



International Civil Aviation Organization

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, Canada – 17 to 21 October 2016

REPORT FOLDER

The material in this report has not been considered by the Air Navigation Commission. The views expressed therein should be taken as advice of a panel of experts to the Air Navigation Commission but not as representing the views of the Organization. After the Air Navigation Commission has reviewed this report, a supplement setting forth the action taken by the Air Navigation Commission thereon will be issued to this report.



METP/2
4/11/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

GENERAL

The attached constitutes the general part of the report and should be inserted at the appropriate place in the yellow folder.

**SECOND MEETING OF THE
METEOROLOGY PANEL (METP) (2016)**

LETTER OF TRANSMITTAL

To: President, Air Navigation Commission

From: Chairman, Meeting of the Meteorology Panel (METP)
(2016)

I have the honour to submit the report of the second meeting of the Meteorology Panel (METP) which was held in Montréal, from 17 to 21 October 2016.

Mr. Peter Lechner
Chairman

Montréal, 21 October 2016

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- 8.2 Annex 3 amendment proposals from other sources
- 8.3 Future work and future meetings
- 8.4 Any other business

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* Recommendations annotated "RSPP" relate to proposals for amendment of Standards, Recommended Practices and Procedures for Air Navigation Services or guidance material in an Annex.

MEETING OF THE METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

HISTORY OF THE MEETING

1. DURATION

1.1 The second meeting of the Meeting of the Meteorology Panel (METP) was opened by the President of the Air Navigation Commission in Montréal, at 0930 hours on 17 October 2016. The meeting ended on 21 October 2016.

1.2 Mr. Farid Zizi (President of the Air Navigation Commission (ANC)) provided some opening remarks to the panel. Mr Zizi noted that the ANC was appreciative of the project management approach taken to the delivery of the work programme, noting that other panels had been encouraged to adopt similar working practices. He drew the panels attention to ongoing work regarding the update of the Global Air Navigation Plan and encouraged the METP to be fully engaged in the process which was already in place. Mr. Zizi also highlighted the work plan prioritization which was about to be undertaken by the ANC with assistance from the Secretariat and the panels concerned, this work would assist in the delivery of the key elements of the GANP. Mention was made of the All Panel website which had been designed to allow all panel members access to the overall work programme relating to air navigation. Finally, Mr. Zizi noted that some ground breaking work was being undertaken by the METP including the development of provisions relating to space weather and a number of issues relating to cost recovery and governance. The METP was encouraged to tackle these issues and share its thoughts for the benefit of many sectors within the aviation industry.

2. ATTENDANCE

2.1 The meeting was attended by members and observers nominated by eighteen Contracting States and six international organizations, as well as by advisers and others as shown in the list below:

Members	Advisers	Nominated By
Claudia Ribero		Argentina
Sue O'Rourke	Michael Berechree	Australia
Bill Maynard	Gilles Ratté Brian Grechuk	Canada

	Éric Dupuis Mario Ouellet Karine Dumas Larisa Trichtchenko	
Rodrigo Fajardo		Chile
Zhongfeng Zhang	Juan Zou Chi-ming Shun Sharon Lau Xiao Xin Zhang	People's Republic of China
Ivan Gonzales Valdez		Cuba
Christiane Givone	Fabien Masson Stéphanie Desbios	France
Dirk Engelbart	Klaus Sturm	Germany
Jun Ryuzaki	Mamoru Ishil Naoko Komatsu Nobuhiro Watanabe	Japan
Peter Lechner	Norm Henry Keith Mackersy	New Zealand
Yuliya Naryshkina	Larisa Nikitina Gamalak Vareldzhian Vyachislav Burov Dimitry Moryakov	Russian Federation
Maluta Tshifaro		South Africa
Colin Hord	Nigel Gait	United Kingdom
Richard J. Heuwinkel	Thomas J. Helms Jr. Steven Albersheim	United States

	Michael Patrick Murphy	
	Larry Burch	
	William H. Bauman, III	
Moise Betole Ada		ASECNA
Dennis Hart		EUROCONTROL
	Graham Rennie	IATA
	Hans-Rudi Sonnabend	
	Fernando Rodriguez	
	Kristin Kopka	
Klaus Sievers	Carole Couchman	IFALPA
Matthew Tucker		IFATCA
Dimitar Ivanov	Ian Lisk	WMO
	Greg Brock	

Observers

Abdulla al Mannai	Qatar
Yusef Cakmak	Turkey
Zambrano Peidy	Venezuela

3. OFFICERS AND SECRETARIAT

3.1 Mr. Peter Lechner (New Zealand) and Mr. Bill Maynard (Canada) continued as Chair and Vice-Chair of the panel respectively and supported by the meeting for the period to the end of 2018. This represents a six-month extension on the original three-year appointment. Mr. Neil Halsey, Technical Officer (Airport Operations and Interoperability), and Mr. Raul Romero, Technical Officer (Airspace Management and Optimization), acted as Secretaries for the meeting.

4. AGENDA OF THE MEETING

4.1 The agenda for the meeting shown hereunder was approved by the Air Navigation Commission:

Item 1: Opening of the meeting and introductory remarks

- 1.1 Welcome address
- 1.2 Introduction
- 1.3 Organization and administrative notes
- 1.4 Review of the agenda and timetable

Item 2: Working methods of the panel

- 2.1 Status of METP work programme

Item 3: Meteorological requirements and integration

- 3.1 Meteorology requirements to support trajectory-based operations (TBO)
(*Ref: Job-card METP009.01*)
- 3.2 ASBU-MET development (*Ref: Job-card METP002.01*)
- 3.3 PANS-MET development (*Ref: Job-card METP005.01*)

Item 4: Meteorological information service development

- 4.1 Radioactive material in the atmosphere (*Ref: Job-card METP006.01*)
- 4.2 Space weather (*Ref: Job-card METP009.01*)
- 4.3 Volcanic ash (*Ref: Job-card METP003.01*)
- 4.4 Regional hazardous weather advisories (*Ref: Job-card METP007.01*)
- 4.5 World area forecast system (*Ref: Job-card METP010.01*)

Item 5: Meteorological information exchange (*Ref: Job-card METP004.01*)

Item 6: Meteorological operations group

- 6.1 World area forecast system (*Ref: Job-card METP010.01*)
- 6.2 SADIS/WIFS (*Ref: Job-card METP008.01*)
- 6.3 Volcanic ash (*Ref: Job-card METP003.01*)

Item 7: Cost recovery guidance and governance (*Ref: Job-card METP011.01*)

Item 8: Additional items

- 8.1 Implementation requirements for each of the work programme deliverables
- 8.2 Annex 3 amendment proposals from other sources
- 8.3 Future work and future meetings
- 8.4 Any other business

5. **WORKING ARRANGEMENTS**

5.1 The panel met as a single body, with ad hoc drafting groups as required. Discussions in the main meeting were conducted in English. Working papers were presented in English only. The report was issued in English.

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METP/2
4/11/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 2

The attached constitutes the report on Agenda Item 2 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 2: Working methods of the panel**2.1 STATUS OF THE METP WORK PROGRAMME**

2.1.1 The MET work programme was addressed under Agenda Items 3 to 8.

2.1.2 In a related issue the Panel discussed WP/0001 related to the roles and responsibilities of the individual working groups. In this regard it was noted that although the functional-based framework of the METP working groups had been quite successful, there was some uncertainty about the roles and responsibilities that should be addressed to ensure the continued efficient functioning of the METP.

2.1.3 The Panel was reminded that it agreed that its work programme would be carried out primarily through the following four working groups: Meteorological Information Exchange (WG-MIE), Meteorological Information and Service Development (WG-MISD), Meteorological Operations Groups (WG-MOG) and Meteorological Requirements and Integration (WG-MRI).

2.1.4 In this regard there was no doubt that the original functional framework for the METP Working Groups led to the successful completion of a significant work programme in a relatively short amount of time. However, it was indicated that a lack of clarity about the specific responsibilities of the working groups in a couple of functional areas persisted.

2.1.5 It was noted that the Job Cards assigned by the ANC to the METP were almost exclusively based on the recommendations of the 2014 Meteorology Divisional meeting (Montreal, 7-18 July 2014). In addition, the current work programmes of the METP Working Groups was driven by deadlines for the inclusion of proposed SARPs in Amendment 78 to Annex 3. However, in the future the METP work programme would be greatly influenced by the need for MET information to support the implementation of specific operational capabilities described in the Aviation System Block Upgrades described in the Global Air Navigation Plan (Doc 9750, 4th ed.).

2.1.6 It was therefore noted that the need for a robust strategic analysis and planning function prior to the development of performance requirements for any specific MET information to meet user needs was pivotal.

2.1.7 Similarly, the Panel noted that the requirements development process did not reflect the important operational oversight function of the METP on the work of the former MET Operations Groups to monitor performance of existing MET information provision systems and ensure continuity of service. The end-to-end work flow process should show both this activity, as well as the management of ongoing improvements to existing information and services by the WG-MOG.

2.1.8 The Panel therefore concluded that the responsibilities of the working groups should be adjusted where necessary to be consistent with the functional roles in the end-to-end work flow to be finalized by METP.

2.1.9 The Panel agreed that the responsibilities of the Ad Hoc Group on MET Cost Recovery Guidance and Governance(MCRGG) were also unchanged. However, the output of the MCRGG group could significantly impact the work of the WG-MISD, WG-MOG, and WG-MRI if there are substantive changes in the cost recovery mechanisms for aeronautical MET information. The Panel was of the view

that since the MCRGG effort was likely to continue for some time, it should be referred to as a Working Group of the METP to clarify the likely longevity of its work programme.

2.1.10 In discussion around the manner in which the Panel undertakes its tasks and manages its work through a formal structure, a comment was made that the Management Group did not contain anyone from Asia, and that such an addition might be advantageous. While the Chairman noted that there were in fact 2 people from the Asia/Pacific Region, there were none from Africa or South America. While the Management Group was a functional element of the Panel, it had no particular obligation to be geographically representative, however, the Chairman undertook to give the matter further consideration.

2.1.11 Given the discussion above the Panel agreed to continue with the work on the review, assessment and update to the functional framework for METP Working Groups and to update the METP Terms of Reference as necessary.

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METP/2
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METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 3

The attached constitutes the report on Agenda Item 3 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 3: Meteorological requirements and integration

The WG-MRI Rapporteur, Dennis Hart, informed the Panel that six working papers (WP) and two information papers (IP) were delivered to the meeting pertaining to the work completed or in progress by work streams under MRI.

During the intersessional period, the WG-MRI met in Washington, D.C., on 18-20 November 2015 and in Montreal on 14-15 July 2016, back to back with WG-MISD meetings.

Mr. Hart thanked the three activity leaders (Stéphanie Desbios, Rick Heuwinkel and Michael Berechree) and all other WG-MRI members for their support and contributions to the work to date.

3.1 METEOROLOGY REQUIREMENTS TO SUPPORT TRAJECTORY-BASED OPERATIONS (TBO)

3.1.1 The Panel noted that Activity 1 of METP/WG-MRI, supporting the ATMRPP in finalising the Meteorological Information Integration for Trajectory Based Operations Concept, had been concluded in December 2015. The members of the WG-MRI had provided inputs to the last iterations of this document and the ATMRPPP in their November 2015 meeting had approved the document for further consideration.

3.1.2 The Panel was informed that the METP/WG-MRI observed that the notion ‘trajectory based operations’ used in the title of the Concept could be misunderstood with respect to the scope and purpose of the document. Some considered trajectory based operations (TBO) as one specific module in the ASBU methodology and consequently limited in scope with respect to the required information. Others considered TBO as the overall encompassing concept to describe the future state of international air navigation.

3.1.3 Further deliberations with the ATMRPP chairman and Secretariat led to a modification of the title ensuring that the scope, ATM in the widest sense, could not be misunderstood. The group agreed that the revised title would be: Concept for the integration of Meteorological information for ATM.

3.1.4 Given the above discussion, the Panel agreed that the Concept for the Integration of Meteorological Information for ATM should be published as soon as possible and that the ATMRPP should be informed accordingly by the Panel secretariat.

Decision 3/1 — Publication of the document *Concept for the Integration of Meteorological Information for ATM*.

That, the document *Concept for the Integration of Meteorological Information for ATM* be published in the most appropriate form as soon as possible.

3.1.5 Based on the Concept for the integration of Meteorological information for ATM, activity 2 of the METP/WG-MRI would provide further detail to the requirements for MET information and the integration into ATM. A first iteration of ‘functional’ requirements for all ASBU modules identified was planned for December 2016 followed by the development of ‘performance requirements’ over 2017. It was also noted that the distribution of detailed roles and responsibilities for developing

functional and performance requirements was also further subject of discussion in the METP Management Team meeting in order to support the most efficient ways of working of the Panel.

3.1.6 After careful consideration, the METP/WG-MRI had reached consensus on the structure and framework to apply in detailing requirements. The proposal was to document requirements per ASBU module and for which it identifies the MET information required enabling the successful implementation of such a module.

3.1.7 Additionally, the Panel noted that the METP/WG-MRI also concluded that for the successful development of these requirements, coordination with other Panels or Groups, that could be considered as the ‘owner’ of the identified ASBU modules, was required. METP/2-WP/0103 provided more detail on the approach applied to initiate working arrangements with these other Panels and Groups.

3.1.8 The METP/WG-MIE requested the METP/WG-MRI for their opinion on the provision of WAFS SIGWX in XML format for inclusion in Amendment 79 to Annex 3- Meteorological Service for International Air Navigation, with expected applicability of November 2020. The members of the METP/WG-MRI supported a geo-referenced object oriented data format (GML) for SIGWX-information exchange but also indicated that low level SIGWX were not considered to be in scope. These could be handled as national/regional extension of a foreseen WAFS SIGWX XML/GML-schema.

3.1.9 It was also noted that the ATMRPP, ANC, and Secretariat were in the process of updating the job card ATMRPP.006. With this revised job card, and the perspective outlined above, clarifies the various roles and responsibilities with respect to developing MET information requirements and ensure the integration of MET in ATM. No fundamental changes to the expectations by the ANC or ATMRPP with respect to the METP contributions should arise from the job card amendment.

3.1.10 The Panel was pleased to note that, with a number of misunderstandings removed during the two METP/WG-MRI meetings, including the various roles and responsibilities between panels and internal panel structure, a common understanding on the scope of the activities and a clear plan how to describe MET requirements, the METP/WG-MRI rapporteur was confident that substantial progress could be made in support of job card ATMRPP.006 within the given time available.

3.2 ASBU-MET DEVELOPMENT

3.2.1 It was noted that activity 3 of the WG-MRI, related to job card METP.002.01, called for the development of a ASBU AMET Block 2 relating to meteorology by May 2017 and an update to ASBU AMET Block 1 relating to meteorology to support ATM in the terminal area was also called for by May 2017.

3.2.2 The Panel also noted that a general update for the global air navigation plan (GANP) was planned by ICAO for 2019 and that individual Members were invited to support this activity. This planned activity should be synchronised with the activities defined in job card METP.002.01, but insufficient information was available to date on the process and timelines of this GANP 2019 update to accommodate appropriate planning by the Panel, its WG-MRI and its individual Members.

3.2.3 It was noted that the current assessment was that no change to Job Card METP.002.01 was required to meet the objectives set earlier.

3.2.4 The Panel expressed their opinion that the overall communication around the GANP 2019 update could be improved by including more clarity on who the nominated experts represent.

3.3 PANS-MET DEVELOPMENT

3.3.1 With regard to Job Card METP.005.01 the Panel noted that since the first meeting of the Panel (METP/1), the METP/WG-MRI had worked on the reorganisation of the provisions relating to aeronautical meteorology. This development would 1) enable meteorological information to be better integrated into the system-wide information management (SWIM) environment and 2) would provide a clearer separation between performance and functional-based requirements and allow for an improved separation between these requirements and the associated technical specifications.

3.3.2 The Panel noted that extensive discussions on the methodology to apply, initial concerns expressed on the developing a PANS-MET, and limitations in available resources, had slowed progress in the intersessional period.

3.3.3 The Panel discussed various options to progress on the activity and concluded on a phased approach for the development of the PANS-MET and the additional development of supporting explanatory material on the rationale and methodology that would be applied.

3.3.4 The phased approach discussed and agreed consists of two phases. The initial phase would complete the transposition of the relevant existing Annex 3 SARPs into a new PANS-MET. The second phase would transform the provisions in the newly restructured Annex 3 and PANS-MET from a product-based perspective to an information-based perspective enabling the integration of meteorological information into the SWIM environment.

3.3.5 It was agreed by the Panel that the phased approach and consequential changes to the timelines will be reflected in an update to Job Card METP.005.01.

3.3.6 Given the above discussion, the Panel formulated the following recommendation:

Recommendation 3/1: METP Job Card 5 Revision.

That the revised Job Card METP.005.01 for the Reorganization of provisions relating to aeronautical meteorology (as given in Appendix A) be included in the meeting report for the consideration by the ANC.

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Appendix A Proposal for updated Job Card METP.005.01

Title		Reorganization of provisions relating to aeronautical meteorology			Reference:		MEPT.005.01	
Source		MET Divisional Meeting 2014 (Recommendations 1/3 and 5/2)						
Problem Statement		In order for meteorological information supporting aviation operations to be integrated into the system-wide information management (SWIM) environment there is a need to migrate related provisions from a product-based viewpoint to an information-based viewpoint leading to a change of emphasis of all of the current provisions of Annex 3; this will also encompass a more clear separation between performance and functional requirements and an improved separation between these requirements and technical specifications (i.e. means of compliance)						
Specific Details (including impact statements)		It was recommended by the MET Divisional Meeting (Recommendation 5/2) that an appropriate ICAO group, in close coordination with WMO, undertake a restructuring of Annex 3 and develop <i>Procedures for Air Navigations Services – Meteorology</i> (PANS-MET). Ensuring that the evolution of aeronautical service provisions is in line with the One-Sky concept as referenced in the <i>Global Air Navigation Plan</i> (GANP) (Doc 9750). The restructuring of Annex 3 and the development of the PANS-MET should be undertaken through a phased approach. The initial phase will undertake the transposition of existing Annex 3 SARPs into a new PANS-MET. The second phase will migrate the provisions in the newly restructured Annex 3 and PANS-MET from a product-based viewpoint to an information-based viewpoint enabling meteorological information, supporting aviation operations, to be better integrated into the SWIM environment. The restructuring of the aeronautical meteorological provisions will be in line with the restructuring already underway relating to Annex 15 and PANS-AIM.						
Expected Benefit		The integration of all aeronautical information into the SWIM environment and the alignment of the associated provisions will enable a smooth transition to SWIM and an improved seperation between performance and functional requirements and technical specifications will enable a more fit-for-purpose cost effective implementation of provisions.						
Reference Documents		Annex 3 — <i>Meteorological Service for International Air Navigation</i> , <i>Global Air Navigation Plan</i> (Doc 9750), Meteorology (MET) Divisional Meeting Report (Doc 10045) Agenda Item 5, Appendix E. Principles to be followed in the restructuring of Annex 3 and the development of a new PANS-MET.					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	Restructured document to contain functional and performance requirements		Sep 2018	Jul 2020	Nov 2020		
	(Action)	Develop PANS-MET document including technical specifications		Sep 2018	Jul 2020	Nov 2020		
	(Action)	Update Annex 3 and PANS-MET to include information-based viewpoint		Sep 2020	Jul 2022	Nov 2022		
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015		Session/Meeting: 199-9				



METP/2
4/11/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 4

The attached constitutes the report on Agenda Item 4 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 4: Meteorological information and service development

The WG-MISD Rapporteur, Richard Heuwinkel, informed the Panel that 19 working papers (WP) and six information papers (IP) were delivered to the meeting pertaining to the work completed or in progress by the five work streams under MISD.

The five work streams and their coordinators are: Release of Radiological Material (RRM) Work Stream led by Coordinator Dirk Engelbart; Space Weather Information led by Coordinator Steven Albersheim, Volcanic Ash and Gas Information Work Stream also led by Mr. Albersheim, Regional Hazardous Weather Advisory Centre (RHWAC) Work Stream led by Sharon Lau, and the World Area Forecast System (WAFS) Work Stream led by Michael 'Pat' Murphy.

Each work stream had held two face-to-face meetings and several virtual meetings during the intersessional period. Reports from the face-to-face meetings are filed on the METP secure web site.

Mr. Heuwinkel thanked the work stream coordinators and experts for their accomplishments, which included the development of standards and recommended practices (SARP) for the provision of space weather information, the provision of SIGMET information for radioactive cloud (RDOACT CLD), and to improve the provision of SIGMETs in deficient areas of the globe.

4.1 RELEASE OF RADIOACTIVE MATERIAL IN THE ATMOSPHERE (RRM)**4.1.1 Summary of work**

4.1.1.1 The RRM Work Stream work during the intersessional period had focused on two areas. The first was the development of provisions for the SIGMET information message, which would aid Meteorological Watch Offices (MWO) in the issuance of the SIGMET information message for the radioactive cloud (RDOACT CLD). The second area was progress on the revised Concept of Operations (ConOps) for Radioactive Material Information Services in Support of International Air Navigation.

4.1.1.2 The work stream had prepared three WPs for METP/2, which were presented to the meeting. They addressed updates to the job card (WP/2101) and work plan (WP/2102), and the proposed SARPs (WP/2103). In addition, one IP (IP/2101) was delivered to the Panel, which covered the progress of the latest draft of the ConOps.

4.1.2 Concept of Operations (ConOps)

4.1.2.1 The Panel was informed that considerable progress had occurred with the Concept of Operations (ConOps) for Radioactive Material Information Services (IP/2101). This work consisted of a significant revision to the initial versions of the ConOps, which were presented to the Seventh Meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/7), March 2013, Bangkok (IAVWOPSG/7-WP/18 refers), and then at the 2014 MET Divisional Meeting, July 2014, Montreal (MET/14-IP/5 refers).

4.1.2.2 Several comments had recently been received on the latest draft version, but due to time constraints had not yet been addressed. It was noted that these comments would be addressed in time for the expected completion date in early 2017. In addition, the structure of the ConOps would be changed to

align with other ConOps in WG-MISD, which may necessitate moving some of the content to other yet-to-be written documents, such as functional and performance requirements.

4.1.3 Annex Amendments

4.1.3.1 The Panel reviewed WP/2103 which proposed additions to the template for SIGMET and AIRMET messages (Annex 3 – Table A6-1A) to aid in the provision of RRM information through the SIGMET for RDOACT CLD.

4.1.3.1.1 The first addition considered allows for the use of a circle to describe the location of any SIGMET and AIRMET phenomenon, which results in a cylinder shaped SIGMET and AIRMET.

4.1.3.1.2 The second addition proposed was the inclusion of a note in Annex 3, Appendix 6, Table A6-1A stating that when detailed information on the release is not available a radius of up to 30 km may be used in the SIGMET for RDOACT CLD, in addition to a vertical extent from the surface to the upper limit of the applicable airspace.

4.1.3.2 Following the discussion, the Panel formulated the following recommendation:

**RSPP | Recommendation 4/1 — Draft Amendment 78 to Annex 3/
Technical Regulations [C.3.1] concerning the use of a circle
(cylinder) in SIGMET messages, including RDOACT CLD**

That, the proposal to amend Annex 3, Table A6-1A of Appendix 6, to allow the use of a circle (cylinder) for any SIGMET message as well as a note to address the issuance of a RDOACT CLD SIGMET when detailed information on the release is not available, be consolidated with other elements of draft Amendment 78 to Annex 3 (Appendix A refers).

4.1.3.3 In a related issue the Panel was of the view that emanating from the above proposal for amendment there was a need to review Annex 3 paragraph 3.4.2 concerning the appropriateness of the current text in the note to the paragraph.

4.1.3.3.1 Therefore, the Panel agreed the following:

**Decision 4/1 — Review of the note to Annex 3 paragraph
3.4.2g**

That, the WG-MISD, through the RRM Work Stream, review Annex 3 paragraph 3.4.2. g) concerning the appropriateness of the current text in the note to the paragraph.

4.1.4 Guidance Material

4.1.4.1 The Panel was informed that the associated guidance material on the draft SARP would be developed by October 2017, per the work stream's work plan.

4.1.5 Updated Job Card and Work Plan

4.1.5.1 The revised job card (WP/2101) for the further development of provision for information on the release of radioactive material in the atmosphere was presented and reviewed.

4.1.5.2 In this regard, the Panel agreed to endorse the proposed changes and formulated the following recommendation:

Recommendation 4/2 - Revised Job Card METP.006.01 - Further Development of Provisions for Information on the Release of Radioactive Material into the Atmosphere

That the revised Job Card METP.006.01 for the further development of information on the release of radioactive material as given in Appendix B) be included in the meeting's report for the consideration by the ANC.

4.1.5.3 The revised work plan for RRM Work Stream (WP/2102) was presented and discussed.

4.1.5.4 The Panel was informed that the work stream would focus the coming intersessional period on the development of the provision of RRM information based on atmospheric transport and dispersion models (ATDM), based on functional and performance requirements. This includes the review of regional initiatives that aim to develop and test ATDM-based approaches including criteria and guidance on how to use the information. The goal is to have additional SARPs ready in time for Amendment 79 to Annex 3.

4.1.5.5 The Panel agreed that the proposed changes be included in the updated work plan of the WG-MISD in the meeting's report (Appendix C).

