



**GREPECAS Programmes and Projects Committee (PPRC) Fourth Virtual Meeting
 (ePPRC/04)
 Online, 21 – 22 April 2022**

Agenda Item 2 Follow-up to the Programmes and Projects of the CAR/SAM Regional Planning and Implementation Group (GREPECAS)

2.1 Air Navigation Services (ANS) Implementation Status in the CAR/SAM Regions through the GREPECAS Programmes and Projects (Aerodromes and Ground Aids (AGA), Air Traffic Management (ATM), Aeronautical Information Management (AIM), Communications, Navigation and Surveillance (CNS), Meteorology (MET) and Search and Rescue (SAR))

REVIEW OF THE MET PROGRAMME FOR THE SAM REGION

(Presented by the Secretariat)

EXECUTIVE SUMMARY	
The working paper presents the reports of the activities carried out under the MET Programme Projects, in addition to the achievements made in the development of these projects.	
Action:	As indicated in 4.1.
<i>Strategic Objectives:</i>	<ul style="list-style-type: none"> • Capacity and efficiency of air navigation • Environmental Protection
<i>References:</i>	<ul style="list-style-type: none"> • Annex 3 – Meteorological Services for International Air Navigation • Nineteenth Meeting of GREPECAS (GREPECAS/19) • MET Coordination Meeting of the SAM Region

1. Introduction

1.1 Amendment 79 to ICAO Annex 3 introduced recommendations for a better harmonization of information concerning en-route weather phenomena which may affect the safety of aircraft operations (SIGMET).

1.2 The e-CRPP/03 had concluded the projects of the MET Programme because the deliverables recommended by GREPECAS had been generated in the previously approved projects.

1.3 The GREPECAS/19 Meeting approved Conclusion 19/02 – Implementation of the Standards and Recommended Practices of ICAO Annex 3.

1.4 The SAM Region carried out a Coordination Meeting for the MET area, where issues related to MET area implementations were analyzed, as well as the GREPECAS Conclusions related to MET.

2. Analysis

2.1 Amendment 79 to ICAO Annex 3 introduced the recommendation of 3.4.4, which literally reads:

3.4.4 Recommendation. — A Meteorological Watch Office (MWO) should coordinate SIGMET information with neighboring MWOs, especially when en-route meteorological phenomena extend or are expected to extend beyond the area of responsibility specified for the MWO, with the purpose of guaranteeing the harmonized supply of SIGMET information.

2.2 The eCRPP/02 and 03 Meetings had recommended closing the Projects in the MET area and replacing them with a follow-up project for the implementations that have remained pending in the MET Programme. Likewise, they recommended that, if the preparation of new projects was considered, they should be focused on:

- a) Preparation of information concerning en-route weather phenomena which may affect the safety of aircraft operations (SIGMET); or
- b) Implementation of the ICAO Weather Information Exchange Model (IWXXM); or
- c) Preparation of meteorological messages for exchange in a System Wide Information Management (SWIM) environment.

2.3 The Nineteenth Meeting of GREPECAS had approved Conclusion 19/02 through which it provided guidelines for the implementation of SARPs, related to the MET area, in the CAR/SAM Regions.

2.4 In the SAM Region, the MET Coordination Meeting, held between 29 November and 1 December, 2021, analyzed, among other topics, the recommendation of eCRPP/03, regarding the formulation of new projects, Amendment 79 to ICAO Annex 3 and Conclusion 19/03 of GREPECAS/19.

2.5 The MET Coordination Meeting, after observing Recommendation 3.4.4 of ICAO Annex 3 and recommendations of eCRPP/02 and 03, in relation to the formulation of new projects, decided to outline two new projects, to present them to the next PPRC meeting. The projects presented are the following:

- a) “SIGMET Coordination Project between MWOs covering adjacent Flight Information Regions (FIR)”. The project is led by Chile, with the participation of Argentina, Panama and Paraguay. **Appendix A** contains the Project Charter of the Project;

- b) Regional implementation of the ICAO meteorological information exchange model (IWXXM): The Project is led by Peru and has the participation of Argentina. **Appendix B** contains the Project Charter of the Project.

2.6 Additionally, in the MET area, the ISO 9001:2015 Standard Lead Auditor Course, with International Register of Certified Auditors (IRCA) certification, has been carried out, a course in which 11 meteorologists have been trained as Lead Auditors of the Quality Management System (QMS). The course has been delivered by SGS from Peru, between the months of January and March 2022, and the objective was to build capacities in the States for the implementation and certification of the QMS in the MET processes.

