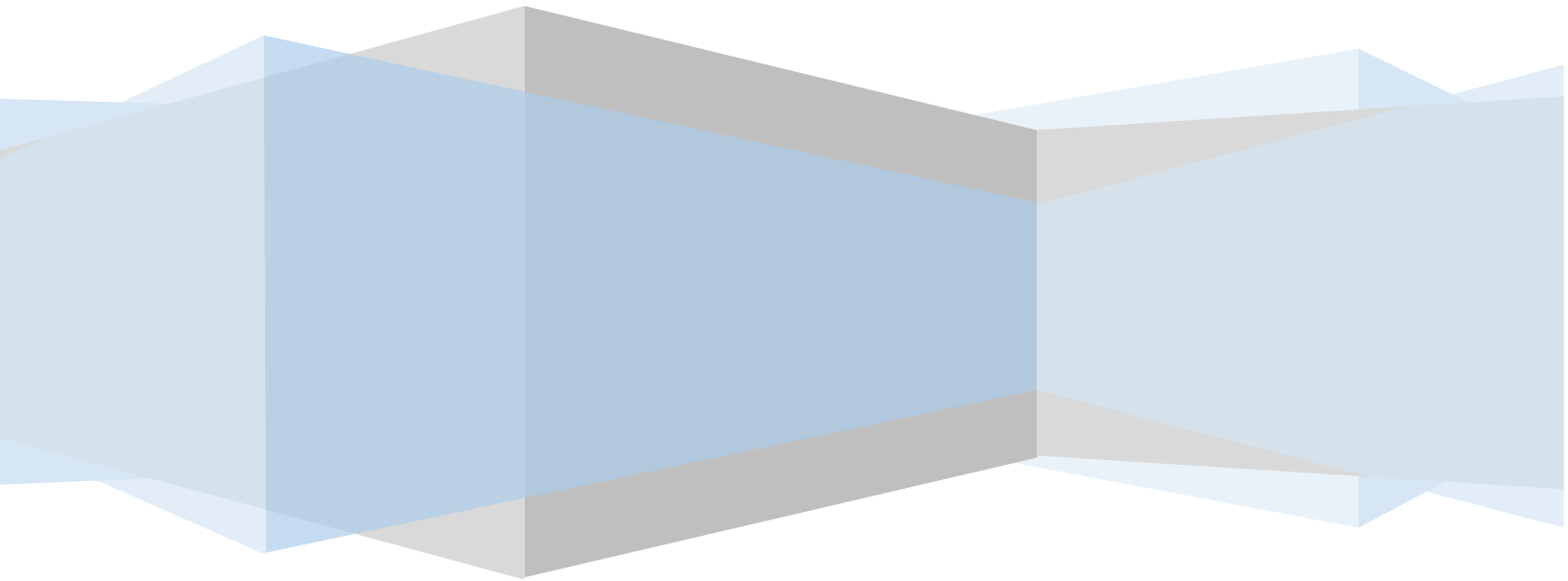


POST OPERATIONS ANALYSIS REPORT

October, 2021

CENTRAL COMMAND CENTER, C-ATFM, DELHI







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A. Executive Summary

Post the deadly second wave of Covid, India's air travel is showing signs of recovery. The ministry of civil aviation issued an order, which comes against the backdrop of business activities returning to normal, allowing all domestic operators to fly with 100 percent capacity from 18th October '21. This move coincided with the upcoming festival season and is believed to further boost up the steady increase in domestic air travel.

The coronavirus induced suspension of scheduled international passenger flights has been extended till 30th November '21. But special international flights have been operating under the Vande Bharat Mission since May 2020 and under bilateral "air bubble" arrangements with selected countries since July 2020.

Under an air bubble pact between two countries, special international flights can be operated by their airlines between their territories.

Two(2)ATFM measures were applied in the month of October '21 due to reduction in capacity because of Civil repair works in Mumbai and Kolkata Airport .

