



**WORKING PAPER**

**TWELFTH AIR NAVIGATION CONFERENCE**

**Montréal, 19 to 30 November 2012**

**Agenda Item 5: Efficient flight paths – through trajectory-based operations**

**5.1: Improved operations through enhanced airspace organization and routing**

**OPERATIONAL FLIGHT TRIALS OF USER PREFERRED ROUTES IN UPR GEOGRAPHIC ZONE  
IN ARABIAN SEA - INDIAN OCEAN REGION - AN INSPIRE INITIATIVE**

(Presented by India)

**EXECUTIVE SUMMARY**

This paper presents a details of activities that INSPIRE has undertaken to conduct demonstration flights on user preferred routes and establishment of a user preferred route geographic zone in the Arabian Sea and the Indian Ocean.

**Action:** The Conference is invited to note the activities being taken by INSPIRE and ASIOACG to support efficient and sustainable aviation in their area of work, and the excellent collaboration achieved by the twenty-five organizations (fifteen ANSPs, nine airlines and IATA) and consider endorsing the establishment of Arabian Sea - Indian Ocean UPR geographic zone as the proposed UPR zone lies in APAC, MID East and AFI regions of ICAO as a model for other regions.

**1. INTRODUCTION**

1.1 At the 37th Session of the Assembly, the Member States of ICAO reaffirmed the vital role which international aviation plays in global economic and social development and the need to ensure that international aviation continues to develop in a sustainable manner. ICAO Assembly Resolution A37-19 recognizes that States and relevant organizations will work through ICAO to achieve global annual average fuel efficiency improvement of 2 per cent until 2020 and an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue tone kilometre performed. In the ICAO Environment Report 2010 – Aviation and Climate Change, the Secretary General of United Nations stated “*I commend efforts by the air transport sector to improve the efficiency of aircraft engines, as well as the industry’s progress on developing and using sustainable fuels for aviation. I also welcome growing cooperation between governments and industry on a programme of action to reduce climate impacts from aviation emissions. This second ICAO Environmental Report reflects and promotes cooperation among governments, industry and members of civil society. It also showcases ideas and best practices that can accelerate efforts towards the goal of a sustainable air transport industry... Air travel has brought many benefits to modern life. Let us ensure that, from now on, it benefits both people and the planet*”.

1.1.1 INSPIRE - the Indian Ocean Strategic Partnership to Reduce Emission is a collaborative network of partners and peer organizations across the Indian Ocean and Arabian Sea Region dedicated to improving the efficiency and sustainability of aviation. The INSPIRE was founded by the ANSP partners viz The Airservices

Australia, the Air Traffic and Navigation Services South Africa and Airports Authority of India in March 2011. The INSPIRE Agreement was signed on 7 March 2011. The partner ANSPs, inter alia, also pledged that “Through development and execution of work programmes, to adopt and promote best practices that have demonstrated and proven success in operating efficiencies and the reduction of greenhouse gasses, in accordance with ICAO Assembly Resolution A37-19.”

1.2 ASIOACG is the Arabian Sea - Indian Ocean ATS Coordination Group of ANSPs. The group was established:

- a) to facilitate the optimum provision of air traffic management (ATM) in the Arabian Sea and Northern Indian Ocean Region, through the development and near term implementation of improvements to ATM operational procedures; and
- b) to implement technology developments available to ATM providers within the Arabian Sea and Northern Indian Ocean region.

ASIOACG provides an informal forum for senior representatives to consider various air traffic management strategies and to develop potential solutions to ATM problems in the Arabian Sea and Northern Indian Ocean Flight Information Regions. Airspace users, and industry stakeholders participate in the meetings of ASIOACG.