3. Conclusions

3.1 Based on the foregoing, the following Draft Conclusion is formulated:

DRAFT CONCLUSION	
ePPRC/04/XX	APPROVAL OF MET PROJECTS FOR THE SAM REGION
<p>That:</p> <p>In relation to the projects in the MET Programme for the SAM Region, it is considered that they are aligned with the PPRC recommendation regarding the new Projects for the MET area. Therefore, the ePPRC/04 decides:</p> <p>To approve the following Projects:</p> <p>a) SIGMET Coordination Project between MWOs covering adjacent FIRs;</p> <p>b) Regional implementation of the ICAO Meteorological Information Exchange Model (IWXXM).</p>	<p>Expected impact:</p> <p><input type="checkbox"/> Political / Global</p> <p><input type="checkbox"/> Inter-regional</p> <p><input checked="" type="checkbox"/> Economic</p> <p><input checked="" type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Operational/Technical</p>
<p>Why:</p> <p>a) To issue continuous and homogeneous SIGMET messages when a phenomenon affects more than one FIR is to provide reliable, quality-assured information that supports safety;</p> <p>b) The implementation of the OPMET Message Exchange in IWXXM format is an enabler for SWIM</p>	
<p>When: Both projects must be completed before December 2025.</p>	<p>Status:</p> <p>a) Tasks related to coordination between MWOs have been initiated but not yet formalized;</p> <p>b) The OPMET Bank of Brasilia and some States are already able to exchange OPMET messages in IWXXM format.</p>
<p>Who: <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input checked="" type="checkbox"/> Others: Users/Industry</p>	

4. Suggested Action:

4.1 The Meeting is invited to:

- a) Take note of the information contained in this working paper;
- b) Review the Project proposals presented in Appendices A and B; and
- c) Approve, if the meeting considers it pertinent, the Draft Conclusion presented in 3.1.

APPENDIX A
SIGMET COORDINATION PROJECT BETWEEN MWOS COVERING ADJACENT FIRs

Name of the project:	"SIGMET Coordination Project between MWOs covering adjacent FIRs"		
Date:	xx/xx/2022	Emission: xx/xx/xxxx	Version 1
Author:	SAM Regional Office		
Promoter:	GREPECAS		
Representative:	Armoa, Jorge		
Client:	States of the CAR/SAM Region		
ID Document:	xxx		
Link:	xxx		

Note: This document is valid only on the date it is printed.

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1. Executive Summary

This project, called "SIGMET Coordination Project between MWOs covering Adjacent FIRs", seeks to correct the deficiencies detected by the 2014 ICAO Divisional MET, which establishes the need to have harmonized and coordinated SIGMET information between different States in order to provide accurate information on aviation hazardous weather phenomena that may affect more than one FIR in adjacent States.

2. Background

The main reason that guides this project is to provide a solution to remedy the deficiencies identified by users in relation to SIGMET information. As one of the first antecedents, in 2014 during the Meeting of the then called MET Division of the International Civil Aviation Organization (ICAO), this problem was discussed regarding SIGMET information. Therefore, in the final report of the Meeting we find the agreed recommendation, in order to mitigate the deficiencies through the development of a system of Regional Advisory Centers on Hazardous Meteorological Phenomena for aviation. After the restructuring of ICAO, in 2015, the designated Meteorology Panel (METP) began to work on the development of this system, as well as other changes in Annex 3, to introduce improvements that manage to provide a solution to the deficiencies regarding SIGMET information, clearly taking into account that meteorological weather does not follow national nor sub-national borders. In this sense, the various MET groups of the different ICAO Regions began to work on initiatives to provide efficient solutions to this problem. Thus, various multinational projects and/or SIGMET coordination alliances arose in the world, such as, for example, in Europe the "MET Alliance SIGMET Coordination Project" made up of: Germany, Austria, Belgium, France, Ireland, Luxembourg, the Netherlands and Switzerland. Also, NAMCon between Denmark and Sweden, PT-EAST Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Ukraine and Uzbekistan have advanced their coordination efforts. At the same time, several coordination projects have been developed in Asia, including that of the LMOs of Indonesia, Malaysia and Singapore. It is important to note that the Hong Kong Observatory developed a web tool to support SIGMET coordination in Southeast Asia. Finally, since 2016, the SIGMET Coordination has been implemented on a pilot basis among Japan, the Philippines and Vietnam, who also have a common platform for operational interaction for the preparation of SIGMET messages.