4.2 SPACE WEATHER

4.2.1 Summary of Work

4.2.1.1 The Panel noted that the work done by the Space Weather Work Stream during the intersessional period was reported to the Panel through six WPs and two IPs. The WPs presented updates to the job card (WP/2301) and work plan (WP/2302), proposed SARPs (WP/2303), proposed criteria for space weather information providers (WP/2304), functional and performance requirements for space weather information (WP/2305), and the proposed guidance on the process for selecting space weather providers (WP/2306). The IPs presented version 4.0 of the ConOps for space weather information (IP/2301) and the draft outline for the space weather manual (IP/2302).

4.2.2 Concept of Operations (ConOps)

4.2.2.1 It was noted that the Space Weather Work Stream had produced version 4.0 of the ConOps during the intersessional period, which was posted on the METP/2 web site as a separate attachment to IP/2301. Some key changes made in version 4.0 included:

- Updated content to reflect current ConOps outline for the WG-MISD
- Moved and updated the functional and performance requirements into a separate document

- Updated the descriptions of the users, as well as their needs and decisions
- Focused on the impacts of space weather events

4.2.3 Functional and Performance Requirements

4.2.3.1 The Panel reviewed WP/2305 on the functional and performance requirements for near real-time and forecast space weather information. The Panel was informed that these requirements were a revision of the initial collection of functional and performance requirements presented at the 2014 MET Divisional Meeting as part of the version 3.0 of the ConOps (MET/14-IP/3 refers).

4.2.3.2 The Panel was informed that key changes included:

- A focus on the impacts of space weather events on: 1) HF communications; 2) satellite navigation, communication, and surveillance; and, 3) radiation exposure;
- The elimination of functional and performance requirements for observations of space weather events in favour of requirements for the provision of near real-time information;
- The elimination of functional and performance requirements pertaining to specific types of space weather events (e.g., geomagnetic storms);
- An update to the performance requirements to more accurately reflect the expected capabilities of space weather information providers to deliver global and regional information; and
- Movement of performance requirements pertaining to overall global or regional information provision capabilities (e.g., availability, reliability) to the guidance document for selecting space weather information providers.

4.2.3.3 The Panel was informed that the functional and performance requirements only pertain to the provision of space weather information necessary to meet the needs of aviation users as described in the ConOps document (IP/2301). A space weather information provider may have other functional and performance requirements for information about the impacts of space weather events on other industries (e.g., electric power providers).

4.2.3.4 The Panel, considering comments during the meeting, endorsed the revised functional and performance requirements for near real-time and forecast space weather information, to be included in the meeting's report (Appendix D).

4.2.4 Annex Amendments

4.2.4.1 In this regard, the Panel noted that significant accomplishment of WG-MISD during the intersessional period was the delivery of the provision of space weather information (WP/2303), i.e., draft SARPs for Amendment 78 to Annex 3 and consequential amendments to other related ICAO documents. These SARPs were derived from the functional and performance requirements for space weather information (WP/2305), which was a significant precursor activity of the Space Weather Work Stream.

4.2.4.2 Recognising the recommendation from the 2014 MET Divisional Meeting (Recommendation MET/14 – 2.7) calling for the designation of an optimal number of global and regional

space weather centres, the Panel noted that the proposed SARPs for Amendment 78 enable a global space weather service. Realizing the pressing need to implement the space weather service by the time of applicability of Amendment 78, the Panel agreed to pursue a global service as a matter of priority with subsequent consideration of the need for more regionally based models of integrated service delivery to then be pursued for possible future amendment to Annex 3.

4.2.4.3 The Panel was informed that the SARPs proposed the establishment of the space weather service and a template for an advisory message. The format proposed for the advisory is similar to the formats of advisory messages issued for volcanic ash clouds and tropical cyclones.

4.2.4.4 It was noted that the proposed space weather service would include advisories for space weather events affecting, or expected to affect, communications, GNSS-based navigation and surveillance systems and pose a radiation risk to flight crew members and passengers within the next 24 hours. The proposed advisory will inform the user on the:

- Type of space weather impact
- Expected onset, or event in progress, and duration of the event
- Generalized description of the spatial extension affected for the next 24-hours
- General description on the severity of the space weather activity in moderate (MOD) or severe (SEV) terminology (the thresholds for MOD and SEV will be included in the manual on the effects of space weather)

4.2.4.5 The Panel also reviewed additional consequential amendments related to:

- Annex 15 – Aeronautical Information Services
- *Procedures for Air Navigation Services – ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400)
- *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444)
- *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377).

4.2.4.6 After discussion the Panel endorsed the provisions for space weather information and formulated the following recommendation:

**RSPP Recommendation 4/3 — Draft Amendment 78 to Annex 3/
Technical Regulations [C.3.1] concerning the provision of
space weather information**

That,

a) the proposals to amend Annex 3 – *Meteorological Service for International Air Navigation* to introduce the provision of space weather service information be consolidated with other elements of draft Amendment 78 to Annex 3 (Appendix A refers); and

b) the following consequential proposals for amendments given in:

- Appendix E for inclusion into Annex 15 – *Aeronautical Information Services*;
- Appendix F for inclusion into *Procedures for Air Navigation Services – ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400);
- Appendix G for inclusion into *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM Doc 4444); and
- Appendix H for inclusion into the *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377),

be consolidated with other elements for inclusion in their next edition, amendment or update.

4.2.5 Guidance Material

4.2.5.1 The Panel was informed (IP/2302 refers) on the draft outline of the Space Weather Information Manual. The outline was considered high-level at this time and would be developed further during the upcoming intersessional period.

4.2.5.2 The Panel also noted that the work stream will be drafting updates to the following documents for inclusion of space weather information:

- *Manual of Aeronautical Meteorological Practice* (Doc 8896)
- *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377)

4.2.6 Guidance on the Process to Designate Space Weather Service Provider(s)

4.2.6.1 The Panel recognized the need to develop a set of criteria to identify those space weather service providers that are able to provide the information required by the proposed SARPs.

4.2.6.2 The Panel was informed about the processes developed by the work stream, in coordination with World Meteorological Organization (WMO), to aid ICAO in their designation of space weather service provider(s) and the selection of service provider(s). These included the proposed guidance to be used by WMO in assessing potential qualified provider(s) (WP/2306), and the proposed guidance on the criteria to be used by WMO in assessing potential space weather providers (WP/2304).

4.2.6.3 The criteria were divided into the following four areas: 1) Institutional; 2) Operational; 3) Technical; and, 4) Communications/Dissemination. The most important criteria is the ability of a potential space weather information provider to deliver the space weather information services, as defined in the SARPs.

4.2.6.3.1 It was noted that the institutional criteria pertain to the overarching characteristics that a space weather information provider must possess. These characteristics are at a corporate level and not necessarily unique to the provision of space weather information for aviation.

4.2.6.3.2 The operational criteria are those characteristics that are necessary to support aviation decision-makers that operate in a 24/7 environment employing systems with a high degree of both technical sophistication and reliability.

4.2.6.3.3 The technical criteria pertain to the ability of a space weather information provider to provide the information required for the space weather information service.

4.2.6.3.4 The communications/dissemination criteria are intended to ensure that any potential global space weather information provider is able to distribute the global advisory message product to aviation decision-makers through both traditional aviation meteorology dissemination channels, such as OPMET data centres, and newer means of dissemination, primarily Internet-based platforms.

4.2.6.4 It was noted that while WP/2306 provided proposed guidance on the selection of space weather information providers it did not delineate between potential provider(s) of the global space weather information capability and potential providers of a regional space weather information capability.

4.2.6.5 Therefore, the METP was of the view that the SARPs for space weather information should be recommended for inclusion in Amendment 78 of Annex 3 applicable in November 2018.

4.2.6.6 Subsequently, the METP would address the need for and implementation of any regional scale space weather information capabilities based on desired improvements in the provision, efficiency, and cost-effectiveness of the global capability.

4.2.6.7 Importantly, it was also noted that the optimal number of space weather information provider(s) to efficiently deliver a globally harmonized space weather service may be comprised of a single entity or multiple entities as part of a consortium.

4.2.6.8 In this regard, it was considered necessary that WMO, in accepting the responsibility of the assessment space weather information providers, would designate experts to conduct site assessment visits and audits for each candidate Provider State. It is important to note that WMO will report the findings of the site assessment visits to ICAO, who will then pass it to the METP. WMO will neither determine the ICAO-designated space weather information provider(s), nor will it provide a ranking of the candidate Provider States based on its site assessment visits and audits.

4.2.6.9 To facilitate the timely designation of ICAO space weather information provider(s), WMO will provide to ICAO the results of the audits based on the site assessment visits within an agreed upon timeframe. The space weather information provider(s) is expected to fund the service on a voluntary basis at the initial stage until the guidance on regional/global cost recovery is developed and would be reflected in the impact assessment of the proposed amendment. The governance of space weather information provider(s) would be added to the job card of MOG at the next METP meeting.

4.2.6.10 During the meeting, the Secretariat noted that ICAO typically identifies the providers of global and regional meteorological information in each Regional Air Navigation Plan (RANP). The Secretariat further noted that there was insufficient time to include the provider(s) of the space weather information, proposed in Amendment 78 of Annex 3, in the regional air navigation plans before its November 2018 applicability.

4.2.6.11 To ensure the timely implementation of the provisions for space weather information, the METP agreed that the space weather provider(s) be identified in the forthcoming *Manual on Space Weather Information for International Air Navigation* (Doc #####).

4.2.6.12 Following the discussion, the Panel endorsed the guidance on the criteria to be used by WMO in assessing potential space weather capability as well as the process schedule.

4.2.6.13 In view of the above, the Panel formulated the following recommendation:

Recommendation 4/4: Guidance on the process for selecting space weather information providers

That to assist in the process of selection of space weather information providers, the guidance on the process for establishing the global space weather information capability, including the schedule to complete the said process (Appendix I) be endorsed by the ANC.

4.2.6.14 In a related item the Panel was of the view that a State letter requesting interest in providing space weather information service, should be sent to States as soon as practical, but no later than 28 February 2017.

4.2.6.15 To formalize the process, the Panel agreed that WMO be invited to support the METP by developing a report that identifies those space weather information providers that meet the criteria. Therefore, the Panel formulated the following recommendation:

Recommendation 4/5 – WMO support to the development of a report on providers meeting the criteria to provide space weather information

That WMO be formally requested to undertake site assessments and audits of prospective space weather information providers in accordance with the timeline presented at Appendix I and to provide a consequential report to ICAO.

4.2.7 Updated Job Card and Work Plan

4.2.7.1 The revised job card (WP/2301) for the development of provision for information on space weather was presented and reviewed. The Panel was informed that significant progress had been made over the past year in the actions given in the job card. However additional work remains to be done and the revised job card reflects changes in the delivery schedule for the Space Weather Work Stream. The Panel endorsed the proposed changes and formulated the following recommendation:

Recommendation 4/6 - Revised Job Card METP.009.01 - Development of Provisions for Information on Space Weather for International Air Navigation

That the revised Job Card METP.009.01 for the development of space weather information as given in Appendix B be included in the meeting's report for consideration by the ANC.

4.2.7.2 The revised work plan for Space Weather Work Stream (WP/2302) was presented and reviewed. The changes addressed further work necessary for the implementation of the SARPs for Amendment 78, specifically the completion of a manual on space weather and the completion of amendments to regional plans. The Panel recognized the need to consider the development of an implementation plan for provision of space weather services and agreed that the WG-MISD should undertake this effort. Therefore, the Panel formulated the following decision:

Decision 4/2— The development of an implementation plan for the provision of space weather services.

That, the WG-MISD, through its space weather work stream, develop an implementation plan for the provision of space weather services in November 2018, to be added to the work plan.

4.2.7.3 The Panel agreed to include the updated work plan in this report (Appendix C refers).

4.3 VOLCANIC ASH AND GASES

4.3.1 Summary of Work

4.3.1.1 The Panel noted that the work done by the Volcanic Ash and Gases Work Stream during the intersessional period was reported to the Panel through five WPs and one IP. The WPs discussed and presented updates to two job cards (WP/2401 and WP/2405), updates to the work plan (WP/2402), updates to the Roadmap for the International Airways Volcano Watch (IAVW), and new IATA requirements for volcanic ash and sulphur dioxide (SO₂). The one IP presented version 2.1 of the ConOps for volcanic hazard information (IP/2401).

4.3.2 Concept of Operations (ConOps)

4.3.2.1 The Panel reviewed IP/2401 which informed that the work stream had updated the *Concept of Operations for Volcanic Hazard Information for International Air Navigation in Support of the Global Air Navigation Plan and the Aviation System Block Upgrades* during the intersessional period. The ConOps was posted on the METP/2 web site as a separate attachment to IP/2401.

4.3.2.2 Version 2.1 was a complete revision from version 1.0, which was presented to IAVWOPSG/7, March 2013, Bangkok (IAVWOPSG/7-WP/21 refers).

4.3.2.3 As noted in the ConOps, it describes the need for and use of volcanic hazards information for operational decisions, in qualitative and quantitative terms, from the perspective of the end user and relevant to an operator's Safety Management System (SMS). The ConOps is not intended to describe how future volcanic hazard information is to be provided or by whom the future information is to be provided.

4.3.3 Annex Amendments

4.3.3.1 None.

4.3.4 Guidance Material

4.3.4.1 The Panel was provided with WP/2404 which presented version 2.1 of the *Roadmap for the International Airways Volcano Watch (IAVW)*. In this regard, it was noted that Version 2.1 was a complete revision from version 1.0, which was presented at the 2014 MET Divisional Meeting. The document now focuses on a time-line as a roadmap combined with brief descriptions of the anticipated changes.

4.3.4.2 The Panel, after review of the document endorsed the Roadmap and agreed to place it on the METP's secure web site.

Decision 4/3— Placement of the document *Roadmap for the International Airways Volcano Watch (IAVW)* on the METP website

That, the Secretariat place version 2.1 of the document *Roadmap for the International Airways Volcano Watch (IAVW)* on the secure METP website.

4.3.4.3 The attention of the meeting was drawn to WP/2406, which presented IATA's requirements for volcanic ash and sulphur dioxide (SO₂) and other hazardous gases. In this regard the IATA's requirements are:

- Determination of the safe SO₂ threshold and dosage level to ensure aircraft avoid areas of SO₂ or other hazardous gases, which may affect human health.
- Determination of the international threshold level(s) for aviation and provide this information in graphic context for the near term as well as longer term forecasts. Information should be provided at fixed time periods and issued more frequently when high impact airspace is affected such as in close proximity to major airports. Both the observation and forecasts should contain the horizontal and vertical dimensional areas of SO₂ where the agreed health safe threshold has been exceeded or likely to exceed. Information needs to be updated at agreed incremental changes in dose exposure similar to how SPECI are issued for a METAR once a threshold is crossed.
- The information (observations and forecasts) must be in XML format, machine readable and integrated into the SWIM environment.
- Direct uplink capability to aircraft should also be considered. Provision should include evolving from being product centric to data centric and provide observation and forecasts data to operators. In the longer term, this should be provided as streamed data that could dynamically and automatically update operator situational display systems with the current and forecast operational status.
- Air Traffic Management (ATM) has a need of situation awareness for information of SO₂ to anticipate the management of airspace both safely and efficiently in collaboration with pilots and dispatchers to ensure that aircraft do not encounter SO₂ cloud that is deemed a risk to en-route aircraft. Subsequently as Global Air Navigation Plan further evolves there will be a need for this information in support of trajectory-based operations (TBO).

- To maintain consistency with the warning of a hazard, IATA believes SO₂ forecasts should eventually be provided to all stakeholders via the SWIM portal as determined by the proposed International Airways Hazard Watch (IAHW).
- The IATA preference would be for a safe SO₂ threshold decision to be agreed within a reasonable timeframe with observations, near term and longer forecasts being made available by 2020. This would support SO₂ being included in ICAO Annex 3 Amendment 79. Should the safe threshold become known and available for use prior to this date then IATA suggests implementing an operational trial until Annex 3 Amendment 79 becomes applicable.

4.3.4.4 The Panel thanked IATA for their listing of requirements and took the action for the Working Group MISD consider the proposals by IATA in their efforts to develop provisions of SO₂. However, the METP noted that determining the safe levels of SO₂ thresholds and dosage level to enable aircraft to avoid areas of SO₂, which may affect human health, would require consultation with health professionals.

4.3.4.5 In view of the above discussion, the panel agreed the following:

Decision 4/4— Use of documented IATA requirements for SO₂ Information

That, WG-MISD take into consideration the list of requirements from IATA in the planned work to be done for the development of provisions for SO₂ information.

4.3.5 Updated Job Card and Work Plan

4.3.5.1 The Panel was presented with an update to Job Card METP.003.01 for the IAVW (WP/2401), which updated the 'Expected Dates' section to extend the work beyond 2016.

4.3.5.2 Following METP/1 the job card concerning "*the provision of information on sulphur dioxide and other hazardous gases in the atmosphere that pose a risk to aircraft occupants*", which had been previously approved by the ANC, was forwarded to the METP. This job card asked for an assessment on how to provide information on SO₂, which posed a risk to aircraft occupants.

4.3.5.3 In this regard, the work stream, in coordination with the member from IATA, produced an update to the SO₂ Job Card IAVWOPSG001 (WP/2405). The revised job card updates the relevant information on the card and sets forth expected dates for the development of proposals to amend Annex 3 (Amendment 79) for the provision of SO₂ information.

4.3.5.4 The Panel reviewed both job cards and formulated the following recommendations:

Recommendation 4/7: Revised Job Card METP.003.01 - Further development of the International Airways Volcano Watch (IAVW)

That the revised Job Card METP.003.01 for the further development of the IAVW as given in Appendix B be included in the meeting's report for consideration by the ANC.

And,

Recommendation 4/8: Proposed Job Card METP.xxx.xx - Provision of information on sulphur dioxide from volcanic eruptions in the atmosphere

That the proposed Job Card METP.xxx.xx for the provision of SO₂ information from volcanic eruptions, as given in Appendix B, be included in the meeting's report for consideration by the ANC.

4.3.5.5 An updated work plan for the work stream was presented (WP/2402). The work plan has evolved over the course of the intersessional period with changes made at the first face-to-face meeting and then at the second face-to-face meeting. These changes primarily addressed necessary activities related to SO₂. The Panel agreed to include the updated work plan in this meeting's report (Appendix C).

4.4 REGIONAL HAZARDOUS WEATHER ADVISORIES

4.4.1 Summary of Work

4.4.1.1 The Panel noted that the WG- MISD Regional Hazardous Weather Advisory Centre Work Stream (MISD/RHWAC Work Stream) had made significant progress over the intersessional period in completing the Amendment proposal and actions described in the Job Card METP.007.01. However, additional work remains to be done and the job card requires revision to reflect changes in the delivery schedule for the MISD/RHWAC Work Stream.

4.4.1.2 The work completed by the work stream was reported to the Panel through three WPs. The WPs presented updates to the job card (WP/2201), work plan (WP/2202), and draft SARPs for Amendment 78 to Annex 3 for the SIGMET message (WP/2203).

4.4.1.3 The Panel was also informed that considerable work had been done to progress the ConOps, develop guidance material to support selection criteria of regional hazardous weather advisory centres, and develop user needs for en route hazardous weather information.

4.4.2 Concept of Operations (ConOps)

4.4.2.1 The Panel was informed that Version 2.0 of the ConOps for Advisory Services for Hazardous Meteorological Information, dated 10 June 2016, had been presented to the work stream at their second face-to-face meeting (Montréal, 12 July 2016). The Panel was informed that the work stream recognized the need to change the scope of the ConOps from a strictly regional hazardous weather advisory centre concept to one that addresses phenomena-based, globally consistent, en-route hazardous weather information. This change was supported by the METP's Management Team. As such, completion of a new version to the ConOps is now planned for June 2017. The new ConOps will be based on a user needs analysis and an analysis of current capabilities and their shortfalls.

4.4.3 Annex Amendments

4.4.3.1 The Panel was informed that at the work stream's second face-to-face meeting work stream, members had agreed that user needs must first be defined in order to develop requirements for any

hazardous weather centres. The Panel noted that the work stream meeting then formed an ad hoc group to work in coordination with the METP's Working Group on Meteorological Requirements and Integration (WG-MRI) to develop meteorological information needs and high-level requirements.

4.4.3.2 The Panel noted that work stream members then considered it necessary that the implementation of new hazardous weather services should be delayed until Amendment 79 to Annex 3 (expected applicability in November 2020). To address user needs in the near-term, the Panel agreed that Amendment 78 to Annex 3 (November 2018) should include a note to 3.4.1 on guidance to meteorological watch offices (MWO) in bilateral and multi-lateral cooperation and coordination of SIGMET information messages.

4.4.3.3 The Panel reviewed the draft proposal for a note to 3.4.1 of Annex 3 and formulated the following recommendation:

RSPP	<p>Recommendation 4/9 — Draft Amendment 78 to Annex 3/ Technical Regulations [C.3.1] concerning guidance to improve the provision of SIGMET information by MWOs</p> <p>That, the proposal to add a note to Annex 3, Chapter 3, Paragraph 3.4.1 on guidance to meteorological watch offices (MWO) regarding bilateral and multi-lateral cooperation and coordination of SIGMET information messages, be consolidated with other elements of draft Amendment 78 to Annex 3 in Appendix A to this report.</p>
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4.4.4 Guidance Material

4.4.4.1 The Panel was informed that associated guidance for the draft SARP was being prepared, which will be included in Doc 8896 - *Manual on Aeronautical Meteorological Practices*. This guidance is based on best practices.

4.4.4.2 Noting that there have been sub-regional projects for SIGMET coordination successfully conducted in South East Asia and Europe, the Panel concurred that such regional frameworks or trials should be encouraged to facilitate near-term improvement in SIGMET provision in parallel with development of the guidance on coordination between MWOs.

4.4.5 Updated Job Card and Work Plan

4.4.5.1 The Panel was informed on the proposed changes to Job Card METP.007.01 for the implementation of a regional advisory system for select en-route hazardous meteorological conditions. Several changes were proposed to align with the new direction agreed to by the work stream and supported by the METP Management Team. Included is the change to the title of the job card to *Develop provisions for a phenomena-based, globally-consistent, en-route weather information system(s)*. The Panel was reminded that the overall objective remained the same, which was to address: inconsistent information across flight information region (FIR) boundaries, insufficient granularity of forecasts, excessive forecast latencies, and other deficiencies that exist over many parts of the world.

4.4.5.2 Following a discussion, the Panel formulated the following recommendation:

Recommendation 4/10: Revised Job Card METP.007.01 – Development of provisions for a phenomena-based, globally-consistent, en-route weather information system(s)

That the revised Job Card METP.007.01 for the development of provisions for a phenomena-based, globally-consistent, en-route weather information system(s), as given in Appendix B, be included in the meeting's report for consideration by the ANC.

4.4.5.3 The Panel was informed (WP/2202) that the work plan for the work stream had been revised to reflect a more realistic view of when the work could be completed.

4.4.5.4 In this regard, the Panel agreed:

Decision 4/5— Inclusion of updated work plan for globally-consistent, en-route weather information system.

That, the updated work plan on the development of provisions for a phenomena-based, globally-consistent, en-route weather information system be included in the Report (refer Appendix C).

4.5 WORLD AREA FORECAST SYSTEM

4.5.1 Summary of Work

4.5.1.1 The Panel noted that the work done by the WAFS Work Stream during the intersessional period was reported to the Panel through one WP and two IPs. The WP presented an updated roadmap for the WAFS (WP/2504). The IPs presented a ConOps for the WAFS (IP/2501) and a catalogue of WAFS information for the System Wide Information Management (SWIM) system.

4.5.2 Concept of Operations (ConOps)

4.5.2.1 The Panel was informed that the first version of the ConOps for the WAFS had been presented to the work stream at their second face-to-face meeting (Gatwick, UK, 17 June 2016). The first version was revised based on comments received at the June meeting and was presented to the Panel in IP/2501. The ConOps presents the future use of WAFS information for international air navigation in support of the Global Air Navigation Plan (GANP) and associated Aviation System Block Upgrades (ASBU). This ConOps, like all of the ConOps, is a living document.

4.5.3 Annex Amendments

4.5.3.1 None.

4.5.4 Guidance Material

4.5.4.1 In this regard the Panel noted WP/2504 which presented version 3.1 of the *Roadmap for the World Area Forecast System (WAFS) in support of the Aviation System Block Upgrades (ASBU)*. Version 3.1 is a complete revision from version 1.0, which was presented to MET/14, July 2014,

Montreal (MET/14 IP/2). The document now focuses on a time-line as a roadmap combined with brief descriptions of the anticipated changes.

4.5.4.2 The panel agreed that references to a 10% increase in fuel efficiency should be removed and that WG-MOG would be discussing replacement performance metrics at their next meeting that were more relevant to airline operations.

4.5.4.3 The Panel, having reviewed and endorsed the roadmap, and with minor changes agreed to place it on the METP's secure web site:

Decision 4/6— Placement of the document *Roadmap for the WAFS* on the METP's secure web site.

That, Secretariat place version 3.1 of the updated document *Roadmap for the WAFS* version on the METP's secure web site.

4.5.4.4 The Panel was informed that at the work stream's second meeting the need to plan for WAFS information to be available in the SWIM environment had been discussed. The World Area Forecast Centres agreed to develop a high-level catalogue of WAFS information for the SWIM environment. This catalogue is expected to be completed shortly after METP/2.

4.5.5 Updated Job Card and Work Plan

4.5.5.1 The Panel was reminded that the job card for the WAFS had been shared with the WG-MOG. MOG WP/4202 presented changes to the job card, which would be reported under Agenda Item 6.

4.5.5.2 No changes were made to the work plan.

— — — — —

APPENDIX A

Note: Proposed new text to Annex 3 is shaded grey. All tables and examples are new, but not shaded grey.