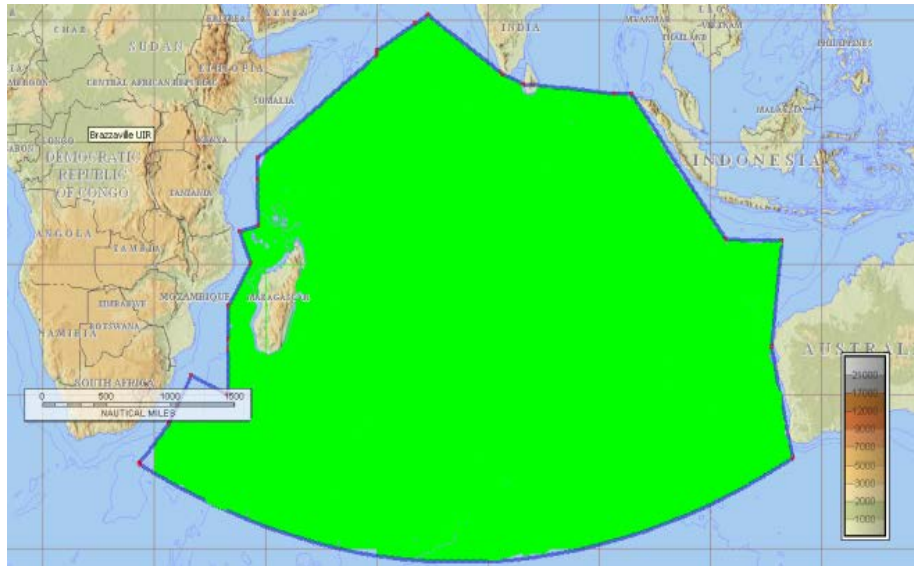
1.3 What started in March 2011, as a humble agreement among three partner ANSPs with vision to contribute towards protection of environment, has developed into a strong comradery of like minded ANSPs, Airport Operators and Airlines. As of today besides the INSPIRE founding partners – the Airservices Australia, Air Traffic and Navigation Services South Africa and Airports Authority of India - the ANSPs of Sri Lanka, Maldives, Seychelles, Mauritius, Réunion, Madagascar, Kenya, Ethiopia, Somalia, Sultanate of Oman, Abu Dhabi Department of Transport, Abu Dhabi Airports Company (ADAC), Dubai Air Navigation Services (DANS) and the United Arab Emirates General Civil Aviation Authority (UAE GCAC) participate and contribute as peer organizations in the activities of INSPIRE.

1.4 The nine participating airlines in INSPIRE activities are: Emirates Airlines, Etihad Airways, Cathay Pacific Airlines, Singapore Airlines, Qatar Airways, Ethiopian Airlines, Kenya Airways, South African Airways and Virgin Australia.

1.5 IATA through its offices in Delhi, Johannesburg and Singapore proactively participate in the INSPIRE meetings and activities in identifying and supporting the initiatives for reducing emissions. IATA also provides valuable support by functioning as a vital link for coordination between ANSPs and airlines and arranging the teleconferences as and when required by INSPIRE.

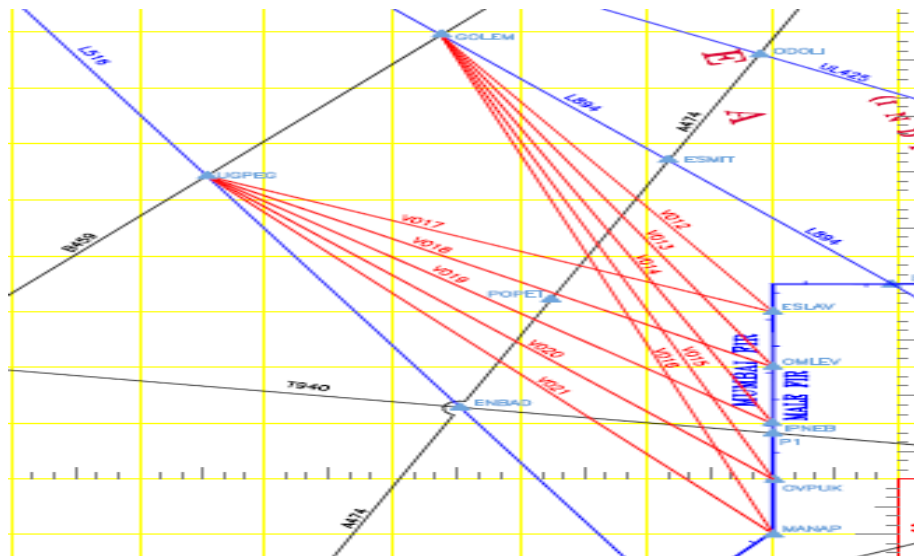
1.6 On behalf of INSPIRE, the Airservices Australia manages the INSPIRE website [www.inspire-green.com](http://www.inspire-green.com) wherein details of the activities undertaken by INSPIRE are communicated to global community.