Among the initiatives implemented, one that has proven to be very efficient is based on commonly used procedures, monitoring and follow-up of coordination results, including annual training on best practices based on lessons learned, the most notable being the coordination established between Germany, Austria and Switzerland (DACH).

Meanwhile, a series of changes were introduced through ICAO Annex 3 "Meteorological Service for International Air Navigation" through different amendments.

In amendment 78 (2018), of the aforementioned Annex, a Note was added in paragraph 3.4.1 of Chapter 3 of Annex 3, referring to guidelines addressed to the Meteorological Watch Offices: "on cooperation and coordination, bilateral and multilateral for the provision of SIGMET information messages (Doc.8896), to meet the needs of users and harmonize the provision of information on dangerous meteorological conditions en route".

Added to the previous initiative was the inclusion through amendment 79 to Annex 3 of a Recommended Practice (3.4.4) that encourages the MWOs of the States to coordinate SIGMET: "[...] 3.4.4 Recommendation.—An MWO should coordinate SIGMET information with neighboring MWOs, especially when en-route weather phenomena extend, not expected to be beyond the MWO's specified area of responsibility, in order to ensure the harmonized provision of SIGMET information. . [...]"

3. Problem Statement

The preparation of SIGMETs messages by a Meteorological Watch Office (MWO) is only limited to the area under its responsibility (Flight Information Region – FIR). Due to the nature of the phenomena, which sometimes affect more than one FIR at the same time, it is common to observe that the description of the meteorological phenomena, as well as the region that they affect, does not present homogeneity or continuity.

4. Objective of the Project

Based on:

- The recommendation of Annex 3 and other ICAO documents;
- Work carried out by the MET Panel;
- Examples of good practices, at a global level, of the coordination for the issuance of continuous SIGMETs;

It is intended to establish a platform and agreements that allow the issuance of continuous and homogeneous SIGMETs to be coordinated.

5. Guidance Documents

The guidance material available to orient the implementation includes the following documents:

- Annex 3 - Meteorological Service for International Air Navigation
- Doc. 8896 – Manual of Aeronautical Meteorological Methods
- Guide for the Preparation and Dissemination of SIGMET Messages for the CAR/SAM Regions

6. Options when facing problems

a) Not planning corrective actions

Based on the needs raised by the users of the aeronautical industry, air operators, and airlines, this is an initiative that seeks to efficiently satisfy the expressed requirements and that seeks to comply with the practice recommended by ICAO, that not developing this project implies not reducing the risk to operational safety due to the lack of harmonization of this information, as well as:

- Maintain the current deficit of SIGMET information in the Region.
- Lack of harmonic procedures for issuing SIGMET information.
- Maintain a territorial and non-regional view of meso-scale meteorological phenomena.
- Maintain a deficient Regional monitoring of adverse meteorological phenomena.

b) Planning corrective actions

The development and implementation of this project has a direct impact on improving the service provided, increasing the levels of operational safety, delivering more precise information and without "cuts", making the air routes safer and more efficient. In addition, it allows meeting the needs of users and ICAO requirements in a context in which it is mandatory to apply a quality management system, in accordance with the needs and requirements of users, as mentioned in Annex 3.

7. Implementation perspective

In order to implement the Project it is necessary:

- Bilateral agreements agreeing on meteorological phenomena on which SIGMET will be coordinated (supported by climatology), monitoring and follow-up actions, lessons learned, regularity of training based on the results of the coordination;

- Common coordination action procedures;
- Web platform for common use, where it is possible to interact simultaneously to agree on elements and spatial distribution of SIGMET reports (chat, necessary tools, such as products produced by the WAFCs, remote sensing products, numerical models, etc.);
- Common training for all personnel related to the different adjacent MWOs, harmonized, common, and permanent.

The implementation of the Coordination between the MWOs of the adjacent FIRs implies changes in the functionality of the surveillance information processing of a flight information region, since it implies extending the borders of this surveillance and interacting with other MWOs, some of which could be located in other regions (CAR/SAM or AFI/SAM). For this reason, it will be imperative to train the staff that works in the MWOs to carry out this integration as well as the sharing of data and information, even in different languages. *Table 1* presents the overview of the processes evolution, included in the period 2022-2025.