B. Traffic Analysis

I. Air Traffic Movement at Major Airports in India

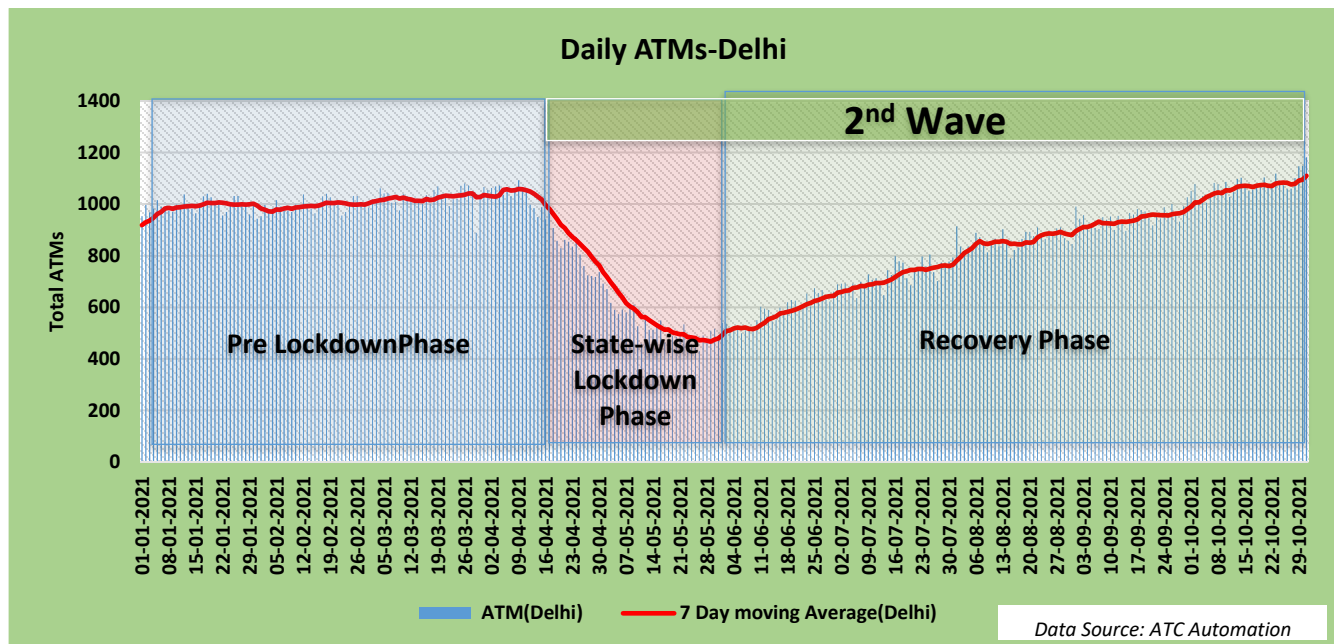


Figure 1: Air Traffic Movement-Delhi

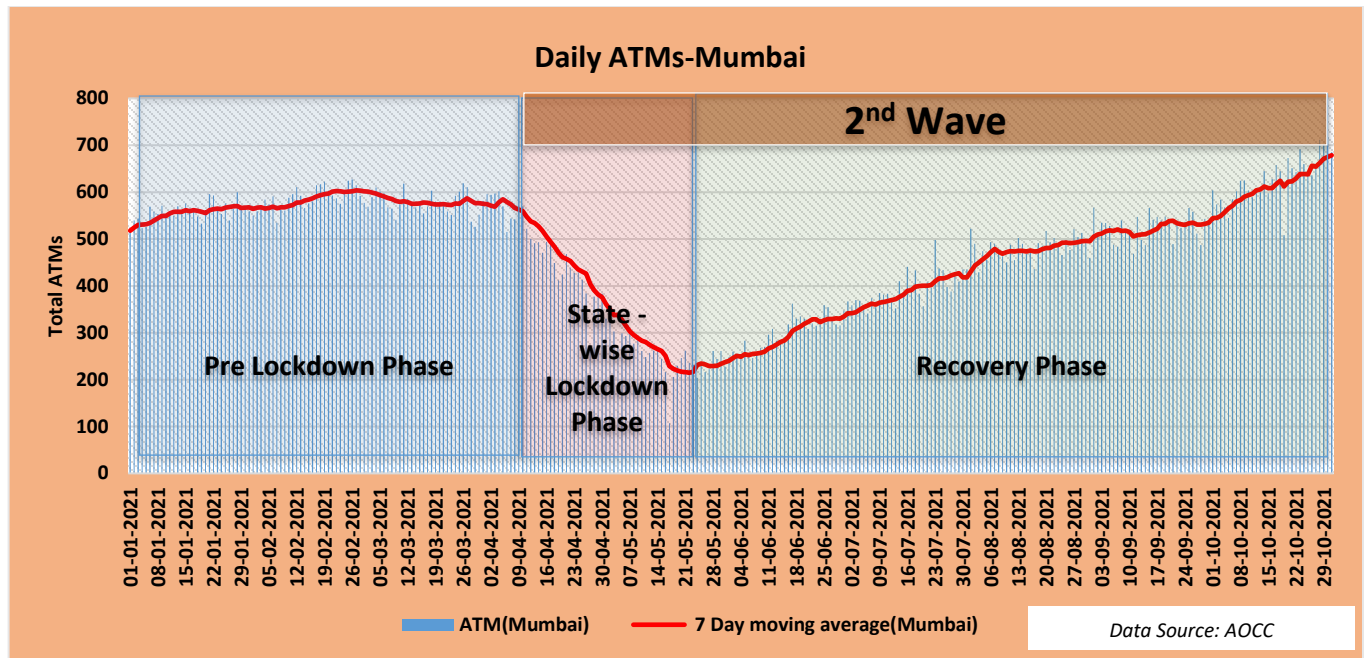


Figure 2: Air Traffic Movement– Mumbai

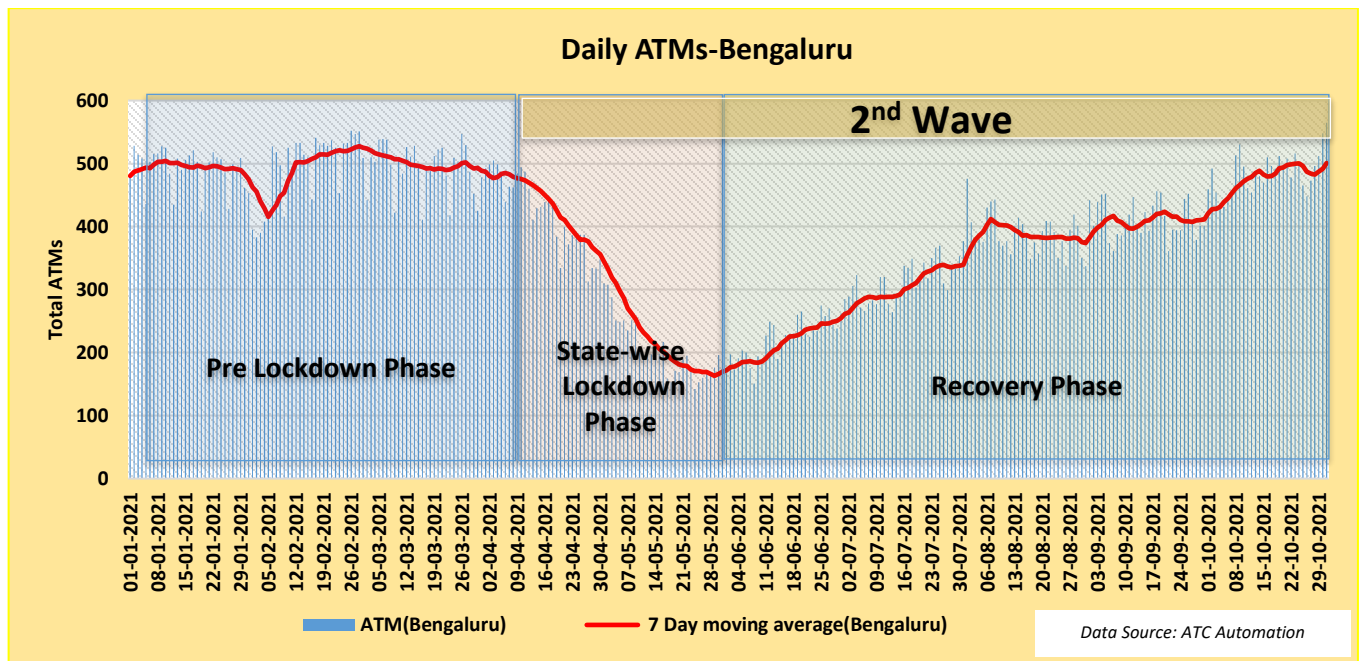


Figure 3: Air Traffic Movement–Bengaluru

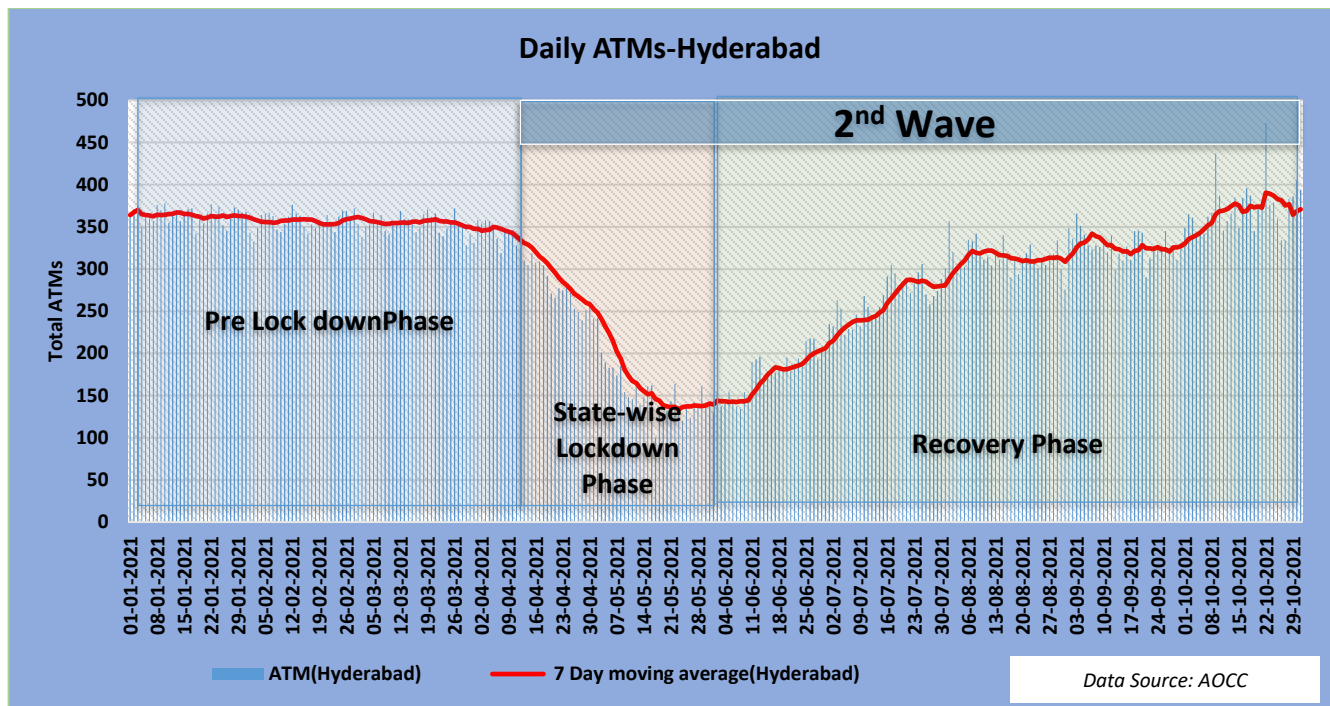


Figure 4: Air Traffic Movement –Hyderabad

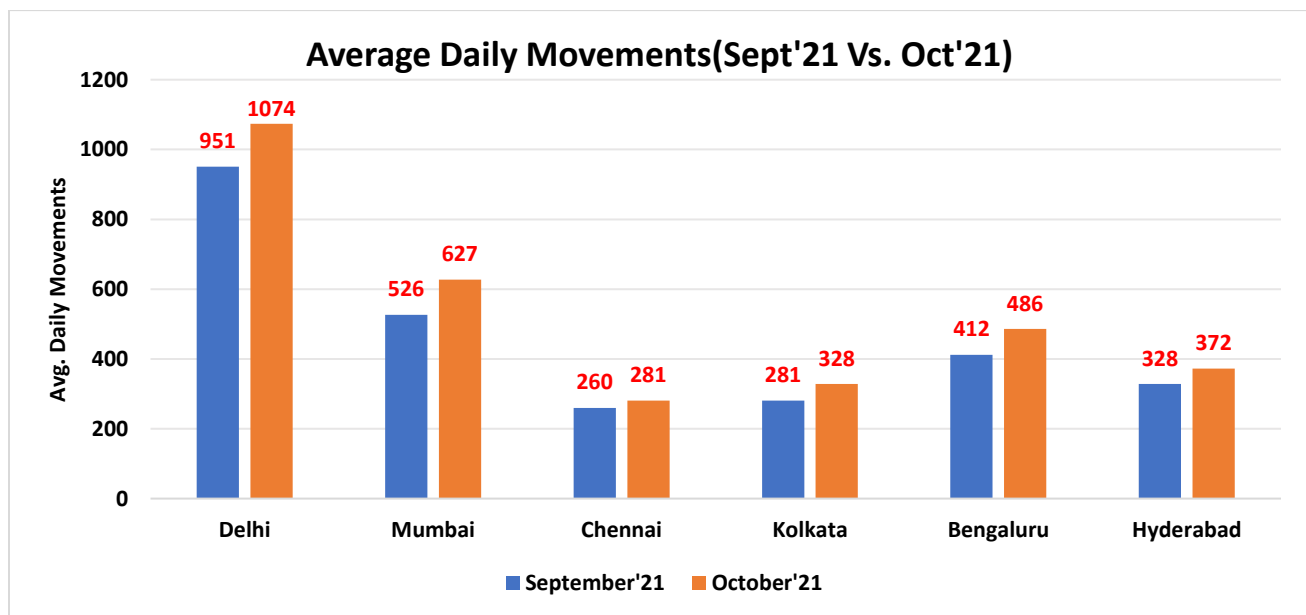


Figure 5: Average Daily Movements at Six Metro Airports



It is evident from the above chart that Average Daily movements has increased in October’21 as compared to the month of September’21at all the six metro Airports

I. Comparison of total ATMs (YoY) and Monthwise

The total Air traffic movement including Passenger and Combination of other flights i.e. All-Cargo flights, International scheduled, International non-scheduled, Domestic scheduled, Domestic non-scheduled, Air taxi & commercial business flights at six major Indian Airports namely Delhi, Mumbai, Bengaluru, Hyderabad, Kolkata and Chennai is plotted for the month of October’21. Air Traffic movement is also plotted Airline wise for the month for the major Scheduled Operators.

