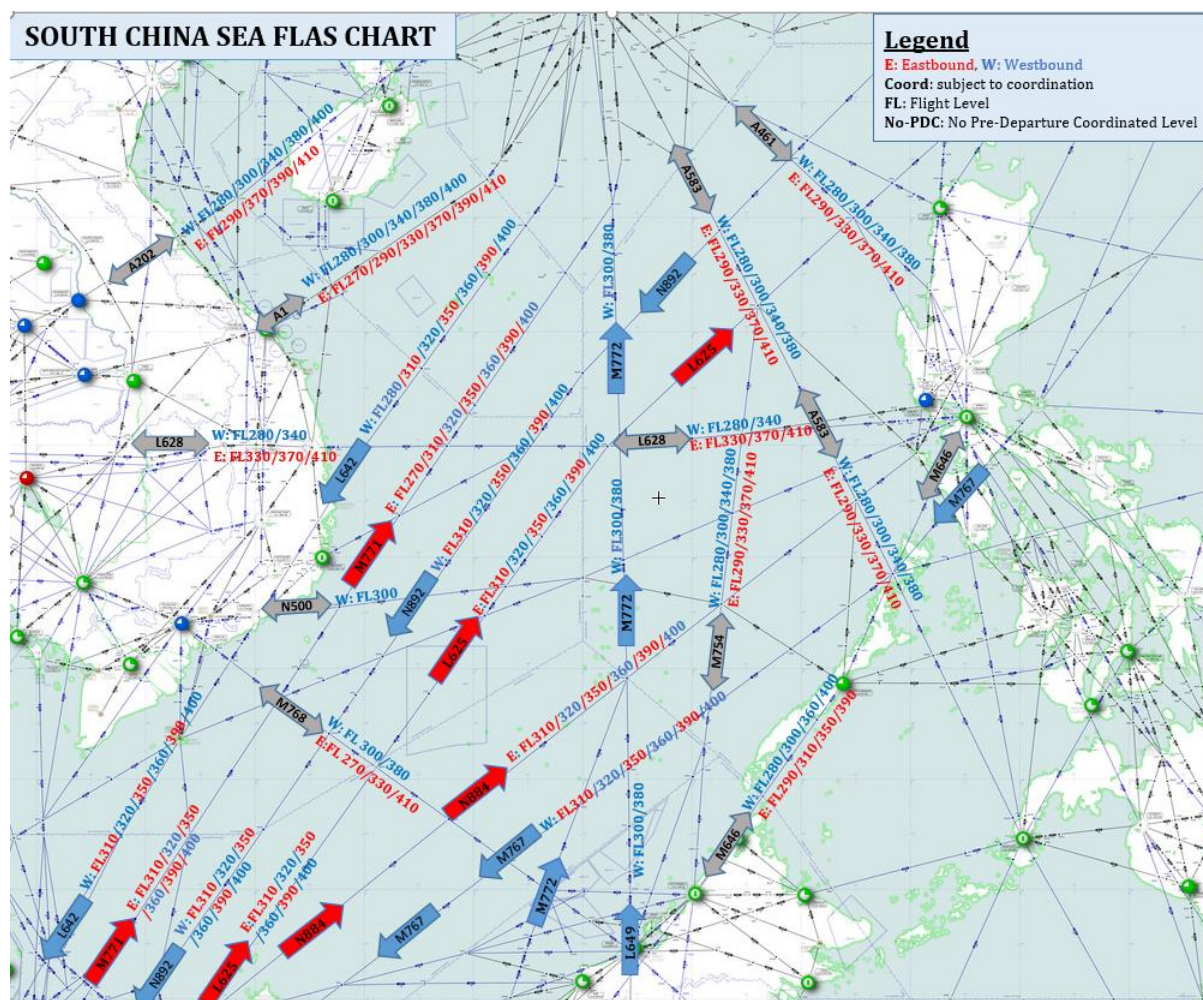


Chart 1: FLAS/FLOS among the ATS Routes

2.2 The SCS airspace structure used a non-standard Flight Level Orientation System (FLOS) and a complex Flight Level Allocation System (FLAS) providing vertical separation between the major routes and the less-busy crossing routes to overcome lengthy pre-departure coordination procedures.

2.3 As shown in the chart, non-standard FLOS is being used on the pairs of the unidirectional parallel routes system under the multilateral agreements of the relevant ACCs to fully utilize the limited usable flight levels ever since the SCS FLAS system was designed.

2.4 This group have noted the interconnectivity of the airspace structure and FLAS/FLOS system. In years of operation, ACCs have become accustomed to this FLAS system, and derived to relatively mature risk response plan, such as the Large Scale Weather Contingency Plan and flexible temporary coordination mechanism. In fact, the current FLAS system has been proven to be reliable, but the following drawbacks should be taken into consideration:

- The reduction of fuel efficiency and increment of carbon emission because of the unavailability of the optimal cruising level, especially on the secondary routes.
- Frequent flight-level changes to accommodate the FLAS requirements among different route segments.

- High demands of extra coordination, causing an increase in the ATCOs' workload, especially in adverse weather conditions.
- Lack of flexibility, some of the secondary crossing routes are now busier than the primary routes compared with the original concept, timely adjustment is necessary.
- Human factors issues. Systemic risks resulting from the switching from normal FLAS to Large-Scale Detour Procedure, lead to the high possibility of coordination errors in the ATC-to-ATC transfer of control responsibility.
- Safety issues caused by the transition from non-standard FLOS levels to standard FLOS levels at the TOC points, especially at the boundary of the SCS area.
- Excessive longitudinal separation increased the reliance on vertical separation to separate the traffic, leading to insufficient use of limited flight Levels, significantly contributing to the shortage of flight-level resources.
- The capability and efficiency of current FLAS might be insufficient to cope with future traffic growth.

