



**Fifth GREPECAS–RASG-PA Joint Meeting (GREPECAS-RASG-PA/5) and
 Twenty-Third Meeting of the CAR/SAM Regional Planning and Implementation Group
 (GREPECAS/23)**

Virtual Phase (Asynchronous, 19 January to 17 February 2026)

In-Person Phase (Mexico City, Mexico, 4 to 6 March 2026)

Agenda Item 6: Progress on Regional and National air navigation planning

EFFECTIVE KPIS FOR INFORMING OPERATIONAL IMPROVEMENTS

(Presented by the United States and the International Air Transport Association - IATA)

EXECUTIVE SUMMARY

This paper reviews the application of the Performance Based Approach (PBA) in the CAR/SAM Region and the progress made to date on using Volume III of the regional Air Navigation Plan in facilitating the PBA. The paper notes that even with several meetings and workshops, Volume III has not been updated and distributed at the time of this paper submission. The paper recommends the CAR/SAM Region simplify the document to focus on the core objective of using data in the PBA. That is, to use data to monitor and inform the Operational Improvements (OIs) in the region. An effective start would be to have Volume III reflect the OIs currently in progress for GREPECAS. This would be followed by recommended data and analytics that best inform the planning and implementation task forces supporting the NACC/WG, the SAM/IG and/or the E/CAR CATG.

Finally, a joint task item between the Ad-hoc Group for the Development of KPIs of GANP (GADHOC) and the supporting implementation group(s) in the CAR/SAM Region, such as the Airspace Management and Capacity Balancing Task Force (AMCB TF), should be added to keep a simplified Volume III regularly updated to reflect the work efforts in the region.

Action:	See Section 6.1
<i>Strategic Objectives 2026-2050:</i>	<ul style="list-style-type: none"> • Every flight is safe and secure • Aviation is environmentally sustainable • Aviation delivers seamless, accessible, and reliable mobility for all • No country left behind • The International Civil Aviation Convention and Other Treaties, Laws and Regulations Address All Challenges • The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All
<i>References:</i>	<ul style="list-style-type: none"> • ICAO Doc. 9883, Manual on Global Performance of the Air Navigation System • CAR/SAM/ANP-VOLIII/2 Presentation: <i>Industry expectations for CAR/SAM Airspace ANS provision</i>

1. Introduction

1.1 For years now the CAR/SAM region has been attempting to implement the standardized use of Key Performance Indicators (KPIs) across the CAR/SAM region. This effort has continuously been plagued by implementation problems due in part to the cost of ATFM related data that is not always available and the usefulness of the metrics that organizations have been tasked with implementing as they relate to actual operational improvements. The purpose of this paper is to highlight what the US has observed as the region continues to pursue a data informed planning process. It then recommends simplifications that would make the Performance Based Approach (PBA) easier to implement.

2. Discussion

2.1 ICAO Doc. 9883, “Manual on Global Performance of the Air Navigation System”, was published in 2009. It has not been revised, and the material is now over 15 years old. In that time, ICAO has produced a GANP Portal (www4.icao.int/ganpportal) which has guidance on Key Performance Indicators (KPIs) and assistance in developing performance objectives and assigning KPIs to monitor progress. It currently reports as being under maintenance until 19 January. The manual itself is very comprehensive. However, its length can make it difficult to read. On one level, ICAO Doc 9883 can be simply summarized by the familiar ISO 9001, “Quality management systems – Requirements”. The ISO document keeps to the 4-Step approach to PBA that is abundantly addressed in the literature. Namely, Plan-Do-Check-Act where data analytics and metrics are key to all steps, especially the Planning phase and Check/Study/Review phase.

