Assistance for Action

Aviation and Climate Change Seminar

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OPERATIONAL IMPROVEMENTS AND FUEL SAVINGS PROVIDED BY ASECNA.

Sainarayan A

BACKGROUND

- The continued growth in air travel in the AFI Region creates an increasing demand on the Air Traffic Management system of the Region.
- To attend the expectations of airspace users, constant improvements to the Air Traffic Management system is necessary to enhance efficiency whilst maintaining or improving levels of safety.

BACKGROUND

As part of contribution to improve efficiency of the ATM system in the AFI Region, ASECNA with its eighteen members States has undertaken since 2005 several initiatives:

- to redesign airspace and
- to implement new concepts of operations

This to increase capacity aiming to cope with predicted growth of air traffic.

Those Initiatives were aiming to -

attend the expectations of the aviation community through better provision of air traffic services and better airspace management.

How to Reach those expectations for Fuel Savings

1. With the use of advanced capabilities onboard the aircraft, associated to enhanced processes to manage the air traffic, minima separation and distances between city pairs could be reduced.
2. Also, associated to better use of wind, flying time was reduced and fuel could be saved and the impact on climate change reduced through reductions on emissions.

Where Operational Improvements Were Realized??

1-Indian Ocean Random RNAV airspace were implemented between FL290 and 410 inclusive. The FIRs involved were Antananarivo, Beira, Johannesburg Oceanic, Mauritius and Melbourne FIR.

2-European/South American Corridor (EUR/SAM),

-Reduced Vertical Separation Minimum (RVSM),

-Required Navigation Performance 10 (RNP 10) and ADS were implemented. The FIRs involved are Canarias, Sal, Dakar Oceanic, Atlantic and Recife

Where Operational Improvements Were Realized??

3-In the South Atlantic implementation of RVSM and random RNAV routing Area (AORRA) were realized

4-In the continental airspace the implementation of the red carpet routes, using the RNP10 capability, allowed reduction in lateral separation between routes and more direct routes between city pairs located in Europe, Africa and South America.

Where Operational Improvements Were Realized??

5-Terminal area

- Continuous descend operations (CDO)
- Continuous climb operations (CCO)
- GNSS Approaches by using «T » or « Y » techniques following waypoint

Note That

All operational improvements mentioned above impacts aircraft operations and make possible a more efficient flight through the use of optimum altitudes and shorter routes, also allow them to take advantage of tailwinds that contribute to reduction in fuel consumption.

Provisions of FIR Data

To assess the reduction in fuel burn between 2005 and 2011, ASECNA provided ICAO with FIR traffic data covering level segments in the ASECNA airspace.

This FIR data was used to generate the estimated fuel savings achieved during the 2005 – 2011 period using the ICAO Fuel Savings Estimation Tool (IFSET).

Methodology

The methodology adopted to arrive at the estimated fuel savings is detailed below :

Step 1 -Match aircraft types in the ASECNA FIR database to IFSET aircraft categories

Step 2 -Use IFSET and the time elapsed between Entry and Exit as indicated in the ASECNA FIR database to estimate fuel burn for each flight

Step 3 -Group flights by Origin, Destination and aircraft category, estimate the number of flights and the fuel burn for the years 2005 and 2011.

Methodology

Step 4 -For the year 2011, estimate the fuel burn had the fuel burn per flight (for the same Origin, Destination and aircraft category) remained the same as in 2005.

Step 5 -Fuel savings are equal to the difference between the estimated fuel Burn in 2011 as arrived in Step 3 and the estimated fuel burn had the fuel burn per flight (for the same Origin, Destination and aircraft category) remained the same as in 2005 as arrived in Step 4.

Savings in Fuel & Associated Environmental Benefits

1-In total, there were 2158 unique combinations of Origin, Destination and aircraft category representing 232 250 flights for the year 2011.

2-These origin, destination pairs were available both in 2005 and 2011. In addition based on the FIR database provided by ASECNA, ASECNA airspace handled more traffic with 92,316 additional movements in 2011 compared to 2005.

Savings in Fuel & Associated Environmental Benefits

Using the methodology indicated, the analysis using IFSET indicates that on 149 018 flights, there was a benefit while on the remaining there was an increase in fuel burn. The net benefits or savings on account of reduction in fuel burn is estimated at around 144 million Kg of Fuel between 2005 and 2011 mostly on account of shortening of level segment.

Other reasons for the variance are changes in speeds and in fuel burn on account of differential altitudes between 2005 and 2011.

Savings in Fuel & Associated Environmental Benefits

The environmental benefits due to this translates to a reduction of around 455 million Kg of CO2 during the 2005 to 2011 period.

In addition to the efficiencies achieved due to navigational and operational improvements indicated above, based on the FIR database provided by ASECNA, ASECNA airspace handled more traffic with 92,316 additional movements in 2011 compared to 2005.

The following tables summarizes the improvements made and the benefits achieved in terms of fuel savings and CO_2 reductions.

