Concept of Operations
for
Advisory Services for
Hazardous Meteorological Information
in Support of
International Air Navigation
and
Consistent with the
Global Air Navigation Plan
And the
Aviation System Block Upgrades

10 June 2016

Version 2.0

Version Control Table

Revision	Date	Description
0.1	16 July 2012	Initial draft. New document.
0.2	18 January 2013	Initial draft with comments from METWSG members.
0.3	February 2013	Revised draft.
0.46	April 2013	Draft sent out to METWSG members for second round of comments
0.5	August 2013	Draft sent to members of ad hoc group that was formed in 5th meeting of METWSG
0.6	August 2013	Draft revised according to comments of ad hoc group that was formed in 5th meeting of METWSG
0.7	28 September 2013	Editorial improvement to draft prior to consultation with METWSG members via correspondance
1.0	25 February 2016	Revised draft subsequent to Conjoint
1.01	7 April 2016	Updated draft to reflect revised ConOps outline.

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1.0 Introduction

This Concept of Operations (ConOps) document describes the **need** for and **use of** regional hazardous meteorological advisory information for operational decisions from the perspective of aviation decision-makers. This ConOps is not intended to describe **how** future regional hazardous meteorological advisory information is to be provided or by **whom** the future information is to be provided.

This ConOps updates the draft *Concept of Operations for Advisory Services for Hazardous Meteorological Conditions in Support of International Air Navigation*, Version 0.7 (28 September 2013), which was presented at the Conjoint World Meteorological Organization (WMO)/International Civil Aviation Organization (ICAO) Meteorology Divisional Meeting, 7 to 18 July 2014. It is intended to be a living document that will evolve as the operational need for and use of space information change over time.

1.1 Information Identification

Meteorological conditions present in the en route domain can adversely affect the safety of flight operations. Amongst others, the following meteorological phenomena can pose significant risks to flight operations:

- Thunderstorms
- Icing
- Clear-Air Turbulence
- Mountain Wave Turbulence
- Sand/duststorms

This ConOps only addresses the above en-route hazardous weather information that currently require the issuance of SIGMET but exclusive of volcanic ash and tropical cyclones.

Aviation decision-makers require observations and "warnings" of these phenomena to make informed operational decisions necessary to ensure the safety of flight, especially the location and time period when these conditions are of a severity that is considered hazardous.

The ICAO *Global Air Navigation Plan* (ICAO Doc. 9750, 4th Ed.) (GANP) identifies the need for SIGMETs to provide information on meteorological conditions that may affect the safety of aircraft operation under Improvement Area 2: Globally Interoperable Systems and Data, Aviation System Block Upgrade (ASBU) Block 0 Module B0-AMET Meteorological Information Supporting Enhanced Operational Efficiency and Safety.

The GANP further identifies the need for forecast and observed meteorological conditions that impact aerodromes or airspace for full Air Traffic Management (ATM)-Meteorology integration in ASBU Block 1 Module B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term). The GANP notes that enhanced safety through the avoidance of hazardous meteorological conditions is one of the benefits associated with Module B1-AMET.

1.2 Information Overview

Aviation decision-makers must know if a meteorological event will pose a hazard to the safety and efficiency of a flight operation. They must also know the potential impacts of a meteorological hazard

Commented [SY1]: Need to advise readers where these are covered.

Commented [SY2]: To cover all SIGMETs other than TC and volcanic ash but need to discuss amongst the workstream.

and the options for mitigating the risk of a hazard in accordance with applicable aviation regulations, operational rules, and business practices.

Information about meteorological conditions that could adversely affect the safety of flight are applicable to traffic flow planning and all aircraft operations in all domains en-route, regardless of the level of aircraft equipage. Thus, the following aviation decision-makers require observations and "warnings" of hazardous meteorological conditions:

- Operators
  - Flight Planners (or Support)
  - Dispatchers
  - Pilots
- Air Traffic Service
  - Air Traffic Control Service
  - Air Traffic Flow Management (sometimes referred to as Traffic Flow Management)

Observations of hazardous meteorological conditions primarily support decisions about in-flight route deviations and altitude changes to avoid the affected airspace. Observations also support decisions about en route deviations to an en route alternate airport if hazardous meteorological conditions prevent landing an aircraft at the intended destination.