2.2 To implement PBA and the continuous improvement process, it would be useful for organizations to have a tool or document that lists the improvements in the planning or implementation phase and the metrics and data analytics that are being used to make informed decisions. ICAO has developed Volume III of the regional Air Navigation Plan that has the potential to meet this objective. However, for the CAR/SAM Region, there has been little progress in achieving an effective and updated Volume III. At present, it is discoverable at: <https://www2023.icao.int/NACC/Pages/namcar-eANPV1.aspx>. and appears to have not been updated since November of 2023. Volume III is not available under the eANP documents of the GREPECAS link: <https://www.icao.int/GREPECAS/eapn-documents>.

2.3 In February of 2024, the CAR region held a 1-week workshop for the purpose of updating regional ANP Volume III. The meeting was well represented and break out groups provided their recommendations for updating Volume III. During that meeting, IATA presented a paper titled, *Industry expectations for CAR/SAM Airspace ANS provision* that listed their recommendations for OIs in the region (Presentation: [ANPVOL3-P0-01-EN](#)). The US also submitted comments on ANP Volume III. From what can be observed, none of these efforts resulted in an update. This indicates a flaw in either the document itself and/or the CAR/SAM process for maintaining and keeping it current.

2.4 On June 13th, 2025, the NACC ATFM Task Force (now part of the AMCB TF) introduced recommendations for data that would allow the group to assess flight activity in the region that could inform or prioritize OIs. These are known in the AMCB TF as Caribbean Performance Indicators or CARPIs. For Aerodromes, there is some overlap to a GANP KPI. The Task Force expands this flight activity monitoring to FIR’s and Sectors. This simple start has the advantage of allowing groups to assess throughput with data that should be more readily accessible to States through their ATC/ATFM/Billing Systems.

2.5 Resources in producing all ICAO GANP KPI’s will continue to be an issue for the region. PBA as described in ICAO Doc 9883 will continue to stagnate if a simpler process is not developed and States can see the value in archiving flight data that can be used for performance analysis resulting in OIs.

2.5.1 Use of Proxy Data Sets - In cases where States are not yet able to provide complete or timely data, proxy datasets (e.g., implementation status, regional indicators, or operational information) may be used for regional-level monitoring purposes only. This approach is intended to support trend analysis, prioritization, and decision-making, and does not replace State-validated data nor imply State non-compliance.

3. Recommended Next Steps on the regional ANP Volume III

3.1 ICAO Document 9883, presents a circular continuous improvement process in 6 steps which follow the concept of the 4-step process of ISO 9001. ICAO just expands 1 step into several parts. The question is, *where should a group begin on the circle given that work is already in progress*. This reality of introducing PBA to an organization already making improvements is acknowledged in ICAO 9883. For Volume III, after a comprehensive Strength-Weakness-Opportunity-Threat (SWOT) analysis, Volume III continues with a table for identifying Performance Objectives using ICAO constructs of Key Performance Areas (KPA's) and Focus Areas which require education and where not everyone will agree on what a definition means.

3.2 This is followed by linking 15 of the ICAO GANP KPI's to KPA's and Focus Areas. Followed by tables that baseline and set targets for all 15 KPIs by State. These are very complex and advanced tasks that assume the data and analytics are well enough understood to set targets.

3.3 This is followed by Table PMP III-6 where OIs are first documented. It is acknowledged that not all OIs will fit the GANP/ASBU framework. The paper recommends beginning the PBA circular improvement process by first making this table work for the GREPECAS related Task Forces charged with implementation. The table is organized with each State reporting separately. This paper recommends listing the OIs currently in the work scope of the task force and then the States necessary for successfully implementing the improvement.

3.4 If PMP III-6 with OIs can be successful, it demonstrates that Volume III can meet its overall objective of serving as document that assists PBA for the regions. It also allows States to prioritize and focus scarce resources on data that can assist with completing the next part of Table PMP III-6, that lists the KPI's that best assist with the OIs in progress. In summary, Vol. III should only focus on KPI's that can be linked to current work rather than trying to address every GANP related KPI at once.

4. US Data KPI Examples

4.1 The FAA uses multiple KPIs however, they are all designed with one common goal, that goal being the eventual implementation of operational improvements. Examples of those KPIs are presented in **Appendix**. They are intended to be illustrative rather than prescriptive.

