



(Lima, Peru, from 18 to 22 September 2017)

**Agenda Item 4: Review of Project H5 – Improvements of MET services in accordance with the new operational requirements in support of ATM**

**Analysis of ATM Requirements and ASBU methodology**

(Presented by the Secretariat)

<b>SUMMARY</b>	
<p>This working paper describes the importance of the transmission of meteorological products with quality and opportunity to support the operations of Air Traffic Management (ATM) community and its relationship with the requirements of the Global Air Navigation Plan, the ATM operational concept and the Aviation System Block Upgrades (ASBU). It also analyzes the first activities of Project H5 to generate new products for ATM based on the discussions.</p>	
<b>References:</b>	
<ul style="list-style-type: none"><li>• Annex 3 – <i>Meteorological Service for International Civil Aviation</i></li><li>• Doc 9750 – Global Air Navigation Plan</li><li>• Doc 10045 - Report of MET/Divisional Meeting (2014)</li><li>• Doc 9854 – ATM Operational Concept</li><li>• Air Navigation Performance Based Implementation Plan (PBIP) of the CAR and SAM Regions</li><li>• Report of the First Meeting of GREPECAS MET Projects Programme for the SAM Region (SAM/MP/1)</li><li>• Report of the Fourth Meeting of the Projects and Programmes Review Committee (PPRC/4)</li></ul>	
<b>ICAO strategic objectives:</b>	<i>A - Safety</i> <i>B – Air navigation capacity and efficiency</i> <i>E – Environmental protection</i>

**1. Introduction**

1.1 Doc 9750 – Global Air Navigation Plan, in its fourth edition, presents the ASBU methodology.

1.2 During the Meteorology Divisional Meeting (2014) (MET/14), several issues of ASBU modules in which MET information is important, were discussed.

1.3 ICAO Doc 9854, regarding operational concept components, highlights that the provision of meteorological information represents an integrated function of the ATM system, and the information to satisfy ATM requirements should consider both the contents and the format and its opportunity.

1.4 The CAR and SAM Regions prepared their corresponding Performance Based Air Navigation System Implementation Plan, taking into consideration the ICAO Global Air Navigation Plan (GANP) (Doc 9750), under the framework of the Aviation System Block Upgrades (ASBU) methodology, in order to reach a more efficient and interoperable airspace, which will allow to attend the future capacity demand, without comprising safety.

1.5 SAM/MP/1 Meeting proposed the creation of Project H5. This proposal was approved by PPRC/4.

## 2. Analysis

### ATM Operational Concept and Meteorological Information

2.1 In accordance with the ATM operational concept, the main benefits of meteorological information for the ATM system are related with the following:

- a) availability of more precise and timely meteorological information will allow to optimize the planning and forecasting of the flight path, which will improve ATM system safety and efficiency;
- b) a greater availability of meteorological information shared aboard the aircraft will allow to define in real time the preferred path;
- c) a better identification, forecasting and presentation of adverse meteorological conditions will allow to confront the effects more efficiently, which will improve safety and flexibility; i.e., precise and timely information on the need to make a deviation or a re-routing will be available;
- d) the improvement of aerodrome reports and forecasts will facilitate the optimum utilization of the capacity available at aerodromes;
- e) a greater availability of meteorological information (air-reports), originated from the meteorological sensors aboard, will contribute to improve the information of meteorological forecasts and the display of these information in real time; and
- f) meteorological information will contribute to reduce to the minimum the effect of air traffic in the environment.

### Aviation System Block Upgrades (ASBU)

2.2 Meteorological information is an integral component of the information management environment of all the future system, together with the aeronautical information, flight and flow information and other information sources. While the meteorological information transits from the current formats, mostly gridded, binary, alphanumeric and graphic, to the future non-registered and interoperable codes (as XML/GML) using new aeronautical information exchange models (WXXM), there is a great potential to improve safety and efficiency of the global air traffic management (ATM) system through a greater availability and use of meteorological information.