DRAFT AMENDMENT TO ANNEX 3 — METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION (TWENTIETH EDITION — JULY 2018)

...

PART I. CORE SARPs

...

CHAPTER 1. DEFINITIONS

1.1 Definitions

...

Space weather centre (SWXC). A centre designated to monitor and provide information on space weather expected to affect communications, GNSS-based navigation and surveillance systems and/or pose a radiation risk to flight crew members and passengers.

...

CHAPTER 3. WORLD AREA FORECAST SYSTEM AND, METEOROLOGICAL OFFICES, AND OTHER CENTRES

...

3.4 Meteorological watch offices

3.4.1 A Contracting State, having accepted the responsibility for providing air traffic services within a flight information region (FIR) or a control area (CTA), shall establish, in accordance with regional air navigation agreement, one or more MWOs, or arrange for another Contracting State to do so.

Note.— Guidance on the arrangements between Contracting States for the provision of meteorological watch office services can be found in Doc 8896 – Manual of Aeronautical Meteorological Practice.

...

3.8 Space weather centre

3.8.1 A Contracting State, having accepted the responsibility for providing a SWXC, shall arrange for that centre to provide information on space weather that is expected to affect communications and navigation systems and/or pose a radiation risk to flight crew members and passengers in its area of responsibility by arranging for that centre to:

a) monitor relevant ground-based, airborne, and space-based observations to detect, and predict when possible, the existence and extent of space weather conditions that have an impact in the following areas concerned:

1) high frequency (HF) radio communications;

2) GNSS-based navigation and surveillance; and

3) radiation exposure at flight levels.

b) issue advisory information regarding the extent, severity and duration of the space weather phenomena that have an impact referred to in a).

c) supply space weather information referred to in b) to:

1) area control centres, flight information centres and aerodrome meteorological offices serving flight information regions in its area of responsibility which may be affected;

2) other SWXC; and

3) international OPMET databanks, international NOTAM offices and aeronautical fixed service Internet-based services.

3.8.2 SWXC shall maintain a 24-hour watch.

3.8.3 In case of interruption of the operation of a SWXC, its functions shall be carried out by another SWXC or another centre, as designated by the SWXC Provider State concerned.

Note.— Guidance on the provision of space weather information, including the ICAO-designated provider(s) of space weather information, is provided in the Manual on Space Weather in Support of International Air Navigation (Doc #####).

...

CHAPTER 9. SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

9.1 General provisions

...

9.1.3 Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as established by the meteorological authority in consultation with operators concerned:

...

k) space weather information relevant to the intended route including aerodrome of departure, intended landing and alternate destination.

...

9.3 Flight documentation

Note.— The requirements for the use of automated pre-flight information systems in providing flight documentation are given in 9.4.

9.3.1 Flight documentation to be made available shall comprise information listed under 9.1.3 a) 1) and 6), b), c), e), f) and, if appropriate, g) and k). However, when agreed between the meteorological authority and operator concerned, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, but in all cases the flight documentation shall at least comprise information on 9.1.3 b), c), e), f) and, if appropriate, g) and k).

...

PART II. APPENDICES AND ATTACHMENTS

...

APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED TO WORLD AREA FORECAST SYSTEM, AND METEOROLOGICAL OFFICES AND OTHER CENTRES

(See Chapter 3 of this Annex)

...

6. SPACE WEATHER CENTRES

6.1 Space weather advisory information

6.1.1 **Recommendation** — *Advisory information on space weather should be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, and should be in accordance with the templates shown in Table A2-3. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used.*

6.1.2 **Recommendation** — *Until 4 November 2020, space weather advisory information should be available in IWXXM XML/GML form, in addition to the issuance of this advisory information in abbreviated plain language in accordance with 6.1.1.*

6.1.3 From 5 November 2020, space weather advisory information shall be available in IWXXM XML/GML form, in addition to the issuance of this advisory information in abbreviated plain language in accordance with 6.1.1.

Note.— Guidance on IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003).

6.1.4 Recommendation — *One or more of the following space weather effects should be included in the space weather advisory information, using their respective abbreviations as indicated below:*

- HF communication (propagation, absorption) *HF COM*

- GNSS-based navigation and surveillance (degradation) *GNSS*

- Radiation at flight levels (increased exposure) *RADIATION*

6.1.5 Recommendation — *The following intensities should be included in space weather advisory information, using their respective abbreviations as indicated below:*

- moderate *MOD*

- severe *SEV*

6.1.6 Recommendation — *Issue updated advisory information as necessary but at least every six hours.*

...

Table A2-3. Template for advisory message for space weather information

Key: M = inclusion mandatory, part of every message

O = inclusion optional

Note 1.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400).

Note 2.— The spatial resolutions are shown in Attachment E.

Element	Detailed content	Template(s)	Examples
1 Identification of the type of message (M)	Type of message	SWX ADVISORY	SWX ADVISORY
2 Time of origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20161108/0100Z
3 Name of centre (M)	Name of SWXC	SWXC: nnnnnnnnnnnn	SWXC: <TBD>
4 Advisory number (M)	Number with year in full and unique message number	ADVISORY NR: nnnn/[n][n][n]	ADVISORY NR: 2016/1
5 Space weather effect and intensity	Kind of effect and intensity from the space weather event (HF communication, GNSS navigation and surveillance, radiation level exposure environment)	SWX EFFECT: HF COM MOD or SEV, or GNSS MOD or SEV, or HF COM MOD or SEV AND GNSS MOD or SEV, or RADIATION ¹ MOD or SEV	SWX EFFECT: HF COM MOD GNSS SEV HF COM MOD AND GNSS MOD RADIATION MOD
6 Observed or expected extent	Specify time: year, month, day, time in	OBS or FCST SWX:	OBS SWX:

	of space weather event (M)	<p>UTC (time T)</p> <p>Observed (or forecast if event has yet to occur) space weather horizontal extent (latitude bands and longitude in degrees) and/or altitude at time T.</p>	<p>nnnnnnnn/nnnnZ</p> <p>DAYLIGHT SIDE</p> <p><i>and/or</i></p> <p>HNH <i>and/or</i> MNH <i>and/or</i> EQN <i>and/or</i> EQS <i>and/or</i> MSH <i>and/or</i> HSH</p> <p>Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn)</p> <p><i>and/or</i></p> <p>ABV FLnnn or FLnnn–nnn</p> <p><i>or</i></p> <p>Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – [Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p> <p><i>or</i></p> <p>NO SWX EXP</p>	<p>FCST SWX:</p> <p>20161108/0100Z</p> <p>DAYLIGHT SIDE</p> <p>HNH HSH</p> <p>HNH MNH MSH HSH</p> <p>EQN EQS</p> <p>W18000 – W09000</p> <p>ABV FL350</p> <p>S3000 E09000 – S3000 E18000 – S4000 E18000 – S4000 E09000</p> <p>NO SWX EXP</p>
7	Forecast for the next 6 hours (M)	<p>Day and time (in UTC) (6 hours from time given in item 6, rounded to the next full hour)</p> <p>Forecast extent and/or altitude for the fixed valid time.</p>	<p>FCST SWX +6 HR:</p> <p>nn/nnnnZ</p> <p>DAYLIGHT SIDE</p> <p><i>and/or</i></p> <p>HNH <i>and/or</i> MNH <i>and/or</i> EQN <i>and/or</i> EQS <i>and/or</i> MSH <i>and/or</i> HSH</p> <p><i>and/or</i></p> <p>Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn)</p> <p><i>and/or</i></p> <p>ABV FLnnn or FLnnn–nnn</p> <p><i>or</i></p>	<p>FCST SWX +6 HR:</p> <p>20161108/0700Z</p> <p>DAYLIGHT SIDE</p> <p>HNH HSH</p> <p>HNH MNH MSH HSH</p> <p>EQN EQS</p> <p>W09000 – W00000</p> <p>ABV FL350</p> <p>S3000 E09000 – S3000 E18000 – S4000 E18000 – S4000 E09000</p> <p>NO SWX EXP</p> <p>NOT AVBL</p>

			<p>Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – [Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p> <p>or</p> <p>NO SWX EXP</p> <p>or</p> <p>NOT AVBL</p>	
8	Forecast for the next 12 hours (M)	<p>Day and time (in UTC) (12 hours from time of onset given in item 6, rounded to the next full hour)</p> <p>Forecast extent and/or altitude for the fixed valid time.</p>	<p>FCST SWX +12 HR:</p> <p>nn/nnnnZ</p> <p>DAYLIGHT SIDE</p> <p>or</p> <p>HNH and/or MNH and/or EQN and/or EQS and/or MSH and/or HSH</p> <p>and/or</p> <p>Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn)</p> <p>and/or</p> <p>ABV FLnnn or FLnnn–nnn</p> <p>or</p> <p>Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – [Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p> <p>or</p> <p>NO SWX EXP</p> <p>or</p> <p>NOT AVBL</p>	<p>FCST SWX +12 HR:</p> <p>20161108/1300Z</p> <p>DAYLIGHT SIDE</p> <p>HNH HSH</p> <p>HNH MNH MSH HSH</p> <p>EQN EQS</p> <p>E00000 – E09000</p> <p>ABV FL350</p> <p>S3000 E09000 – S3000 E18000 – S4000 E18000 – S4000 E09000</p> <p>NO SWX EXP</p> <p>NOT AVBL</p>
9	Forecast for the next 18 hours (M)	<p>Day and time (in UTC) (18 hours from time of onset given in item 6, rounded to the next full hour)</p> <p>Forecast extent and/or altitude for the fixed valid time.</p>	<p>FCST SWX +18 HR:</p> <p>nn/nnnnZ</p> <p>DAYLIGHT SIDE</p> <p>or</p> <p>HNH and/or</p>	<p>FCST SWX +18 HR:</p> <p>20161108/1900Z</p> <p>DAYLIGHT SIDE</p> <p>HNH HSH</p> <p>HNH</p>

			MNH <i>and/or</i> EQN <i>and/or</i> EQS <i>and/or</i> MSH <i>and/or</i> HSH <i>and/or</i> Wnnn(nn) <i>or</i> Ennn(nn) – Wnnn(nn) <i>or</i> Ennn(nn) <i>and/or</i> ABV FLnnn <i>or</i> FLnnn–nnn <i>or</i> Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – [Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] <i>or</i> NO SWX EXP <i>or</i> NOT AVBL	MNH MSH HSH EQN EQS E09000 – E18000 ABV FL350 S3000 E09000 – S3000 E18000 – S4000 E18000 – S4000 E09000 NO SWX EXP NOT AVBL
10	Forecast for the next 24 hours (M)	Day and time (in UTC) (24 hours from time of onset given in item 6, rounded to the next full hour) Forecast extent and/or altitude for the fixed valid time.	FCST SWX +24 HR: nn/nnnnZ DAYLIGHT SIDE <i>or</i> HNN <i>and/or</i> MNH <i>and/or</i> EQN <i>and/or</i> EQS <i>and/or</i> MSH <i>and/or</i> HSH <i>and/or</i> Wnnn(nn) <i>or</i> Ennn(nn) – Wnnn(nn) <i>or</i> Ennn(nn) <i>and/or</i> ABV FLnnn <i>or</i> FLnnn–nnn <i>or</i>	FCST SWX +24 HR: 20161109/0100Z DAYLIGHT SIDE HNN HSH HNN MNH MSH HSH EQN EQS W18000 – W09000 ABV FL350 S3000 E09000 – S3000 E18000 – S4000 E18000 – S4000 E09000 NO SWX EXP NOT AVBL

			Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – [Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	
			or	
			NO SWX EXP	
			or	
			NOT AVBL	
11	Remarks (M)	Remarks, as necessary.	RMK: Free text up to 256 characters.	RMK: SWX EVENT HAS CEASED RMK: WWW.SPACEWEATHERPROVIDER.GOV RMK: NIL
12	Next advisory (M)	Year, month, day, time in UTC.	NXT ADVISORY: nnnnnnnn/nnnnZ or Free text up to XX (TBD) characters or NO FURTHER ADVISORIES	NXT ADVISORY: 20161108/0700Z. NO FURTHER ADVISORIES

Example A2-3: Space weather advisory message (GNSS and HF COM effects)

(communication header)	
SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	(to be determined)
SWX EFFECT:	GNSS MOD AND HF COM MOD
ADVISORY NR:	2016/1
OBS SWX:	20161108/0100Z HNH HSH E18000 – W18000
FCST SWX +6 HR:	20121108/0700Z HNH HSH E18000 – W18000
FCST SWX +12 HR:	20161108/1300Z HNH HSH E18000 – W18000
FCST SWX +18 HR:	20161108/1900Z HNH HSH E18000 – W18000
FCST SWX +24 HR:	20161109/0100Z NO SWX EXP
RMK:	LOW-LEVEL GEOMAGNETIC STORMING IS CAUSING INCREASED AURORAL ACTIVITY AND SUBSEQUENT MOD DEGRADATION OF GNSS ACCURACY AND HF COM AVAILABILITY IN THE AURORAL ZONE. THIS STORMING IS EXPECTED TO SUBSIDE IN THE FORECAST PERIOD. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	NO FURTHER ADVISORIES

Example A2-4: Space weather advisory message (RADIATION effects)

(communication header)	
SWX ADVISORY	
DTG:	20161108/0000Z
SWXC:	(to be determined)
SWX EFFECT:	RADIATION MOD
ADVISORY NR:	2016/2

FCST SWX:	20161108/0100Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +6 HR:	20121108/0700Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +12 HR:	20161108/1300Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +18 HR:	20161108/1900Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +24 HR:	20161109/0100Z NO SWX EXP
RMK:	RADIATION LEVELS HAVE EXCEEDED 100 PERCENT OF BACKGROUND LEVELS AT FL350 AND ABOVE. THE CURRENT EVENT HAS PEAKED AND LEVELS ARE SLOWLY RETURNING TO BACKGROUND LEVELS. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	NO FURTHER ADVISORIES

Example A2-5: Space weather advisory message (HF COM effects)

(communication header)	
SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	(to be determined)
SWX EFFECT:	HF COM SEV
ADVISORY NR:	2016/1
OBS SWX:	20161108/0100Z DAYLIGHT SIDE
FCST SWX +6 HR:	20121108/0700Z DAYLIGHT SIDE
FCST SWX +12 HR:	20161108/1300Z DAYLIGHT SIDE
FCST SWX +18 HR:	20161108/1900Z DAYLIGHT SIDE
FCST SWX +24 HR:	20161109/0100Z DAYLIGHT SIDE
RMK:	PERIODIC HF COM ABSORPTION HAS BEEN OBSERVED AND IS LIKELY TO CONTINUE IN THE NEAR TERM. COMPLETE AND PERIODIC LOSS OF HF ON THE SUNLIT SIDE OF THE EARTH EXPECTED. CONTINUED HF COM DEGRADATION LIKELY OVER THE NEXT 7 DAYS. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	20161108/0700Z

...

APPENDIX 6. TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

(See Chapter 7 of this Annex.)

...

Table A6-1A. Template for SIGMET and AIRMET messages

...

<i>Element</i>	<i>Detailed content</i>	<i>SIGMET template</i>	<i>AIRMET template</i>	<i>SIGMET message examples</i>	<i>AIRMET message examples</i>
...
Location (C) ¹⁹	Location (referring to latitude and longitude (in degrees and minutes))	<p>Nnn[nn] Wnnn[nn] or Nnn[nn] Ennn[nn] or Snn[nn] Wnnn[nn] or Snn[nn] Ennn[nn]</p> <p>or</p> <p>N OF Nnn[nn] or S OF Nnn[nn] or N OF Snn[nn] or S OF Snn[nn] [AND]</p> <p>W OF Wnnn[nn] or E OF Wnnn[nn] or W OF Ennn[nn] or E OF Ennn[nn]</p> <p>or</p> <p>N OF Nnn[nn] or N OF Snn[nn] AND S OF Nnn[nn] or S OF Snn[nn]</p> <p>or</p> <p>W OF Wnnn[nn] or W OF Ennn[nn] AND E OF Wnnn[nn] or E OF Ennn[nn]</p> <p>or</p> <p>N OF LINE²⁰ or NE OF LINE²⁰ or E OF LINE²⁰ or SE OF LINE²⁰ or S OF LINE²⁰ or SW OF LINE²⁰ or W OF LINE²⁰ or NW OF LINE²⁰ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]</p> <p>[AND N OF LINE²⁰ or NE OF LINE²⁰ or E OF LINE²⁰ or SE OF LINE²⁰ or S OF LINE²⁰ or SW OF LINE²⁰ or W OF LINE²⁰ or NW OF LINE²⁰ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]]</p>		<p>N2020 W07005 N48 E010 S60 W160 S0530 E16530</p> <p>N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 E OF W45 W OF E15540 E OF E09015</p> <p>N OF N1515 AND W OF E13530 S OF N45 AND N OF N40</p> <p>N OF LINE S2520 W11510 – S2520 W12010 SW OF LINE N50 W005 – N60 W020 SW OF LINE N50 W020 – N45 E010 AND NE OF LINE N45 W020 – N40 E010</p> <p>WI N6030 E02550 – N6055 E02500 – N6050 E02630 – N6030 E02550</p> <p>APRX 50KM WID LINE BTN N64 W017 – N60 W010 – N57 E010</p>	

		<p>or WI^{20, 21} Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – [Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]</p> <p>or APRX nnKM WID LINE²⁰ BTN (or nnNM WID LINE²⁰ BTN) Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]</p> <p>or ENTIRE FIR/[UIR]</p> <p>or ENTIRE CTA</p> <p>or²² WI nnnKM (or nnnNM) OF TC CENTRE</p> <p>or²⁹ WI nnnNM or nnnKM OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p>		<p>ENTIRE FIR</p> <p>ENTIRE FIR/UIR</p> <p>ENTIRE CTA</p> <p>WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE</p> <p>WI 30 KM OF N6030 E02550</p>	
...
Forecast position (C) ^{19, 24, 25}	Forecast position of phenomenon at the end of the validity period of the SIGMET message	<p>Nnn[nn] Wnnn[nn] or Nnn[nn] Ennn[nn] or Snn[nn] Wnnn[nn] or Snn[nn] Ennn[nn]</p> <p>or N OF Nnn[nn] or S OF Nnn[nn] or N OF Snn[nn] or S OF Snn[nn] [AND] W OF Wnnn[nn] or E OF Wnnn[nn] or W OF Ennn[nn] or E OF Ennn[nn]</p> <p>or N OF Nnn[nn] or N OF Snn[nn] AND S OF Nnn[nn] or S OF Snn[nn]</p> <p>or W OF Wnnn[nn] or W OF Ennn[nn] AND E OF Wnnn[nn] or E OF Ennn[nn]</p> <p>or N OF LINE²⁰ or NE OF LINE²⁰ or E OF LINE²⁰ or SE OF LINE²⁰ or S OF LINE²⁰ or SW OF LINE²⁰ or W OF LINE²⁰ or NW OF LINE²⁰ Nnn[nn] or</p>	—	<p>N30 W170</p> <p>N OF N30</p> <p>S OF S50 AND W OF E170</p> <p>S OF N46 AND N OF N39</p> <p>NE OF LINE N35 W020 – N45 W040</p> <p>SW OF LINE N48 W020 – N43 E010 AND NE OF LINE N43 W020 – N38 E010</p> <p>WI N20 W090 – N05 W090 – N10 W100 – N20 W100 – N20 W090</p> <p>APRX 50KM WID LINE BTN N64 W017 – N57 W005 – N55 E010 – N55 E030</p> <p>ENTIRE FIR</p> <p>ENTIRE FIR/UIR</p> <p>ENTIRE CTA</p> <p>TC CENTRE PSN N2740 W07345</p>	—

		<p>Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [AND N OF LINE²⁰ or NE OF LINE²⁰ or E OF LINE²⁰ or SE OF LINE²⁰ or S OF LINE²⁰ or SW OF LINE²⁰ or W OF LINE²⁰ or NW OF LINE²⁰ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] or Wl^{20, 21} Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] or APRX nnKM WID LINE²⁰ BTN (nnNM WID LINE²⁰ BTN) Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] or ENTIRE FIR/[UIR] or ENTIRE CTA or²² TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] or²⁶ NO VA EXP or²⁹</p>		<p>NO VA EXP</p> <p>WI 30 KM OF N6030 E02550</p>	
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		WI nnnNM or nnnKM OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]			
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Notes.—

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29. When using SIGMET for RDOACT CLD, when detailed information on the release is not available, a radius of up to 30 km may be applied based on the International Atomic Energy Agency (IAEA) recommendation for surface contamination contained in IAEA Safety Guide GS-G-2.1 - *Arrangements for Preparedness for a Nuclear or Radiological Emergency* (2007); and a vertical extent from surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) is to be applied as applicable.

APPENDIX 8. TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

(See Chapter 9 of this Annex)

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4. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

4.1 Presentation of information

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4.1.3 METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, GAMET, SIGMET, AIRMET and space weather, volcanic ash and tropical cyclone advisory information shall be presented in accordance with the templates in Appendices 1, 2, 3, 5 and 6, respectively. Such meteorological information received from other meteorological offices shall be included in flight documentation without change.

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ATTACHMENT E. SPATIAL RANGES AND RESOLUTIONS FOR SPACE WEATHER ADVISORY INFORMATION

Note.— The guidance contained in this table relates to Appendix 2, 6.1 Space weather advisory information.

Element		Range	Resolution
Flight Level:		250-600	30
Longitudes for advisories:		000 – 180 00	15 0
Latitude bands for advisories:	High latitudes northern hemisphere (HNH)	N9000 - N6000	30
	Middle latitudes northern hemisphere (MNH)	N6000 - N3000	
	Equatorial latitudes northern hemisphere (EQN)	N3000 - N0000	
	Equatorial latitudes southern hemisphere (EQS)	S0000 - S3000	
	Middle latitudes southern hemisphere (MSH)	S3000 - S6000	

	High latitudes southern hemisphere (HSH)	S6000 - S9000	
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Note.— One or more latitude ranges should be included in the space weather advisory information for GNSS and RADIATION

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APPENDIX B**PROPOSED REVISIONS TO METP JOB CARDS****Job Card METP.003.01 for the IAVW**

Title	Further development of the International Airways Volcano Watch (IAVW)	Reference:	METP003.01
Source	MET Divisional Meeting 2014 (Recommendation 2/6)		
Problem Statement	The international airways volcano watch (IAVW) was established to provide notification (via advisory messages, warnings and other notices) to international air navigation regarding the existence of volcanic ash in the atmosphere. The IAVW needs to be maintained and further developed including the integration of the information provided into the future system wide information management (SWIM) in support of the ASBU methodology.		
Specific Details (including impact statements)	<p>The IAVW consists of a number of international arrangements for monitoring the atmosphere and to provide notification to aircraft regarding the existence of volcanic ash in the atmosphere. The system comprises nine volcanic ash advisory centres (VAACs), provided by eight Provider States, tasked to monitor relevant data to detect volcanic ash, to forecast its movement and to provide advisory information to meteorological authorities and other users.</p> <p>It was recommended by the MET Divisional Meeting (Recommendation 2/6) that an appropriate ICAO expert group, in close coordination with WMO, further develop the requirements for the IAVW consistent with the Global Air Navigation Plan (Doc 9750), including the integration of the information produced by the system into the future system wide information management (SWIM) environment using, as a basis, the IAVW roadmap.</p> <p>Further development should take into consideration the main legacy tasks from the international airways volcano watch operations group (IAVWOPSG) that relate to volcanic ash.</p> <p>This development will be supported by the World Meteorological Organization (WMO), through the Volcanic Ash Scientific Advisory Group (VASAG) and the International Union of Geophysics and Geodesy (IUGG) through the World Organization of Volcano Observatories (WOVO).</p>		
Expected Benefit	Increase safety and efficiency by keeping aircraft operations out of areas of VA in the atmosphere and by integrating the VA information produced, under the IAVW, into the SWIM environment in line with the GANP.		
Reference Documents	Annex 3 — Meteorological Service for International Air Navigation, Global Air Navigation Plan (Doc 9750), Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds (Doc 9691), Handbook on the International Airways Volcano Watch (Doc 9766), Manual of Aeronautical Meteorological Practice (Doc 8896), Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377), Meteorology (MET) Divisional Meeting Report (Doc 10045) Agenda Item 2, Appendix C. Roadmap for International Airways Volcano Watch (IAVW) in Support of International Air Navigation.		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 — Meteorological Service for International Air Navigation	Proposals to update Annex 3 to meet current and evolving operational requirements in line with the GANP and to integrate IAVW information into the SWIM.		Sep 2016 7	Jul 2018 20	Nov 2018 20
	Regional Air Navigation Plans	Based on Annex 3 amendment, update of the plans as necessary.		Sep 2016 7	Jul 2018 20	Nov 2018 20
	Docs 8896, 9377, 9691, 9750 and 9766.	Update related guidance material to support the implementation of Annex 3 Amendment.	WMO (VASAG), WOVO	Sep 2016 7	Jul 2018 20	Nov 2018 20
	(Action)	Assist ICAO in the coordination of the arrangements between the States/Provider States, international organizations and other stakeholders comprising the IAVW and in ensuring that the global requirements for IAVW information are met.		On-going	On-going	On-going
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015	Session/Meeting: 199-9			

Proposed Revisions to Job Card METP.006.01 (Radioactive material)