The graph below depicts the total ATMs in the month of October for the year 2019,2020 and 2021 for six major airports and the percentage change in comparison to the total ATMs in October’19.

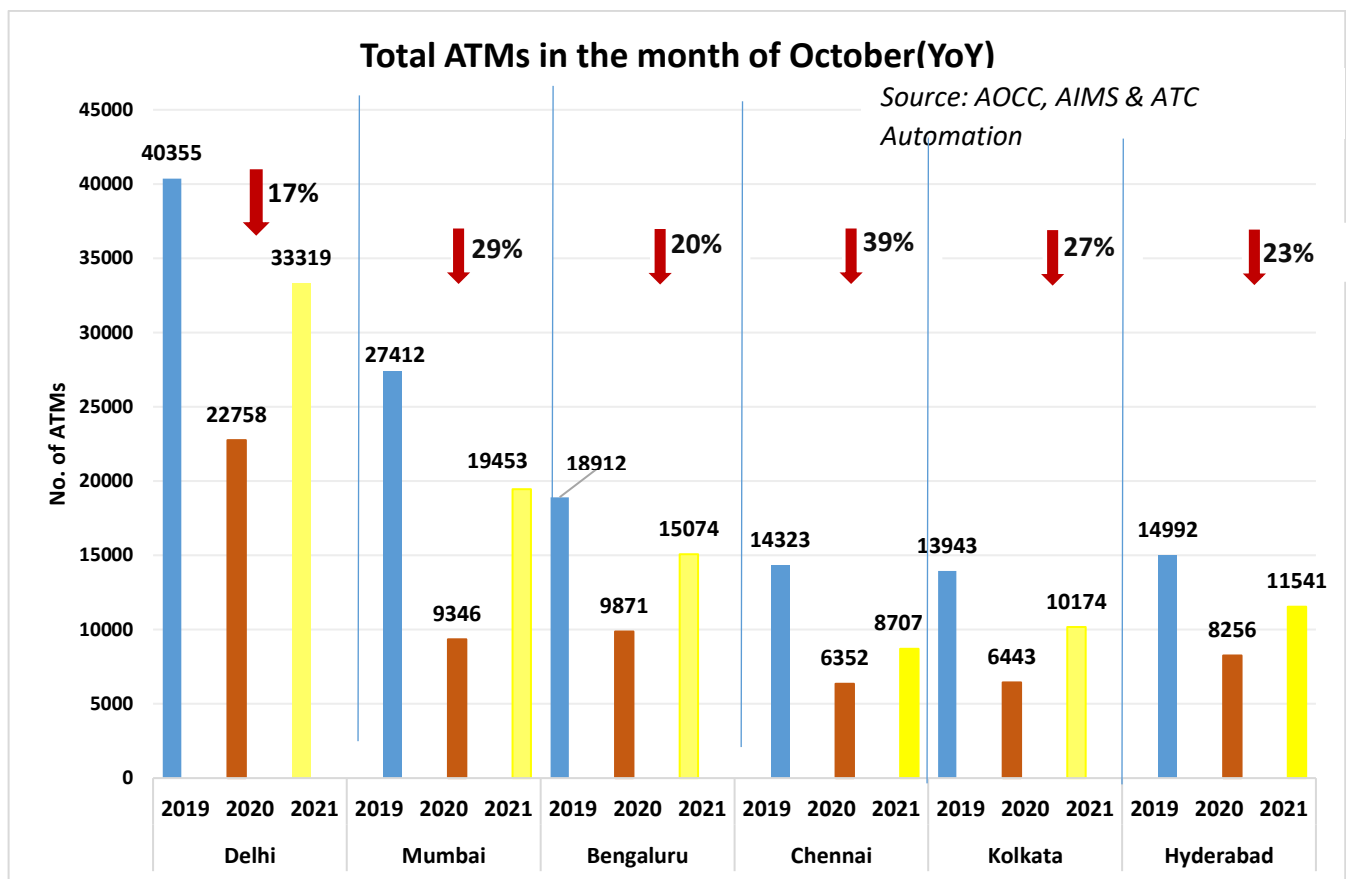


Figure 6: Total ATMs in September & Percentage Traffic Variation



II. Flight Operations – Airlinewise

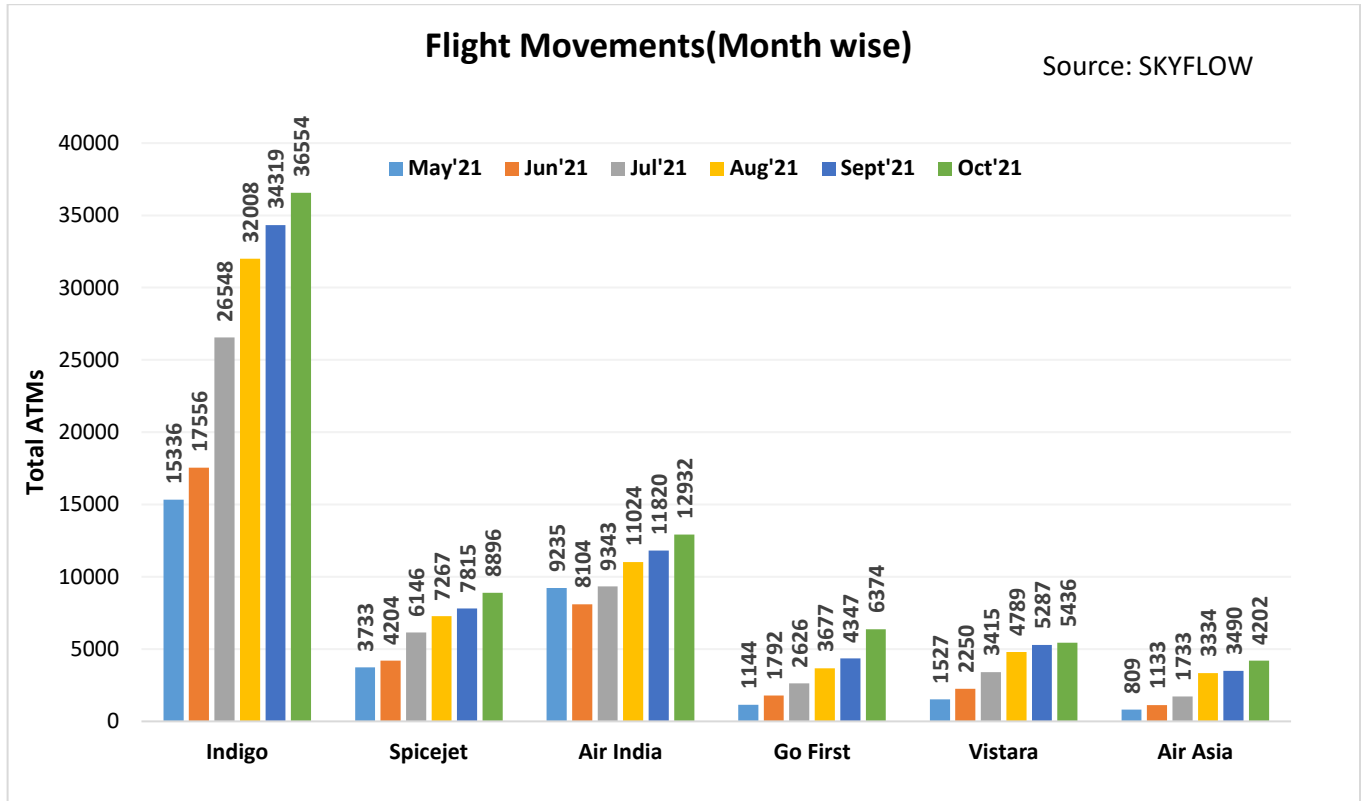


Figure 7: Flight Movements –Airlinewise



C. ATFM Post Operations – CDM Analysis

I. Introduction

Analysis Period 1st – 31st October '21