2.3 Taking this into account, the inclusion within ASBU framework of a planning thread that promotes the use of integrated meteorological information to improve operational decisions has been proposed. This schedule by blocks is developed in a period from 2013 to 2028 in four blocks, where Block 0 duration is from 2013 to 2018.

2.4 All this arrangement will be useful to support a dynamic and flexible airspace management, a dynamically optimized planning of flight paths, a greater awareness of the situation and a collaborative decision making.

2.5 It is expected that the proposal or the dynamic integration of ATM and meteorological information (MET) provide timely meteorological information to allow the identification in real time, a greater possibility of forecasting and the integration of ATM solutions operationally efficient to adjust to changing conditions, as well as to facilitate the tactical avoidance of hazard meteorological conditions.

2.6 The MET Divisional Meeting (MET/14) identified the ASBU modules in which MET information is important. **Appendix A** presents the different modules identified for all the blocks.

### Project H5 for the SAM Region

2.7 The SAM Region presented to PPRC the work programme for Project H5. The chart of activities and persons responsible is presented in **Appendix B** to this working paper. It is important to inform the Meeting that the proposed Project was approved by PPRC/4, but changes may be introduced in order to improve and enrich the project. It shall be recalled that the project was prepared with the purpose of providing information and meteorological services in ATM collaborative decision making (CDM) and at aerodromes (A-CDM).

2.8 The Project Coordinator has worked through teleconferences and e-mails with the Secretariat, mainly in the preparation of the survey for the States. The proposal is presented as **Appendix C** to this working paper. The Meeting could review the document and improve it if necessary.

2.9 El Coordinador del Proyecto ha trabajado mediante teleconferencia y correos electrónicos con la Secretaría, principalmente en la preparación de la encuesta para los Estados. La propuesta se presenta como **Apéndice C** a esta nota de estudio. La Reunión pudiera revisar el documento y enriquecerlo si considera necesario.

## 3. **Discussion**

3.1 The Meeting should consider that some modules as A-CDM, CDM and those related to flights by path, will need the greatest coordination between ATS and MET services.

3.2 The Meeting should consider that, according to statistical studies, the aeronautical movement is duplicating each 15 years. The global ATM system will continue subject to the same vagaries of meteorological phenomena which are currently affecting air transport. The additional and significant air traffic volume forecasted for the next years will result in a much more sensible system to the interruptions of the service and to greater consequent costs associated to them. Historically, aeronautical meteorological services have taken care mainly of safety problems. Nowadays, within the context of ATM system in evolution, it is necessary to give more importance to the impact of meteorological conditions in capacity and efficiency and to the possibility of reducing some of the aviation environmental impacts and, at the same time, continue operating in a safely manner.

3.3 The Meeting could consider a project through which the meteorological services necessary within the ATM Concept of Operations is evaluated.

3.4 Work in CDM have been noticed in some States of the CAR/SAM Regions, where coordinated work among all the areas conduct to tactical, pre-tactical and strategic decisions, but

meteorological information together with aeronautical information are essential for air traffic flow management.

3.5 The Meeting could consider a joint work of both regions, since the work in a CDM and A-CDM environment is still in an emerging stage. The survey to aeronautical users and operators should be considered a starting point to determine the MET services required within a CDM and A-CDM environment.

4. **Suggested action**

4.1 The Meeting is invited to:

- a) take note of the information provided in this working paper;
- b) review and analyze Appendices A, B, and C;
- c) agree other actions as necessary, regarding the proposal of paragraph 3.5; and
- d) consider other actions that may deem appropriate.