Title	Further development of provisions for information on the release of radioactive material into the atmosphere	Reference:	MEPT.006.01
Source	MET Divisional Meeting 2014 (Recommendation 2/8)		
Problem Statement	The release of radioactive materials into the atmosphere could pose a risk to aircraft operations and the health of its occupants, air traffic and aerodromes. Recent events highlighted the need to continue and enhance existing international arrangements and procedures. to keep aircraft operations out of areas affected by the release of radioactive material into the atmosphere		
Specific Details (including impact statements)	<p>It was recommended by the MET Divisional Meeting 2014 (Recommendation 2/8) that an appropriate ICAO expert group, in close coordination with WMO, further develop provisions for information on the release of radioactive material into the atmosphere.</p> <p>The development of this task should include the main legacy tasks from the International Airways Volcano Watch Operations Group (IAVWOPSG) that relate to radioactive release. It should be taken into account that further development of provisions should be consistent with the evolving Global Air Navigation Plan (Doc 9750), including integration of the information produced into the future system-wide information management (SWIM) environment underpinning the future globally interoperable air traffic management system.</p> <p>This development will be supported by the World Meteorological Organization (WMO) Commission for Basic Systems (CBS) Expert Team on Emergency Response Activities (ET-ERA) and the International Atomic Energy Agency (IAEA) Inter-Agency Committee on Radiological and Nuclear Emergencies.</p>		

	Recognizing that the provision of improved information about the release of radioactive material relevant to aviation operations is a difficult challenge to address, the METP is pursuing two parallel efforts. In Amendment 78 to Annex 3, the METP will propose provisions to allow for the issuance of a cylinder-shaped SIGMET and, in certain instances, allow a cylindrical SIGMET to cross the boundaries of adjacent FIRs. Simultaneously, the METP, in consultation with appropriate expert groups, will develop guidance for the provision of information about airspace potentially affected by the release based on airborne transport dispersion modelling using a default source term.					
Expected Benefit	To continue and enhance the provision of information on the release of radioactive material into the atmosphere to avoid the risks posed to flight safety by aircraft operations in areas affected by the release. Integrate the information produced into the SWIM environment in line with the GANP.					
Reference Documents	Annex 3 — <i>Meteorological Service for International Air Navigation</i> , <i>Global Air Navigation Plan</i> (Doc 9750), <i>Manual of Aeronautical Meteorological Practice</i> (Doc 8896), Part II, <i>Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services</i> (Doc 9377), <i>Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds</i> (Doc 9691), Concept of operations for radioactive material information services in support of international air navigation, 10 December 2012, Draft Version 0.3, Meteorology (MET) Divisional Meeting (2014) Report, Doc 10045.					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 — <i>Meteorological Service for International Air Navigation</i>	Proposals for inclusion in Amendment 78 to Annex 3 to meet operational requirements in line with the GANP and to integrate the information on the release of radioactive material into the atmosphere into the SWIM.		Sep 2016	Jul 2018	Nov 2018
	Regional/Electronic Air Navigation Plans (eANP)	Based on Annex 3 provisions, provide draft amendment proposals for eANPs, update of the plans as necessary.		Sep 2016 ⁷	Jul 2018	Nov 2018
	Docs. 8896, 9377, 9691	Update related guidance material to support the implementation of Annex 3.		Sep 2016 ⁷	Jul 2018	Nov 2018
	Annex 3 — <i>Meteorological Service for International Air Navigation</i>	Proposals for inclusion in Amendment 79 to Annex 3 to meet operational requirements in line with the GANP and to integrate the information on the release of radioactive material into the atmosphere into the SWIM.		Sep 2018	July 2020	Nov 2020
	Electronic Air Navigation Plans (eANPs)	Based on Annex 3 provisions, provide draft amendment proposals for eANPs, as necessary.		Sep 2019		
	Docs. 8896, 9377, 9691	Update related guidance material to support the implementation of Annex 3.		Sep 2019		

Initial Issue Date: 17 June 2015	Date approved by ANC: 17 June 2015	Session/Meeting: 199-9
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Proposed Revisions to Jab Card METP.007.01 (Hazardous weather)

Title	Implementation of a regional advisory system for select en-route hazardous meteorological conditions weather information system(s)	Reference:	MEPT.007.01
Source	MET Divisional Meeting 2014 (Recommendation 2/9 and 4/4) and METP-WG/MISD/2-SN/15		
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 the provision of phenomenon-based system globally consistent information on a global basis. In certain areas of the globe, the problem is particularly acute with little or no service at all.		
Specific Details (including impact statements)	<p>It was recommended by The 2014 MET Divisional Meeting (Recommendation 2/9) recommended 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 (Recommendation 2/9). Such requirements should be integrated into the SWIM environment with appropriate guidance to support the selection criteria of centres. The problem statement provided by the users on the METP, particularly IATA, IFALPA, and IFATCA, reveals that the problem of inconsistent information across FIR boundaries (i.e., lack of phenomena-based coverage), insufficient granularity of forecasts, excessive forecast latencies, and other deficiencies exist over many parts of the world, not just in a few specific regions.</p> <p>Therefore, the users identified a need for phenomena-based, globally-consistent en-route hazardous weather information system(s) for select hazardous meteorological conditions. The users also recognized the need to develop, in parallel, guidance required for near-term improvement in those areas of the globe with the greatest service deficiencies.</p> <p>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.</p> <p>Related needs, such as cost recovery mechanisms and governance (Recommendation 4/4), and integration of improved and new services into the SWIM environment, will be undertaken.</p>		
Expected Benefit	Increased safety and efficiency of global aviation operations by keeping aircraft operations out of enabling operators to avoid areas of hazardous meteorological conditions.		
Reference Documents	Annex 3 — <i>Meteorological Service for International Air Navigation, Global Air Navigation Plan</i> (Doc 9750), <i>Manual of Aeronautical Meteorological Practice</i> (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 – <i>Meteorological Service for International Air Navigation</i>	Proposals for inclusion in Amendment 78 to Annex 3 to encourage States to cooperate in providing needed services to mitigate current SIGMET deficiencies 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 78 to Annex 3.		Sep 2017 2016	Jul 2018	
	Electronic Air Navigation Plans (eANPs)	Based on Annex 3 provisions, provide proposed amendments to the eANPs, as necessary.		Sep 2017		
	Annex 3 – <i>Meteorological Service for International Air Navigation</i>	Provisions to enable the establishment of a regional advisory system(s) that will provide phenomenon-based, globally consistent en-route hazardous weather information for select hazardous meteorological conditions.		Sep 2018	July 2020	Nov 2020
	Doc. 8896	Update related guidance material to support implementation of Amendment 79 to Annex 3		Sep 2019		
	N/A (Action)	Develop guidance for use by ICAO Regions in the selection of advisory centres in identifying potential providers of phenomena-based, globally-consistent en-route hazardous weather information		Sep 2019 2016		
	Regional Electronic Air Navigation Plans	Based on Annex 3 provisions, update of the plans provide proposed amendments to the eANPs, as necessary.				
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015	Session/Meeting: 199-9			

Proposed Revisions to Job Card METP.009.01 (Space weather)

Title	Development of provisions for information on space weather to international air navigation	Reference:	METP.009.01
Source	MET Divisional Meeting 2014 (Recommendation 2/7)		
Problem Statement	Space weather events such as solar radiation storms, solar flares, geomagnetic storms and ionospheric disturbances that impact earth pose a risk to flight safety, impacting communication, navigation systems, on board avionics and also posing a risk to the health of aircraft occupants.		

Specific Details (including impact statements)	<p>It was recommended by the MET Divisional Meeting (Recommendation 2/7) that an appropriate ICAO expert group, in close coordination with WMO, develop provisions for information on space weather to international air navigation.</p> <p>The development should specifically address:</p> <ul style="list-style-type: none"> a) requirements for space weather information services consistent with the draft concept of operations for space weather information services; b) selection criteria and associated capability for the designation of global and regional space weather centres, including the optimum number thereof; and c) appropriate governance and cost recovery arrangements for the provision of space weather information services on a global and regional basis; and d) considerations on the use of space weather information and the various impacts space weather events could have on international air navigation. <p>It should be taken into account that development of provisions should be consistent with the evolving Global Air Navigation Plan (Doc 9750), including integration of the information produced into the future system-wide information management (SWIM) environment underpinning the future globally interoperable air traffic management system.</p> <p>This development will be supported by the World Meteorological Organization (WMO) Inter-Programme Coordination Team on Space Weather.</p>					
Expected Benefit	To provide information on space weather and to avoid the risks posed to flight safety regarding communications, navigation (including the global positioning system (GPS)), surveillance, and avionics, as well the risk to the health of aircraft occupants (i.e. flight crew and passengers) due to radiation exposure. Integrate the information produced into the SWIM environment in line with the GANP.					
Reference Documents	Annex 3 — <i>Meteorological Service for International Air Navigation</i> , <i>Global Air Navigation Plan</i> (Doc 9750), <i>Manual of Aeronautical Meteorological Practice</i> (Doc 8896), <i>Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services</i> (Doc 9377), Concept of operations for space weather information in support of international air navigation, 6 December 2013, Draft version 4.0, <i>Meteorology (MET) Divisional Meeting (2014) Report</i> , Doc 10045.					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— Meteorological Service for International Air Navigation	Initial proposals for inclusion in Amendment 78 to Annex 3 to meet operational requirements in line with the GANP and to integrate space weather information into the SWIM.	NSP	Sep.2016	Jul 2018	Nov 2018
	(Action)	Finalize the concept of operations and associated roadmap		Sep 2016	Jul 2018	Nov 2018
	(Action)	Recommend to the ANC the designation of space weather information provider(s) based on the WMO report of those providers capable of meeting the agreed upon space weather information selection criteria as shown through site assessment visits and audits.	WMO	Jun 2018		
	Regional — Air — Navigation PlansElectronic Air Navigation Plans (eANPs)	Based on Annex 3 provisions, provide draft amendment proposals for eANPs, update of the plans as necessary.		Sep 2016 ⁷	Jul 2018	Nov 2018

	Docs. 9750, 8896, 9377	Initial related guidance material to support the implementation of Annex 3. New user Manual.	NSP, WMO (ICTSW)	Sep 2016 ⁷	Jul 2018	Nov 2018
	Annex 3— Meteorological Service for International Air Navigation	Additional proposals for inclusion in Amendment 79 to Annex 3 to meet operational requirements in line with the GANP and to integrate space weather information into the SWIM.	NSP	Sep 2018	Jul 2020	Nov 2020
	Electronic Air Navigation Plans (eANPs)	Based on Annex 3 provisions, provide draft amendment proposals for eANPs, as necessary.		Sep 2019		
	Docs. 9750, 8896, 9377, Space Weather Manual (Doc #####)	Updated related guidance material to support the implementation of Annex 3.	NSP, WMO	Sep 2019		
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015		Session/Meeting: 199-9		

Proposed Revisions to Job Card METP.xxx.xx (Sulphur dioxide)

(Note: The original job card form was in a form that has been superseded, which contained a different format)

Title	Provision of information on sulphur dioxide and other hazardous gases from volcanic eruptions in the atmosphere	Reference:	IAVWOPSG001 METP.xxx.xx
Source	IAVWOPSG Conclusion 7/34 / Decision 7/35		
Problem Statement	Significant levels of sulphur dioxide and other hazardous gases in the atmosphere emitted from volcanic eruptions pose health risks to aircraft occupants.		
Specific Details (including impact statements)	<p>IVATF Recommendation 4/11 invited the IAVWOPSG, in coordination with the VASAG, as part of deliverable IAVWOPSG-04 and, in the context of the hazards posed by sulphur dioxide (SO₂) and other hazardous gases in the atmosphere, to progress work on identifying and quantifying any associated health risks to aircraft occupants with a view to enhancing the guidance contained in Doc 9766. The group took note of an emerging requirement for providing assessments of the health risks to flight crew and passengers on aircraft entering an SO₂ cloud. The group determined that ICAO, through an appropriate expert group or groups, should determine a clear meteorological/atmospheric chemistry requirement (such as a critical level of SO₂ in the atmosphere that would be observed or forecast) that, after passing through the aircrafts ventilation system, could pose a health risk to the aircraft's occupants. The group recommended that such a requirement should also take into account issues such as instantaneous exposure to and accumulated dosage of SO₂.</p> <p>The MET Panel, in the context of the hazards posed by sulphur dioxide (SO₂) from volcanic eruptions, to progress work on identifying and quantifying any associated health</p>		

		<p>risks to aircraft occupants with a view to formulate either provisions for Annex 3 or enhancing the guidance contained in Doc 9766. The Panel should determine a clear meteorological/atmospheric chemistry requirement for the critical threshold level of SO₂ in the atmosphere emitted from a volcanic eruption (that would be observed or forecast) that, could pose a health risk to the aircraft's occupants. Upon completion of this work, the Panel will examine the need for requirements to address other hazardous gases from volcanic clouds.</p> <p>This development will be supported by the World Meteorological Organization (WMO), through the Volcanic Ash Scientific Advisory Group (VASAG), the International Union of Geophysics and Geodesy (IUGG) through the World Organization of Volcano Observatories (WOVO) and the expert views of ANB Aeronautical Medicine Section.</p>				
Expected Benefit		Increase safety and efficiency by keeping aircraft operations out of areas of significant SO ₂ in the atmosphere and by integrating the SO ₂ information produced, under the IAVW, into the SWIM environment in line with the GANP.				
Reference Documents		Annex 3 — Meteorological Service for International Air Navigation, Global Air Navigation Plan (Doc 9750), Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds (Doc 9691), Handbook on the International Airways Volcano Watch (Doc 9766), Manual of Aeronautical Meteorological Practice (Doc 8896), Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377), Meteorology (MET) Divisional Meeting Report (Doc 10045) Agenda Item 2, Appendix C. Roadmap for International Airways Volcano Watch (IAVW) in Support of International Air Navigation.				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 — Meteorological Service for International Air Navigation	Proposals to update Annex 3 to meet current and evolving operational requirements in line with the GANP and to integrate IAVW information into the SWIM.		Sep.18	Jul 20	Nov 20
	Electronic Air Navigation Plans (eANPS)	Based on Annex 3 amendment, provide draft amendment proposals for eANPs as necessary.		Sep.18	Jul 20	Jul 20
	Docs 8896, 9377, 9691, 9750 and 9766.	Update related guidance material to support the implementation of Annex 3 Amendment.	WMO (VASAG), WOVO	Sep.18	Jul 20	Jul 20
	(Action)	Assist ICAO in the coordination of the arrangements between the States/Provider States, international organizations and other stakeholders comprising the IAVW and in ensuring that the global requirements for IAVW information are met.		On-going	On-going	On-going
Initial Issue Date: 22 March 2013		Date approved by ANC: 13 June 2013	Session/Meeting:			

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APPENDIX C**UPDATED WORK PLANS WITHIN MISD****UPDATED WORK PLAN FOR THE RRM WORK STREAM**

Key:

M = Milestone

D = Deliverable

Type	WBS	Description	Start Date	End Date	Status	Assigned
M	1	Input to Amendment 78	Apr 2015	Oct 2017	In Progress	Dirk
D	1.1	Complete Standards and Recommended Practices for provision of SIGMETs in a cylinder-shape that, in some instances, cross FIR boundaries	Apr 2015	Sep 2016	In Progress	Rick
D	1.2	Complete draft amendment proposals for electronic Air Navigation Plans (eANPs), if necessary	Nov 2016	Oct 2017	Not Started	TBD
D	1.3	Complete Updates to Guidance Material (ICAO Doc. 8896, 9377, and 9691) to Support the Provision of a Cylinder-shaped SIGMET, as necessary	Nov 2016	Oct 2017	Not Started	Dirk
M	2	Initial Guidance for Provision of RRM Information Based on Airborne Transport Dispersion Models (ATDM)	Nov 2016	Oct 2017	Not Started	Dirk
D	2.1	Complete Initial Guidance for the Provision and Use of RRM Information Based on ATDM Using a Default Source Term	Nov 2016	Oct 2017	Not Started	Dirk
M	3	Input to Amendment 79	Nov 2016	Oct 2019	Not Started	Dirk
D	3.1	Complete Concept of Operations for RRM Information Based on ATDM	Nov 2016	Jan 2017	Not Started	Dirk
D	3.2	Complete Preliminary Functional and Performance Requirements for RRM Information Based on ATDM	Jan 2017	Jun 2017	Not Started	Dirk
D	3.3	Complete Alternatives Analysis for the Provision of RRM Information Based on ATDM	Aug 2017	Dec 2017	Not Started	Dirk

Type	WBS	Description	Start Date	End Date	Status	Assigned
D	3.4	Complete Final Functional and Performance Requirements for RRM Information Based on ATDM	Jan 2018	Mar 2018	Not Started	Dirk
D	3.5	Complete Standards and Recommended Practices for the provision of RRM Information Based on ATDM	Apr 2018	Sep 2018	Not Started	Dirk
D	3.6	Complete draft amendment proposals for electronic Air Navigation Plans (eANPs), if necessary	Nov 2018	Oct 2019	Not Started	TBD
D	3.7	Complete Updates to Guidance Material (ICAO Doc. 8896, 9377, and 9691) to Support the Implementation of RRM Information Based on ATDM, if necessary	Nov 2018	Oct 2019	Not Started	TBD

UPDATED WORK PLAN FOR SPACE WEATHER WORK STREAM

Type	WBS	Description	Start Date	End Date	Status	Assigned
M	1	Input to Amendment 78	Apr 2015	Sep 2017	In Progress	Steve
D	1.1	Complete proposed Standards and Recommended Practices (SARPs) for the provision of global space weather information	Apr 2015	Sep 2016	In progress	Steve
D	1.2	Complete Guidance (i.e., manual) on the provision and use of global space weather information	July 2016	Sep 2017	In progress	Steve
D	1.3	Complete draft amendment proposals for electronic Air Navigation Plans (eANPs), as necessary	Nov 2016	Sep 2017	Not started	Steve
D	1.4	Complete high-level implementation plan for the provision of global space weather information	Nov 2016	Feb 2017	Not Started	Steve
M	2	Input to Amendment 79	Jul 2017	Sep 2019	Not started	Steve
D	2.1	Complete additional proposed SARPs for the provision of	July 2017	Sep 2018	Not started	Steve

Type	WBS	Description	Start Date	End Date	Status	Assigned
		space weather information				
D	2.2	Complete updates to related guidance material to implement SARPs	July 2018	Sep 2019	Not Started	Steve
D	2.3	Complete draft amendment proposals for eANPs, as necessary	Nov 2018	Sep 2019	Not started	Steve

UPDATED WORK PLAN FOR REGIONAL HAZARDOUS WEATHER ADVISORY CENTRE WORK STREAM

Type	WBS	Description	Start Date	End Date	Status	Assigned
M	1	Input to Amendment 78	Apr 2015	Oct 2017	In Progress	Sharon
D	1.1	Complete Standards and Recommended Practices for near-term improvement of SIGMET provision	Apr 2015	Sep 2016	In progress	Rick
D	1.2	Complete Guidance to support near-term improvement in SIGMET provision	July 2016	Oct 2017	In progress	Sharon
M	2	Input to Amendment 79	Nov 2016	Oct 2019	In progress	Sharon
D	2.1	Complete User Needs Analysis for phenomena-based, globally-consistent, en-route hazardous weather information	July 2016	Jan 2017	In progress	SDT-MI
D	2.2	Complete Current Capability Assessment and Shortfall Analysis	Jan 2017	Mar 2017	Not Started	SDT-MI
D	2.3	Complete Concept of Operations for phenomena-based, globally-consistent, en-route hazardous weather information	Apr 2017	Jun 2017	Not Started	SDT-MI
D	2.4	Complete preliminary functional and performance requirements	July 2017	Dec 2017	Not Started	Sharon
D	2.5	Complete Alternatives Analysis for the provision of phenomena-based, globally-consistent, en-route hazardous weather information	Jan 2018	Apr 2018	Not Started	Sharon

Type	WBS	Description	Start Date	End Date	Status	Assigned
D	2.6	Complete final functional and performance requirements	May 2018	June 2018	Not Started	Sharon
D	2.7	Complete Standards and Recommended Practices to enable the establishment of systems to provide phenomena-based, globally-consistent, en-route hazardous weather information	June 2018	Sep 2018	Not Started	Sharon
D	2.8	Complete Guidance to support the implementation proposed SARPs	Oct 2018	Oct 2019	Not Started	TBD
M	3	Implementation of Systems to Provide Phenomena-based, Globally-consistent, En-route Hazardous Weather Information	May 2018	Oct 2018	Not Started	TBD
D	3.1	Complete Implementation Plan	May 2018	July 2018	Not Started	TBD
D	3.2	Complete Guidance to identify potential providers of phenomena-based, globally-consistent, en-route hazardous weather information	May 2018	Oct 2018	Not Started	TBD

UPDATED WORK PLAN FOR VOLCANIC ASH AND GAS INFORMATION WORK STREAM

(Note: The format of this work plan will be updated to align with other work plans within the WG-MISD)

4. WORK PLAN			
Activity / Milestone	Assigned to	Date	Status
Milestone 04.00.00: Volcanic Ash and Gas Information			
Deliverable 04.01.00: Updated IAVW Roadmap for endorsement by MET Panel	S Albersheim	May 2016	Closed
Deliverable 04.02.00 Updated Concept of Operations (ConOps) for volcanic hazards to aviation	S Albersheim	May 2016	Closed
Deliverable 04.03.00: Requirements for volcanic ash information in ASBU Block 0 (2013-18), not addressed by WG-MOG	S Albersheim	June 2016	Closed

Deliverable 04.04.00: Report on levels of SO ₂ concentrations that could cause health effects for flight crew and passengers.	TBD	June 2017	Open
Deliverable 04.05.00: Requirements for volcanic ash and SO ₂ information in ASBU Block 1 (2018-23). To be preceded by a users' needs analysis, a current capability analysis, and a shortfall analysis.	S Albersheim	June 2018	Open
Deliverable 04.06.00: Alternative analysis for the provision of SO ₂ information in ASBU Block 1 (2018-2023)	TBD	TBD	Open
Deliverable 04.07.00: Proposals for Amendment of ICAO Annex 3 with respect to volcanic ash and SO ₂ information in ASBU Block 1 (2018-2023)	TBD	September 2018	Open 1.
Deliverable 04.08.00: Requirements for volcanic ash and SO ₂ information in ASBU Block 2 (2023-28)	TBD	June 2022	Open
Deliverable 04.09.00: Proposals for Amendment of ICAO Annex 3 with respect to volcanic ash and SO ₂ information in ASBU Block 2 (2023-28)	TBD	September 2022	Open
Deliverable 04.10.00: Draft Operational Risk Severity Indicators (ORSI) into VAA.	TBD	TBD	Open

APPENDIX D**REVISED FUNCTIONAL AND PERFORMANCE REQUIREMENTS FOR SPACE WEATHER INFORMATION PROVIDERS****Functional and Performance Requirements for Near Real-time Space Weather Information**

Type	No.	Requirement
Functional	1	The Provider State shall provide near real-time information about space weather conditions that affect systems used for international air navigation, surveillance, and aircraft occupants.
Functional	1.1	The Provider State shall provide near real-time information about space weather conditions affecting High Frequency (HF) propagation
Performance	1.1-1	The Provider State shall provide near real-time information about the extent of space weather conditions affecting HF propagation using geographic coordinates
Performance	1.1-1.1	The Provider State shall provide near real-time information about the extent of space weather conditions affecting HF propagation for day side latitudinal ranges of the globe applicable to northern, middle-north, equatorial (north and south), middle-south, and southern
Performance	1.1-1.2	The global Provider State shall provide near real-time information about the extent of space weather conditions affecting HF propagation with a longitude resolution of 15 degrees
Performance	1.1-1.3	The regional Provider State shall provide near real-time information about the extent of space weather conditions affecting HF propagation in whole degree latitude and whole degree longitude
Performance	1.1-1.4	The regional Provider State shall provide near real-time information about the extent of space weather conditions affecting HF propagation with a variation tolerance of one (1) whole degree latitude and one (1) whole degree longitude
Performance	1.1-2	The Provider State shall provide near real-time information about space weather conditions affecting HF propagation with a longitude resolution of 15 degrees
Performance	1.1-3	The Provider State shall provide near real-time information about space weather conditions affecting HF propagation with a temporal resolution of 15 minutes
Performance	1.1-4	The Provider State shall provide near real-time information about space weather conditions affecting HF propagation with a latency equal to or less than 5 minutes

Type	No.	Requirement
Functional	1.1.1	The Provider State shall provide near real-time information about HF absorption
Performance	1.1.1-1	The Provider State shall provide near real-time information about HF absorption in the following two (2) categories: Moderate Degradation and Severe Degradation
Functional	1.1.2	The Provider State shall provide near real-time information about depressions in HF Maximum Usable Frequencies (MUFs)
Performance	1.1.2-1	The Provider State shall provide near real-time information about HF MUF depression in the following two (2) categories: Moderate Degradation and Severe Degradation
Functional	1.2	The Provider State shall provide near real-time information about space weather conditions affecting GNSS navigation and surveillance
Performance	1.2-1	The Provider State shall provide near real-time information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication using geographic coordinates
Performance	1.2-1.1	The Provider State shall provide near real-time information about the extent of space weather conditions affecting GNSS navigation and surveillance for latitudinal ranges of the globe applicable to northern, middle-north, equatorial (north and south), middle-south, and southern
Performance	1.2-1.2	The global Provider State shall provide near real-time information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication with a longitude resolution of 15 degrees
Performance	1.2-1.3	The regional Provider State shall provide near real-time information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication in whole degrees latitude and whole degrees longitude
Performance	1.2-1.4	The regional Provider State shall provide near real-time information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication with a variation tolerance of one (1) whole degree latitude and one (1) whole degree longitude
Performance	1.2-2	The Provider State shall provide near real-time information about the extent of space weather conditions affecting GNSS navigation and surveillance with a longitude resolution of 15 degrees
Performance	1.2-3	The Provider State shall provide near real-time information about space weather conditions affecting GNSS navigation and surveillance with a temporal resolution of 15 minutes
Performance	1.2-4	The Provider State shall provide near real-time information about space weather conditions affecting GNSS navigation and surveillance with a latency equal to or less than 5 minutes
Functional	1.2.1	The Provider State shall provide near real-time information about