5. Conclusion

5.1 Volume III has proven difficult to implement in part likely due to the fact that it introduced a large number of KPI tables, the presence of which is overwhelming, cost-restrictive and therefore difficult to initiate. This paper recommends beginning with the OIs that could be included in Table PMP-6. The table is currently organized by State, however, for OI's that require multi-Stakeholder cooperation, all stakeholders would be linked to the OI listed.

5.2 The next step then is to evaluate the data and analytics that best serve the work in progress by the existing regional implementation TFs. Recognizing wide-spread human and financial resource constraints, all stakeholders, including airlines, should strive to bring what is possible to the table, even if it does not fit a prescriptive ICAO GANP KPI definition for the OIs in progress. The goal is to implement data informed decisions based on data that is readily available whenever possible.

5.3 It will take resources to keep Volume III current. The paper recommends this be a joint task item between the GADHOC and regional implementation TFs tasked with driving the regional changes. The first step should be straightforward as it is simply transcribing the work items in the remit of the TFs to a Volume III table. Not all Work Items will make sense for data analytics (i.e., implementing improved weather service). The regional PBA can be achieved through a simplified ANP Volume III.

6. Suggested Actions

6.1 The meeting is invited to:

- a) Develop a simplified ANP Volume III as described in Section 2 of the paper that starts by listing the OIs currently identified for the GREPECAS region.
- b) Direct the regional implementation WGs to create a task item for their respective implementation groups (the AMCB TF in the CAR) and/or the newly formed GADHOC group that:
 1. maintains the ANP Tables to fully represent the OIs and,
 2. assesses the effectiveness of metrics and data analytics in improvements both
 - i. linked to current improvements and,
 - ii. used to recommend new OIs.

APPENDIX

US Data KPI Examples

A.1 The FAA uses its Traffic Flow Management System (TFMS) to obtain airspace traffic volume, flight plan, and trajectory data. Additionally, the FAA obtains Out, Off, On, In (OOOI) times from Official Airline Guide (OAG) to calculate GANP KPIs for surface and airborne times.

A.2 For domestic application, the FAA will adapt and prioritize its data analytics depending on conditions and resources available. For example, airports with high numbers of de-icing events will need special consideration that airports in warmer climates do not. Not all regions have the same complexity of airspace or technology deployments. The PBA process fully allows an organization to adapt and structure their analytics to what makes the most sense for their unique operating environments. There is nothing in PBA guidance requiring every organization, facility or State to use identical analytics.

A.3 For the US, understanding air traffic volume in the airspace is fundamental for airspace performance analysis and improvement. This helps provide advanced planning for facility staffing and routing. For example, as can be seen in Figures 1 and 2 below, using volume data, the FAA can analyse flights between the US and the CAR/SAM region:

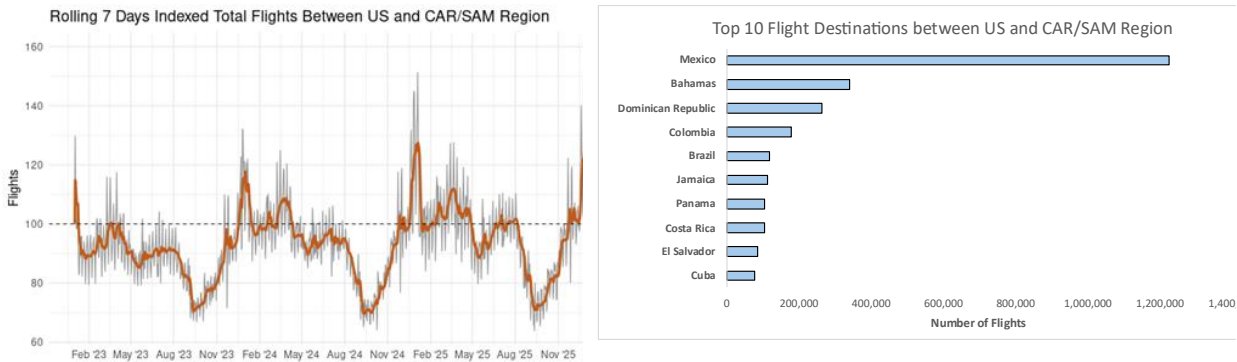


Figure 1 US - CAR/SAM Traffic Seasonality and Top Destinations by State (2023-2025)