Process	Current Scenario 2022	New Scenario 2025
<p style="text-align: center;">Production of Bilateral Agreements</p>	<ul style="list-style-type: none"> • There are no bilateral agreements. • There are first contacts between some MWOs, but no formal agreements. • The task is still at Recommendation level in Annex 3. • There are examples of good practices as well as work by the MET Panel aimed at forming Regional Advisory Centers on SIGMETs. 	<ul style="list-style-type: none"> • Bilateral agreements that allow the exchange of information and meteorological surveillance data between the MWOs of adjacent FIRs, as well as the preparation and dissemination of continuous and homogeneous SIGMETs. • Preparation and dissemination of homogeneous and continuous SIGMETs.
<p style="text-align: center;">Procedures for Coordination of common actions and web platform for common use</p>	<ul style="list-style-type: none"> • There are no coordination procedures between the MWOs of adjacent FIRs in cases where a meteorological phenomenon affects more than one FIR at the same time. • There are no platforms that allow the sharing of data and information on meteorological surveillance of the FIRs. • Homogeneous and continuous coordinated SIGMETs are not issued between the MWOs of adjacent FIRs when the meteorological phenomenon affects two or more FIRs. 	<ul style="list-style-type: none"> • Existence of well-defined procedures between MWOs of adjacent FIRs in case a meteorological phenomenon affects more than one FIR at the same time. • Existence of a platform that allows data and information on meteorological surveillance to be shared between the MWOs of adjacent FIRs. • Existence of a platform that allows data and information on meteorological surveillance to be shared between the MWOs of adjacent FIRs. ¹ • Homogeneous and continuous coordinated SIGMETs will be issued between MWOs of adjacent FIRs when meteorological phenomena affect two or more FIRs. ¹

¹ Meteorological phenomena, in the case of storms or mesoscale convective complexes, that affect more than one FIR, will not always have, the CBs, the same top in said FIRs. In this case, homogeneous SIGMETs will not always be issued.

<p>Common training for all personnel connected to the different adjacent MWOs</p>	<ul style="list-style-type: none"> • The States, and the MWOs in particular, have planned training for meteorological surveillance of the FIR but have not included in their plans training for coordinated work between MWOs of adjacent FIRs. 	<ul style="list-style-type: none"> • It is expected that once the platform and the bilateral agreements have been implemented, the training for the use of the platforms be included in the Training Programs, as well as in the implementation of the bilateral agreements.
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8. Actions for implementation

Actions based on the participation of States, international organizations and interested parties are proposed. The collaborative approach is the critical factor of this initiative. The following actions are proposed:

8.1 Establishment of support groups and bilateral agreements

The MET Coordination Group has established a working group, made up of representatives of States and MET service providers to support the preparation and execution of this project. The Project is led by an expert from the State of Chile and has the support of experts from:

- Argentina;
- Panama
- Paraguay

In order to ensure that the implementation process meets the projected deadline, a collaborative approach is proposed that generates synergy based on the effort and participation of each State, through consultations and preliminary meetings between those responsible for the Project, the States that must establish bilateral agreements, based on climatology, and the Secretariat.

It is proposed to form groups of 2, 3 or 4 countries, according to the Climatology of meteorological phenomena, with whom the models of bilateral coordination agreements will first be presented. These first tasks will be carried out through zoom platforms or TEAMS.

Actions	Completion period
1. Climatology of Meteorological Phenomena	2 months after approval
2. Meeting and establishment of adjacent MWOs that should have bilateral Agreements	2 months after completion 1)
3. Establishment of bilateral or multilateral Agreements between adjacent MVOs	Up to 6 months after completion 2)
4. Coordination tests	During the following 12 months after 2) subject to the occurrence of meteorological phenomena
5. Industry consultations with industry	1 week after each coordination test

8.2 Establishment of the Platform for the sharing of data and information on meteorological surveillance for decision-making

The Group of experts that will develop the Project, after establishing the Bilateral Agreements, will focus on the preparation of the web platform to share the information on the FIRs' meteorological surveillance. The involvement of the industry and other areas of air navigation, at this stage, will be essential to establish the best interface to increase the situational awareness of MET experts working on MWOs and to make the best decisions at the time of deciding to issue or not continuous and homogeneous SIGMETs.