Back Ground During the above mentioned period, **One each** ATFM measure was applied for **Mumbai and Kolkata Airport** due to the following reason as illustrated in the bar chart below:–

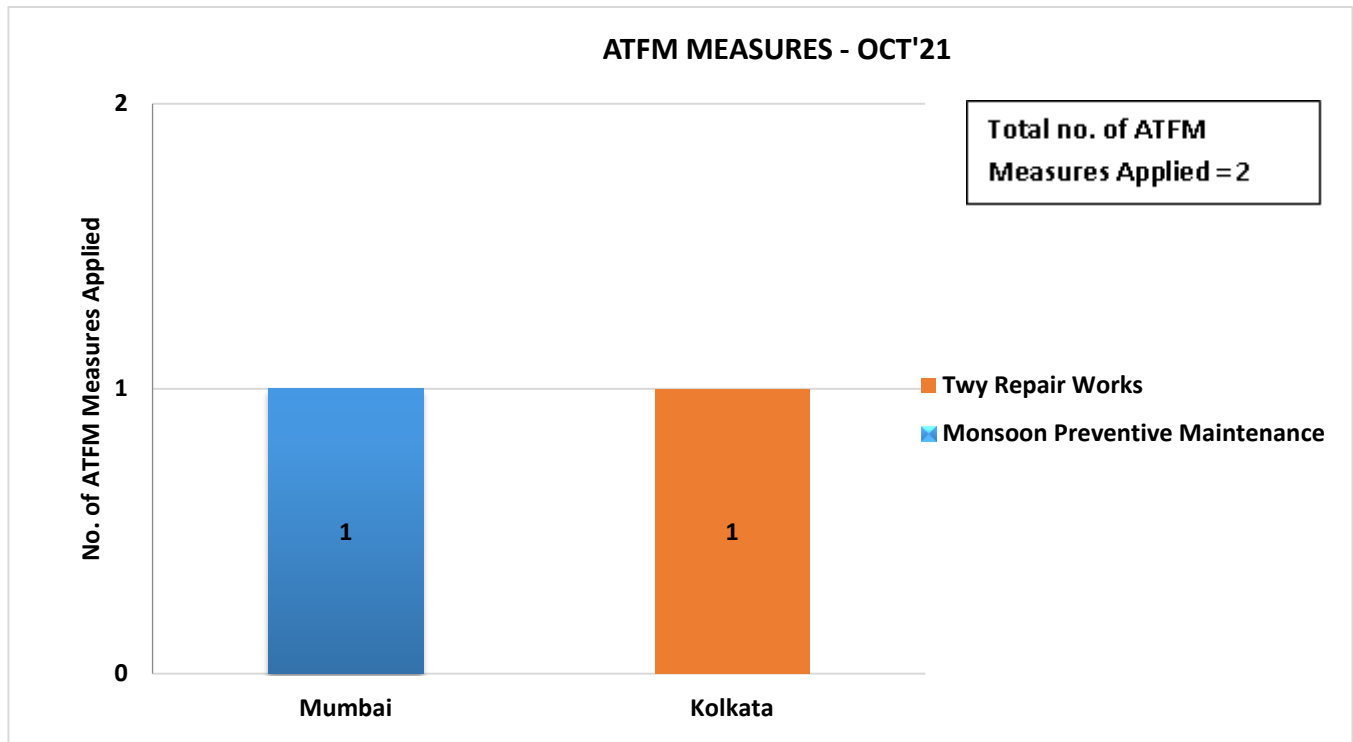


Figure 8: ATFM Measures –Oct'21

II. ATFM Measures Overview

	Kolkata Airport	Mumbai Airport
Number of ATFM measures applied	1	1
Average ATFM Ground delay due to measures*	23 Min	11 min
Maximum ATFM Ground delay due to measures	38 Min	26 min
% Compliance	92	79