A.3.1 The data indicates high seasonality with flight volume peaks around December/January of every year (indexed from January 2023), while the lowest volume occurs between August and November. Thus, there are noticeable volume differences seasonality between the US and various States within the CAR/SAM region indicating areas where operational improvement efforts should be focused.

Departure	Arrival	Departure Count	Arrival Count	Country
KMIA	SKBO	23,525	30,362	Colombia
KMIA	MUHA	16,115	16,092	Cuba
KMIA	MPTO	14,036	11,391	Panama
KMIA	SPJC	12,290	12,435	Lima
KMIA	SEQM	7,173	16,657	Ecuador
KMIA	MDSD	11,919	11,190	Dominican Republic
KLAX	MMGL	12,287	9,441	Mexico
KMIA	MYNN	10,473	11,227	Bahamas
KIAH	MMMX	10,800	10,885	Mexico
KJFK	MDST	10,233	10,942	Dominican Republic

Figure 2 - Top US - CAR/SAM City Pairs 2023-2025

A.4 By comparing Off Block Times to Wheels Off Time, the Taxi-Out Times can be evaluated during peak periods to find surface inefficiencies and constraints. For example, one can get an approximation of Average Daily Taxi Time at an airport by taking the difference between Wheels Off Time and the Off Block Time and then averaging the values by a daily basis. Figure 3 below shows the Average Daily Taxi Times from Miami International Airport (KMIA) to CAR/SAM Destinations.

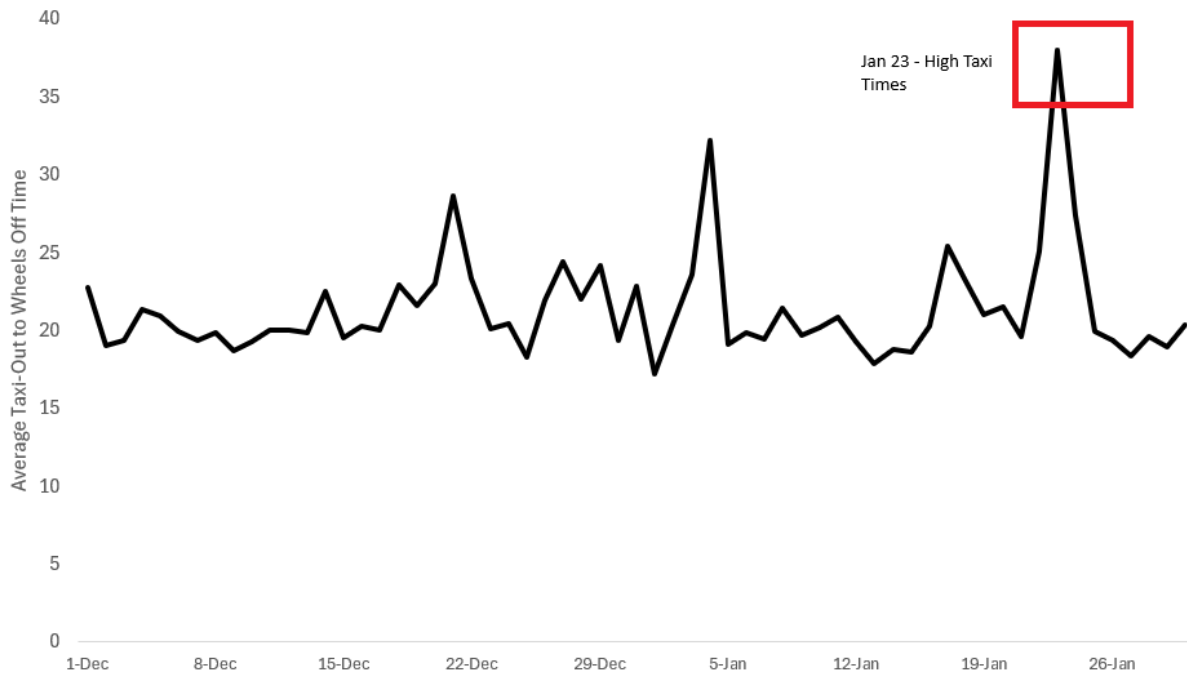
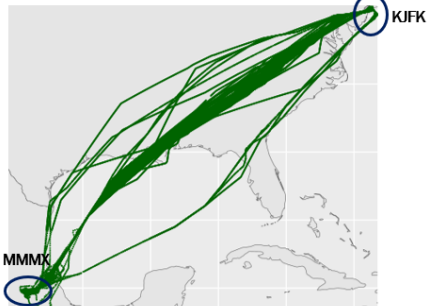