-----

**APPENDIX A****NON-MET SPECIFIC ASBU MODULES WHERE  
AERONAUTICAL MET SERVICE WILL BE OF RELEVANCE**

<i>Performance improvement area</i>	<i>Module reference</i>	<i>Module scope</i>
Airport operations	B0-ACDM	Improved Airport Operations through Airport-CDM
	B0-APTA	Optimization of Approach Procedures including Vertical Guidance
	B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation
	B1-WAKE	Increased Runway Throughput through Dynamic Wake Turbulence Separation
	B2-WAKE	Advanced Wake Turbulence Separation (Time-based)
Globally interoperable systems and data	B1-DATM	Service Improvement through Integration of all Digital ATM Information
	B1-FICE	Increased Interoperability, Efficiency and Capacity through Flight and Flow Information for a Collaborative Environment Step-1 (FF-ICE/1) application before Departure
	B1-SWIM	Performance Improvement through the Application of System-Wide Information Management (SWIM)
	B2-FICE	Improved Coordination through multi-centre Ground-Ground Integration (FF-ICE/1 and Flight Object, SWIM)
	B2-SWIM	Enabling Airborne Participation in collaborative ATM through SWIM
	B3-FICE	Improved Operational Performance through the introduction of Full FF-ICE
Optimum capacity and flexible flights — through global collaborative ATM	B0-FRTO	Improved Operations through Enhanced En-Route Trajectories
	B1-FRTO	Improved Operations through Optimized ATS Routing
	B1-NOPS	Enhanced Flow Performance through Network Operational Planning
	B3-NOPS	Traffic Complexity Management

<i>Performance improvement area</i>	<i>Module reference</i>	<i>Module scope</i>
Efficient flight path — through trajectory-based operations	B0-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDO)
	B0-CCO	Improved Flexibility and Efficiency in Departure Profiles — Continuous Climb Operations (CCO)
	B1-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDOs) using VNAV
	B1-TBO	Improved Traffic Synchronization and Initial Trajectory-Based Operation
	B2-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDOs) using VNAV, required speed and time at arrival
	B3-TBO	Full 4D Trajectory-based Operations

-----

## APPENDIX B

**NAME OF THE DRAFT PROJECT: IMPROVEMENTS TO MET SERVICES IN ACCORDANCE WITH THE NEW OPERATIONAL REQUIREMENTS IN SUPPORT OF ATM**

<b>SAM Region</b>	<b>DESCRIPTION OF PROJECT (DP)</b>	<b>DP N° H5</b>	
<b>Programme</b>	<b>Title of the Project</b>	<b>Start date</b>	<b>End date</b>
Aeronautical Meteorology  (Programme coordinator: Jorge Armoa)	Improvements to MET services in accordance with the new operational requirements in support of ATM  <i>Project coordinator: Arturo Lomas (Ecuador)</i> <i>Experts contributing to the project: Eduardo Recalde (Ecuador)</i> <i>Ricardo Reyes Távara (Peru)</i>	January 2016	December 2018
<b>Objective</b>	Implement MET services within the framework of the ATM operational concept, CDM, and ASBU blocks related to improvements favouring data and system interoperability (SWIM) by December 2018.		
<b>Scope</b>	Deliver quality and timely MET information to all stakeholders of the SAM Region, in alignment with the Global Air Navigation Plan.		
<b>Metrics</b>	Number of States that responded to the survey. Submission by States of an implementation programme to improve MET services, including human and technological factors.		
<b>Strategy</b>	All the work will be carried out by experts designated by SAM States participating in the project, under the leadership of the Project Coordinator and the supervision of the MET Programme Coordinator through the GoTo Meeting system. Once the tasks have been completed, the results will be delivered to the MET Programme Coordinator as a final document, for its submission to, and, if necessary, approval by, the GREPECAS PPRC through the GREPECAS fast-track procedure. To support collaborative decision-making, meetings will be held with the areas involved.		
<b>Goals</b>	Completion of the proposed survey by 100% of States. Submission of a continuous improvement programme in the provision of MET services by 100% of States.		
<b>Rationale</b>	Through more precise and timely meteorological information, it will be possible to optimise flight path planning and prediction, thus enhancing the safety and efficiency of the ATM system; improved reports and aerodrome forecasts will optimise the use of available aerodrome capacity; and meteorological information will contribute to minimise the environmental impact of air traffic. Performance management will be an important part of meteorological information quality assurance.		