Note: * *Average ATFM Delay* = $\frac{\text{Total ATFM Delay}}{\text{Total Domestic Arrivals}}$

Total Arrivals	45
Total International Arrivals(Exempted)	2
Total affected flights in scenario (Domestic Arrivals)	43
Total Domestic Arrivals with zero ATFM delay	7
Total Domestic Arrivals with ATFM delay	36

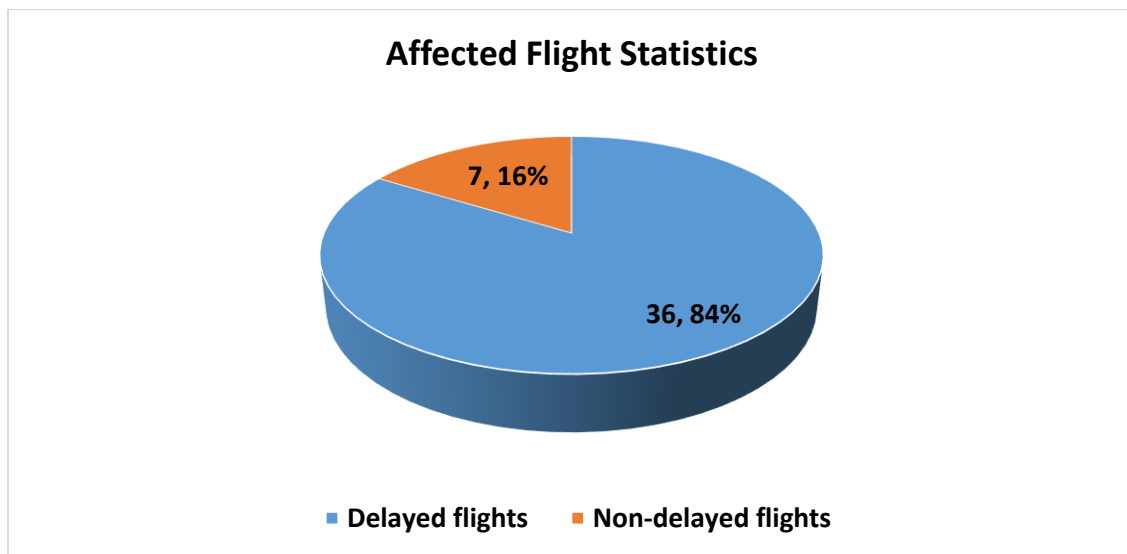


Figure 9: Affected Flight Statistics –Oct'21



III. Overall Compliance

Total arrivals	45
Domestic arrivals	43
Flights with complete data (ATOT)	43
Flights with incomplete data	0
Flights Not Operated	0
Compliant*	38
Non-Compliant	5

*Total No. of Revised CTOTs issued = 5 (Compliance calculation for flights which were issued revised CTOT is w.r.t. new CTOT issued)

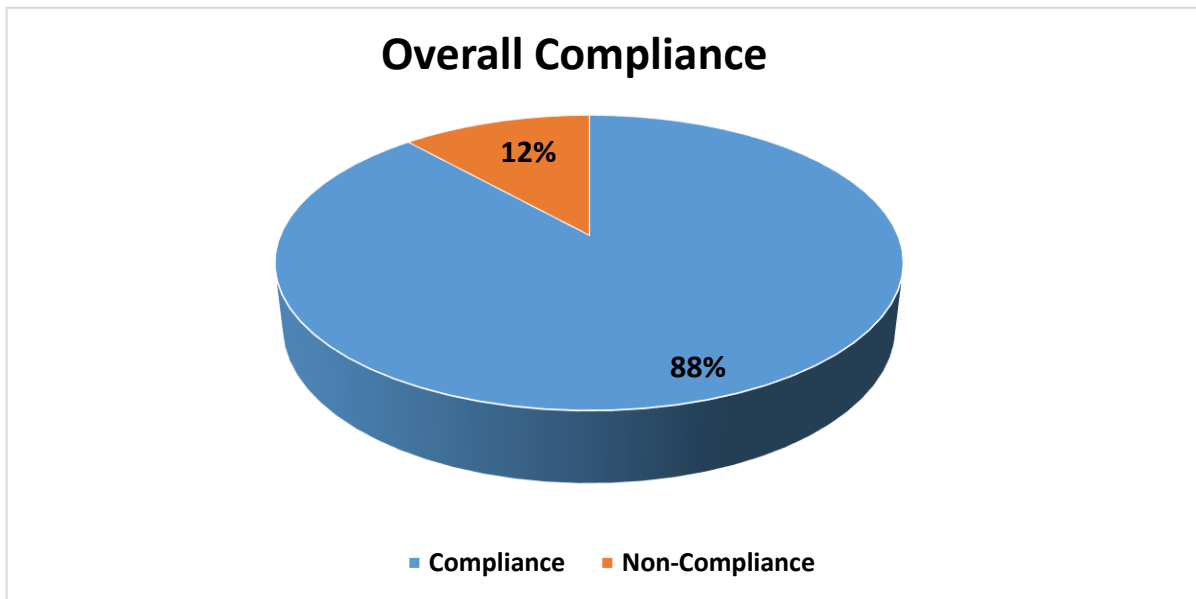


Figure 10: Overall Compliance – Oct'21

NOTE: Flights with required data (i.e. ATOT) are only considered for compliance measurement