Type	No.	Requirement
		scintillation affecting GNSS-based navigation and surveillance
Performance	1.2.1-1	The Provider State shall provide near real-time information about scintillation affecting GNSS-based navigation, communications, and surveillance in the following two (2) categories: Moderate Degradation and Severe Degradation
Functional	1.2.2	The Provider State shall provide near real-time information about ionospheric induced delay affecting GNSS-based navigation and surveillance
Performance	1.2.2-1	The Provider State shall provide near real-time information about ionospheric induced delay affecting GNSS-based navigation surveillance in the following two (2) categories: Moderate Degradation and Severe Degradation
Functional	1.3	The Provider State shall provide near real-time information about the radiation exposure environment
Performance	1.3-1	The Provider State shall provide near real-time information about the extent of space weather conditions affecting the radiation exposure environment for latitudinal ranges of the globe applicable to northern, middle-north, equatorial (north and south), middle-south, and southern
Performance	1.3-2	The Provider State shall provide near real-time information about the radiation exposure environment with a longitude resolution of 15 degrees
Performance	1.3-3	The Provider State shall provide near real-time information about the vertical extent of the radiation exposure environment from FL250 to FL600
Performance	1.3-4	The Provider State shall provide near real-time information about the radiation exposure environment with a vertical resolution of 3000 feet
Functional	1.3.1	The Provider State shall provide near real-time information about the background radiation exposure environment
Performance	1.3.1-1	The Provider State shall provide near real-time information about the background radiation exposure environment with a temporal resolution of 24 hours
Performance	1.3.1-2	The Provider State shall provide near real-time information about the background radiation exposure environment with a latency of 1 hour
Functional	1.3.2	The Provider State shall provide near real-time information about enhanced radiation exposure environment
Performance	1.3.2-1	The Provider State shall provide near real-time information about enhanced radiation exposure environment with a temporal resolution of 1 hour
Performance	1.3.2-2	The Provider State shall provide near real-time information about enhanced radiation exposure environment with a latency of 10 minutes

Functional and Performance Requirements for Forecast Space Weather Information

Type	No.	Requirement
Functional	2	The Provider State shall provide forecast information about space weather conditions that affect systems used for international air navigation, surveillance, and aircraft occupants
Functional	2.1	The Provider State shall provide forecast information about space weather conditions affecting HF propagation
Performance	2.1-1	The provider state shall provide forecast information about the extent of space weather conditions affecting HF propagation using geographic coordinates
Performance	2.1-1.1	The Provider State shall provide forecast information about the extent of space weather conditions affecting HF propagation for latitudinal ranges of the globe applicable to northern, middle-north, equatorial (north and south), middle-south, and southern
Performance	2.1-1.2	The global Provider State shall provide forecast information about space weather conditions affecting HF propagation with a longitude resolution of 15 degrees
Performance	2.1-1.3	The regional Provider State shall provide forecast information about the extent of space weather conditions affecting HF propagation in whole degree latitude and whole degree longitude
Performance	2.1-1.4	The regional Provider State shall provide forecast information about the extent of space weather conditions affecting HF propagation with a variation tolerance of one (1) whole degree latitude and one (1) whole degree longitude
Performance	2.1-2	The Provider State shall provide forecast information about space weather conditions affecting HF propagation for forecast ranges of 6, 12, 18 and 24 hours
Performance	2.1-3	The Provider State shall provide forecast information about space weather conditions affecting HF propagation with an update cycle equal to or less than 6 hours
Performance	2.1-4	The Provider State shall provide forecast information about space weather conditions affecting HF propagation with a latency of 15 minutes
Functional	2.1.1	The Provider State shall provide forecast information about HF absorption
Performance	2.1.1-1	The Provider State shall provide forecast information about HF absorption in the following two (2) categories: Moderate Degradation and Severe Degradation

Type	No.	Requirement
Functional	2.1.2	The Provider State shall provide forecast information about depressions in HF Maximum Usable Frequencies (MUFs)
Performance	2.1.2-1	The Provider State shall provide forecast information about HF MUF depression in the following two (2) categories: Moderate Degradation and Severe Degradation
Functional	2.2	The Provider State shall provide forecast information about space weather conditions affecting GNSS-based navigation, surveillance, and communication
Performance	2.2-1	The Provider State shall provide forecast information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication using geographic coordinates
Performance	2.2-1.1	The Provider State shall provide forecast information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication for latitudinal ranges of the globe applicable to northern, middle-north, equatorial (north and south), middle-south, and southern
Performance	2.2-1.2	The global Provider State shall provide forecast information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication with a longitude resolution of 15 degrees
Performance	2.2-1.3	The regional Provider State shall provide forecast information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication in whole degrees latitude and whole degrees longitude
Performance	2.2-1.4	The regional Provider State shall provide forecast information about the extent of space weather conditions affecting GNSS navigation, surveillance, and communication with a variation tolerance of one (1) whole degree latitude and one (1) whole degree longitude
Performance	2.2-2	The Provider State shall provide forecast information about space weather conditions affecting GNSS navigation, surveillance, and communication for forecast ranges of 6, 12, 18, and 24 hours
Performance	2.2-3	The Provider State shall provide forecast information about space weather conditions affecting GNSS navigation, surveillance, and communication with an update cycle equal to or less than 6 hours
Performance	2.2-4	The Provider State shall provide forecast information about space weather conditions affecting GNSS navigation, surveillance, and communication with a latency of 15 minutes
Functional	2.2.1	The Provider State shall provide forecast information about scintillation affecting GNSS navigation, surveillance, and communication
Performance	2.2.1-1	The Provider State shall provide forecast information about scintillation affecting GNSS navigation, surveillance, and communication in the following two (2) categories: Moderate Degradation and Severe Degradation

Type	No.	Requirement
Functional	2.2.2	The Provider State shall provide forecast information about ionospheric induced delay affecting GNSS navigation, surveillance, and communication
Performance	2.2.2-1	The Provider State shall provide forecast information about ionospheric induced delay affecting GNSS navigation and surveillance in the following three (2) categories: Moderate Degradation and Severe Degradation
Functional	2.3	The Provider State shall provide forecast information about the radiation exposure environment
Performance	2.3-1	The Provider State shall provide forecast information about the extent of space weather conditions affecting HF propagation for latitudinal ranges of the globe applicable to northern, middle-north, equatorial (north and south), middle-south, and southern
Performance	2.3-2	The Provider State shall provide forecast information about the radiation exposure environment with a longitude resolution of 10 degrees
Performance	2.3-3	The Provider State shall provide forecast information about the radiation exposure environment from FL250 to FL600
Performance	2.3-4	The Provider State shall provide forecast information about the radiation exposure environment with a vertical resolution of 3000 feet
Functional	2.3.1	The Provider State shall provide forecast information about the changes in the background radiation exposure environment
Performance	2.3.1-1	The Provider State shall provide forecast information about changes in the background radiation exposure environment with a temporal resolution of 24 hours
Performance	2.3.1-2	The Provider State shall provide forecast information about changes in the background radiation exposure environment with an update rate equal to or less than 24 hours
Performance	2.3.1-3	The Provider State shall provide forecast information about the background radiation exposure environment with a latency equal to or less than 1 hour
Functional	2.3.2	The Provider State shall provide forecast information about enhanced radiation exposure level
Performance	2.3.2-1	The Provider State shall provide forecast information about enhanced radiation exposure level with a temporal resolution of 6 hours
Performance	2.3.2-2	The Provider State shall provide forecast information about enhanced radiation exposure level with an update rate of 6 hours
Performance	2.3.2-3	The Provider State shall provide forecast information about enhanced radiation level with a latency of 10 minutes

APPENDIX E**DRAFT AMMENDMENT TO Annex 15 – *Aeronautical Information Services***

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CHAPTER 5. NOTAM

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5.1.1.1 A NOTAM shall be originated and issued concerning the following information:

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t) forecasts of ~~solar cosmic radiation, where provided~~ space weather events (that have an impact on high frequency radio communications, GNSS-based navigation and surveillance, and radiation exposure at flight levels), the date and time of the event, the flight levels, where provided, and portions of airspace which could be affected;

APPENDIX F

Procedures for Air Navigation Services – ICAO Abbreviations and Codes (PANS-ABC, Doc 8400)

The space weather advisory introduces several new abbreviations to be included in the *Procedures for Air Navigation Services – ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400):

These abbreviations are shown below:

Abbreviation	Decode
EQN	Equatorial latitudes northern hemisphere
EQS	Equatorial latitudes southern hemisphere
HNH	High latitudes northern hemisphere
HSH	High latitudes southern hemisphere
MNH	Middle latitudes northern hemisphere
MSH	Middle latitudes southern hemisphere
SWX	Space weather
SWXC	Space weather Centre

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APPENDIX G

Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444)

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CHAPTER 9

FLIGHT INFORMATION SERVICE AND ALERTING SERVICE

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9.1.3.x TRANSMISSION OF INFORMATION CONCERNING SPACE WEATHER ACTIVITY

Information on space weather events that have an impact on high frequency radio communications, GNSS-based navigation and surveillance, and radiation exposure at flight levels, within the area of responsibility of the ATS unit shall be transmitted to aircraft by one or more of the means specified in 9.1.3.1.1.

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CHAPTER 15

PROCEDURES RELATED TO EMERGENCIES, COMMUNICATION FAILURE AND CONTINGENCIES

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15.5.4 DESCENTS BY ~~SUPERSONIC~~ AIRCRAFT DUE TO SOLAR COSMIC RADIATION FROM SPACE WEATHER EVENTS

Air traffic control units should be prepared for the possibility that ~~supersonic~~ aircraft ~~operating at levels above 15 000 m (49 000 ft)~~ may, on rare occasions, experience a rise solar cosmic radiation which requires them to descend to lower levels, ~~possibly down to or below the levels being used by subsonic aircraft~~. When such a situation is known or suspected, air traffic control units should take all possible action to safeguard all aircraft concerned, including any ~~subsonic~~ aircraft affected by the descent.

Note.— All ~~supersonic~~ aircraft in a particular portion of airspace and above a certain altitude may will be affected at the same time, and the event may be accompanied by a deterioration or loss of air-ground communications. It is expected that the aircraft will alert air traffic control units before the radiation reaches a critical level and will request a descent clearance when the critical level is reached. However, situations may occur in which the aircraft will need to descend without waiting for a clearance. In such cases, the aircraft are expected to advise air traffic control units, as soon as possible, of the emergency action taken.

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APPENDIX H***Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377)***

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Chapter 2**AIR TRAFFIC AND METEOROLOGICAL SERVICES ORGANIZATIONS**

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2.2.2 Meteorological service is provided by the following centres, offices and stations:

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g) ***Space weather centre (SWXC)***. A centre designated to monitor and provide information on large-scale space weather expected to affect communications, GNSS-based navigation and surveillance systems and/or pose a radiation risk to flight crew members and passengers.

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APPENDIX I**GUIDANCE ON CRITERIA FOR SPACE WEATHER INFORMATION PROVIDERS
and
SCHEDULE FOR ESTABLISHING GLOBAL SPACE WEATHER INFORMATION
CAPABILITY****Guidance on Criteria for Space Weather Information Providers**

To ensure quality, reliability, and integrity of the space weather information service for international air navigation, a space weather information provider should demonstrate and/or provide evidence that it meets the following criteria:

1. Institutional Criteria

- a. Experience as a designated national space weather centre
- b. A Quality Management System
- c. Appropriate qualifications of personnel and an ongoing competency and training program
- d. Adherence to ICAO security provisions
- e. Adherence to all applicable data rights
- f. Procedures to liaise with aviation decision-makers and gather feedback on the space weather information service
- g. Procedures to coordinate with other space weather information providers
- h. A source of funding and an adequate level of funding to provide the space weather information service for a period of at least 3 years
- i. Provide the funding and access to facilities and records necessary for the completion of the validation and audit process

2. Operational Criteria

- a. 24/7 operational capability
- b. A system reliability¹ of 99.9 percent with no single failure exceeding 90 minutes in a 24-hour period

¹ Reliability. The probability of a system or system element performing its intended function under stated conditions without failure for a given period of time. (American Society of Quality, 2011)

- c. A system availability² of 98.0 percent with no single outage exceeding 4 hours in a 1-year period
- d. A system maintainability³ of 95.0 percent for a 2-hour interval

Note: These criteria may be met by a single space weather information provider with appropriate system redundancy or by multiple space weather information providers with appropriate arrangements for backup capability.

3. Technical Criteria

- a. Ability to provide the space weather information service, both near real-time and forecast information, as defined in the draft SARPs for Amendment 78 of ICAO Annex 3.
- b. Ability to access observations (own observations and received from other space weather providers) of:
 - i. Coronal mass ejections and high-speed streams
 - ii. Geomagnetic storms
 - iii. Solar radiation storms
 - iv. Solar flares
 - v. Solar radio bursts
 - vi. Ionospheric activity
- c. Ability to produce near real-time and forecast information regarding the potential impacts of space weather using numerical models capable of ingesting observation data from multiple sources.
- d. Ability to produce near real-time and forecast information that meets the proposed functional and performance requirements, as well as harmonize information with the space weather information providers for adjacent geographic areas, as necessary.
- e. Ability to provide the space weather service over the entire globe.
- f. Ability to conduct forecast verification.

4. Communication/Dissemination Criteria

- a. Ability to provide the space weather information service to aviation decision-makers, as defined in the draft SARPs for Amendment 78 of Annex 3.

² Availability. The probability that a repairable system or system element is operational at a given point in time under a given set of environment conditions. (American Society of Quality, 2011)

³ Maintainability. The probability that a system or system element can be repaired in a defined environment within a specified period of time. (American Quality Society, 2011)

- b. Ability to provide a communications system and infrastructure that supports the availability, maintainability, and reliability criteria is section 2.
- c. Ability to provide the space weather information service via the following means of dissemination:
 - i. ICAO Aeronautical Fixed Service
 - ii. World Area Forecast System Internet File Service
 - iii. Secure Aviation Data Information Service
 - iv. Regional OPMET centres

Schedule for Establishing Global Space Weather Information Capability

Start Date	End Date	Description	Responsibility
February 2017	March 2017	Issue State requesting interest in providing the global space weather information service	ICAO
April 2017	May 2017	Respond to State Letter indicating ability to meet criteria for space weather information providers, including funding for site assessment visit and audit (to be conducted by WMO).	Candidate Provider States
June 2017	July 2017	Request WMO assistance to evaluate candidate Provider States through site assessment visits and audits	ICAO
August 2017	December 2017	Conduct site assessment visits and audits of candidate Provider States for global space weather information capability	WMO
January 2018	February 2018	Complete report to ICAO on candidate Provider States for global space weather information capability	WMO
March 2018	June 2018	Select optimal number of providers of global space weather information capability	ICAO
June 2018	July 2018	Designate provider(s) of global space weather information capability	ICAO
July 2018	November 2018	Commence production and dissemination of global space weather information	Space Weather Provider(s)



METP/2
4/11/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 5

The attached constitutes the report on Agenda Item 5 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 5: Meteorological information exchange (Ref: Job-card MET004.01)

The Working Group on Meteorological Information Exchange (WG-MIE) Rapporteur, Sue O'Rourke, informed the Panel that 12 working papers (WP) and five information papers (IP) were delivered to the meeting pertaining to the work completed or in progress by the five work streams under WG-MIE.

The six work streams and their coordinators are: Extensions Work Stream lead by Coordinator Michael 'Pat' Murphy; Annex 3 matters lead by Coordinator Tim Hales, SWIM Work Stream lead by Aaron Braeckel, IWXXM Guidance Work Stream lead by Chris Tyson, Governance and IMP Work Stream lead by Stuart Dingle/Pat Murphy, and the Support and Co-ordination Work Stream lead by William 'Bill' Maynard.

The WG-MIE has held two face-to-face meetings and several virtual meetings during the intersessional period. Reports from the face-to-face meetings are filed on the METP secure web site.

Ms. O'Rourke thanked the work stream coordinators and experts for their accomplishments noting the complex and significant nature of their work in defining future MET systems.

5.1 STANDARDIZED 'EXTENSIONS' IN THE IWXXM SCHEMA

5.1.1 The Panel discussed WP/3101 and WP/3102 which presented the Working Group on Meteorological Information Exchanges (WG-MIE's) opinion on the inclusion of standardized 'Extensions' in the IWXXM schema. The ICAO Meteorological Information Exchange Model (IWXXM) has adopted as the Extensible Mark-Up Language (XML) schema to be used for the exchange of a range of meteorological products identified in Annex 3. XML schemas are specifically 'extensible', and as such allow for additional data (i.e. extensions) to be included with the full message, without interfering with the message, content, dissemination, and integrity.

5.1.2 The Panel recalled that the current Traditional Alphanumeric Code (TAC) formats, standards, and dissemination procedures were based on now-obsolete communications systems such as teletype and facsimile machines. TAC formatted meteorological information was also developed for editing and viewing by humans. As communications (hardware and software systems) have improved over the past 20 years, the format standards and the associated standards and recommended practices (SARPs) have not evolved enough to capitalize on the new technologies. The transition to the IWXXM schema enables the improved exchange of meteorological information.

5.1.3 It was agreed that there needed to be a benefit to users to transition to IWXXM by enabling additional parameters and meteorological information within IWXXM. The WG-MIE experts from the user community have stated a desire for a standardised way to represent additional parameters, with standardised terminology.

5.1.4 The WG-MIE has decided that 'Extensions', properly identified and following the standards for such extensions in the IWXXM schema, as has been used in the Aeronautical Information Exchange Model (AIXM), should be supported and are necessary for enabling the inclusion of Annex 3 products in IWXXM format in SWIM. They should, however, not be seen as a replacement of the requirements as described in the core part of IWXXM.

5.1.5 Given the above discussion, the Panel agreed to the following recommendation:

Recommendation 5/1- Standardized Extensions within IWXXM Schema

That, the following principles and actions:

- a) extensions, properly identified and following standards for such extensions, in the IWXXM schema should be allowed and follow-on work be completed by the WG-MIE;
- b) abuse of the use of extensions must be prevented and enforced by a maximum message size;
- c) the extension approach in IWXXM should be similar to the policy and technical implementation to be used in AIXM; and
- d) that WMO be requested to enable extensions in IWXXM to encourage State transition to IWXXM,

be endorsed by the Air Navigation Commission.

5.2 METEOROLOGICAL INFORMATION INTEGRATION INTO SWIM

5.2.1 The Panel recalled that Job Card METP.004.01 required the development of provisions to enable the inclusion of meteorological information in the future system-wide information management (SWIM) environment.

5.2.2 The members of WG-MIE Work Stream 3 have created an initial draft of the MET-SWIM Plan (currently titled the *Plan for Meteorology in System Wide Information Management (SWIM)*). A separate document, the MET-SWIM Roadmap (currently titled *Roadmap for Meteorology in System Wide Information Management (SWIM)*) is also being developed.

5.2.3 The *Manual on System Wide Information Management* (Doc 10039) describes the overall SWIM concept, along with key goals and characteristics of the SWIM system. The *Manual on the Digital Exchange of Aeronautical Meteorological Information* (Doc 10003) provides implementation guidance on aeronautical meteorological data exchange models and XML/GML. The MET-SWIM Plan supplements these manuals with further detail on the exchange of aeronautical meteorology information within SWIM.

5.2.4 It was noted that there were a number of topics that had been discussed during the MET-SWIM Plan development including:

- a) specific data and/or products to be exchanged in MET-SWIM (i.e., the migration of current Annex 3 products to a data-centric form, new operational exchanges of specific gridded and imagery data products, new products such as space weather);

- b) potential changes to ICAO MET operational routing roles (in particular Regional OPMET Centres (ROC) and Regional OPMET Data Banks (RODB)) given that point-to-point exchanges are no longer required with TCP/IP technology and communications between SWIM participants may be routed in an optimal fashion automatically by the network;
- c) potential relationships between different MET forecast data products at the same time and place (such as model data and forecaster-generated TAFs), and the operational policies on their use; and
- d) improvements to operational decision-making which can be enabled by “Tier 2” web services which can provide advanced synthesis and processing of raw meteorological and other aeronautical data into new usable forms in a timely and authoritative fashion.

5.2.5 Due to synergies between Doc 10039 and the MET-SWIM Plan, the conclusion of the WG-MIE was that MET-SWIM concepts could be integrated into Doc. 10039 as a new section or appendix. The Panel noted that the Information Management Panel (IMP) had been contacted regarding this approach and that it was in agreement. It should be noted that MET-SWIM content in Doc. 10039 would not include any specific meteorological data product descriptions.

5.2.6 Web services as described in Doc 10039 and the MET-SWIM Plan utilize HTTP as a foundational communications technology. Similarly, messaging protocols (e.g. AMQP) and publish/subscribe technologies described in Doc 10039 and the MET-SWIM Plan require the use of general-purpose TCP/IP communications between SWIM participants. At present there is insufficient ICAO guidance on how SWIM communications can be operationally enabled with TCP/IP and HTTP communications, and fully developing this guidance may take a number of years.

5.2.7 Based upon the above discussion, the Panel formulated the following recommendation:

Recommendation 5/2 - Policy on use of TCP/IP, HTTP and AMQP communications

That, the following principles and actions:

- a) agreement that the SWIM implementation timelines are approaching rapidly;
- b) agreement that general-purpose TCP/IP (specifically HTTP) communications are required for exchanging data with web services and non ATS-messaging protocols (e.g. AMQP), as described in Doc. 10039, for SWIM;
- c) communication to the Information Management Panel (IMP), Communications Panel (CP), Air Navigation Commission (ANC) of the METP view, based on the agreement in a) and b) above, and
- d) recommend that the ANC, through the IMP and the CP, ensure that general-purpose TCP/IP communications, web services and non ATS-messaging should be

appropriately standardized in Annex 10, Doc 9896, and elsewhere well in advance of near-term SWIM-based operational exchanges.

be submitted to the Air Navigation Commission for endorsement as a policy on the use of TCP/IP, HTTP and AMQP communications.

5.3 AMHS TESTING

5.3.1 The Panel considered WP/3401 that discussed testing IWXXM messages over AMHS extended services and other communications requirements heading towards a SWIM environment. The testing is defined in the Communications Panel (CP) Job Card CP.008.01.

5.3.2 The WG-MIE suggested that the testing needed to consider the following aspects to ensure that the operational roll-out would be successful:

- In all scenarios the IWXXM messages must be transmitted using extended AMHS from aeronautical meteorological service producer system to aeronautical meteorological service consumer system as the final recipient (end-to-end);
- All transmissions must be verified by checking that the received data is identical to the source;
- The testing must be performed between multiple ICAO regions, and the WG-MIE could provide all test files; and
- Tests results should include the elapsed transfer times and other relevant communications details for the following cases:
 - Uncompressed, individual IWXXM XML files in a single attachment;
 - GZIP-compressed individual IWXXM XML files in a single attachment;
 - A compressed 2MB, 4MB, and 6MB IWXXM XML files in a single attachment, and;
 - Uncompressed, multiple IWXXM XML files in a single AMHS message, each file in a separate attachment.

5.3.3 The Panel noted that as part of the coordination mentioned above, the Secretary of the CP had developed a test plan to support the necessary testing of AMHS systems to determine their ability to handle XML traffic according to the IWXXM model. The testing described is in two phases:

Phase I- will test whether the AFS network infrastructure is capable of passing XML/IWXXM messages; and

Phase II - expands Phase 1 to include real-time data and traffic volumes.

5.3.4 Testing has been successfully conducted to verify that AMHS can support XML traffic or more specifically IWXXM messages as both standard messages and as file attachments. This testing has been conducted in a number of different regions of the world and further verification testing is planned.

5.3.5 Phase II testing using realistic traffic volumes has not yet been conducted. The Secretary of the CP asked that information on likely traffic volumes be provided from METP along with examples.

5.3.6 Given the above discussion, the Panel formulated the following recommendation:

Recommendation 5/3 - IWXXM Testing

The Panel agreed:

- a) that the testing of AMHS for information (existing or newly developed) other than the IWXXM GML/XML form based on Traditional Alphanumeric Code (METAR/SECI, TAF, SIGMET, AIRMET, TCA, VAA) is not required;
- b) that the focus of AMHS testing as a matter of urgency should be focused on IWXXM GML/XML form based on Traditional Alphanumeric Code (METAR/SECI, TAF, SIGMET, AIRMET, TCA, VAA) and should consider the issues reflected in paragraph 5.3.2 above;
- c) to provide the CP Secretary with details and examples of the full volume of meteorological information to be expected; and

suggested that the ANC, based on the agreement in a) and b) above, consider the amendment of Job Card CP.008.01

5.4 IWXXM IMPLEMENTATION

5.4.1 The Panel noted that Information in IWXXM format was not designed to be processed by people. Amendments to Annex 3 that require modifications to the IWXXM representations cannot be implemented until the supporting technical developments have been implemented at all centres that are obliged to create or use the modified representations. It was noted that an Annex applicable in November of decisions made in March did not, in this instance, permit enough time to carry out the technical procedures. It was also noted that an 18 month interval between approval of an Annex 3 Amendment that involves IWXXM representation of information and its applicability date would normally allow adequate time to develop, test and implement the tools needed to support the amendment. The Panel supported this approach.