This initiative suggests establishing an interdisciplinary team (MET, ATM, Industry, IT) that allows the development of this interface based on best practices implemented globally. The tasks are described below:

Actions	Completion period
1. Platform type design	3 weeks from approval
2. IT consultations on feasibility	3 weeks from completion 1)
3. Platform preparation by IT experts	3 weeks from completion 2)
4. Tests for use of the platform with MET personnel	1 month from completion 3) and for 3 months, subject to the occurrence of meteorological phenomena
5. Feedback from industry and information users	To be determined

8.3 Regional documents / guidance material to support implementation

It is required to prepare a material for the use of the Platform according to the needs of the CAR/SAM States. Therefore, the development, publication and updating of documents related to the following matters should be promoted:

- Platform User Manual.

This initiative suggests establishing a team of experts to attend to the development of guide material oriented to the Region, in Spanish and English.

Actions	Completion period
1. Establish guide material development team	2 weeks from completion 1)
2. Presentation of work plan	3 weeks from completion 2)
3. Progress report until the end of the plan	1 month from the end 3)
4. Publication and dissemination	To be determined

8.4 Organization of interregional cooperation seminar

The implementation process of the Information Sharing Platform for the FIRs' meteorological surveillance, as well as the bilateral cooperation agreements between the adjacent MWOs is of general interest to the ICAO Member States, because it materializes the first steps to the emission of continuous and homogeneous SIGMETs when a meteorological phenomenon affects two or more FIRs. It is proposed to request the cooperation of international organizations for the transmission of knowledge and experience as good practices are observed, in these fields, collected in the MET Panel.

Actions	Completion date
1. Request for cooperation to designated body	1 week from approval
2. Organization and invitation to a virtual or face-to-face seminar	2 weeks from the response of 1)
3. Development of virtual or face-to-face seminar	2 weeks from completion 2)
4. Presentation of conclusions and recommendations	2 weeks from completion 3)

8.5 Application of tests of use of the Platform and the Bilateral Agreement

The tests of use of the Platform and of the Bilateral Cooperation Agreement between the MWOs of adjacent, regional and intra-regional FIRs, require a methodology that defines the test platform and the logical support to be used by the regional system. Each State must train its experts, who work in the MWOs, and their IT support teams, who will be responsible for the development of the tests in order to prepare, in a coordinated manner among the MWOs of the adjacent FIRs, the continuous and homogeneous SIGMETs.

9. Expected Benefits

The expected benefits of the implementation are:

- Bilateral coordination agreements for the issuance of SIGMET
- Clear and precise definition of dangerous phenomena that impact air operations at different latitudes in the Region.
- Common and harmonized procedures, to be used by the region
- Continuous monitoring of dangerous meteorological phenomena for air navigation
- Improvements in the issuance and availability of SIGMET for the Region
- Highly qualified and trained personnel throughout the Region.

10. Budget / Costs

Costs related to the following needs are foreseen:

- Establishment of the platform to share data and information on meteorological surveillance and decision making for the issuance of continuous and homogeneous SIGMETs.
- Education and training of human resources.

11. Main risks

- Short-term costs; States must take into account in their budget the initial costs involved in the implementation of the platform and the personnel training.
- Context of uncertainty: The COVID 19 pandemic maintains a state of uncertainty that affects project planning.
- Delays in signing bilateral agreements: Each State has an established procedure for signing these agreements. These internal procedures could delay the signing of these bilateral agreements.
- Failure to comply with agreed deadlines. The signing of bilateral agreements and the implementation of platforms to share information and data on meteorological monitoring would lead to a delay in the Region that does not allow sufficient flexibility in terms.

12. Possible disadvantage

No disadvantages that may be associated with the implementation of this project are detected at the moment.

13. Project deliverable

The following records are expected:

- Project design;
- Planning of activities to develop

- Gantt diagram or chart
- Model of bilateral agreements
- Coordination action procedures and associated spread sheets, format and monitoring responsibilities, and follow-up for the results report by country, as well as training for associated best practices (regularity, how, who)
- Technical bases for the development of a common web platform.

14. Deadlines

The estimated time for the development of the project is 3 years.