"Warnings" of hazardous meteorological conditions primarily support decisions about en route deviations and pre-flight decisions regarding route and altitude selection and fuel loading. "Warnings" of airspace likely to be impacted by hazardous meteorological conditions also inform traffic flow management decisions about availability of routes and flight tracks, and metering and spacing of aircraft.

1.3 References

The following documents were referenced in developing this ConOps:

- *Annex 3 – Meteorological Services for International Air Navigation,* Part I, Chapters 3 and 7, and Part II, Appendix 6
- *Annex 11 – Air Traffic Services*, Chapters 4 and 7
- *Procedures for Air Navigation Services – Air Traffic Management* (ICAO Doc 4444), Chapter 9
- *Basic Air Navigation Plan*, Part IV and Facilities and Services Implementation Document (FASID) Tables MET 1B, 3A, and 3B
- *Regional Supplementary Procedures* (ICAO Doc 7030), Chapter 6
- *Global Air Navigation Plan* (ICAO Doc. 9750, 4th Ed.)
- *Manual of Aeronautical Meteorological Practice* (ICAO Doc 8896, 9th Ed., 2011)
- *Manual on Co-ordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (ICAO Doc 9377, 4th Ed., 2008)
- *Regional SIGMET Guides*

2.0 User Need Identification

Users require observation and "warning" about clear air turbulence, icing, mountain wave turbulence, thunderstorms and dust/sandstorm that may constrain operations along intended routes of flights or flight tracks and across FIRs. Users has expressed concern over the safety of operations in areas where en-route hazardous meteorological information are rarely available.

Moreover, a lack of coordination between neighbouring Flight Information Regions (FIR) may lead to inconsistent information of hazardous weather across FIR boundaries, users indicated the need for globally-consistent, phenomena-based information that transends FIRs about the location (both present and future), extent (vertical, horizontal, and temporal), and intensity of potential hazards caused by meteorological phenomena that impact flight operations along intended routes or flight tracks. This information must be in a format that is usable by multiple aviation decision-makers, including automated decision support tools (DST) in the time frame of ASBU block 1.

2.1 Operators

Operators are entities engaged in the conduct of domestic and international flights. Operators are responsible for the safe and efficient conduct of flight operations and need to know the potential for hazardous conditions caused by meteorological phenomena.

Typically, operators have two distinct functions: flight planning and flight operation. In larger operators, these are usually separate roles performed by different individuals. Smaller operators may combine these roles and require flight crew members to fulfill both the flight planning and flight operation functions.

2.1.1 Flight Planners and Dispatchers

Flight planners and dispatchers are generally responsible for flight planning, route selection, and fuel loading. In some instances, these roles may also be responsible for en route deviations that require re-filing a flight plan.

Flight planners and dispatchers use en route hazardous weather information to plan routes that allow flights to fly through airspace in which the risk of encounter hazardous meteorological conditions is low. The planned routes dictate the amount of fuel required to complete the flight to the intended destination and appropriate alternate destinations. Since some meteorological phenomena are difficult to avoid through tactical aircraft movements, the pre-flight decisions about route selection and fuel loading are critically important to allow flights to avoid the adverse impacts of hazardous meteorological conditions.

Enhanced forecasts and "warning" of potentially hazardous meteorological conditions could improve the safety and efficiency of flight operations. This information will result in improved utilization of airspace because the potential airspace constraints associated with hazardous weather conditions will be better understood allowing flight planners and dispatchers to plan the safest and most efficient routes. This will lead to cost savings for operators through decreased fuel consumption and minimize the potential for flights to encounter hazards caused by meteorological conditions. In order to achieve maximum utility, this information should be available to flight planners and dispatchers in a format that can be ingested by automated DSTs in the time frame of ASBU block 1. Currently the requirement for

forecasts of potentially hazardous meteorological conditions is met by the gridded forecasts by the World Area Forecasts System (WAFS).