FLAS/FLOS Expectations in the APAC Seamless ANS Plan

2.5 The objective of Seamless ATM was agreed by the Asia/Pacific Seamless ATM Planning Group/APSAPG) as follows:

'The objective of Seamless ATM is the safe and interoperable provision of harmonized and consistent air traffic management service provided to a flight, appropriate to the airspace category and free of transitions due to a change in the air navigation service provider or Flight Information Region.'

2.6 All States should use the ICAO Table of Cruising Levels (FLOS) based on feet as contained in **Annex 2 Appendix 3a**, as specified in paragraph 7.15 as Regional Seamless ANS Elements with Priority 2.

2.7 As per ATM performance expectations in the APAC Seamless ANS Plan PASL 7.35 (Priority 2), priority for FLAS level allocations should be given to higher-density ATS routes over lower density ATS routes. FLAS should comply with **Annex 2, Appendix 3a** unless part of an OTS. FLAS other than OTS should only be utilised for safety and efficiency reasons within:

- a) Category R airspace with the agreement of all ANSPs that provide services:
 - Within the airspace concerned; and
 - Within adjacent airspace which is affected by the FLAS; or
- b) Category S airspace with the agreement of all ANSPs that provide services:
 - Where surveillance tract conflicts occur within 50NM of the FIRB; and
 - ATS surveillance coverage does not overlap the FIRB concerned, or ATS surveillance data is not exchanged between the ATC units concerned.

South China Sea ATS Surveillance and Communication coverage

2.8 According to the current *APAC Seamless ANS Plan version 3.0*, paragraph 6.13 identified the South China Sea lacking ATS surveillance and DCPC VHF coverage which need to be addressed with the highest priority. Recent developments in the CNS area since CNS SG/26 meeting might be of interest to SCSTFRG.

Note: Figure 2 only considers DCPC VHF communications and does not include other forms of DCPC communications.

2.10 According to the figure, with other surveillance and communication enhancement such as ADS-B, ADS-C and CPDLC, it is believed that most of SCS airspace is almost surveillance and communication covered.

Principles and Guidelines of the Optimisation of SCS FLAS/FLOS

2.11 Some aspects should be taken into account when optimizing the existing SCS FLAS/FLOA such as:

- normalization of the SCS modified Single Alternative FLOS to the ICAO Standard Single Alternative FLOS as per Annex 2 Appendix 3a;
- service performance level commensurate with the CNS/ATM system capabilities in accordance with the expectations of the Asia/Pacific Seamless ANS Plan;
- harmonized and consistent service provision of separation and procedures across the SCS area to reduce human errors;
- removal of FLAS to allow more opportunities for better flight level allocation according to fleet capability;
- Recognition of the gap between current practice and best practice by senior management and its strong willingness and commitment to cooperate with States and ANSPs concerned; and
- airspace users' expectations and needs for improved capacity, efficiency and safety including economic and environmental considerations.

Possible breakthroughs of the SCS FLAS dilemma

2.12 Mindful of the above aspects, some thoughts based on IFATCA's original proposal at the SCSTFRG/7, the review of existing FLAS and FLOS operating within the SCS could be conducted in six phases:

- *Phase 1: Revision of FLAS on selected ATS routes*

Re-allocation of two of the six flight levels on the primary routes M767/N884, L625/N892 (one eastbound and one westbound flight levels) to the secondary crossing routes A461, A583, M758 and M761. The remaining four flight levels on the primary routes would provide adequate capacity under normal circumstances to satisfy the traffic demand. The additional capacity that one flight level in each direction on the secondary crossing routes would relieve some of the delays and restrictions that are currently imposed on traffic.

- *Phase 2: Reduction of longitudinal separation*

Reduce longitudinal separation (operationalization of 5-10NM ATC separation, 10-20 NM separation at Transfer of Control Points (TOC)) among ATS routes, especially for primary routes, which occupy the majority of flight level resources as soon as possible. As a result, the capacity of the ATS route will be significantly increased, and the demands of flight level will be released by such an increase.

- Phase 3: Release flight level on selected ATS routes and revision of non-standard FLOS

Release flight levels on selected ATS routes, which are supported by the aforementioned capacity increment. Revision of the FLOS on the primary routes L625/N892 and M767/N884, from the SCS modified single alternate FLOS to the standard FLOS (Annex 2, Appendix 3a) would serve the purpose of removing the need to transition flights at the Manila FIR boundary and thereby resolve the Large Height Deviation (LHD) safety issues.

- Phase 4: Reshuffle the FLAS or flexibly use FLAS

Dynamically adjust the FLAS system in a scientific method.

Phase 5: Partial removal of FLAS

Gradually reducing dependence on FLAS systems. Suspended the FLAS operating in normal situations, and only activated it in adverse weather or contingency conditions.

- Phase 6: Re-structure the SCS Route Network and Removal of FLAS

This topic will be further discussed by the WP11 *Concept Review of South China Sea Airspace Structure*, presented by IFATCA, under agenda item 4.

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) urge States to review CNS/ATM system capability and match this with service performance, in accordance with the expectations of the Asia/Pacific Seamless ANS Plan;
- c) review and provide feedback to the South China Sea FLAS/FLOS Chart; and
- d) discuss any relevant matters as appropriate.

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