Figure 3 Average Daily Taxi-out to Wheels Off Times for KMIA to CAR/SAM - Dec 2024 - Jan 2025

A4.1 As indicated by the results of the above analysis, January 23rd had high taxi out times for aircraft; thus, further evaluation to determine inefficiencies can be made and causes identified and mitigated.

A.5 Flight information can also be used to identify routes that encountered constraints or have the least predictability in terms of flight time. For example, when the trajectories of the 10th and 90th percentile enroute flight times are visually compared for a given city pair, inefficient or constrained routes can be identified. In Figure 4 below, the Airborne Duration percentiles and respective trajectories are calculated and compared between JFK and MMMX (Jan–May 2025).

Enroute Min 10th Percentile JFK to MMMX Trajectories (Jan to May 2025)



Departure	Arrival	Enroute Min 90 Percentile	Enroute Min 10 Percentile	Difference	Enroute Dist 90 Percentile	Enroute Dist 10 Percentile	Difference	Sample
KJFK	MMMX	288.7	244.0	44.8	1841.0	1711.5	129.5	926

Enroute Min 90th Percentile JFK to MMMX Trajectories (Jan to May 2025)



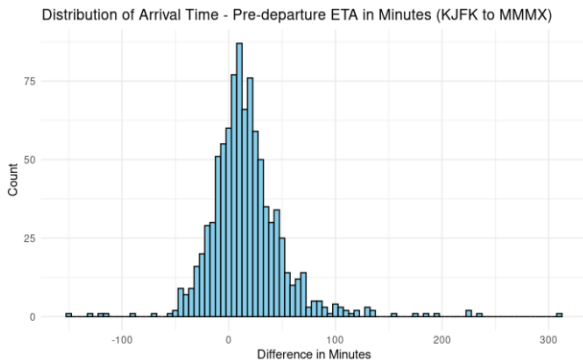
Radar hits are bolded points. **Green**: The enroute minutes <= 10 percentile. **Red**: Enroute min >= 90 percentile

Note: 40nm and 100nm buffer applied to departure and arrival airports, respectively, to ignore terminal trajectories as it may skew enroute statistics

Departure	Arrival	Airborne Duration (Minutes)			Airborne Duration Distance (NM)			Flights
		90 Percentile	10 Percentile	Difference	90 Percentile	10 Percentile	Difference	
KJFK	MMMX	288.7	244.0	44.8	1841.0	1711.5	129.5	926
KORD	MMMX	226.4	190.3	36.1	1467.3	1342.7	124.6	944
KORD	MMUN	187.1	156.9	30.2	1270.0	1163.4	106.6	955
KJFK	MMUN	206.7	177.2	29.5	1299.4	1250.5	48.8	1109
KJFK	SKBO	166.4	137.9	28.4	1055.9	1010.8	45.1	451
KJFK	MDST	179.1	153.9	25.1	1278.2	1171.6	106.6	1363
KDFW	MMUN	124.1	102.6	21.5	883.0	776.2	106.7	1415
KORD	SKBO	163.8	143.2	20.6	1160.8	1127.2	33.7	146