2.1.2 Pilots

Pilots are responsible for safely conducting flight operations. For some operators, particularly those of a smaller scale, pilots may also fulfill the flight planning responsibilities described in Section 2.1.1. This section addresses only the use of hazardous weather information when pilots are conducting flight operations.

Pilots use hazardous weather information to make tactical decisions regarding en route altitude changes deviations to avoid hazardous conditions. For most air carriers, pilots need to coordinate any deviations or re-routing that result in re-filing a flight plan with flight planners and dispatchers to ensure that the fuel onboard is sufficient to complete the new route. These decisions are based on both observations of potentially hazardous conditions, such as turbulence, often provide by other pilots, and "warnings" of airspace likely to be affected by hazardous meteorological conditions.

Enhanced, in-situ observations and "warnings" of hazardous meteorological conditions are needed to enable en route course and altitude changes. This information will allow pilots to make decisions about altitude changes and coordinate en route deviations with flight planners and dispatchers before the aircraft encounters hazardous conditions caused by meteorological phenomena. This will lead to a reduction in the risk of aircraft encountering en route hazardous meteorological conditions.

2.2 Air Traffic Service

Air Traffic Service (ATS) is a generic term referring to flight information service, alerting service, air traffic advisory service, and air traffic control service (area control service, approach control service, or aerodrome control service). The three components of ATS that most require hazardous weather information are Flight Information Service (FIS), Air Traffic Flow Management (ATFM) and Air Traffic Control Service (ATCS).

2.2.1 Flight Information Service

FIS is a service established for the purpose of giving advice and information useful for the safe and efficient conduct of flights. Information required includes the provision of pertinent en-route hazardous "warning" information. FIS thus requires the availability of en-route hazardous weather "warnings" to meet its obligation.

2.2.2 Air Traffic Flow Management

ATFM is a service established with the objective of contributing to a safe, orderly, and expeditious flow of air traffic by ensuring that Air Traffic Control capacity is utilized to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

ATFM plans the flow of air traffic through airspace based on filed flight plans and known or forecast constraints, particular those caused by weather. ATFM also identifies the flight tracks that will be used for trans-oceanic flights.

Enhanced “warnings” of the impact of hazardous weather conditions on airspace will enable ATFM to maximize the flow of aircraft through the airspace. For airspace not supported by meteorological services for ATM, ATFM could use the enhanced “warning” information to begin planning aircraft flows through affected airspace in a more timely manner. The enhanced “warning” information is especially important for the oceanic flight tracks in which aircraft are sequenced and separated in advance of entering the airspace and there is limited ATC surveillance and communication. Similar to the FOCs, flight planners, and dispatchers, ATFM requires the enhanced “warning” information in a format that can be ingested by automated DSTs in the time frame of ASBU block 1.

2.2.3 Air Traffic Control Service

ATCS is a service provided for the purpose of preventing collisions between aircraft and, on the maneuvering area, between aircraft and obstructions. ATCS also expedites and maintains the orderly flow of air traffic.

For airspace not supported by meteorological services for ATM, ATCS could use the enhanced observation and “warnings” of the impacts of hazardous weather conditions to plan for the potential and actual disruptions to the use air routes, oceanic tracks, and arrival and departure procedures. ATCS could use the enhanced observation and “warning” information to temporarily discontinue the use of certain arrival and departure procedures that are impacted by hazardous weather conditions and increase the separation distance between aircraft. The enhanced “warning” information, along with in situ observations, could also be used by ATCS to help manage requests for route deviations and altitude changes from aircraft that may be affected by meteorological phenomena causing hazardous conditions.

3.0 Current Capability Assessment

Currently, MWOs established by the States with ATS responsibilities provide SIGMETs for en-route hazardous meteorological conditions for their area(s) of responsibility, in accordance with Annex 3. The SIGMETs are valid for up to four hours and describe, in coarse terms, the location and expected location of the en route hazardous meteorological condition within the area of responsibility of the MWO. They are disseminated via established ICAO communication networks and systems and then used by flight planners, dispatchers, pilots, Flight Information Services (FIS), ATFM, and ATCS for flight planning and tactical decisions in order to avoid impacts from the expected or occurring hazardous meteorological conditions.

