



**STUDY NOTE**

**MEETING OF THE METEOROLOGY PANEL (METP)  
WORKING GROUP MOG (WAFS)**

**SEVENTH MEETING**

**Offenbach, Germany, 11 to 13 April 2018**

**Agenda Item 3.3: Work required in support of WAFS Developments  
3.3.2 Matters relating to the Significant Weather Provision**

**NEXT GENERATION WAFS SIGWX PRODUCTION**  
(Presented by the WAFS Provider States)

**SUMMARY**

The WAFSs have developed plans on how to deliver SIGWX forecasts fit for the next 10+ years through the introduction of multiple time-step SIGWX forecasts in November 2022. This paper provides a top level overview of the changes and implementation timeline.

Action by the METP-WG/MOG is in paragraph 4.

**1. INTRODUCTION**

1.1 Over the past 10 years, feedback has been provided to the WAFSs by States, IFALPA and IATA about SIGWX forecasts not fully meeting the needs of the aviation industry. Three main issues were identified:

- The SIGWX Charts issued by WAFS Washington and WAFS London are not harmonised
- The WAFS Gridded data sets for turbulence, icing and cumulonimbus clouds are not harmonised with the SIGWX forecasts
- SIGWX forecasts are only produced for a single timeframe and therefore do not adequately meet the needs of long or short haul flight planning.

1.2 The WAFSs have been busy determining the best way of providing SIGWX services fit for the next 10+ years that are in line with the Global Air Navigation Plan (GANP) 2016-2030 and associated Aviation System Block Upgrades (ASBU) upgrades.

1.3 The group may recall that at METP-WG/MOG/4 the WAFIC Provider States presented some preliminary ideas of the improvements that could be made (METP-WG/MOG/4-SN/26 refers). This paper provides more detailed information on the changes that are required.

## 2. DISCUSSION

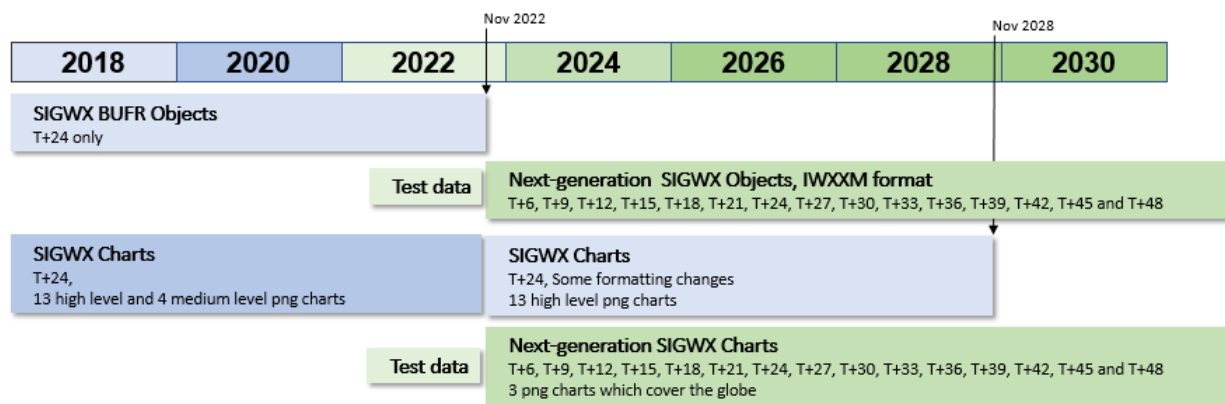
2.1 A key requirement for the next generation SIGWX provision is the requirement to provide data for more than just the T+24 hour time-step. Short haul flight planning would typically require data for the T+6 to T+18 timeframe, whilst ultra-long haul flight planning requires data beyond T+24.

2.2 Scientific developments made by both WAFICs over the past few years is now enabling the direct use of the underlying forecast data sets in SIGWX production. WAFIC London has been trialling the production of T+24 SIGWX objects in a non-operational environment for the past few years. Verification has been carried out which shows that the T+24 SIGWX Object data has a higher quality than objects drawn manually by a meteorologist. This evidence is presented in METP-WG/MOG/7 SN/22

2.3 For the reasons presented in paragraphs 2.1 and 2.2 both WAFICs now believe that the oversight of meteorologists in SIGWX production can be reduced, which enables an increase in the number of time-steps of SIGWX data that is provided.