5.4.2 Given the above discussion, the Panel formulated the following draft recommendation:

Recommendation 5/4 - IWXXM lead time for Annex 3 SARPs

That for changes that require modification of the IWXXM representations of information, a standing working practice be introduced requiring that, the applicability date should not be sooner than eighteen months following publication of the amendment to Annex 3.

5.4.3 As of November 2016, distribution of IWXXM messages will be raised to a 'Recommended Practice'. Accordingly, the WG-MIE, in collaboration with representatives of the ICAO Regional OPMET databanks (RODBs), has formulated guidelines, to facilitate controlled, consistent and efficient transition towards the production and distribution of IWXXM messages.

5.4.4 The proposed guidance is entitled "Guidelines for the Implementation of OPMET data exchange using IWXXM", and is presented in WP/3601. The guidance document was developed to:

- Establish the purpose of the transiting to IWXXM;
- Describe current operations and capabilities, including the definition of data producers, National OPMET Centres, Regional OPMET Centres and Interregional OPMET Gateways;
- Describe the changes required;
- Propose the service concept, including specifying the Operating Principles and making recommendations;
- Elaborate on functional requirements in the form of a Framework; and
- Express the requirements for successful transition, in three proposed phases.

5.4.5 It was noted that the guidance document had been formulated based upon the expert knowledge of the members of the WG-MIE. That knowledge, and the content of the guidance document, has been augmented through the involvement of representatives from RODBs and Interregional Gateways, in particular at the "Workshop on Implementing the ICAO Meteorological Information Exchange Model" held 30th May to 2nd June 2016 at the European and North Atlantic (EUR/NAT) Office.

5.4.6 Given the above discussion, the Panel formulated the following recommendation:

Recommendation 5/5 - Guidelines for the Implementation of OPMET data exchange using IWXXM

That the guidance document "Guidelines for the Implementation of OPMET data exchange using IWXXM" be endorsed and recommended as guidance for Planning and Implementation Regional Groups (PIRGs).

5.5 STATUS INDICATORS

5.5.1 The Panel noted that for many years, tropical cyclone advisories (TCA), volcanic ash advisories (VAA) and SIGMET had been issued regularly for TEST and EXERCISE events. The Panel will also note that a separate information paper was presented relating to the recent introduction of 'operational status' indicators for all IWXXM messages.

5.5.2 Whilst acknowledging that modifications to TAC messages are expected to be limited to a minimum in the future (refer Agenda Item 8), given the important nature of TCA, VAA and SIGMET, and their regular distribution as TEST or EXERCISE messages, it was agreed that a simple 'operational status' indicator be introduced effective with Amendment 78 to ICAO Annex 3 – Meteorological Service for International Air Navigation.

5.5.3 Accordingly, the Panel formulated the following Recommendation:

RSPP | Recommendation 5/6 — Draft Amendment 78 to Annex 3/ Technical Regulations [C.3.1] regarding the introduction of operational status indicators (TEST or EXERCISE) in VA Advisories, TC Advisories and SIGMET

That additional fields in Annex 3, Table A2-1 (VAA), Table A2-2 (TCA) and A6-1A (SIGMET/AIRMET), to indicate the operational status (TEST or EXERCISE) events be included in the draft proposed Amendment 78 of Annex 3 (Appendix A refers).

5.6 JOB CARD MET.004.01

5.6.1 The Panel reviewed the METP.004.01 Job Card and the following changes were proposed:

- Introduction of ICAO Doc 10039 – *Manual on System Wide Information Management (SWIM) Concept* as a reference document;
- Inclusion the regular review of "*Guidance for the implementation of OPMET data exchange using the ICAO Meteorological Information Exchange Model (IWXXM)*";
- Introduction the activity to develop a MET-SWIM Road Map; and
- Amendment of the timelines to be more realistic.

5.6.2 Given the above discussion, the Panel formulated the following recommendation:

Recommendation 5/7 — Revised Job Card 4 METP.004.01

That the changes to the METP Job Card METP.004.01, as given in Appendix B, be provided to the Air Navigation Commission for its consideration.

5.7 REVISIONS TO DIFFERENT ISSUES RELATED TO STANDARDS AND RECOMMENDED PRACTICES FOR AMENDMENT 78 TO ANNEX 3

5.7.1 It was noted that the Meteorology Divisional Meeting, held in July 2014 in Montreal, had agreed that Amendment 78 to Annex 3 – Meteorological Service for International Air Navigation should include standards for the exchange of METAR, SPECI, TAF and SIGMET in IWXXM format (Appendix A to agenda item 3 of the meeting report – Doc 10045 – Meteorology Division Meeting (2014) - refers, in part). This was seen as a logical progression of the recommended practice that would become applicable with Amendment 77 of Annex 3 in November 2016.

5.7.2 The Panel also noted that Amendment 77 to Annex 3 also introduced recommended practices for the exchange of IWXXM-compliant AIRMET, Volcanic Ash Advisories (VAA) and Tropical Cyclone Advisories (TCA). Thus it was agreed that these products should also be upgraded from a recommended practice to a standard.

5.7.3 The Panel agreed that the best option would be that IWXXM be introduced as a standard in Annex 3 in 2018 as part of Amendment 78 but that the applicability date be delayed until 2020. This would allow more time for ICAO/WMO to resolve technical issues and is a more realistic timeframe for implementation based on recent surveys of States readiness for IWXXM implementation. This proposal allows for a 30-month lead time for the notification to States that IWXXM will become a standard, thus allowing for better planning and budgeting for the implementation phase.

5.7.4 Given the above discussion, the Panel formulated the following draft recommendation:

RSPP	<p>Recommendation 5/8 — Draft Amendment 78 to Annex 3/ Technical Regulations [C.3.1] regarding IWXXM standards for METAR/SPECI, TAF, SIGMET, AIRMET, volcanic ash advisories and tropical cyclone advisories</p>
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That,

a) the provisions relating to IWXXM, as given in Appendix C be consolidated with other elements of Amendment 78 to Annex 3 – Meteorological Service for International Air Navigation, and

b) the applicability date of the above provisions be delayed until November 2020.

5.7.5 The Panel also agreed that corresponding revisions to ICAO Doc 8896 – Manual of Aeronautical Meteorological Practice - should be coordinated to take effect along with Amendment 78 to Annex 3.

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APPENDIX A

Proposal for Amendment 78 to Annex 3 – Operational Status Indicators

DRAFT AMENDMENT TO ANNEX 3 –

METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION

(TWENTIETH EDITION – JULY 2018)

PART II. APPENDICES AND ATTACHMENTS

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APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED TO WORLD AREA FORECAST SYSTEM, AND METEOROLOGICAL OFFICES AND OTHER CENTRES

(See Chapter 3 of this Annex)

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Table A2-1 Template for Advisory message for volcanic ash

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Detailed content	Template(s)		Examples
Identification of the type of message (M)	Type of message	VA ADVISORY	VA ADVISORY
TEST or EXERCISE indicator (C)*	Indicator of TEST or EXERCISE	TEST or EXERCISE	TEST EXERCISE
Time of origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20080923/0130Z
Name of VAAC (M)	Name of VAAC	VAAC: nnnnnnnnnnnnn	VAAC: TOKYO
Name of volcano (M)	Name and IAVCEI ¹ number of volcano	VOLCANO: nnnnnnnnnnnnnnnnnnnnn [nnnnnn] or UNKNOWN or UNNAMED	VOLCANO: KARYMSKY 1000-13 VOLCANO: UNNAMED

...

Notes.—

* Only use when the message issued as a TEST or EXERCISE and is not to be used for operational decision making. When TEST is indicated the message may contain information (not to be used operationally) or will otherwise end immediately after the work "TEST".

Table A2-2. Template for advisory message for tropical cyclones

.....

<i>Element</i>		<i>Detailed content</i>	<i>Template(s)</i>		<i>Examples</i>	
1	Identification of the type of message	Type of message	TC ADVISORY		TC ADVISORY	
2	TEST or EXERCISE indicator (C)*	Indicator of TEST or EXERCISE	TEST or EXERCISE	TEST EXERCISE	TEST or EXERCISE indicator (C)*	TEST or EXERCISE indicator (C)*
3 2	Time of origin	Year, month, day and time in UTC of issue	DTG:	nnnnnnnn/nnnnZ	DTG:	20040925/19600Z
4 3	Name of TCAC	Name of TCAC (location indicator or full name)	TCAC:	nnnn or nnnnnnnnnn	TCAC:	YUFO ¹²
					TCAC:	MIAMI
5 4	Name of tropical cyclone	Name of tropical cyclone or "NN" for unnamed tropical cyclone	TC:	nnnnnnnnnnn or NN	TC:	GLORIA

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Notes.—

1. Only use when the message issued as a TEST or EXERCISE and is not to be used for operational decision making. When TEST is indicated the message may contain information (not to be used operationally) or will otherwise end immediately after the work "TEST".
2. Fictitious location.

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Table A6-1A. Template for SIGMET and AIRMET messages

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Name of the FIR/CTA (M)	Location indicator and name of the FIR/CTA ⁴ for which the SIGMET/AIRMET is issued	nnnn nnnnnnnnnn FIR/[UIR] or nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR/[n]	YUCC AMSWELL FIR ² YUDD SHANLON ² FIR/UIR ² YUDD SHANLON CTA ²	YUCC AMSWELL FIR/2 ² YUDD SHANLON FIR ²
IF THE SIGMET OR AIRMET MESSAGE IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.					
TEST or EXERCISE indicator (O)*	Indicator of TEST or EXERCISE	TEST or EXERCISE	TEST or EXERCISE	TEST EXERCISE	TEST EXERCISE
Phenomenon (M) ⁵	Description of phenomenon causing the issuance of SIGMET/AIRMET	OBSC ⁶ TS[GR ⁷] EMBD ⁸ TS[GR ⁷] FRQ ⁹ TS[GR ⁷] SQL ¹⁰ TS[GR ⁷] TC nnnnnnnnnn PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] CB or TC NN ¹¹ PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] CB 	SFC WIND nnn/nn[n]MPS (or SFC WIND nnn/nn[n]KT) SFC VIS nnnnM (nn) ¹⁵ ISOL ¹⁶ TS[GR ⁷] OCNL ¹⁷ TS[GR ⁷] MT OBSC 	OBSC TS OBSC TSGR EMBD TS EMBD TSGR FRQ TS FRQ TSGR SQL TS SQL TSGR TC GLORIA PSN N10 W060 CB TC NN PSN S2030 E06030 CB 	SFC WIND 040/40MPS SFC WIND 310/20KT SFC VIS 1500M (BR) ISOL TS ISOL TSGR OCNL TS OCNL TSGR MT OBSC

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Notes.—

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*. Only use when the message issued as a TEST or EXERCISE and is not to be used for operational decision making. When TEST is indicated the message may contain information (not to be used operationally) or will otherwise end immediately after the work "TEST".

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METP/2

Appendix B to the Report on Agenda Item 5

APPENDIX B

METP.004 Job Card

Title	Inclusion of aeronautical meteorological information in the SWIM-enabled environment and further development of the SWIM concept relating to meteorology	Reference:	MEPTP.004.042
Source	MET Divisional Meeting 2014 (Recommendations 2/2, 3/2 and 3/3)		
Problem Statement	Aeronautical meteorological information needs to be integrated into the SWIM-enabled environment which introduces unique issues relating to governance and data management.		
Specific Details (including impact statements)	<p>It was recommended by the MET Divisional Meeting (Recommendations 2/2, 3/2 and 3/3) that an appropriate ICAO expert group, in close coordination with WMO, develop provisions to enable the inclusion of aeronautical information in the future system-wide information management (SWIM) environment consistent with the Doc 9750, <i>Global Air Navigation Plan</i>. Further principles were also identified to guide the development of the SWIM concept relating to meteorology as provided in Appendix B of Agenda Item 3 of the Meteorology Divisional Meeting 2014 (Doc 10047). The transition from the Internet-based SADIS/WIFS system is an integral part of these considerations as are the intermediate steps towards full SWIM by making the Annex 3 products IWXXM-compliant.</p> <p>This will involve the resolution of institutional issues that solely relate to the management and use of aeronautical meteorological information and the necessary links between information supporting other domains in the aviation field and in meteorology supported by the World Meteorological Organization.</p> <p>Further development should take into consideration the main legacy tasks from the meteorological aeronautical requirements and information exchange project team (MARIE-PT), Satellite Distribution System for Information Relating to Air Navigation Operations Group (SADISOPSG) and the World Area Forecast System Operations Group (WAFSOPSG) that relate to information exchange.</p>		
Expected Benefit	The full integration of aeronautical meteorological information into the SWIM environment will enable the full benefits to be derived relating to safety and efficiency.		
Reference Documents	ICAO Annex 3 - <i>Meteorological Service for International Air Navigation</i> ICAO Doc 8896 - <i>Manual of Aeronautical Meteorological Practice</i> ICAO Doc 9750 - <i>Global Air Navigation Plan</i> ICAO Doc 10003 - <i>Manual on the Digital Exchange of Aeronautical Meteorological Information</i> ICAO Doc 10045 - <i>Report of the Meteorology Divisional Meeting 2014</i> ICAO Doc 10039 – <i>Manual on System Wide Information Management (SWIM) Concept</i>		Attachments
Primary Expert Group:	METP		

METP/2

5B-2

Appendix B to the Report on Agenda Item 5

WPE No.	Document affected	Description of Amendment proposal or Action	Supporting Expert Group	Expected dates:		
				Expert Group	Effective	Applicability
	Annex 3	Standards for IWXXM compliant METAR, SPECI, TAF and, SIGMET, AIRMET, VAA and TCA exchange		Sep Jul 2016	Jul 2018	Nov 2018 for 2020

APPENDIX C
Proposal for Amendment 78 to Annex 3 – IWXXM

DRAFT AMENDMENT TO ANNEX 3 —
METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION
(TWENTIETH EDITION — JULY 2018)

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PART I. CORE SARPs

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CHAPTER 1. DEFINITIONS

1.1 Definitions

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ICAO meteorological information exchange model (IWXXM). A data model for representing aeronautical meteorological information.

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PART II. APPENDICES AND ATTACHMENTS

...

**APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED
TO WORLD AREA FORECAST SYSTEM,
AND METEOROLOGICAL OFFICES AND OTHER CENTRES**

(See Chapter 3 of this Annex)

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3.1 Volcanic Ash Advisory Information

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3.1.2 Recommendation.—*Until 5 November 2020, Volcanic ash advisory centres should issue volcanic ash advisory information should be disseminated in digital IWXXM GML form in addition to the issuance of this advisory information in abbreviated plain language in accordance with 3.1.1.*

3.1.3 *Volcanic ash advisory information, if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML). From 5 November 2020, volcanic ash advisory*

information shall be disseminated in IWXXM GML form in addition to the issuance of this advisory information in accordance with 3.1.1.

~~3.1.4 Volcanic ash advisory information if disseminated in digital form shall be accompanied by the appropriate metadata.~~

Note.— Guidance on ~~the information exchange model~~ IWXXM, ~~XML/GML and the metadata profile~~ is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) Digital Exchange of Aeronautical Meteorological Information (Doc 10003).

...

5.1 Tropical Cyclone Advisory Centres

...

5.1.3 Recommendation.— *Until 5 November 2020, ~~Tropical cyclone advisory centres should issue tropical cyclone advisory information should be disseminated in digital~~ IWXXM GML form in addition to the issuance of this advisory information in ~~abbreviated plain language in accordance with 5.1.2.~~*

~~5.1.4 Tropical cyclone advisory information, if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use XML/GML. From 5 November 2020, tropical cyclone advisory centres shall issue tropical cyclone advisory information in IWXXM GML form in addition to the issuance of this advisory information in abbreviated plain language in accordance with 5.1.2.~~

~~5.1.5 Tropical cyclone advisory information if disseminated in digital form shall be accompanied by the appropriate metadata.~~

Note.— Guidance on ~~the information exchange model~~ IWXXM, ~~XML/GML and the metadata profile~~ is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003).

APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this Annex)

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2.1 Format of meteorological reports

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2.1.3 Recommendation.— *Until 5 November 2020, METAR and SPECI should be disseminated in ~~digital~~ IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.*

~~2.1.4 METAR and SPECI if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML). From 5 November 2020, METAR and SPECI shall be disseminated in IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.~~

~~2.1.5 METAR and SPECI if disseminated in digital form shall be accompanied by the appropriate metadata.~~

Note.— Guidance on ~~the information exchange model IWXXM, XML/GML and the metadata profile is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) Digital Exchange of Aeronautical Meteorological Information (Doc 10003).~~

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this Annex)

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1.1 TAF format

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1.1.2 **Recommendation.**— *Until 5 November 2020, TAF should be disseminated in ~~digital~~ IWXXM XML/GML form in addition to the dissemination of the TAF in accordance with 1.1.1.*

1.1.3 ~~TAF if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~ From 5 November 2020, TAF shall be disseminated in IWXXM GML form in addition to the dissemination of the TAF in accordance with 1.1.1.

1.1.4 ~~TAF if disseminated in digital form shall be accompanied by the appropriate metadata.~~

Note.— Guidance on ~~the information exchange model IWXXM, XML/GML and the metadata profile is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) Digital Exchange of Aeronautical Meteorological Information (Doc 10003).~~

APPENDIX 6. TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

(See Chapter 7 of this Annex)

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1.1 Format of SIGMET messages

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1.1.6 **Recommendation.**— *Until 5 November 2020, ~~Meteorological watch offices should issue SIGMET information~~ should be disseminated in ~~digital~~ IWXXM GML form; in addition to the dissemination ~~issuance of this~~ SIGMET information in ~~abbreviated plain language in~~ accordance with 1.1.1.*

1.1.7 ~~SIGMET if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~ From 5 November 2020, SIGMET information shall be disseminated in IWXXM GML form in addition to the dissemination of SIGMET information in accordance with 1.1.1.

1.1.8 ~~SIGMET if disseminated in digital form shall be accompanied by the appropriate metadata.~~

Note.— Guidance on ~~the information exchange model IWXXM, XML/GML and the metadata profile~~ is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) ~~Digital Exchange of Aeronautical Meteorological Information~~ (Doc 10003).

...

2.1 Format of AIRMET messages

...

2.1.6 **Recommendation.**— *Until 5 November 2020, ~~Meteorological offices should issue AIRMET information should be disseminated in digital IWXXM GML form; in addition to the dissemination issuance of this AIRMET information in abbreviated plain language in accordance with 2.1.1.~~*

2.1.7 ~~AIRMET if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use XML/GML.~~ From 5 November 2020, AIRMET information shall be disseminated in IWXXM GML form in addition to the dissemination of AIRMET information in accordance with 2.1.1.

2.1.8 —~~AIRMET if disseminated in digital form shall be accompanied by the appropriate metadata.~~

Note.— Guidance on ~~the information exchange model IWXXM, XML/GML and the metadata profile~~ is provided in ~~the Manual on the ICAO Meteorological Information Exchange Model (IWXXM)~~ (Doc 10003).

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METP/2
21/10/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 6

The attached constitutes the report on Agenda Item 6 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 6: Meteorological operations group

The WG-MOG Rapporteur, Colin Hord, informed the Panel that five working papers (WPs) and one information paper (IP) were delivered to the meeting pertaining to the work completed or in progress by the three work streams under MOG.

The three work streams are: World Area Forecast System (WAFS) Work Stream lead by Matt Strahan; Secure Aviation Data Information Service (SADIS)/ WAFS Internet File Service (WIFS) Work Stream lead by Chris Tyson, and International Airways Volcano Watch (IAVW) Work Stream lead by Emile Jansons.

The SADIS/WIFS Work Stream held two face-to-face meetings in Gatwick, London, United Kingdom, from 8 to 9 September 2015 and from 13 to 14 June 2016. The IAVW Work Stream held one face-to-face meeting in Buenos Aires, Argentina, from 27 to 28 April 2016. The WAFS work stream held two meetings from September 10 and 11 2015, and from 15 to 16 June 2016.

6.1 WORLD AREA FORECAST SYSTEM**6.1.1 Summary of work conducted**

6.1.1.1 The Panel noted that during the intersessional period the work stream had achieved considerable progress (WPs 4202 and 4203 refers). In this regard the meeting noted that from its first meeting the follow-up of seven Actions/Decisions had been completed, with work still going on two remaining issues actions (review of Terms of Reference and WAFS Medium Level Strategy for ASBU Block 1). The Panel noted, from the second meeting, that there was ongoing work on seven actions, out of eleven, and that two decisions were taken. The meeting was pleased to note that the ongoing work included, inter alia, the investigation of discrepancies in WAFS performance indicators (between the two WAFCs), the review of current deadline for the issuance of WAFS data, update of WAFS Job Card and the addition of new agenda items regarding WAFS future plans for the next meeting.

6.1.2 Guidance material

6.1.2.1 The Panel considered WP/4001 regarding an update to the Regional SIGMET Guide Template. In this regard it was noted that Amendment 77 to ICAO Annex 3 — *Meteorological Service for International Air Navigation* would introduce significant changes to the SIGMET (and AIRMET) templates. These changes had been proposed by METWSG and endorsed by the MET Divisional Meeting (7 to 18 July 2014, Montréal, Canada). The aim was to provide a more logical structure and clarify certain aspects with the expected result of more consistent SIGMET.

6.1.2.2 Although there is no explicit Job Card or work activity that directly requires such an update, the meeting considered the matter, noting that a proposed update to the Regional SIGMET Guide Template had been developed by the United Kingdom and Australia.

6.1.2.3 Given the importance of SIGMET to the aviation community, and the ongoing desire to enhance consistency and compliance globally in relation to SIGMET, the Meeting endorsed the Regional SIGMET Guide Template presented in the Attachment to WP/4001.

6.1.2.4 Therefore, the Panel formulated the following decision:

Decision 6/1 — Updated Regional SIGMET Guide Template.

That, the proposal, contained in Appendix to WP/4001, to update the Regional SIGMET Guide Template is endorsed by the METP.

6.1.3 Issues needing Panel guidance or decision

6.1.3.1 The meeting reviewed the revised Terms of Reference for the MOG (Appendix A to WP/4203 (Revised) refers) which after careful consideration were endorsed.

6.1.4 Updated job card

6.1.4.1 The meeting reviewed WP/4202 containing an update to the WAFS Job Card METP.010.01. In this regard the meeting noted that the update referred mainly to changes to infrastructure (SADIS 2G cessation) and Working Group arrangements (disbandment of WAFSOPSG and establishment of METP WG-MOG). In agreement with the proposed changes, the meeting endorsed the updated Job Card.

Recommendation 6/1 — Updated Job Card METP.010.01

That, the proposal for update of the WAFS Job Card METP.010.01, as described in Appendix A be presented for the consideration of the Air Navigation Commission

6.2 SADIS/WIFS**6.2.1 Summary of work conducted**

6.2.1.1 The Panel noted that during the intersessional period the work stream had achieved considerable progress (WPs 4302 and 4303 refers) as follows:

- a) Work related to the follow-up of eight Action agreed/Decisions of the first face-to-face meeting was completed. This included, inter alia, the Annual statement of operational efficacy of SADIS 2014/2015, the 2015/2016 SADIS operational efficacy questionnaire, the SADIS Inventory 2015/2016, the update of the SADIS gateway operations, cessation of distribution of T4 formatted volcanic ash graphics and the revised definition of the SADIS acronym.
- b) Work related to the follow-up of five Action agreed/Decisions of the second face-to-face meeting was completed. This included, inter alia, the Annual statement of operational efficacy of SADIS 2015/2016, the 2016/2017 SADIS operational efficacy questionnaire, the SADIS Inventory 2016/2017, OPMET data for non-AOP aerodromes, and the cessation of SADIS-2G broadcasts.

6.2.1.2 The Panel noted the work related to the actions taken in advance of the cessation of the satellite based component of the SADIS service (SADIS 2G) on 31 July 2016; and the status regarding user transition to the Internet based component of the service (SADIS FTP) (IP/4301 refers). In this

regard, the meeting was pleased to note that the actions undertaken prior to the cessation of the SADIS 2G service by all stakeholders contributed greatly to a smooth and successful transition process and the minimum disruption to services.

6.2.2 Guidance material

6.2.2.1 With regard to the Sixth Edition of the SADIS User Guide, the meeting noted an update emanated from the meeting of the METP Meteorological Operations Group (in relation to SADIS matters) which took place in Gatwick, UK, between 13 to 14 June 2016. The updated guide formed by two parts: Part 1 – General and Administrative and Part 2 – Technical. It was noted that as a substantial change to the preceding version, the updated guide was a new (Sixth) Edition.

6.2.2.2 It was additionally noted that the referred guide had been available on the MOG website since 28 July 2016 with the said update.

6.2.3 Issues needing Panel guidance or decision

6.2.3.1 With regard to the dissemination of MET information from AOP aerodromes and non-AOP aerodromes the meeting agreed that while the dissemination of OPMET from AOP Aerodromes was adequately covered in regional air navigation documents, the provision of OPMET data from non-AOP aerodromes was a State responsibility. At present, many ICAO regions were maintaining lists of OPMET data for non-AOP Aerodromes that were being disseminated internationally. The meeting noted that there was no mandate under the convention to provide this data through ICAO systems. In this regard, it was suggested that IATA raise this matter formally with ICAO.

6.2.3.2 The meeting reviewed WP/4201 presented by the Rapporteur which provided an update relating to Aircraft Based Observation activities (ABO). These included the AMDAR programme and the work that was in progress to provide observations using MODE-S technology. IATA noted that Quality Assurance (QA) for source data other than AMDAR was required in the future. A proposal was made to coordinate the development of user requirements for ABOs that will be required for ICAO's Global Air Navigation Plan (GANP). Given this expanding access to information, it was noted that the broad range of aviation users (operators, ATM, airports) may have varied requirements. In this regard it was agreed that inter-panel co-ordination on this topic would be conducted by the Secretary.