<b>Related projects</b>	<ul style="list-style-type: none"> <li>➤ Automation</li> <li>➤ A-CDM implementation</li> <li>➤ ATFM implementation</li> <li>➤ PBN implementation</li> <li>➤ Improvement of ATM situational awareness</li> </ul>
-------------------------	---

Project deliverables	Relationship with PFF of the SAM PBIP <sup>i</sup>	Responsible party	Status of implementation <sup>ii</sup>	Delivery date	Comments
Design and drafting of a survey of international air navigation to identify MET services required for the CDM and A-CDM environment		MET Programme Coordinator and Project Director		June 2017	The group will send the survey to the Secretariat for circulation to the States.
Reception of the survey duly completed by the States				March 2018	
Analysis and assessment of results obtained from the survey and identification of gaps for improving MET services in order to increase efficiency, safety, and regularity.		MET Programme Coordinator and Project Director		June 2018	Communicate the results to the States through the Secretariat, so that each may prepare its MET service improvement programme.
Follow-up to programmes submitted by States on the basis of the gaps identified.		MET Programme Coordinator and Project Director		December 2018	
<b>Required resources</b>	Availability of GoToMeeting to define the content of the survey and analyse its results. The States could use their human resources to plan the implementation of requirements in support of ATM. Availability of resources to hold meetings on the second year in order to review the project.				

<sup>i</sup> Performance-Based Air Navigation Implementation Plan for the SAM Region

<sup>ii</sup>

<i>Grey</i>	<i>Task not started yet</i>
<i>Green</i>	<i>Activity being implemented as scheduled</i>
<i>Yellow</i>	<i>Activity started with some delay, but expected to be implemented on time</i>
<i>Red</i>	<i>Activity not implemented on time; mitigation measures are required</i>

**Survey Proposal for Project H5 - Improvements of MET services in accordance with the new operational requirements in support of ATM**

(1 = lowest level – 10 = highest level)

1. Do you identify CDM and A-CDM concepts? Indicate your identification level from 1 to 10.
2. Has your State (country) implemented this concept? Indicate 0 or 1
3. Are you from the:
  - MET service provider \_\_\_\_\_
  - Meteorological authority? \_\_\_\_\_
4. How important do you consider MET information for air operations? Indicate the importance level from 1 to 10
5. What MET products are prepared by your service? Enumerate.
  - 
  - 
  - 
  - 
  -
6. What WAFS products do you use for the preparation of warning messages and services regarding severe weather for aviation? Enumerate
  - 
  - 
  - 
  - 
  -
7. Do you use your State's local models or other different than the one used by the WAFS for the preparation of warning messages and services on severe weather for aviation? If affirmative, indicate the name and origin of the model.
  - 
  - 
  - 
  - 
  -

8. How many airports of your State have A-CEM implemented? Indicate what airports.

- 
- 
- 
- 
- 

9. How does MET information integrate to CDM in your State?

---



---

10. How does MET information integrate to A-CDM in your State?

---



---

11. Do you know if your State has implemented the following:

- ATFM \_\_\_\_\_
- CDM \_\_\_\_\_
- A-CDM \_\_\_\_\_

12. What kind of systems are used by your Service to identify severe MET phenomena to aviation?

Severe Phenomenom	System
_____	_____
_____	_____
_____	_____

13. Have your State defined or implemented letters or agreement with Air Navigation Services (ATS, CNS, AIM, SAR, AGA, etc.) to share MET information?

---

14. Do you know ICAO Doc 9971 – “Manual on Collaborative Air Traffic Flow Management”

---

15. Who is the ATM provider in your State?

---

16. How many MET offices, OVM, OMA, EMA, are available in your service?

---

17. Has your State implement the National Air Navigation Plan aligned to the regional and global plan (Doc 9750) with the ASBU methodology?

---

18. Do you know the implementation status of Module B0-ACDM, does it include meteorology issues?

---