Figure 4: Enroute Flight Statistics JFK to MMMX (OOOI Data)

A.6 Comparing the difference between the Arrival Time and the Expected Time of Arrival (ETA) which is the expected time a flight will arrive to their destination (according to their flight plan) provides a Flight Plan Punctuality measure. Finding the flight plans with the largest ETA difference identifies flights that are expected to take longer to arrive at their destination. Causal factors can then be further investigated and mitigated. Figure 5 below shows a pre-departure flight plan with a large ETA difference of 71.4 minutes. The flight often encounters adverse weather, requiring flights to re-route around it while enroute which indicates an inefficient or problematic flight plan.



Route	Average Difference Minutes	N Flights
KJFK.RBV.Q430.COPES.Q75.GVE.LYH.COLZI.AWYAT.IPTAY.CHOPZ.MGM.SJI.TBD.M575.KEN GS.M345.AXEXO.UM345.LIRPO.UM345.PAZ.UT154.ENAGA.ENAGA3A.MMMX	71.4	8
KJFK.WAVEY.EMJAY.Q167.ZJAAY.Q97.CAKET.KONEY.Q409.ENEME.CAMJO.Q109.KNOST.M215.SNOMN.M215.MINOW.M580.IRDOV.UM580.TADET.UT154.ENAGA.ENAGA3A.MMMX	53.7	8
KJFK.RBV.Q430.COPES.Q75.GVE.LYH.COLZI.AWYAT.IPTAY.CHOPZ.MGM.SJI.TBD.M575.WA HOO.M575.KENG.S.M345.AXEXO.UM345.PAZ.UT154.ENAGA.ENAGA3A.MMMX	30.7	10
KJFK.RBV.MXE.MURPH.Q75.DRAIK.KIDDO.Q22.ACMES.TBD.M345.AXEXO.UM345.PAZ.UT154.ENAGA.ENAGA3A.MMMX	28.3	71
KJFK.RBV.Q430.COPES.Q75.GVE.LYH.COLZI.AWYAT.IPTAY.CHOPZ.MGM.SJI.TBD.M575.KEN GS.M345.AXEXO.UM345.SAVEK.UM345.PAZ.UT154.ENAGA.ENAGA3A.MMMX	27.2	15
KJFK.RBV.Q430.COPES.Q75.GVE.LYH.COLZI.AWYAT.IPTAY.CHOPZ.MGM.SJI.TBD.M575.KEN GS.M345.SEAGL.M345.AXEXO.UM345.PAZ.UT154.ENAGA.ENAGA3A.MMMX	26.0	6
KJFK.RBV.Q430.LARRI.J110.AIR.JIU.LIT.J101.IAH.J29.PSX.J177.RADAS.J177.TAM.UT100.ENAGA.ENAGA3A.MMMX	25.9	15
KJFK.WAVEY.EMJAY.Q167.YAZUU.Q167.ZJAAY.Q97.CAKET.KONEY.Q409.ENEME.CAMJO.Q109.KNOST.M215.MINOW.M580.IRDOV.UM580.TADET.UT154.ENAGA.ENAGA3A.MMMX	25.8	7
KJFK.RBV.Q430.BYRDD.J48.CSN.FANPO.Q40.AEX.DAS.J180.IAH.J29.PSX.BRO.MAM.UJ59.TAM.UT100.SELIR.UT100.ENAGA.ENAGA3A.MMMX	25.6	6
KJFK.RBV.Q430.COPES.Q75.GVE.LYH.COLZI.AWYAT.IPTAY.CHOPZ.MGM.SJI.TBD.M575.KEN GS.M345.AXEXO.UM345.PAZ.UT154.ENAGA.ENAGA3A.MMMX	25.5	18

Figure 15: Pre-departure ETA Differences Distribution with Top 10 Inefficient Flight Plans