2.4 Harmonisation – Both WAFICs currently blend forecasts. This will continue with the use of blended WAFIC 0.25° gridded data sets for cumulonimbus cloud, turbulence and icing when creating SIGWX objects. An evaluation will be carried out to determine the best approach for creating jet stream objects, in order to ensure that peak jet information is not smoothed out.

2.5 The timeline of proposed changes is shown below:



*Note: Next-generation data sets will be provided on the next-generation SWIM compliant data delivery system. From November 2022 to November 2028 T+24 IWXXM format data, and the legacy T+24 high-level png charts will be available on SADIS FTP and WIFS.*

### NEXT GENERATION SIGWX OBJECTS

2.6 METP-WG/MOG/7 SN/22 describes the changes that will need to be made in order to deliver multiple time step SIGWX objects for November 2022. It is important to note the following:

- The turbulence objects will use the Graphical Turbulence Guidance (GTG) system output. It will not be possible to forecast “in-cloud” turbulence so this parameter will be retired.

- Cumulonimbus cloud will be based on probabilistic data. A probability that closely matches the existing “50 per cent or more spatial coverage” criteria will be used. It will not be possible to determine whether the cumulonimbus clouds are embedded or concentrated along a line
- Tropopause height and jet depth information will not be provided as SIGWX output, but will be available as gridded data fields. Cumulonimbus base information will not be provided.
- SIGWX data will be provided covering a single range of FL100 to FL530.
- The next-generation objects will only be provided in IWXXM format (BUFR will be retired in November 2022).
- Changes will be required for Amendment 79 to Annex 3 (described in METP-WG/MOG/7 SN/25) and Amendment 80 to Annex 3 (described in METP-WG/MOG/7 SN/26)

## **NEXT-GENERATION SIGWX PNG FORMAT CHARTS**

2.7 Whilst the provision of png format SIGWX charts is not mandated by Annex 3, or desired within the GANP<sup>1</sup> AMET-B1/4 (Dissemination of meteorological information) the future of these charts needs to be determined, and is discussed fully in METP-WG/MOG/7 SN23.

2.8 Many consumers of the SIGWX object data sets now visualise the data through flight planning software or SADIS/WIFS workstations, which also enable the data to be customised both in terms of appearance and map area.

2.9 Whilst the WAFCs would like to retire png format chart provision entirely, we appreciate that there is still a need to provide charts to users slow to adapt to new technology. For this reason the WAFCs will continue to provide SIGWX png format charts for T+24 until November 2028.

2.10 From November 2022 all png format charts will be generated using the WAFc gridded data sets, and it will not be possible to provide charts that are replicas of those provided at present. It is important to note the following:

- The chart will cover the range FL100 to FL530
- There will be a single turbulence field (see paragraph 2.6)
- Cumulonimbus cloud will be based on probabilistic data.
- Cumulonimbus base, icing, jet depth, and tropopause height information will not be shown as this will cause the charts to be very cluttered and unreadable.
- The four medium-level png charts will be retired.
- Changes will be required for Amendment 79 to Annex 3 (described in METP-WG/MOG/7 SN/25) and Amendment 80 to Annex 3 (described in METP-WG/MOG/7 SN/26).

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<sup>1</sup> Planned for the 2019 edition of the GANP

## TROPICAL CYCLONE, SANDSTORM AND DUSTSTORM DEPICTION

2.11 There are several SIGWX elements which will be difficult to automate;

2.11.1 Sandstorm and duststorm information have never been included on a WAFS SIGWX forecast since 2005, so from November 2022 will not be included in any SIGWX forecast.

2.11.2 Tropical Cyclone Advisories only contain information for T+6, T+12, T+18 and T+24, which means that it is not possible to position them in SIGWX Object data sets and charts at T+9, T+15, T+21 and all time-steps beyond T+24. METP-WG/MOG/7 SN24 discusses the options available to deal with this problem.