1.7 The User Preferred Route Geographic Zone identified by INSPIRE spans fifteen FIR and the three ICAO regions i.e. APAC, the MID East and the AFI. As of today, operational flight trials of UPRs are being conducted in the proposed Arabian Sea - Indian Ocean UPR Geographic Zone which is spread over approximately 13 million NM square of the Arabian Sea and Indian Ocean.



**Proposed Arabian Sea Indian Ocean UPR Geo Zone**

1.8 In order to support improved operations through user preferred routes/flexible tracks, India has established a set of flexible tracks in Mumbai FIR near Mumbai/Male FIR Boundary. This set of flexible tracks supports the requirements of airlines participating in operational trials in planning their UPRs.



**Flexible Tracks in Mumbai FIR at Mumbai/Male FIR Boundary**

## 2. DISCUSSION

### 2.1 Paper trials and operational flight trials

2.1.1 Encouraged by the fuel savings and carbon emission reductions achieved for the INSPIRE demonstration green flights conducted in March 2011 (between Perth and Johannesburg) and July 2011 (between the Middle East and Australia via Mumbai and most of the other FIRs encompassed within UPR geographic zone), the INSPIRE decided to pursue the challenging task of establishing the UPR geographic zone as a project to contribute to protection of environment. The following five stages of the project were identified:

- a) Stage I Data Analysis – completed

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|----|-----------|---|
| b) | Stage II  | Paper Trials – completed                          |
| c) | Stage III | Operational Flight Trials – progressing in phases |
| d) | Stage IV  | Post Operational Flight Trials Analysis           |
| e) | Stage V   | Establishing of UPR Geographic Zone               |

2.1.2 Initially the paper trials were conducted in Mumbai FIR during February and April 2012. Thereafter the paper trials were conducted in the entire UPR Geo Zone. Seventy-one paper flight plans submitted by seven airlines were analyzed and twenty paper flight plans were selected for simulation in automation system in live traffic scenario. Wherever feasible, coordination was effected between various FIRs for wider study and analysis. IATA provided proactive support for coordinating the paper trials and operational flight trials.

2.1.3 The Standard Operating Procedures (SOP) for ATC units to coordinate such paper flights were developed jointly by Airports Authority of India and IATA New Delhi. In general the SOP was implemented by all concerned ANSPs. In case of difficulty/inability expressed by any ANSP for adhering to the SOP, the same was accommodated by the adjacent ANSP.

2.1.4 The paper trials were also conducted on 14 and 15 May 2012. All the partner ANSPs, the peer ANSPs and the participating airlines facilitated these paper trials. The airlines projected encouraging fuel savings from these paper trials.

2.1.5 A working group of INSPIRE and ASIOACG met in Dubai during May 2012 and decided to conduct operational flight trials - in phased manner. Accordingly, the first phase of the trial was conducted between 28 June and 19 July 2012. A total of seven flights operated during this phase. The sectors flown during Phase I were as follows:

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|----|--------------------------|--------------------------|
| a) | Dubai – Sydney           | Emirates Airlines Flight |
| b) | Hong Kong – Johannesburg | Cathay Pacific Flight    |
| c) | Dubai – Sydney           | Etihad Airways Flight    |
| d) | Dubai – Sydney           | Qatar Airways Flight     |
| e) | Abu Dhabi – Sydney       | Virgin Australia Flight  |
| f) | Nairobi – Bangkok        | Kenya Airways Flight     |
| g) | Bangkok – Nairobi        | Kenya Airways Flight     |

The carbon emission savings from the Phase I of the operational flight trials were 38.5 tonnes. The operational flight trials were conducted in a safe and efficient manner. All the ANSPs took special precaution that the UPR flights did not affect the safe, orderly and expeditious flow of other air traffic flying on promulgated ATS routes. UPRs also enabled airlines to plan flight tracks avoiding adverse enroute weather, and this was quite important safety aspect during the monsoon season over the Indian Ocean and Arabian Sea.