The SIGMETs are made available to aircraft in-flight by the ATS units through VOLMET/D-VOLMET, ACARS or other communication means. They are distributed globally on AFTN via regional OPMET data banks and are provided to the world area forecast centers (WAFCs) for distribution to users via the Secure SADIS FTP service and the WAFS Internet File Service (WIFS).

4.0 Anticipated Change Identification (Shortfall Analysis)

It is recognized that there are long-standing deficiencies in some FIRs. The lack of issuance or incorrect formulation of SIGMETs to advise operators on hazardous meteorological conditions constitutes a safety risk to international air navigation.

MWOs are established by the States that have accepted responsibility for providing ATS within a FIR but en route hazardous meteorological conditions often extend across FIR boundaries. In addition, the lack

of coordination between MWOs, different forecasting methodologies, and/or issuance times, often leads to inconsistency in describing the timing, location and intensity of the en route hazardous meteorological conditions across FIR boundaries. The problem is particularly acute in regions where the FIRs are small and irregular and as a result could have multiple inconsistent SIGMET messages for the same phenomenon. The need to interpret multiple SIGMET messages increases the workload of the flight planners, dispatchers, and pilots, and could lead to information overload.

Limited by the existing science and technology and thus the predictibility, and according to Annex 3 requirements, the forecast lead time for en route hazardous meteorological conditions is only 4 hours. Moreover, the "warning" area is usually much larger than the actual phenomenon and lacks the granularity and precision required for making avoidance during flight planning practically impossible because it would be too costly to operators to avoid the entire "warning" area. As a result, avoidance of en route hazardous meteorological conditions is currently mostly by way of tactical re-routing and extra fuel is carried by the aircraft to allow for en route avoidance of these hazardous conditions. However, this is both an inefficient airspace and costly for operators.

SIGMETs provide a simple outline of the en route hazardous meteorological condition (observed and forecast), which is often an over simplification due to the format requirements (limited number of vertices/points). Also, the base and top is an over simplification. Moreover, while the detailed format of SIGMET is available in Annex 3, Appendix 6, significant deficiencies in SIGMET format compliance and incorrect routing of SIGMETs have been identified. Furthermore, the SIGMET messages, in traditional alphanumeric code (TAC) format, cannot be easily interpreted by automatic flight planning systems or sophisticated DSTs and are laboriously readable and understood by pilots when many hazardous weather location details are provided.

In summary, the following shortfalls with the current provision of hazardous meteorological conditions have been identified:

a) A lack of MWO resources, in terms of infrastructure and competent personnel to support the issuance of SIGMET;
b) Significant deficiencies in SIGMET format compliance and incorrect routing of SIGMET which prevents users from receiving these time critical messages due to incorrect format that leads to the rejection of messages in automated systems;
c) A lack of coordination between neighboring FIRs leading to inconsistent timing, location and intensity information of hazardous weather "warnings" across FIR boundaries exacerbated by differences in available infrastructure, training and working practices between MWOs;
d) Short lead-times in the availability of SIGMET and the lack of granularity in the "warning" position, makes strategic re-routing practically impossible; and
e) Difficulty of ingesting existing SIGMET messages into automatic flight planning systems or DSTs due to non-interoperable formats.

In future operational environment, the following enhancements to en route hazardous weather information are necessary:

- Improved "warning" of airspace likely to be impacted by hazardous meteorological conditions.
- Information that is consistent across FIR boundaries.

- From the user perspective, a “single answer” about the impact of hazardous weather conditions along an intended route of flight.
- Information that is can be understood by and is meaningful to aviation decision-makers.
- Information disseminated in a format that is ingestible by automated DSTs.

5.0 Concept Definition

The operational concept is based on the identified user need for information about hazardous meteorological conditions, the shortfalls in the provision of such information to aviation decision-makers, and how enhanced information is likely to be used in future operations.