Attachment A - List of Acronyms

AFI/SAM	African/South America Regions
ATM	Air Traffic Management
CAR/SAM	Caribbean/South American Regions
DACH	Region comprising the countries Deutschland (Germany), Austria, and CH for Confoederatio Helvetica [in German (Die) Schweiz]
MET Division	Meteorology Division
FIR	Flight Information Region
GREPECAS	CAR/SAM Regional Planning and Implementation Group
IT	Information technology
METP	Weather Panel
NAMCon	Northern Europe Aviation Meteorology Consortium
ICAO	International Civil Aviation Organization
MWO - OVM	Meteorological Watch Office - Oficina de Vigilancia Meteorológica
PT-EAST	Project Team on Implementation of Meteorological Services in the Eastern part of the EUR
WMO	World Meteorological Organization – Organización Meteorológica Mundial

APPENDIX B
ICAO WEATHER INFORMATION EXCHANGE MODEL (IWXXM) IMPLEMENTATION

MET Project

Name of the Project	Regional implementation of the ICAO Meteorological Information Exchange Model (IWXXM)		
Date:	xx/xx/2022	Emisión: xx/xx/xxxx	Versión 1
Author:	SAM Regional Office		
Promoter:	GREPECAS		
Representative:	Armoa, Jorge		
Client:	States of the CAR/SAM Region		
ID Document:	xxx		
Link:	xxx		

Note: This document is valid only on the date it is printed.

Content	<ol style="list-style-type: none"> 1. Executive Summary 2 2. Problem Statement 2 3. Objective of the project 2 4. Guidance Documents 2 5. Estimated deadline 3 6. Implementation perspective 3 7. Actions for the implementation 5 8. Expected benefits..... 7 9. Budget / costs..... 7 10. Possible risks..... 7 11. Possible disadvantage..... 8 12. Project deliverables..... 8
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1. Executive Summary

Amendment 78 to ICAO Annex 3 establishes the mandatory use of the IWXXM meteorological information exchange model for the transmission and reception of meteorological data related to the following products: meteorological observations and reports (METAR and SPECI) including trend forecast (TREND), aerodrome forecasts (TAF), SIGMET and AIRMET information and advisory information on volcanic ash, tropical cyclones and space weather, in order to adapt the capabilities of the meteorological service to integrate an interoperable environment in the context of the future System-Wide Information Management (SWIM). Likewise, it is provided that the production of OPMET messages be developed in parallel in TAC format and IWXXM XML/GML format.

The States of the CAR/SAM Region have begun the process of adapting their aeronautical meteorology systems towards solutions compatible with IWXXM, by virtue of the commitments made. The current ongoing process is supported by publications and procedures developed by the Meteorological Experts Panel (METP) Working Group on Meteorological Information Exchange (WG-MIE), established with the purpose of providing assistance to the ICAO Member States in the implementation phase of version 3.0 of the IWXXM.

On the other hand, the SAM Region Implementation Group established the Interoperability Task Force (GT-INTEROP), with the aim of providing guidance to the States of the Region regarding the interconnection processes of the implemented aeronautical systems, in order to ensure interoperability between the systems used by air navigation services. The MET/IWXXM sub-group, which is part of GT-INTEROP, deals with the specific issues of exchanging OPMET messages in IWXXM digital format for the Region.

This document has the purpose of establishing a coordinated, harmonized and effective implementation methodology for the Region, considering the purposes of the global provisions.

2. Problem Statement

The rate of progress in the implementation of the IWXXM in the Region presents differences between the States that will affect the future regional and interregional exchange of OPMET data.

3. Objective of the project

Based on the available material and procedures, establish a regional methodology that defines coordinated, harmonized and effective actions to consolidate the regional implementation of the ICAO meteorological information exchange model (IWXXM).

4. Guidance documents

The guidance material available to guide implementation includes the following documents:

- Guidelines for the implementation of OPMET data exchange using IWXXM, Fourth edition, November 2020.
- ICAO Meteorological Information Exchange Model Manual, ICAO DOC 10003 Second Edition, 2019.
- System-Wide Information Management (SWIM) Concept Manual, Interim Advanced Edition, DOC 10039, 2015.
- Description of the external interfaces (SICD) for the OPMET Bank, CISCEA-ATECH.

5. Estimated term

It is estimated that IWXXM implementation will be consolidated in the CAR/SAM Region during the last quarter of 2025, based on the ATM plan described in the Global Air Traffic Management Operational Concept document (DOC 9854).

6. Implementation Perspective

The implementation of the IWXXM implies changes in the functionality of data processing with the purpose of reducing the size of the products, facilitating the regular and efficient flow of data and enabling its digital use. *Table 1* presents the overview of the evolution of the processes, included in the period 2022-2025.