6.2.4 Updated job card

6.2.4.1 The meeting reviewed WP/4301 which drew the attention to the elements of Job Card METP.008.01 that were required to be reviewed and revised in relation to the cessation of SADIS 2G (the satellite component of the SADIS service). In this regard the meeting noted proposals for the update of the job card related to the name, title, problem statement, source, specific details, expected benefits and reference documents which were contained in Appendix C to WP/4301. The referred proposals were endorsed by the meeting which formulated the following recommendation:

Recommendation 6/2 — Proposed Revisions to Job Card METP.008.01

That, the proposed revisions to Job Card METP.008.01 as described in Appendix B to this report be presented for the consideration of the Air Navigation Commission.

6.3 INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW)

6.3.1 Summary of work conducted

6.3.1.1 The meeting noted that the work stream, since its establishment, achieved considerable progress (WPs 4101 refers) with regard to its work plan. In this regard the meeting noted that there was ongoing work on eleven actions agreed and one decision. The group was pleased to note that the ongoing work included, inter alia, updates and trials on VA advisories and VA graphical, trials on the provision of T+24 information by VAACs, the development of key performance indicators (KPI) by VAACs, the need for inclusion of colour code in VA advisories and the inclusion of re-suspended ash in VA advisories and VA SIGMET.

6.3.1.2 Additionally, the meeting was pleased to note Action agreed 2/6 which reported on the extension of the area of responsibility of VAAC Tokyo north of N6000 between E09000 and E15000. The meeting congratulated the IAVW work stream for this achievement and noted (IP 4101 refers) that VAAC Tokyo would be ready to provide VA advisory information on the extended area in early December 2016. It was highlighted that the International Airways Volcano Watch (IAVW) would now have global VAAC coverage which would result in globally improved flight safety and efficiency.

6.3.2 Issues needing Panel guidance or decision

6.3.2.1 The meeting reviewed WP/4101 and endorsed WG-MOG (IAVW) Action agreed 2/6 inviting VAAC Tokyo to extend its area of responsibility to the area north of N6000 between E09000 and E15000. Therefore, the meeting formulated the following recommendation:

Recommendation 6/3 — Extension of the area of responsibility of VAAC Tokyo

That VAAC Tokyo be formally invited to extend its area of responsibility to the area north of N6000 between E09000 and E15000 from 8 December 2016.

6.3.2.2 In a related issue the meeting noted that a review of the utility of colour codes in volcanic ash products would remain under the auspices of the Meteorological Operations Group IAVW work stream in accordance with a METP review which was being performed by the METP Chair.

6.3.2.3 An issue had been raised at the ICAO EUR/NAT regional planning group regarding access to the Met Panel website by non-members particularly in regard to the operational services such as WAFS, SADIS and the IAVW. The group discussed various options regarding this request and agreed in principle that papers and documents relating to WG-MOG activities would be made available publicly and that the Rapporteur would discuss with the Secretary how this would be achieved in practice.

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APPENDIX A

CONSOLIDATED PROPOSALS FOR REVISION TO JOB CARD METP.010.01

Title		Further development of the World Area Forecast System (WAFS)			Reference:	METP.010.01	
Source		MET Divisional Meeting 2014 (Recommendations 2/1, 2/4 b) i), 2/5 and 2/12)					
Problem Statement		The world area forecast system (WAFS) is a worldwide system established to provide aeronautical meteorological en-route forecasts in uniform standardized formats. The WAFS needs to be maintained and further developed, including the integration of the information provided into the future system wide information management (SWIM), in support of the aviation system block upgrade (ASBU) methodology.					
Specific Details (including impact statements)		<p>The WAFS consists of the provision of global aeronautical meteorological en-route WAFS forecasts in digital form to meteorological authorities and other users on a global basis by two Provider States. The WAFS information is made available via two Internet-based services (the Secure Aviation Data Information Service (SADIS) FTP and the WAFS Internet File Service (WIFS)).</p> <p>It was recommended by the MET Divisional Meeting (Recommendations 2/5, 2/5 and 2.12) that an appropriate ICAO expert group (or groups), in close coordination with WMO, further develop the requirements for the WAFS consistent with the Global Air Navigation Plan (Doc 9750), including the integration of the information produced by the system into the future system wide information management (SWIM) environment.</p> <p>Further development should take into consideration the main legacy tasks from the world area forecast system operations group (WAFSOPSG) such the provision of guidance concerning the operation of the WAFS and its effectiveness in meeting current and future operational requirements. It was further recommended by the MET Divisional meeting (recommendation 2/4 b) iv)) that this include the development of guidance for States concerning how their ICAO obligations may be met in the context of local, sub-regional, regional, multi-regional and global MET, including cost recovery and governance considerations.</p>					
Expected Benefit		Keep the system operational and integrate the information produced by WAFCs into the SWIM environment in line with the GANP maintaining and increasing flight efficiency and safety.					
Reference Documents		Annex 3 — <i>Meteorological Service for International Air Navigation, Global Air Navigation Plan</i> (Doc 9750), <i>Manual of Aeronautical Meteorological Practice</i> (DOC 8896), <i>Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services</i> (Doc 9377), Meteorology (MET) Divisional Meeting Report (Doc 10045) Agenda Item 2, Appendices A, B and F, Meteorological Panel (METP) deliverables (through its Working Groups), SADIS User Guide (Part 1 and Part 2), WIFS User Guide and guidance material available at the METP Website.					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 79 to Annex 3 to meet operational requirements in line with the GANP and to integrate WAFS information into the SWIM environment.	ATMRP FLTOPSP	Sep 2018	Jul 2020	Nov 2020	

METP/2

6A-2

Appendix A to the Report on Agenda Item 6

	Regional Air Navigation Plans	Based on Annex 3 amendment, update of the plans as necessary.		Sep 2018	Jul 2020	Nov 2020
	Docs. 9750, 8896 and 9377, SADIS User Guide, WIFS User Guide	Update related guidance material to support the implementation of Annex 3 Amendment.		Sep 2018	Jul 2020	Nov 2020
	(Action)	Assist ICAO in the coordination of the arrangements between the Provider States comprising the WAFS and in ensuring that the global requirements for WAFS information are met.		Ongoing	Ongoing	Ongoing
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015	Session/Meeting: 199-9			

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APPENDIX B

CONSOLIDATED PROPOSALS FOR REVISION TO JOB CARD METP.008.001

JOB CARD & RECOMMENDATIONS							
MET Panel Job Card			MET/14 Recommendations				
# 8			Operation and Development of SADIS				
Title	Further development of the Secure Aviation Data Information Service (SADIS)			Reference:	METP.008.01		
Source	MET Divisional Meeting 2014 (Recommendations 2/2 and 2/3 a) and b)) METP/2						
Problem Statement	The Secure Aviation Data Information Service (SADIS) needs to be managed to ensure that it meets the requirements of States and users via an Internet-based system for the provision of global OPMET and WAFS information.						
Specific Details (including impact statements)	The SADIS FTP provides global OPMET and WAFS information to States and users. It was recommended by the MET Divisional Meeting (Recommendation 2/2) that an appropriate ICAO expert group be tasked to ensure that the SADIS and the WIFS continue to meet user expectations and further develop in a manner consistent with the <i>Global Air Navigation Plan</i> (Doc 9750). Furthermore Recommendation 2/3 a) and b) called for ICAO to undertake a transition from the satellite-based service to the Internet-based services available (now completed) and this is to include consideration of the role of SADIS and WIFS within the future system-wide information management (SWIM) environment underpinning the globally interoperable air traffic management system; and alignment with future activities to be undertaken by ICAO in the information management domain.						
Expected Benefit	Continues provision of global OPMET and WAFS information through an Internet-based system.						
Reference Documents	SADIS User Guide Part 1 and Part 2					Attachments	
Primary Expert Group:	METP						
WPE No.	Document affected	Description of Amendment proposal or Action		Supporting Expert Group	Expected dates:		
					Expert Group	Effective	Applicability
	SADIS User Guide	Based on Annex 3 amendment, update of the plans as necessary.		IMP	TBD		
	(Action)	Assist ICAO in the coordination of the arrangements by the SADIS Provider State in ensuring that the global requirements for the dissemination of global OPMET and WAFS information are met.			Ongoing	Ongoing	Ongoing
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015			Session/Meeting: 199-9		



METP/2
4/11/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 7

The attached constitutes the report on Agenda Item 7 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 7: Cost recovery guidance and governance (Ref: Job-card METP011.01)

7.1 The Panel noted the first meeting of the Meteorology Panel (METP) had set up four working groups (WGs) and one ad-hoc group (AG) to expedite the overall work of the METP. Each of the WGs and the AG were allocated responsibility for undertaking work described in the METP Job Cards (JC). The METP reports to the Air Navigation Commission (ANC) on a routine basis, and presents the progress made on the Job Cards.

7.2 The Meteorological Cost Recovery Guidance and Governance (MCRGG) Ad-Hoc Group was allocated work under Job Card METP.01 - *Development of cost-recovery implementation guidance and governance considerations*, reflecting recommendations from the 2014 International Civil Aviation Organization (ICAO) Meteorology Divisional Meeting held conjointly with the 15th World Meteorology Organization (WMO) Commission for Aeronautical Meteorology (CAeM) Meeting (Recommendations 2/4, 2/7, 2/9 and 4/4).

7.3 In reviewing the overall global situation regarding cost recovery and guidance, and with respect to the potential needs of the development of Regional Hazardous Weather Advisory Centres (RHWACs), as discussed within METP and its Working Group on Meteorological Information Service Development (WG-MISD), the AG concluded that its work would be extensive and cover multiple types of service provision. Thus, it was agreed that significantly more work on governance was required in relation to the envisaged future state of aeronautical meteorology (MET), including a thorough gap analysis.

7.4 In this regard, the group noted that ICAO guidance material provided limited information on how aeronautical meteorological services, other than those provided on national (State) basis, can be managed and financed. On the WMO side, document WMO-No. 904, *Guide to aeronautical meteorological services cost recovery: principles and guidance*, provides some useful material based on the ICAO cost recovery policies with examples of successful national application.

7.5 It was noted that to make progress in assembling sufficient contextual and background information to be able to recommend changes and additions to the guidance material, conjoint meetings of AG-MCRGG had been held with the WMO CAeM Expert Teams on Governance (CAeM ET-GOV) as their objectives are both similar to that of the Panel and also integrated to a high degree through common expert membership.

7.6 As part of expanding knowledge on cost recovery and governance in the meteorological area, the Panel had initiated work on reviewing:

- Cost recovery methods either in place or widely hypothesised, and
- Governance models considered by current guidance documents of both WMO and ICAO.

7.7 In parallel to this work, the Panel expects useful inputs from a WMO global survey with States with regards to the existing national institutional arrangements for the provision of aeronautical meteorological service including:

- How aeronautical MET services are provided
- Governing State legislation on such services

- State compliance monitoring, including QMS and SMS competencies; and
- State cost recovery mechanisms.

7.8 The results of the WMO survey are expected in early 2017.

7.9 Furthermore, in supporting the MCRGG work, IATA is assembling a summary of ATM charging approaches from around the globe. This material is expected by the end of 2016 and would be considered by the AG in identifying prospective good practices for application in the MET service delivery.

7.10 Given the significance of the MCRGG work undertaken, along with the significant MET systems additions and changes being considered, and with regard to the development of a PANS MET document, the Panel recognised a critical need for some form of high-level view on where and how MET service delivery to international aviation was going to proceed well into the future.

7.11 To meet this need, a first draft of a White Paper on Future Aeronautical Meteorology Information Delivery has been developed for internal consideration. It is envisaged that when finalized the White Paper would provide a vision on the future 'MET Eco-System' to assist the ICAO METP, WMO CAeM and other concerned parties in all their forward looking activities related to the GANP developments nominally with a 2035 horizon.

7.12 A further draft of the White Paper on Future Aeronautical Meteorology Information Delivery is expected to be completed during the first quarter of 2017 and will be available to all METP expert members to assist in their work. It is yet to be decided how this paper should be socialized with the broader ICAO and WMO MET community in order to raise awareness and reach consensus on the envisaged changes in MET service delivery and integration into ATM.

7.13 The METP Members were invited to provide their feedback on the White Paper by November 30th, 2016 by using the response form made available on the METP webpages. It was noted that some of the feedback will suggest that material on the future direction of related technologies and sciences might be use full added.

7.14 The MCRGG, in coordination with the WMO ET-GOV, will endeavour to have a first formal iteration of the white paper ready for distribution by January 27th, 2017.

7.15 Reflecting the wide span of the MCRGG and the close working relationship with WMO, the Panel noted the Chairman's intention to appoint co-rapporteurs to manage the work of the group.

7.16 In consideration of the above, and the additional context of the information presented in WP5001, the Panel formulated the following recommendation:

**Recommendation 7/1 — Amendment of Job Card
METP.011.01**

That the proposed revisions to Job Card METP.011.01 amended as shown in Appendix A to this report be presented for the consideration of the Air Navigation Commission.

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Appendix A
Recommended Amendments to Job Card

Title		Development of cost-recovery implementation guidance and governance considerations			Reference:	METP.011.01	
Source		MET Divisional Meeting 2014 (Recommendation 2/4, 2/7, 2/9 and <u>4/1, 4/2, 4/4</u>)					
Problem Statement		MET services are being provided at a range of scales (local, sub-regional, regional, multi-regional or global). When these services are provided in a sub-regional, regional, multi-regional or global context there is a lack of suitable guidance with respect to applicable cost-recovery mechanisms <u>and insufficient governance arrangements to support such initiatives.</u>					
Specific Details (including impact statements)		It was recommended by the MET Divisional Meeting that an appropriate ICAO expert group should develop appropriate guidance on the <u>governance and</u> cost recover aspects of sub-regional, regional, multi-regional or global service provision as one of the essential governance aspects of MET service provision that need to be reviewed.					
Expected Benefit		Enable MET service provision to be provided at an appropriate scale to enable greater efficiency of operations and ensure that governance and associated cost recovery issues are resolved including aspects on the required core MET infrastructure.					
Reference Documents		<u>Manual on Air Navigation Services Economics</u> (Doc 9161) <u>Annex 3</u> <u>ICAO Policies on Charges for Airports and Air Navigation Services</u> (Doc 9082) <u>Manual On Aeronautical MET practice</u> (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	
	Doc 9161	<u>Update Improved guidance on the provision of MET services on a local, sub-regional, regional, multi-regional or global basis – including governance and cost recovery.</u>	ATB/ANSEP	<u>2017</u>	<u>2018</u>		
	<u>Annex 3</u>	<u>Enablement of local, sub-regional, regional, multi-regional or global MET service provision</u>		<u>2017</u>	<u>Jul 2018</u>	<u>Nov 2018</u>	
	<u>Doc 8896</u>	<u>Improved guidance on governance and cost recovery aspects.</u>		<u>2017</u>	<u>2018</u>		
	<u>Doc 10039</u>	<u>Manual On System Wide Information Management (SWIM) Concept</u>	ATMRPP	<u>IMP</u>	<u>2017</u>	<u>2018</u>	
Initial Issue Date: 17 June 2015		Date approved by ANC: 17 June 2015		Session/Meeting: 499-9			



METP/2
4/11/16

METEOROLOGY PANEL (METP)

SECOND MEETING

Montréal, 17 to 21 October 2016

AGENDA ITEM 8

The attached constitutes the report on Agenda Item 8 and should be inserted at the appropriate place in the yellow folder.

Agenda Item 8: Additional items**8.1 TRADITIONAL ALPHANUMERIC CODE CHANGE FREEZE**

8.1.1 The panel discussed the future of the traditional alphanumeric code (TAC) form for meteorological products. the meeting noted that changes to meteorological information content should be limited to IWXXM-only to encourage the global transition from TAC to IWXXM, and to provide the benefit of improved informational content for users. It was agreed that a freeze should be placed on any updates to the TAC code forms unless a justifiable safety case for any changes was presented and agreed. This would allow the panel to concentrate on developing IWXXM, for which human-readable products can still be derived if necessary.

8.1.2 Given the above discussion, the Panel agreed to the following recommendation:

Recommendation 8/1 — Traditional Alphanumeric Code (TAC)

That the proposal by the Panel that no further changes to the traditional alphanumeric code (TAC) form for meteorological messages be allowed unless a strong safety case is presented and agreed be endorsed by the Air Navigation Commission.

8.2 WORKING PAPERS NOT ORIGINATING FROM A METP WORKING GROUP

8.2.1 The Panel reviewed WP6001 that addressed concerns related to the reporting of wind gusts. It was agreed that it has not been a widespread problem and, in the context of the preferred TAC freeze, the Panel must be careful in allocating its scarce resources. However, it was noted that understanding the concept of wind gust continue to be a problem and that anything that would make the situation clearer would be welcome. So while the Panel acknowledged that the improvements may be possible it was agreed that the METP should not pursue this work unless the requirement was first validated by the appropriate operations group or Panel.

8.2.2 Based upon this discussion the Panel agreed:

Decision 8/1 — Issues regarding the consistent reporting of wind gusts

That operators who may have issues with the manner in which wind gusts are reported should first address their concerns to the Flight Operations Panel.

8.2.3 The Panel noted concerns related to limitations upon the description of vertical extent in AIRMET presented in WP/6002. The paper outlined a need for 4 digits in some cases when only 3 were accommodated.

8.2.4 Currently, Annex 3, Table A6-1A allows the use of “[TOP] ABV FLnnn” to describe the level of the phenomenon, however there is no provision to describe a level as [TOP] ABV nnnnFT. It was

assumed that his situation was likely to be an editorial mistake when the SIGMET template Table A6-1A was reformatted. The Panel agreed that this should be enabled in the template and addressed in the IWXXM schema (refer Recommendation 8/2 below).

8.2.5 On another issue outlined in WP6002, the question of how to present information on phenomena which may change in vertical extent over time was discussed. The Panel agreed:

Decision 8/2 — Presentation in IWXXM of phenomena changing in vertical extent.

That the issue of presentation in IWXXM of phenomena changing in vertical extent should also be considered over the long term within the IWXXM development and passed to WG-MIE for consideration.

8.2.6 The Panel discussed the use of ‘APRX’ in SIGMET messages as outlined in WP6006. It was noted that if the term was kept in TAC it will need to be included in IWXXM. This situation was not seen as being of sufficient concern to justify setting aside the proposed TAC development freeze on this matter; however, an interim step was suggested.

8.2.7 The group also recalled that IWXXM has a failsafe that will include the TAC as an added element to make sure that the term is human readable, should it be necessary.

8.2.8 In view of this discussion, the Panel agreed:

Decision 8/3 — The use of the term ‘APRX’ in SIGMET messages.

That, the term ‘APRX’ should be removed from the regional SIGMET guide template and not recommended for use.

8.2.9 The Panel discussed WP/6005 regarding a number of inconsistencies and deficiencies in the existing guidance, procedures and provisions for the generation of tropical cyclone (TC) advisories and TC SIGMETs.

8.2.10 With regard to TC advisories (Annex 3, Table A2-2 Template for advisory message for tropical cyclones) the need for an additional item regarding “time of observation”; the possibility to include the year and allow more than two (2) digits for the “advisory number item; the addition of a new element for horizontal and vertical extent of CB cloud associated with a TC and possible provision of information on the change in intensity of a TC were discussed.

8.2.11 With regard to changes to TC SIGMET (Annex 3, Table A6-1A Template for SIGMET and AIRMET messages, the need to allow the forecast position to be at a time other than the end time of the SIGMET; the introduction of the element “repetition of elements” to be used when volcanic ash cloud or cumulonimbus cloud associated with a tropical cyclone are covering more than one area within the flight information region/control area (FIR/CTA) and the addition of a new element for the “TC centre forecast position” were also discussed

8.2.12 When discussing these proposals, the Panel noted that, for example it was problematic to include 2 tropical storms in a single FIR. Although considered to be a valid issue, it was not an issue that was addressed in the current job cards approved by the ANC. It was agreed that the Panel should focus upon the work given to it by ANC, but that it should be noted to the commission, very clearly, that the METP had difficulty deciding what to do with some of these issues.

8.2.13 With respect to the SIGMET issues in WP/6005, it was felt that the Panel should proceed with the changes since the underlying matter was on the cusp of being safety critical. It was agreed that the advisory number, observed position and observed CB cloud would be proposed for amendment in the template for advisory message for tropical cyclones (Table A2-2), however the observed CB cloud could be handled in the remarks section if necessary and the intensity change would not be included in the proposal. It was also agreed that the TC Centre would be proposed for amendment in the SIGMET template (Table A6-1A).

8.2.14 Therefore, the Panel formulated the following recommendation:

**RSPP | Recommendation 8/2: Draft Amendment 78 to Annex 3/
Technical Regulations [C.3.1] concerning Table A2-2
Template for advisory message for tropical cyclones and
Table A6-1A Template for SIGMET and AIRMET messages**

That the changes to Annex 3, Tables A2-2 and A6-1A as indicated in Attachment A, be included as part of draft Amendment 78 of Annex 3.

8.2.15 In considering WP6007, it was noted that many airlines were centralizing their data centres and that this had resulted in issues related to the distinction between AOP and non-AOP aerodromes. It was suggested that the distinction between AOP and non-AOP aerodromes may be inconsistent with the SWIM concept, however it was clear that SWIM should not be the sole basis for determining AOP versus non-AOP.

8.2.16 The Panel discussed these matters and other concerns regarding reporting deficiencies outlined in the paper. should be routed through existing ICAO deficiencies report tool.

8.2.17 In this regard the Panel agreed:

**Decision 8/4 — General deficiencies and AOP and non-AOP
aerodromes information access concerns**

That user concerns about access to non-AOP aerodrome MET information and other concerns regarding the reporting deficiencies should be routed through the existing ICAO deficiencies report process. Similarly operators are encouraged to raise these matter with the respective States' authorities responsible for the services.

8.2.18 The Panel considered concerns related to the regional SIGMET Guide template as outlined in WP6008 addressing the need for additional notes regarding:

- a) the sequence number for all SIGMET messages types (WS, WV and WC) for one flight information region;
- b) the location of phenomenon given at the beginning of SIGMET with reference to the beginning of validity period;
- c) SIGMET cancellation and the remaining time of the original period of validity; and
- d) The deletion of the abbreviation “LCA” as the term is not used in SIGMETs.

8.2.19 In this regard the Panel agreed:

Decision 8/5 — SIGMET Guide Adjustments

That the concerns set out above warrant review and are referred to the WG-MOG for further consideration.

8.2.20 The Panel was informed that the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG) at its 26th Meeting held in Bangkok, Thailand in September 2015 formulated its Conclusion 26/58 on competency of aeronautical meteorological personnel. This Conclusion invited ICAO to consider introducing a new provision in Annex 3 relating to the above similar to that already provided in Annex 15 (paragraph 3.7.4). In this regard the Panel noted that further consultation regarding this proposal with WMO (where the proposal originated) has led to propose an amendment to the existing Annex 3 provision as follows:

“2.1.5 Each Contracting State shall ensure that the designated meteorological authority complies with the requirements of the World Meteorological Organization (WMO) in respect of qualifications and competencies, education and training of meteorological personnel providing service for international air navigation.

Note.— Requirements concerning qualifications and competencies, education and training of meteorological personnel in aeronautical meteorology are given in WMO Publication No. 49, Technical Regulations, Volume I — General Meteorological Standards and Recommended Practices, ~~Chapter B.4 — Education and Training~~ Part V — Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services, Part VI — Education and Training of Meteorological Personnel, and Appendix A — Basic Instruction Packages. “

8.2.21 After discussion, the Panel agreed on the proposal and formulated the following recommendation:

RSPP Recommendation 8/3 — Qualifications and competencies, education and training of meteorological personnel

That the amendment proposal given above with regard to the WMO requirements in respect of qualifications and competencies, education and training of meteorological personnel be included as part of draft Amendment 78 to Annex 3

8.3 WMO UPDATES

8.3.1 The Panel noted the progress related to the ongoing work on the update of the Working Arrangements between WMO and ICAO (ICAO Doc. 7475 – *Working Arrangements between the International Civil Aviation Organization (ICAO) and the World Meteorological Organization (WMO)*) and encouraged the work to continue.

8.3.2 While considering matters pertaining to Annex 3 amendment proposals from other sources, the METP acknowledged that several of the issues presented did not, currently, appear to have suitable placeholder locations within the job card construct that the ANC expected each of its Panels to apply.

8.3.3 Concerns were expressed that in the event of agreeing to address such ‘supplementary issues’ there was a risk that it could be to the detriment of the existing tasking which was reflected in the METP job cards, particularly in light of the ambitious timelines of the existing tasking and the resources available to support. Moreover, the METP was particularly mindful of the strategic direction provided by the Meteorology Divisional Meeting in July 2014 (MET/14) as well as the Global Air Navigation Plan (GANP) (ICAO Doc 9750) – the MET component of which had been the prime focus of MET/14 – and that departures from such strategic direction by the METP would, potentially, have implications beyond simply MET.

8.3.4 In order to progress, METP agreed to address each proposed amendment to Annex 3 in the context of its safety criticality – i.e. if safety critical: address; if not safety critical: defer or reject. Notwithstanding this, the METP sought clarification from the ANC in respect of how such supplementary issues (that may or may not be considered safety critical) should be addressed in order to enable the METP to better prioritize its work programme and resource the associated activities going forwards.