5.1 Objectives and Scope

The objective of this concept is to describe the information to be provided to improve the safety and efficiency of international air navigation when hazardous meteorological conditions may adversely affect operations.

Since hazardous meteorological conditions often extend beyond single FIR boundaries and can impact long-haul flight operations, the scope of the information required to satisfy the needs described in this concept covers local, sub-regional, regional, and multi-regional.

5.2 Potential Benefit of New or Modified Information

Use of the enhanced “warning” of hazardous meteorological conditions is expected to result in the following benefits:

- Elimination of long-standing deficiencies in the issuance of SIGMETs in certain regions.
- Safer global flight operations, especially on routes that traverse multiple FIRs, through avoiding airspace with a high potential for hazardous meteorological conditions.
- More efficient global flight operations, especially on routes that cross multiple FIR boundaries, through improved flight planning resulting in fewer en route course and altitude adjustments.
- Reduced workload for flight crew, ATFM, and ATCS to accommodate en route course and altitude changes.

5.3 Description of Change in Operational Decision Environment that Produces the Benefit

Initially, in regions where there is a long-standing SIGMET deficiency, MWOs may start to issue the SIGMET after receiving advisory about hazardous meteorological conditions from a designated center. However, some MWOs may still be unable to issue a SIGMET. Thus, to achieve the full benefit of the concept, the hazardous weather advisory information would be made available simultaneously to both MWOs and operators. Thus, operators would have to determine whether to use the SIGMET or the advisory provided by the designated center and incorporate the information into decision making processes.

Eventually, the hazardous meteorological advisory information provided by the designated center replaces the existing SIGMET product produced by MWOs. This advisory information will need to be incorporated into operators’ decision-making processes, including those that support safety management system implementation.

5.4 Operational Scenario(s)

This ConOps describes two operational scenarios for the use of improved forecasts of hazardous meteorological conditions. The first scenario represents the initial stage before SIGMET is replaced by the advisory by the designated center. The second scenario describes an operational environment after the advisory by the designated center replaces the existing SIGMET product produced by MWOs.

5.4.1 Scenario 1

The designated centers would monitor the meteorological conditions and forecast the occurrence of thunderstorms, icing, clear air turbulence, mountain wave turbulence and dust/sandstorm and issue advisory to MWOs and operators. The MWO issues a SIGMET based on the information provided by the designated center. A thunderstorm is used to illustrate the information below:

1) An extended area of thunderstorm was identified on the satellite picture, the designated center initiates collaborative decision making (CDM) discussion;
2) Potential area for TS development may affect FIR A and FIR B;
3) MWO A participated in CDAF discussion with MWOs within its area of responsibility and neighbouring centers and MWO A and designated center agreed on the "warning" area. MWO B did not contact the designated center;
4) The designated center issues forecast information for area of TS covering portions of FIRs A and B;
5) MWO A receives information for the designated center and issues TS SIGMET for FIR A;
6) MWO B did not issue TS SIGMET for FIR B;
7) AOC receive SIGMET for FIR A, and hazardous meteorological conditions information from the designated center which provides TS information of both FIR A and B. AOC use the SIGMET for FIR A which has higher priority than the information from the designated center but uses the hazardous meteorological advisory information from the designated center for FIR B as MWO B does not issue any SIGMET; and
8) ATS A broadcast SIGMET for FIR A; ATS B broadcast the advisory information from the designated provider for FIR B.

5.4.2 Scenario 2

In this scenario, FIR-based SIGMETs produced by MWOs would be completely replaced by phenomena-based advisory information provided by a designated provider. A turbulence situation is used to illustrate the flow of information in this scenario:

1) Pilot reported severe turbulence to ATS A;
2) MWO A or ATS A issued a special air-report based on the pilot report;
3) Designated provider receives the pilot report, and determines that the phenomenon will continue to affect FIR A and FIR B;
4) Designated provider initiates a CDAF discussion with MWOs within its area of responsibility and neighbouring centers;
5) MWO A participated in CDAF discussion but not MWO B;
6) Designated center issues advisory of severe turbulence covering portions of FIRs A and B;
7) AOC receive advisory for FIR A and B;
8) ATS A and B broadcast hazardous weather information issued by designated provider.