YEAR	AREA	FUEL BURN (Mill kg)	CO2 EMISSION (Mill kg)
2005	EUR/SAM	445	1405
	Continental/SAT	981	3097
2011	EUR/SAM	385	1215
	Continental/SAT	897	2832

The following tables summarizes the improvements made and the benefits achieved in terms of fuel savings and CO_2 reductions.

Operational Improvement	2011 Movements	Area	Net fuel saving (Mill kg)	Co2 saving (Mill kg)	% Saving during 2005-2011
RVSM/RNP10	32,490	EUR/SAM	60	190	13.5%
RVSM/Red carpet routes (RNP10),AORRA	199,760	Continental/SAT	84	265	8.6%
Total	232,250	All Areas	144	455	10.1%

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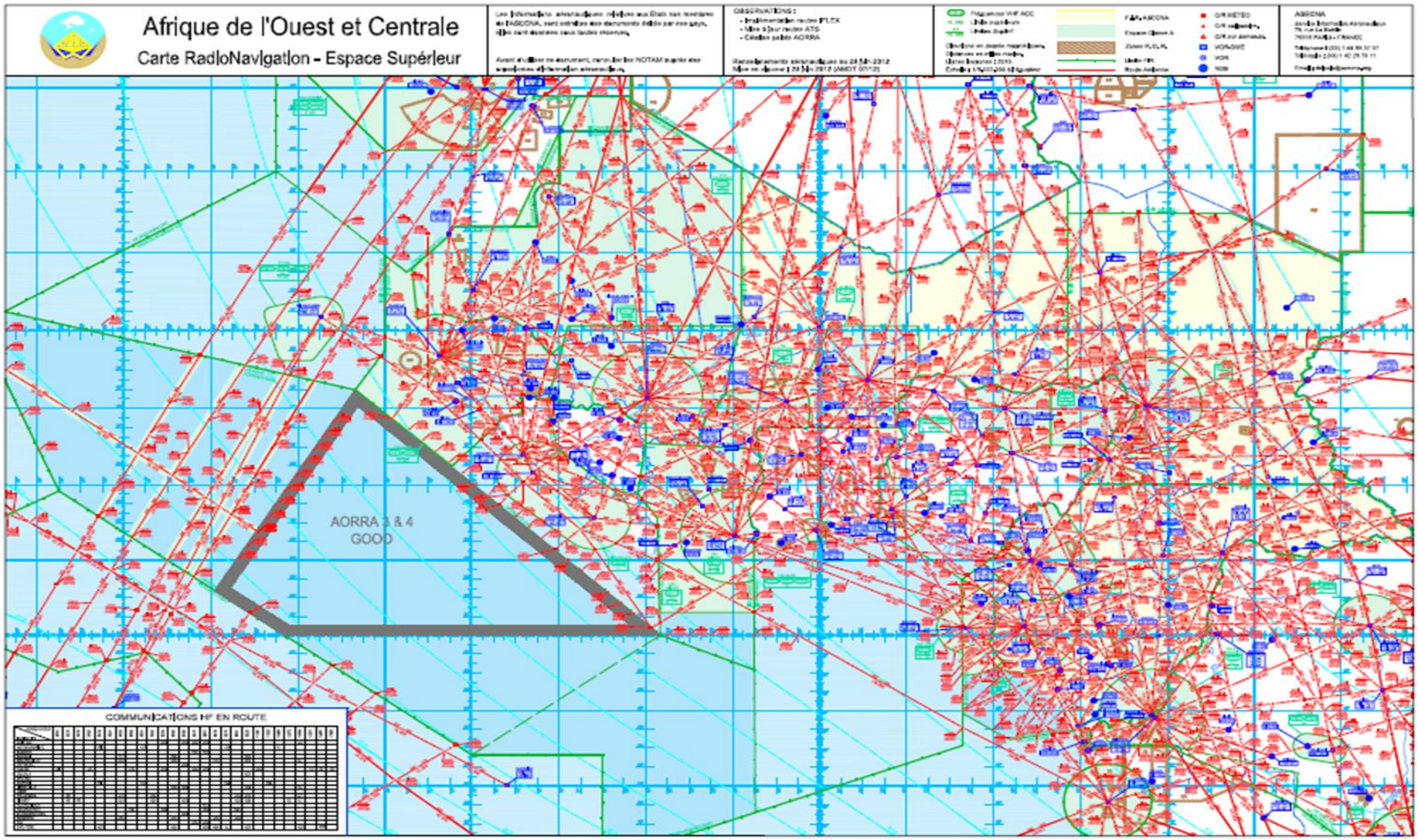
Afrique de l'Ouest et Centrale
Carte RadioNavigation - Espace Supérieur
AORRA 3 & 4
GOOD
COMMUNICATIONS HF EN ROUTE

CONCLUSION

- The analysis conducted is indicative of the significant improvements achieved during the 2005 – 2011 period
- Example of ICAO assistance in quantifying the fuel savings and environmental benefits associated with air navigation improvements.
- ASECNA, together with its members States, are in support of future projects aiming at improvements in the ATM system that will bring environment benefits.
- ICAO has the necessary tools and will continue to provide assistance to meet the needs of the Contracting States.

THANK YOU