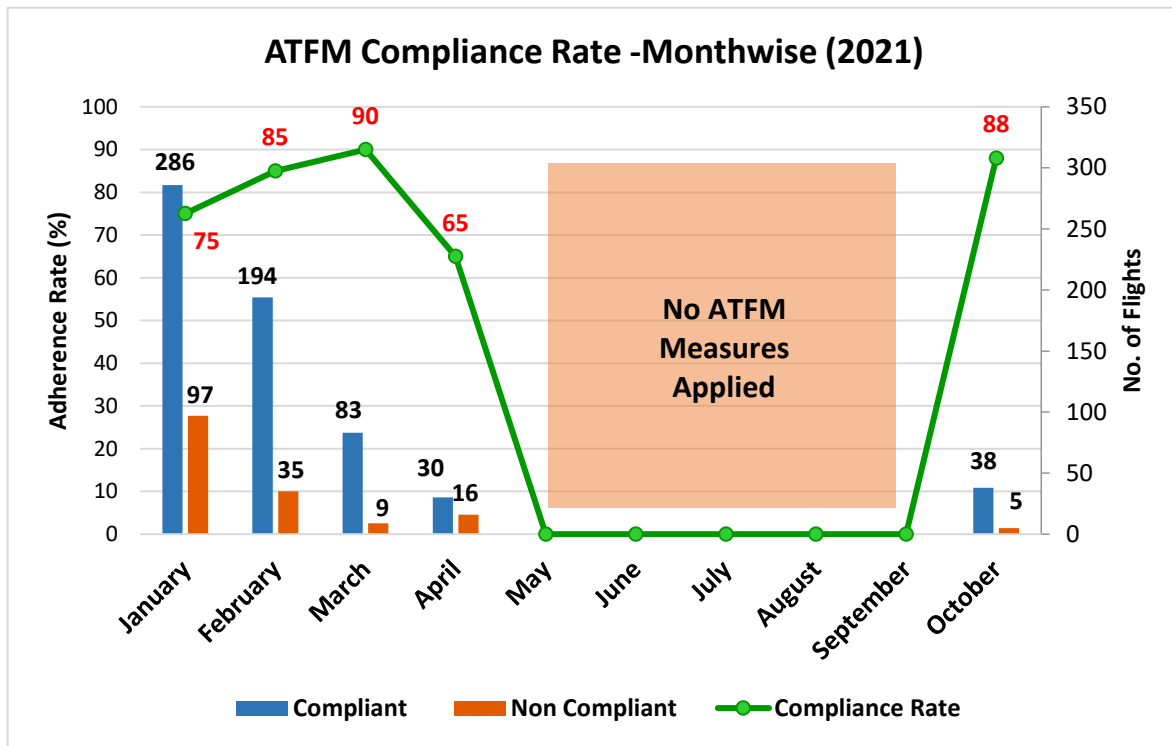


Figure 11: ATFM Compliance-Monthwise

Inference

1. Out of the total arrivals captured for the constrained Airports during the CDM scenario,98% of flights i.e. Domestic arrivals, are participating.
2. Out of these Domestic Arrivals, 84% of arrivals are assigned ATFM ground delay.
3. Out of the total arrivalscaptured to the constrained Airport during the ATFM scenario, 85% of flights are assigned ATFM Ground Delay.



IV. CTOT Compliance rate – Airportwise

MUMBAI FIR (100%)*	Compliant	Non Compliant	%Compliant
Nagpur	1	0	100
Mumbai	2	0	100
Ahmedabad	2	0	100
KOLKATA FIR (100%)*			
Kolkata	1	0	100
Bhubhaneshwar	1	0	100
Ranchi	1	0	100
Patna	1	0	100
Varanasi	1	0	100
DELHI FIR (67%)*			
Lucknow	1	0	100
Jaipur	1	1	50
Agra	1	0	100
Delhi	3	3	50
Bareilly	1	0	100
Chandigarh	1	0	100
CHENNAI FIR (87%)*			
Goa	2	0	100
Bangalore	1	0	100
Madurai	1	0	100
Coimbatore	0	1	0
Chennai	2	0	100
Shamshabad	1	0	100
Portblair	2	0	100

*FIR wise compliance rate

Note: This list contains only the airports affected by the CDMs.

V. CTOT Compliance rate – Airlinewise

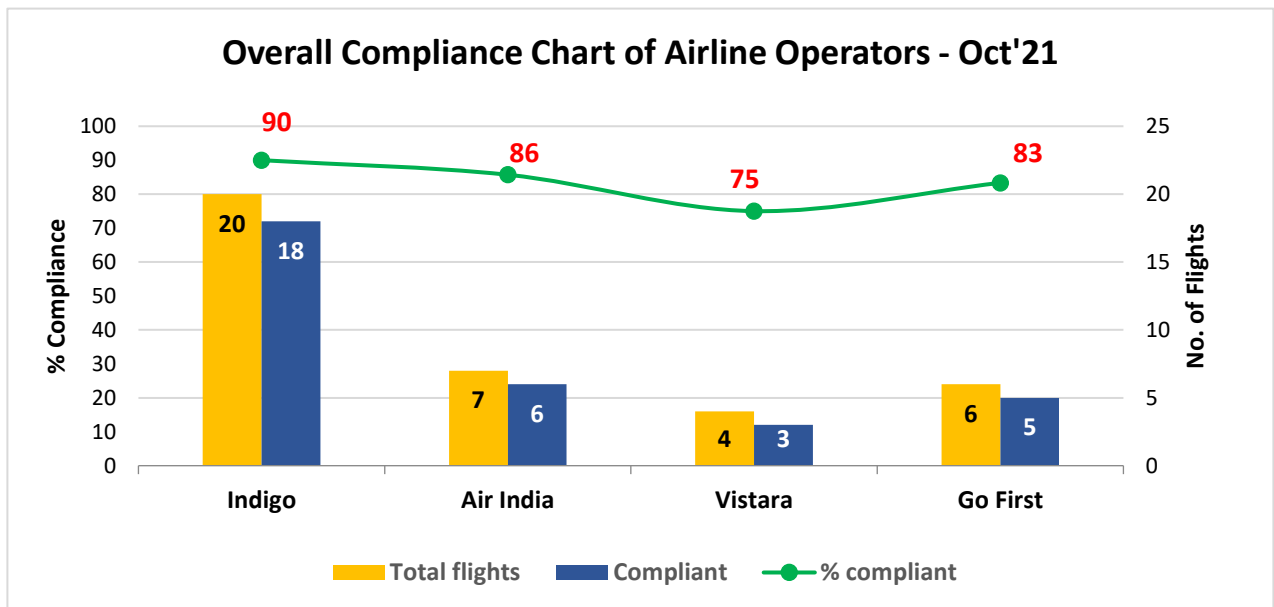


Figure 12: Airlines Overall Compliance –Oct’21

Inference

1. Out of the total domestic arrivals with complete data in the CDM scenario, 88% arrivals are compliant.
2. Delhi region has the lowest compliance rate of 67% whereas Mumbai and Kolkata region has 100% compliance rate.
3. Indigo Airlines has a CTOT Compliance better than the average recorded compliance for the month of Oct’21.