## DOCUMENTATION CHANGES

2.12 Some minor adjustments to Annex 3 are required for Amendment 79, and these are proposed in METP-WG/MOG/7 SN/25

2.13 Larger changes are required for Amendment 80 to Annex 3 (including the expected transfer of technical specifications for SIGWX information to the new PANS-MET). These are proposed in METP-WG/MOG7 SN/26.

## 3. CONCLUSION

3.1 In order for the WAFCs to deliver the next generation of SIGWX information that the aviation industry has long requested the WAFCs to provide will require some compromises to be made in the production of the SIGWX forecasts. It is not possible to simply replicate what is produced now for lots of additional time-steps.

3.2 A summary of all proposals presented in METP-WG/MOG SN 22 to 26 are presented below to assist the group in making the necessary decisions and recommendations that are required to facilitate multiple time-step SIGWX forecast production.

Paper:	Proposal	METP-WG/MOG7 Decision
SN22	<p><b>Agreed Action 7/xx – Next Generation SIGWX forecast data</b></p> <p>That the METP-WG/MOG prepares a working paper for METP/4 on the planned improvements to the provision of WAFS information, and that this paper includes the WAFC's plans to enable the production of SIGWX forecasts in IWXXM format for 3 hourly time-steps (between T+6 and T+48) from November 2022. The following items are to be included in the data set and are as follows:</p> <p>a) Jet stream position, speed and flight level of the jet core;</p>	

	<ul style="list-style-type: none"> <li>b) Cumulonimbus extent and top (in the range FL100-FL530)</li> <li>c) Turbulence areas due to include, but not distinguish between, CAT and MTW (in the range FL100-FL530)</li> <li>d) Icing areas associated with cloud (in the range FL100-FL300)</li> <li>e) Information on the position of tropical cyclones, volcanic eruptions and radioactive release, in accordance with the relevant advisories</li> </ul>	
<b>SN22</b>	<p><b>Agreed Action – BUFR Format SIGWX data</b></p> <p>That the METP-WG/MOG include in their working paper to METP/4 on the planned improvements to the provision of WAFS information, that the production of SIGWX forecasts in BUFR format will cease in November 2022.</p>	
<b>SN23</b>	<p><b>Agreed Action – Retirement of the medium-level SIGWX png charts</b></p> <p>That the METP-WG/MOG include in their working paper to METP/4 on the planned improvements to the provision of WAFS information, to recommend the retirement of the medium level SIGWX charts in November 2022.</p>	
<b>SN 23</b>	<p><b>Agreed Action – Changes to the high-level SIGWX png chart provision</b></p> <p>That the METP-WG/MOG include in their working paper to METP/4 on the planned improvements to the provision of WAFS information, to recommend that the adjustments proposed in Appendix C (of SN23) are implemented in November 2022.</p>	
<b>SN23</b>	<p><b>Agreed Action 7/xx – Provision of SIGWX png charts for multi time-step SIGWX forecasts</b></p> <p>That the METP-WG/MOG include in their working paper to METP/4 on the planned improvements to the provision of WAFS information, to recommend that three new SIGWX charts are provided to accompany each time-step of next-generation SIGWX data from November 2022. These charts will include the parameters described in Appendix D (of SN23).</p>	

SN24	<p><b>Agreed Action 7/xx – Tropical Cyclone depiction in SIGWX forecast</b></p> <p>That the METP-WG/MOG include in their working paper to METP/4 on the planned improvements to the provision of WAFS information, that tropical cyclone positions are not provided in SIGWX forecasts from November 2022. Instead a legend will list the names of current tropical cyclones, as extracted from the current tropical cyclone advisories.</p>	
SN25	<p><b>Agreed Action 7/xx — Amendment 79 to Annex 3</b></p> <p>That the proposed updates to Annex 3 for Amendment 79, as provided in Appendix A (to SN/25) relating to the provision of WAFS SIGWX information be presented at METP/4 for endorsement.</p>	
SN26	<p><b>Action 7/xx — Amendment 80 to Annex 3</b></p> <p>That a detailed summary of the proposed changes to WAFS information planned for implementation in November 2022 be presented at METP/4 for further endorsement .</p>	

4. **ACTION BY THE METP-WG/MOG**

- 4.1 The METP-WG/MOG is invited to:
- a) note the information contained in this paper
  - b) note the actions presented in 3.2, which are addressed in separate study notes presented at this meeting.