Process	Current scenario 2022	New scenario 2025
Data production	<ul style="list-style-type: none"> • Production of data in TAC format. • From November 2020, data production must also use the IWXXM format. • Not all States have acquired the capacity to produce data in IWXXM format. • Use of AFTN and AMHS interface. 	<ul style="list-style-type: none"> • Parallel production of data in TAC and IWXXM format from the original source. • Use of the AMHS interface including FTBP. • Introduction of defined metadata. • Projection to stop producing data in TAC format.
Data aggregation	<ul style="list-style-type: none"> • Limited validation and compilation of the same type data in newsletters. 	<ul style="list-style-type: none"> • Introduction of defined metadata. • Regular meteorological messages (METAR, TAF) are aggregated, compressed and packaged using the WMO Feature Collection (COLLECT) model. • Generation of independent bulletins for each format (TAC / IWXXM).
Data switching	<ul style="list-style-type: none"> • Data routing according to the bulletin's WMO abbreviated heading structure. 	<ul style="list-style-type: none"> • Forwarding of compressed files using an AMHS interface with FTBP. • The WMO short header structure is part of the FTBP file name as a data identifier. • The filename extension will use the suffix gzip (.gz) for identification.

Table 1

The OPMET data management centers also need to adapt their processes and capacities to the needs of using the IWXXM for the exchange of meteorological information. *Table 2* presents the expected changes in a scenario close to the year 2025.

OPMET Center	Current scenario 2022	New scenario 2025
National OPMET Center (NOC)	<ul style="list-style-type: none"> • Collection and validation of messages required at the international level generated by originating agencies. • Compilation of national data in bulletins. • International distribution according to the regional distribution scheme. • Provision of data to national users. 	<ul style="list-style-type: none"> • Translation of national messages from TAC format to IWXXM. • Individual aggregation of IWXXM messages in bulletins. • Data compression and transfer to the responsible ROC
Regional OPMET Center (ROC)	<ul style="list-style-type: none"> • Collection of OPMET data generated by the NOCs in their area of responsibility. • Validation of all the data required in its responsibility area, in accordance with the regional distribution scheme. • Dissemination of data from its area of responsibility, required by other ROCs. • Provision of data from your responsibility area, required by the NOCs. 	<ul style="list-style-type: none"> • Recolección de datos OPMET de los NOC de su área de responsabilidad, en formato IWXXM. • Difusión de datos de su área de responsabilidad a otros ROC, en formato IWXXM. • Suministro de datos requeridos por los NOC de su área de responsabilidad, en formato IWXXM. • Collection of OPMET data from NOCs in its area of responsibility, in IWXXM format. • Dissemination of data from your area of responsibility to other ROCs, in IWXXM format. • Provision of data required by the NOCs in their area of responsibility, in IWXXM format.
International OPMET Data Bank	<ul style="list-style-type: none"> • Offers data interrogation/response capacity in TAC and IWXXM format through the AFTN and AMHS network. • Offers the ability to query/response OPMET data in IWXXM format, through web services using the Internet. 	<ul style="list-style-type: none"> • It is projected that the interrogation and access methods will be expanded, according to the needs that arise in the implementation process.

Table 2

7. Actions for implementation

Actions based on the participation of States, international organizations and interested parties are proposed. The collaborative approach is the critical factor of this initiative. The actions proposed are the following:

7.1 Establishment of support groups

The SAM Region Implementation Group (SAM/IG) has established the Region's Interoperability Task Force (GT-INTEROP), to support and promote air navigation services modernization projects and guarantee interoperability between automated systems used by AIM, ATM, ATFM, CNS, MET and SAR users. Likewise, the MET/IWXXM subgroup has been activated to comply with the specific issues of adapting the aeronautical meteorology system to the new IWXXM digital format.

In order to ensure that the implementation process meets the projected deadline, a collaborative approach is proposed that generates synergy based on the effort and participation of each State.

It is proposed to form groups of 3-4 countries, according to criteria to be determined, to develop coordinated and harmonized implementation actions. Each group will regularly coordinate its progress with the other groups, in order to harmonize implementation and make collaborative decisions.

Actions	Completion period
1. Convening letter to the States	1 week from approval
2. Meeting and establishment of groups	2 weeks from completion 1)
3. Presentation of the action plan for implementation	3 weeks from completion 2)
4. Progress report until the end of the plan	Every 4 months

7.2 Regional documents / guidance material to support implementation

The group of experts on meteorology (MET Panel-METP) has established the Working Group on Meteorological Information Exchange (WG-MIE) to assist ICAO Member States in IWXXM implementation actions. As a result, manuals and support guides have been disseminated that are being used as a reference worldwide.