2.1.6 Phase II of the operational flight trials was conducted between 26 July 2012 and 13 August 2012. A total of sixteen flights operated in this phase. The carbon emission savings achieved from the Phase II trials was 41.2 tonnes. **As per IATA, on an average, savings of at least one tonne of fuel per flight have been achieved.**

2.1.7 Phase III of operational trials will continue until the end of the year 2012 with number of UPR flights gradually increasing throughout the trial period. The third INSPIRE meeting scheduled during 11 to 14 December 2012 (along with ASIOACG/7 meeting) in Mumbai will analyze the results of these trials and decide on a further course of action for establishment of the Arabian Sea - Indian Ocean UPR Geographic Zone.

2.1.8 A significant feature of the activities undertaken by INSPIRE is that during the combined meetings with ASIOACG, teleconferences and exchange of e-mails – **some of the outstanding issues affecting provision of ATS in the region have also been addressed to the satisfaction of all concerned stakeholders.**

2.1.9 The participating airlines ensured that the aircraft taking part in operational trials were RNP 10 approved, equipped with serviceable ADS-CPDLC, HF Radio (with standby SATCOM, subject to airlines' State

approval) and standard VHF equipment. Logging on to ADS-CPDLC, particularly, beyond the areas of VHF coverage was mandatory. The position reporting by the operational trials flights through ADS-CPDLC helped ANSPs not only in tracking these flights in oceanic airspace, but also in areas where 30x30 NM separation minima was applicable.

2.1.10 The airspace boundaries of Mumbai FIR abut the airspace of several FIRs which are located in the MID East Region, Africa Region and the APAC Region. The initiative undertaken by India during BOBASIO meetings and the concerted efforts of the Air Services Australia (ASA), Air Traffic and Navigation Services South Africa (ATNS SA) and IATA have resulted in pro-active participation from neighbouring ANSPs in all the three ICAO regions (APAC, MID-East, AFI) for the common cause to protect the environment through efficient and sustainable aviation.

2.1.11 The user preferred route is a significant step in reducing emissions during enroute phase of flights. The proposed Arabian Sea - Indian Ocean UPR Geographic Zone encompassing airspace from three ICAO regions would be a remarkable achievement of INSPIRE and ASIOACG.

2.1.12 As the Chair of INSPIRE and Member of ASIOACG, India appreciates the collaborative efforts made by all the ANSPs from Australia, South Africa, Sri Lanka, Maldives, Seychelles, Mauritius, Reunion, Madagascar, Kenya, Ethiopia, Somalia, Sultanate of Oman, Abu Dhabi Department of Transport, Abu Dhabi Airports Company (ADAC), Dubai Air Navigation Services (DANS) and the United Arab Emirates General Civil Aviation Authority (UAE GCAC) and the participating airlines.

2.1.13 The aviation community is assured that the collaborative work of INSPIRE and ASIOACG will continue for protection of environment through activities leading to efficient and sustainable growth of aviation.

2.1.14 One of the commitments made by INSPIRE founding partners is to facilitate world-wide interoperability of environmentally friendly procedures and standards.

2.1.15 The SOP for operational trials adopted by the concerned ANSPs and airlines resulted into a seamless ATM scenario for the participating flights. The steps being taken by INSPIRE and ASIOACG to support efficient and sustainable aviation by conducting operational trials on user preferred routes may serve as a role model for other parts of the world, where the ATM systems in adjoining FIRs are at different stages of development. For example, some ANSPs of the INSPIRE group do not have all the infrastructure at par with other advanced ANSPs, but the spirit of collaboration and keenness to contribute for protection of environment prevailed over such limitations. The flight trajectories requested by airlines and being accommodated in operational trials by ANSPs are resulting in noticeable fuel savings and reduction of carbon emissions.

### 3. CONCLUSION

3.1 The Conference is invited to:

- a) note the excellent spirit of collaboration displayed by the twenty-five organizations (fifteen ANSPs, nine airlines and IATA) for this project that has potential to save thousands of tonnes of carbon emissions for the planet; and
- b) consider endorsing the establishment of an Arabian Sea - Indian Ocean UPR Geographic Zone as the proposed UPR zone lies in the APAC, MID-East and AFI Regions of ICAO as a model for other regions.

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