VI. Air Delay during the CDM Scenario period

Average Air Delay to domestic arrivals* within the CDM Scenario period for Mumbai and Kolkata is 5 minutes

*Note: Only calculated for domestic arrivals with both ATOT and ALDT information

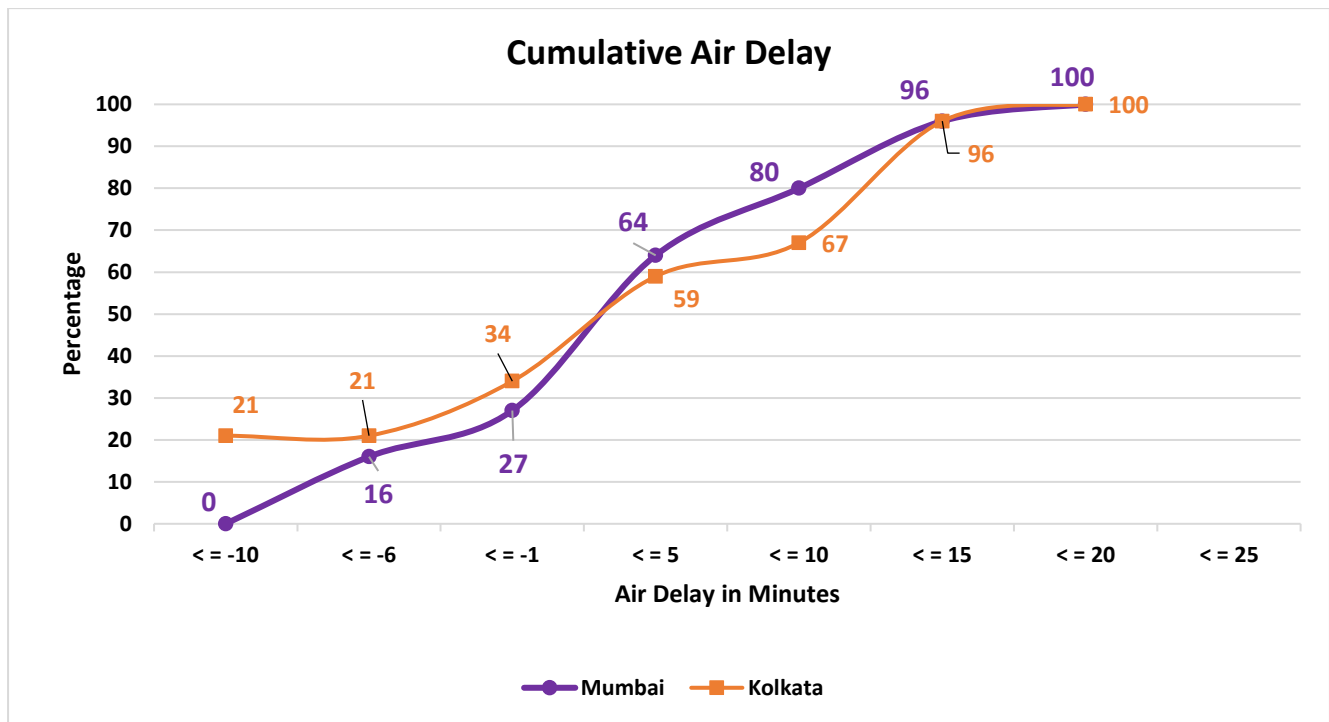


Figure 13: Cumulative Air Delay during CDM period

Inference

1. 80% of arriving flights to Mumbai had an Air delay of equal to or less than 10 minutes during the CDM period.
2. 67% of arriving flights to Kolkata had an Air delay of equal to or less than 10 minutes during the CDM period.



D. Glossary

ATFM Parameters	Definition
<i>Affected Flight statistics</i>	An insight of participating traffic in the scenario i.e. ratio of the domestic arrivals to the constrained airport affected by ATFM measures (assigned delay by the Ground Delay Program) to the domestic arrivals not affected by ATFM measures (not assigned any delay) within the CDM scenario.
ATFM Ground delay	ATFM ground delay defined as CTOT-ETOT (Calculated take off time – Estimated take off time)
<i>Average ATFM delay</i>	<i>$\frac{\text{Total monthly ATFM delay (in minutes)}}{\text{Total Domestic Arrivals}}$</i>
<i>Maximum ATFM delay</i>	Maximum ATFM delay (in minutes) assigned in the month
<i>Overall compliance rate</i>	Defined as monthly ATFM departure slot adherence rate of regulated flights. Flights having ATOT within the ATFM Slot Tolerance Window (STW) of minus 5 to plus 10 minutes of CTOTs, are considered as compliant flights
<i>CTOT Compliance rate of Airline operators</i>	An overview of CTOT compliance rate of various Airline operators
<i>CTOT Compliance rate of Airports within different Regions</i>	An overview of CTOT compliance rate of Airports within 4 FIRs
Air delay statistics	<p>Air delay defined as difference between AET & EET, where AET (actual elapsed time) can be obtained from (ALDT-ATOT) and estimated elapsed time (EET) can be obtained from FPL/RPL or (CLDT-CTOT). Therefore, Air delay = AET-EET</p> <p>Average Air Delay is calculated as:</p> <p style="text-align: center;"><i>Average Air Delay</i> <i>$= \frac{\text{Total Air Delay to domestic arrivals (with values greater than zero)}}{\text{Total Domestic Arrivals}}$</i></p> <p><i>CLDT: Calculated Landing Time</i> <i>CTOT: Calculated Take off Time</i> <i>ALDT: Actual Landing Time</i> <i>ATOT: Actual Take off Time</i></p>