It is necessary to adapt the available material to the structure of the regional system and the needs of the CAR/SAM States. Therefore, the development, publication and updating of documents related to the following matters should be promoted:

- Regional version of the document *Guidelines for the implementation of the exchange of meteorological information in IWXXM format*.
- Framework for exchange and conformance testing, at the regional and intra-regional level.
- Integration of OPMET messages with aeronautical information service messages.
- Agreements to establish data translation centers.

This initiative suggests establishing a team of experts in charge of the development of guide material oriented to the Region.

Actions	Completion period
1. Convening letter to the States	1 week from approval
2. Establish guide material development team	2 weeks from completion 1)
3. Presentation of work plan	3 weeks from completion 2)
4. Progress report until the end of the plan	1 month from the end 3)
5. Publication and dissemination	To be determined

7.3 Organization of interregional cooperation seminar

The IWXXM implementation process is of general interest to ICAO Member States, since it materializes the first transition step towards an interoperable environment that will benefit the global aviation community. It is proposed to request the cooperation of international organizations for the transmission of knowledge and experience according to the progress of implementation in their regions.

Actions	Completion date
Request for cooperation to designated organization	1 week from approval
Organization and invitation to virtual seminar	2 weeks from response of 1)
Development of virtual seminar	2 weeks from completion 2)
Presentation of conclusions and recommendations	2 weeks from completion 3)

7.4 Application of exchange and conformance tests

The regional and intra-regional meteorological information exchange tests in IWXXM format require a methodology that defines the test platform and the logistical support to be used by the regional system. Each State must form the appropriate team responsible for developing the data exchange tests, applying the agreed meteorology and maintaining the statistical record.

Actions	Completion date
1. Request formation of national team	1 week from approval
2. Establish and disseminate common methodology	3 weeks from completion 1)
3. Development of exchange and conformance tests	2 weeks from completion 2)
4. Conclusions and recommendations	1 week from completion 3)
5. Reschedule tests according to 4)	2 weeks from completion 4)
6. Test control report	Monthly

7.5 Application of regional guidelines for implementation

Each State is responsible for implementing the IWXXM format for the exchange of OPMET information in their national systems. The regional version of the document *Guidelines for the implementation of the exchange of meteorological information in IWXXM format* must be implemented by all the States of the Region to ensure coordinated and harmonized actions.

Actions	Completion date
1. Consultation with States on the status of implementation	1 week from approval
2. Request an action plan to comply with the guidelines	1 month from completion 2)
3. Follow-up control report until completion	every 2 months
4. Report of continuous improvement actions	every 6 months

8. Expected Benefits

The expected benefits of the implementation are:

- Implementation of the standards for the exchange of meteorological information.
- Integration of the meteorological service to an interoperable environment, according to the SWIM concept.
- Supply of integral and transparent meteorological information to the ATM.
- More effective support for collaborative decision making (CDM).
- Timely information for flow management and airspace capacity.

- Availability of increasingly accurate forecasts.
- Availability of timely information for processing in graphic format, with superimposition on other variables in a georeferenced environment.

9. Budget / Costs

Foreseen costs related to the following needs are:

- Adaptation of AMHS terminals to infrastructure compatible with the IWXXM format.
- Implementation of AMHS interconnections to facilitate the exchange of OPMET messages in IWXXM format.
- Education and training of human resources.
- Requirement of specialized personnel in the short term.

The implementation of IWXXM requires an initial investment, however it allows the future integration of information originated by other aeronautical services that need to be part of the SWIM digital environment, reflecting a consequent cost reduction.

10. Main risks

- Short-term costs. States must take into account in their budget the initial costs involved in the implementation of the IWXXM, as well as the medium and long-term benefits to the aviation system.
- Context of uncertainty. The COVID 19 pandemic maintains a state of uncertainty that affects project planning.
- Shortage of available specialists and experts. The administrations may have limited availability of appropriate human resources to provide support for the implementation.
- Failure to comply with agreed deadlines. The implementation of the IWXXM is behind schedule in the Region, which does not allow sufficient flexibility in terms.

11. Possible downside

Weak link between the operating systems and the organic units that managing them.

12. Project Deliverable

The following records are expected:

- Progress control of the IWXXM implementation in the CAR/SAM Region.
- Result of meteorological information exchange tests in IWXXM format.

Regional reference documents and advice for the implementation of the IWXXM.

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