5.5 Assumptions and Constraints

This ConOps is based on the assumptions and constraints described in this section.

5.5.1 Assumptions

The concept definition described in this ConOps is based on the following assumptions:

- Text and graphic based advisory information would serve as an immediate interim solution for the end users until digital information can be used by appropriate decision support tools and be made available;
- The SIGMET could be replaced by the advisory information to better meet the operational needs of aviation decision-makers;
- A process will be established to select the Provider States to take up the role to issue advisory information for the transition. Centers could be set up in the interim in other ICAO Regions to prepare for transition for improved harmonization, efficiency and cost reduction.
- MWOs will continue to have a role after the advisory information from the designated center replaces SIGMET through the provision of necessary data (e.g. pilot report) for preparation and verification of the advisory information and through CDAF and supporting its associated ATM; and
- The advisory Provider State will have sufficient competent staff and infrastructure to operate the center, e.g. real-time access to state-of-the-art numerical models to support forecasts, real-time access to satellite and other remote sensing equipment data.

5.5.2 Constraints

The following constraints may limit or delay the final transition to and utilization of hazardous weather advisory information to meet the identified user needs as describe in this ConOps:

- Given that each State decides on what / how information will flow within its borders, States might not agree to the use of advisory in place of SIGMET;
- Cost recovery issues will be required to be resolved in time for cost recovery of services related to the provision of advisory information.

5.6 Operational Policies

The production and dissemination of globally-consistent, phenomena-based hazardous meteorological conditions will require changes in policy regarding the information available for flight documentation, as well as retention of information by the service provider.

Appendix A: Acronyms and Glossary

A.1 Acronyms

Acronym	Term
ACARS	Aircraft Communications, Addressing and Reporting System
AFTN	Aeronautical Fixed Telecommunication Network
AOC	Airline Operation Centre
ASBU	Aviation System Block Upgrade
ATCS	Air Traffic Control Service
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Service
CDAF	Collaborative Decision Analyses and Forecast
CDM	Collaborative Decision Making
ConOps	Concept of Operations
DST	Decision support tools
FIR	Flight Information Region
FIS	Flight Information Services
GANP	Global Air Navigation Plan
ICAO	International Civil Aviation Organization
MWO	Meteorological Watch Office
OPMET	Operational Meteorological Information
SADIS	Secure Aviation Data Information Service (formerly Satellite Distribution System)
SIGMET	Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations.
SWIM	System-Wide Information Management
TAC	Traditionial alphanumeric code
VOLMET	Meteorological information for aircraft in flight
WAFS	World Area Forecast System
WIFS	WAFS Internet File System
WMO	World Meteorological Information

A.2 Glossary

Glossary	Definition
Annex 3	Annex 3 to the Convention on International Civil Aviation – Meteorological Service for International Air Navigation
Annex 11	Annex 11 to the Convention on International Civil Aviation – Air Traffic Services
MET/14	14th Meteorological Divisional Meeting
CAeM-15	Fifteenth Session of the Commission for Aeronautical Meteorology

Appendix B: Historical Review

B.1 There is a significant and long-standing SIGMET deficiency in some Flight Information Regions (FIRs) and harmonisation issues across the current State FIR boundaries. Users have expressed concern over the safety and efficiency of operations in areas where SIGMETs are rarely, if ever, issued for en-route hazardous meteorological conditions. The inconsistent severity and horizontal and vertical extent at FIR boundaries, due to differences in methods and working practices between Meteorological Watch Offices (MWOs) also created significant flight management issues. While noting that some States and MWOs are providing valuable, quality and efficient en-route hazardous weather information through on-going investment in related infrastructures, users have expressed their preference for phenomenon-based rather than FIR-based en-route hazardous weather information service.