8.3.5 Therefore, the Panel formulated the following recommendation:

Recommendation 8/4 — Guidance from the ANC to the METP on supplementary issues

That the ANC be requested to provide guidance to the METP on how to address supplementary issues (not included in current job cards) to assist in the prioritization of its work programme and associated resources.

8.4 OTHER BUSINESS

8.4.1 It was noted that a paper entitled Cold Weather Temperature Corrections was to be tabled at the forthcoming ICAO Air Traffic Management Operations Panel (ATMOPSP) 24 to 28 October 2016. It was requested that coordination take place between the Secretaries of these two panels to ensure that suitable input could be provided from the MET Panel if required.

8.4.2 Also noted was that the third meeting of the Panel was due in 2018. In this regard, the Secretariat advised that the best opportunity to meet at ICAO Montreal in 2018 was likely to be in October. The meeting noted that the METP Management Group would keep this under review along with the scheduling of the various meetings of the working groups and work streams.

APPENDIX A**PROPOSAL FOR AMENDMENT 78 TO ANNEX 3****DRAFT AMENDMENT TO ANNEX 3 –****METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION****(TWENTIETH EDITION – JULY 2018)****PART II. APPENDICES AND ATTACHMENTS**

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**APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED
TO WORLD AREA FORECAST SYSTEM,
AND METEOROLOGICAL OFFICES AND OTHER CENTRES**

(See Chapter 3 of this Annex)

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Table A2-1 Template for Advisory message for volcanic ash

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<i>Detailed content</i>	<i>Template(s)</i>		<i>Examples</i>
Identification of the type of message (M)	Type of message	VA ADVISORY	VA ADVISORY
TEST or EXERCISE indicator (C)*	Indicator of TEST or EXERCISE	TEST or EXERCISE	TEST EXERCISE
Time of origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20080923/0130Z
Name of VAAC (M)	Name of VAAC	VAAC: nnnnnnnnnnnn	VAAC: TOKYO
Name of volcano (M)	Name and IAVCEI ¹ number of volcano	VOLCANO: nnnnnnnnnnnnnnnnnnnnn [nnnnnn] or UNKNOWN or UNNAMED	VOLCANO: KARYMSKY 1000-13 VOLCANO: UNNAMED

...

Notes.—

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* Only use when the message issued as a TEST or EXERCISE and is not to be used for operational decision making. When TEST is indicated the message may contain information (not to be used operationally) or will otherwise end immediately after the work "TEST".

Table A2-2. Template for advisory message for tropical cyclones

Key: = = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in advisory messages for tropical cyclones are shown in Appendix 6, Table A6-4.

Note 2.— The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Note 3.— All the elements are mandatory.

Note 4.— Inclusion of a “colon” after each element heading is mandatory.

Note 5.— The numbers 1 to 219 are included only for clarity and they are not part of the advisory message, as shown in the example.

Element	Detailed content	Template(s)	Examples
1	Identification of the type of message	Type of message	TC ADVISORY
2	TEST or EXERCISE indicator (C)*	Indicator of TEST or EXERCISE	TEST or EXERCISE indicator (C)*
3 2	Time of origin	Year, month, day and time in UTC of issue	DTG: 20040925/19600Z
4 3	Name of TCAC	Name of TCAC (location indicator or full name)	TCAC: YUFO ⁴² TCAC: MIAMI
5 4	Name of tropical cyclone	Name of tropical cyclone or “NN” for unnamed tropical cyclone	TC: GLORIA
6 5	Advisory number	Advisory number: Year in full and message number (separate sequence starting with “01” for each cyclone)	ADVISORY NR: 2004/1304
7 6	Observed position of the centre	Day and time (in UTC) and position of the centre of the tropical cyclone (in degrees and minutes)	OBS PSN: 25/1800Z N2706 W07306
8 7 ³	Observed CB cloud ⁴	Location of CB cloud (referring to latitude and longitude (in degrees and minutes)) and vertical extent (flight level)	CB: WI 250NM OF TC CENTRE TOP FL500

Element	Detailed content	Template(s)	Examples
		Ennn[nn] TOP [ABV or BLW] FLnnn	
79	Direction and speed of movement Direction and speed of movement given in sixteen compass points and km/h (or kt), respectively, <i>or moving slowly</i> (< 6 km/h (3 kt)) <i>or stationary</i> (< 2 km/h (1 kt))	MOV: N nnKMH (or KT) or NNE nnKMH (or KT) or NE nnKMH (or KT) or ENE nnKMH (or KT) or E nnKMH (or KT) or ESE nnKMH (or KT) or SE nnKMH (or KT) or SSE nnKMH (or KT) or S nnKMH (or KT) or SSW nnKMH (or KT) or SW nnKMH (or KT) or WSW nnKMH (or KT) or W nnKMH (or KT) or WNW nnKMH (or KT) or NW nnKMH (or KT) or NNW nnKMH (or KT) or SLW or STNR	MOV: NW 20KMH
810	Central pressure Central pressure (in hPa)	C: nnnHPA	C: 965HPA
911	Maximum surface wind Maximum surface wind near the centre (mean over 10 minutes, in m/s (or kt))	MAX WIND: nn[n]MPS (or nn[n]KT)	MAX WIND: 22MPS
129	Forecast of centre position (+6 HR) Day and time (in UTC) (6 hours from the "DTG" given in Item 6); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +6 HR: nn/nnnnZ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +6 HR: 26/0000Z N2748 W07350
134	Forecast of maximum surface wind (+6 HR) Forecast of maximum surface wind (6 hours after the "DTG" given in Item 6)	FCST MAX WIND +6 HR: nn[n]MPS (or nn[n]KT)	FCST MAX WIND +6 HR: 22MPS
142	Forecast of centre position (+12 HR) Day and time (in UTC) (12 hours from the "DTG" given in Item 6); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 HR: nn/nnnnZ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +12 HR: 26/0400Z N2830 W07430
153	Forecast of maximum surface wind (+12 HR) Forecast of maximum surface wind (12 hours after the "DTG" given in Item 6)	FCST MAX WIND +12 HR: nn[n]MPS (or nn[n]KT)	FCST MAX WIND +12 HR: 22MPS
164	Forecast of centre position (+18 HR) Day and time (in UTC) (18 hours from the "DTG" given in Item 6); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 HR: nn/nnnnZ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +18 HR: 26/1000Z N2852 W07500
175	Forecast of maximum surface wind Forecast of maximum surface wind (18 hours after the "DTG" given in	FCST MAX WIND +18 HR: nn[n]MPS (or nn[n]KT)	FCST MAX WIND +18 HR: 21MPS

Element	Detailed content	Template(s)	Examples
(+18 HR)	Item 6)		
186	Forecast of centre position (+24 HR) Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 HR: nn/nnnnZ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +24 HR: 26/1600Z N2912 W07530
197	Forecast of maximum surface wind (+24 HR)	FCST MAX WIND +24 HR: nn[n]MPS (or nn[n]KT)	FCST MAX WIND +24 HR: 20MPS
204 &	Remarks	RMK: Free text up to 256 characters or NIL	RMK: NIL
219	Expected time of issuance of next advisory	NXT MSG: [BFR] nnnnnnnn/nnnnZ or NO MSG EXP	NXT MSG: 20040925/2000Z

Notes.—

1. Only use when the message issued as a TEST or EXERCISE and is not to be used for operational decision making. When TEST is indicated the message may contain information (not to be used operationally) or will otherwise end immediately after the work "TEST".
2. Fictitious location.
3. Optional field
4. The number of coordinates should be kept to a minimum and should not normally exceed seven.

Example A2-2. Advisory message for tropical cyclones**TC ADVISORY**

DTG: 20040925/19600Z
 TCAC: YUFO
 TC: GLORIA
 ADVISORY NR: 2004/1304
 OBS PSN: 25/1800Z N2706 W07306
 CB: WI 250NM OF TC CENTRE
 MOV: NW 20KMH
 C: 965HPA
 MAX WIND: 22MPS
 FCST PSN +6 HR: 25/2200Z N2748 W07350
 FCST MAX WIND +6 HR: 22MPS
 FCST PSN +12 HR: 26/0400Z N2830 W07430
 FCST MAX WIND +12 HR: 22MPS
 FCST PSN +18 HR: 26/1000Z N2852 W07500
 FCST MAX WIND +18 HR: 21MPS
 FCST PSN +24 HR: 26/1600Z N2912 W07530
 FCST MAX WIND +24 HR: 20MPS
 RMK: NIL
 NXT MSG: 20040926/0100Z

Table A6-1A. Template for SIGMET and AIRMET messages

Key: M = inclusion mandatory, part of every message;
 C = inclusion conditional, included whenever applicable;
 = = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in SIGMET/AIRMET messages are shown in Table A6-4 of this appendix.

Note 2.— In accordance with 1.1.5 and 2.1.5, severe or moderate icing and severe or moderate turbulence (SEV ICE, MOD ICE, SEV TURB, MOD TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should not be included.

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
Location indicator of FIR/CTA (M) ¹	ICAO location indicator of the ATS unit serving the FIR or CTA to which the SIGMET/AIRMET refers	nnnn		YUCC ² YUDD ²	
Identification (M)	Message identification and sequence number ³	SIGMET [n][n]n	AIRMET [n][n]n	SIGMET 1 SIGMET 01 SIGMET A01	AIRMET 9 AIRMET 19 AIRMET B19
Validity period (M)	Day-time groups indicating the period of validity in UTC	VALID nnnnnn/nnnnnn		VALID 010000/010400 VALID 221215/221600 VALID 101520/101800 VALID 251600/252200 VALID 152000/160000 VALID 192300/200300	
Location indicator of MWO (M)	Location indicator of MWO originating the message with a separating hyphen	nnnn-		YUDO- ² YUSO- ²	
Name of the FIR/CTA (M)	Location indicator and name of the FIR/CTA ⁴ for which the SIGMET/AIRMET is issued	nnnn nnnnnnnnnn FIR/[UIR] or UIR or FIR/UIR or nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR/[n]	YUCC AMSWELL FIR ² YUDD SHANLON ² FIR/UIR ² UIR FIR/UIR YUDD SHANLON CTA ²	YUCC AMSWELL FIR ^{2/2} YUDD SHANLON FIR ²
IF THE SIGMET OR AIRMET MESSAGE IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.					
TEST or EXERCISE indicator (C) ⁵	Indicator of TEST or EXERCISE	TEST or EXERCISE	TEST or EXERCISE	TEST EXERCISE	TEST EXERCISE
Phenomenon (M) ⁵⁶	Description of phenomenon causing the issuance of SIGMET/AIRMET	OBSC ⁶⁷ TS[GR ²⁸] EMBD ⁸⁹ TS[GR ²⁸] FRQ ⁹¹⁰ TS[GR ²⁸] SQL ⁴⁰¹¹ TS[GR ²⁸] TC nnnnnnnnnn PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] CB or TC NN ⁴¹² PSN Nnn[nn] or Snn[nn] Wnnn[nn]	SFC WIND nnn/nn[n]MPS (or SFC WIND nnn/nn[n]KT) SFC VIS nnnnM (nn) ⁴⁵¹⁶ ISOL ⁴⁶¹⁷ TS[GR ²⁸] OCNL ⁴⁷¹⁸ TS[GR ²⁸] MT OBSC	OBSC TS OBSC TSGR EMBD TS EMBD TSGR FRQ TS FRQ TSGR SQL TS SQL TSGR TC GLORIA PSN N10	SFC WIND 040/40MPS SFC WIND 310/20KT SFC VIS 1500M (BR) ISOL TS ISOL TSGR OCNL TS OCNL TSGR

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
		or Ennn[nn] CB SEV TURB ⁴²¹³ SEV ICE ⁴³¹⁴ SEV ICE (FZRA) ⁴³¹⁴ SEV MTW ⁴⁴¹⁵ HVY DS HVY SS [VA ERUPTION] [MT nnnnnnnnnn] [PSN Nnn[nn] or Snn[nn] Ennn[nn] or Wnnn[nn]] VA CLD RDOACT CLD	BKN CLD nnn/[ABV] nnnnM (or BKN CLD [n]nnn/[ABV] [n]nnnnFT) or BKN CLD SFC/[ABV] nnnnM (or BKN CLD SFC/[ABV][n]nnnnFT) OVC CLD nnn/[ABV]nnnnM (or OVC CLD [n]nnn/[ABV] [n]nnnnFT) or OVC CLD SFC/[ABV]nnnnM (or OVC CLD SFC/[ABV][n]nnnnFT) ISOL ⁴⁶¹⁷ CB ⁴⁸¹⁹ OCNL ⁴⁷¹⁸ CB ⁴⁸¹⁹ FRQ ⁴⁹¹⁰ CB ⁴⁸¹⁹ ISOL ⁴⁶¹⁷ TCU ⁴⁸¹⁹ OCNL ⁴⁷¹⁸ TCU ⁴⁸¹⁹ FRQ ⁴⁹¹⁰ TCU ⁴⁸¹⁹ MOD TURB ⁴²¹³ MOD ICE ⁴³¹⁴ MOD MTW ⁴⁴¹⁵	W060 CB TC NN PSN S2030 E06030 CB SEV TURB SEV ICE SEV ICE (FZRA) SEV MTW HVY DS HVY SS VA ERUPTION MT ASHVAL ² PSN S15 E073 VA CLD RDOACT CLD	MT OBSC BKN CLD 120/900M BKN CLD 400/3000FT BKN CLD 1000/5000FT BKN CLD SFC/3000M BKN CLD SFC/ABV 10000FT OVC CLD 270/ABV3000M OVC CLD 900/ABV10000FT OVC CLD 1000/5000FT OVC CLD SFC/3000M OVC CLD SFC/ABV 10000FT ISOL CB OCNL CB FRQ CB ISOL TCU OCNL TCU FRQ TCU MOD TURB MOD ICE MOD MTW
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, or forecast	OBS [AT nnnnZ] or FCST [AT nnnnZ]		OBS OBS AT 1210Z FCST FCST AT 1815Z	
Location (C) ⁴⁹²⁰	Location (referring to latitude and longitude (in degrees and minutes))	Nnn[nn] Wnnn[nn] or Nnn[nn] Ennn[nn] or Snn[nn] Wnnn[nn] or Snn[nn] Ennn[nn] or N OF Nnn[nn] or S OF Nnn[nn] or N OF Snn[nn] or S OF Snn[nn] [AND] W OF Wnnn[nn] or E OF Wnnn[nn] or W OF Ennn[nn] or E OF Ennn[nn] or N OF Nnn[nn] or N OF Snn[nn] AND S OF Nnn[nn] or S OF Snn[nn] or W OF Wnnn[nn] or W OF Ennn[nn] AND E OF Wnnn[nn] or E OF Ennn[nn] or N OF LINE ²⁰²¹ or NE OF LINE ²⁰²¹ or E OF LINE ²⁰²¹ or SE OF LINE ²⁰²¹ or S OF LINE ²⁰²¹ or SW OF LINE ²⁰²¹ or W OF LINE ²⁰²¹ or NW OF LINE ²⁰²¹ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [AND N OF LINE ²⁰²¹ or NE OF LINE ²⁰²¹ or E OF LINE ²⁰²¹ or SE OF LINE ²⁰²¹ or S OF LINE ²⁰²¹ or SW OF LINE ²⁰²¹ or		N2020 W07005 N48 E010 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 E OF W45 W OF E15540 E OF E09015 N OF N1515 AND W OF E13530 S OF N45 AND N OF N40 N OF LINE S2520 W11510 – S2520 W12010 SW OF LINE N50 W005 – N60 W020 SW OF LINE N50 W020 – N45 E010 AND NE OF LINE N45 W020 – N40 E010 WI N6030 E02550 – N6055 E02500 – N6050 E02630 – N6030 E02550 APRX 50KM WID LINE BTN N64 W017 – N60 W010 –	

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
		W OF LINE ²⁰²¹ or NW OF LINE ²⁰²¹ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]		N57 E010	

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
		<p>or</p> <p>W^{2021, 2422} Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – [Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]</p> <p>or</p> <p>APRX nnKM WID LINE²⁰²¹ BTN (or nnNM WID LINE²⁰²¹ BTN) Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]</p> <p>or</p> <p>ENTIRE FIR/UIR</p> <p>or</p> <p>ENTIRE FIR</p> <p>or</p> <p>ENTIRE FIR/UIR</p> <p>or</p> <p>ENTIRE CTA</p> <p>or²²²³</p> <p>WI nnnKM (or nnnNM) OF TC CENTRE</p> <p>or²⁹</p> <p>WI nnnNM or nnnKM OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p>		<p>ENTIRE FIR</p> <p>ENTIRE UIR</p> <p>ENTIRE FIR/UIR</p> <p>ENTIRE CTA</p> <p>WI 400KM OF TC CENTRE</p> <p>WI 250NM OF TC CENTRE</p> <p>WI 30KM OF N6030 E02550</p>	
Level (C) ¹⁹²⁰	Flight level or altitude ²³	<p>[SFC]/FLnnn or [SFC]/nnnnM (or [SFC]/[n]nnnnFT) or FLnnn/nnn or TOP FLnnn or [TOP] ABV FLnnn or (or [TOP] ABV [n]nnnnFT) [nnnn]/nnnnM (or [n]nnnn/[n]nnnnFT) or [nnnnM]/FLnnn (or [n]nnnnFT)/FLnnn)</p> <p>or²²²³</p> <p>TOP [ABV or BLW] FLnnn</p>		<p>FL180</p> <p>SFC/FL070</p> <p>SFC/3000M</p> <p>SFC/10000FT</p> <p>FL050/080</p> <p>TOP FL390</p> <p>ABV FL250</p> <p>TOP ABV FL100</p> <p>ABV 7000FT</p> <p>TOP ABV 9000FT</p> <p>TOP ABV 10000FT</p> <p>3000M</p> <p>2000/3000M</p> <p>8000FT</p> <p>6000/12000FT</p> <p>2000M/FL150</p> <p>10000FT/FL250</p> <p>TOP FL500</p> <p>TOP ABV FL500</p> <p>TOP BLW FL450</p>	
Movement or expected movement (C) ^{1920, 24}	Movement or expected movement (direction and speed) with reference to one of the sixteen points of compass, or stationary	<p>MOV N [nnKMH] or MOV NNE [nnKMH] or MOV NE [nnKMH] or MOV ENE [nnKMH] or MOV E [nnKMH] or MOV ESE [nnKMH] or MOV SE [nnKMH] or MOV SSE [nnKMH] or MOV S [nnKMH] or MOV SSW [nnKMH] or MOV SW [nnKMH] or MOV WSW [nnKMH] or MOV W [nnKMH] or MOV WNW [nnKMH] or</p>		<p>MOV SE</p> <p>MOV NNW</p> <p>MOV E 40KMH</p> <p>MOV E 20KT</p> <p>MOV WSW 20KT</p>	

<i>Element</i>	<i>Detailed content</i>	<i>SIGMET template</i>	<i>AIRMET template</i>	<i>SIGMET message examples</i>	<i>AIRMET message examples</i>
		MOV NW [nnKMH] or MOV NNW [nnKMH] (or MOV N [nnKT] or MOV NNE [nnKT] or MOV NE [nnKT] or MOV ENE [nnKT] or MOV E [nnKT] or MOV ESE [nnKT] or MOV SE [nnKT] or MOV SSE [nnKT] or MOV S [nnKT] or MOV SSW [nnKT] or MOV SW [nnKT] or MOV WSW [nnKT] or MOV W [nnKT] or MOV WNW [nnKT] or MOV NW [nnKT] or MOV NNW [nnKT]) or STNR		STNR	

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
Changes in intensity (C) ¹⁹²⁰	Expected changes in intensity	INTSF or WKN or NC		INTSF WKN NC	
Forecast time (C) ²⁴	Indication of the forecast time of phenomenon	FCST AT nnnnZ	—	FCST AT 2200Z	—
TC forecast position (C) ²²	Forecast position of TC centre at the end of the validity period of the SIGMET message	TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	—	TC CENTRE PSN N1030 or E1600015	TC forecast position (C) ²²
Forecast position (C) ^{1920, 24-26}	Forecast position of phenomenon at the end of the validity period of the SIGMET message	Nnn[nn] Wnnn[nn] or Nnn[nn] Ennn[nn] or Snn[nn] Wnnn[nn] or Snn[nn] Ennn[nn] or N OF Nnn[nn] or S OF Nnn[nn] or N OF Snn[nn] or S OF Snn[nn] [AND] W OF Wnnn[nn] or E OF Wnnn[nn] or W OF Ennn[nn] or E OF Ennn[nn] or N OF Nnn[nn] or N OF Snn[nn] AND S OF Nnn[nn] or S OF Snn[nn] or W OF Wnnn[nn] or W OF Ennn[nn] AND E OF Wnnn[nn] or E OF Ennn[nn] or N OF LINE ²⁰²¹ or NE OF LINE ²⁰²¹ or E OF LINE ²⁰²¹ or SE OF LINE ²⁰²¹ or S OF LINE ²⁰²¹ or SW OF LINE ²⁰²¹ or W OF LINE ²⁰²¹ or NW OF LINE ²⁰²¹ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [AND N OF LINE ²⁰²¹ or NE OF LINE ²⁰²¹ or E OF LINE ²⁰²¹ or SE OF LINE ²⁰²¹ or S OF LINE ²⁰²¹ or SW OF LINE ²⁰²¹ or W OF LINE ²⁰²¹ or NW OF LINE ²⁰²¹ Nnn[nn] or Snn[nn] Wnnn[nn] or	—	N30 W170 N OF N30 S OF S50 AND W OF E170 S OF N46 AND N OF N39 NE OF LINE N35 W020 – N45 W040 SW OF LINE N48 W020 – N43 E010 AND NE OF LINE N43 W020 – N38 E010 WI N20 W090 – N05 W090 – N10 W100 – N20 W100 – N20 W090 APRX 50KM WID LINE BTN N64 W017 – N57 W005 – N55 E010 – N55 E030 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA TC CENTRE PSN N2740 W07345 NO VA LONGER EXP	—

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
		<p>Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] or W[²⁰²¹, ²⁴²² Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p> <p>or APRX nnKM WID LINE²⁰²¹ BTN (nnNM WID LINE²⁰²¹ BTN) Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]</p> <p>or ENTIRE FIR{UIR}</p> <p>or ENTIRE UIR</p> <p>or ENTIRE FIR/UIR</p> <p>or ENTIRE CTA</p> <p>^{0/22} TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]</p> <p>^{0/26} NO VA LONGER EXP</p>			
Repetition of elements (C) ²⁷	Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND] ²⁷	—	AND	—
OR					
Cancellation of SIGMET/ AIRMET (C) ²⁸	Cancellation of SIGMET/AIRMET referring to its identification	CNL SIGMET [n][n]n nnnnnn/nnnnnn	CNL AIRMET [n][n]n nnnnnn/nnnnnn	CNL SIGMET 2 101200/101600	CNL AIRMET 05 151520/151800

<i>Element</i>	<i>Detailed content</i>	<i>SIGMET template</i>	<i>AIRMET template</i>	<i>SIGMET message examples</i>	<i>AIRMET message examples</i>
		^{or²⁶} CNL SIGMET [n][n]n nnnnnn/nnnnnn VA MOV TO nnnn FIR		CNL SIGMET A13 251030/251430 VA MOV TO YUDO FIR ²	

Notes.—

1. See 4.1.
2. Fictitious location.
3. In accordance with 1.1.3 and 2.1.2.
4. See 2.1.3.
5. Only used when the message is issued as a TEST or EXERCISE. Under such circumstances the information contained within the message is not to be used for operational decision making. When this field is omitted, information contained within the message is intended to be used operationally. When TEST is indicated, the message may contain information (not to be used operationally) or will otherwise end immediately after the word 'TEST'.
56. In accordance with 1.1.4 and 2.1.4.
67. In accordance with 4.2.1 a).
78. In accordance with 4.2.4.
89. In accordance with 4.2.1 b).
910. In accordance with 4.2.2.
1011. In accordance with 4.2.3.
1112. Used for unnamed tropical cyclones.
1213. In accordance with 4.2.5 and 4.2.6.
1314. In accordance with 4.2.7.
1415. In accordance with 4.2.8.
1516. In accordance with 2.1.4.
1617. In accordance with 4.2.1 c).
1718. In accordance with 4.2.1 d).
1819. The use of cumulonimbus (CB) and towering cumulus (TCU) is restricted to AIRMETs in accordance with 2.1.4.
1920. In the case of volcanic ash cloud or cumulonimbus clouds associated with a tropical cyclone covering more than one area within the FIR, these elements can be repeated, as necessary.
2021. A straight line is to be used between two points drawn on a map in the Mercator projection or between two points which crosses lines of longitude at a constant angle.
2122. The number of coordinates should be kept to a minimum and should not normally exceed seven.
2223. Only for SIGMET messages for tropical cyclones.
23. ~~Only for SIGMET messages for volcanic ash cloud and tropical cyclones.~~
24. The elements "forecast time" and "forecast position" are not to be used in conjunction with the element "movement or expected movement".
25. The levels of the phenomena remain fixed throughout the forecast period.
26. Only for SIGMET messages for volcanic ash.
27. To be used for two volcanic ash clouds or two centres of tropical cyclones simultaneously affecting the FIR concerned..
28. End of the message (as the SIGMET/AIRMET message is being cancelled).
29. When using SIGMET for RDOACT CLD, when detailed information on the release is not available, a radius of up to 30 km may be applied based on the International Atomic Energy Agency (IAEA) recommendation for surface contamination contained in IAEA Safety Guide GS-G-2.1 - *Arrangements for Preparedness for a Nuclear or Radiological Emergency* (2007); and a vertical extent from surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) is to be applied as applicable.

— END —