B.2 The matter was discussed at the Conjoint International Civil Aviation Organization (ICAO) Meteorology Divisional Meeting (2014) (MET/14) and Fifteenth Session of the Commission for Aeronautical Meteorology (CAeM-15) of the World Meteorological Organization (WMO). The meeting agreed with the development of such a regional hazardous weather advisory system which should evolve in line with the GANP and that the information produced within the framework of the system should be integrated into the future System Wide Information Management (SWIM) environment. The meeting agreed that an initial phase of issuing advisories to MWO would serve as a precursor to the next two phases of further regional hazardous weather advisory provision development. The meeting noted the need for appropriate guidance material and formulated the following recommendation:

Recommendation 2/9 — Implementation of a regional advisory system for select en-route hazardous meteorological conditions

That an appropriate ICAO expert group, in close coordination with WMO, be tasked to:

a) expeditiously develop provisions supporting the implementation of a phenomenon-based regional advisory system for select en-route hazardous meteorological conditions consistent with the evolving *Global Air Navigation Plan* (GANP) (Doc 9750), in considering users' long-standing requirements, especially in those States where notable SIGMET-related deficiencies persist using, as appropriate, the strategic, governance and cost-recovery assessments provided in Appendices D and E;

b) integrate the information produced by the referred system into the future system-wide information management environment underpinning the future globally interoperable air traffic management system; and

c) develop appropriate guidance material to support the selection criteria of regional hazardous weather advisory centres taking account of cost-effectiveness, the processes for the preparation and dissemination of the advisory information, mutual cooperation, sustainability of the existing meteorological infrastructure and use of local expertise.

Note.— Select hazardous meteorological conditions in this context includes, as a minimum, thunderstorms, icing, turbulence and mountain waves, but excludes volcanic ash and tropical cyclones

B.3 In response the MET14 Recommendation 2/9, the Meteorology Panel (METP) developed a Job Card for 'Implementation of a regional advisory system for select en-route hazardous meteorological conditions' (Job Card METP.007.01) to increase safety and efficiency by keeping aircraft operations out of areas of hazardous meteorological conditions.

Title	Implementation of a regional advisory system for select en-route hazardous meteorological conditions	**Reference**:	MEPT.007.01
Source	MET Divisional Meeting 2014 (Recommendation 2/9)		
Problem Statement	Long-standing deficiencies in the reporting and forecasting of en-route hazardous meteorological conditions have persisted for many years in some regions with an identified need for a phenomenon-based system.		
Specific Details (including impact statements)	It was recommended by the MET Divisional Meeting (Recommendation 2/9) that an appropriate ICAO expert group, in close coordination with WMO, expeditiously develop provisions supporting the implementation of a phenomenon-based regional advisory system for select en-route hazardous meteorological conditions considering users' long-standing requirements for those States where notable SIGMET-related deficiencies persist. Such requirements should be integrated into the SWIM environment with appropriate guidance to support the selection criteria of centres. Further development should take into consideration the main legacy tasks from the Meteorological Warnings Study Group (METWSG) that relate to en-route hazardous meteorological conditions.		
Expected Benefit	Increase safety and efficiency by keeping aircraft operations out of areas of hazardous meteorological conditions.		
Reference Documents	Annex 3 — *Meteorological Service for International Air Navigation*, *Global Air Navigation Plan* (Doc 9750), *Manual of Aeronautical Meteorological Practice* (Doc 8896).		Attachments
Primary Expert Group:	METP		

WPE No.	**Document affected**	**Description of Amendment proposal or Action**	**Supporting Expert Group**	**Expected dates:**		
				Expert Group	**Effective**	**Applicability**
	Annex 3	Proposals for inclusion in Amendment 78 to Annex 3 to establish a regional advisory system to meet operational requirements in line with the GANP and to integrate the information on the provision of hazardous weather into the SWIM environment.		Sep 2016	Jul 2018	Nov 18
	Docs 8896	Update related guidance material to support the implementation of Annex 3 Amendment.		Sep 2016	Jul 2018	
	N/A	Develop criteria necessary for ICAO Regions to select advisory centres		Sep 2016		
	Regional Air Navigation Plans	Based on Annex 3 provisions, update of the plans as necessary.				
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015	Session/Meeting: 199-9			