



International Civil Aviation Organization

SIXTH MEETING OF THE ASIA/PACIFIC METEOROLOGICAL SERVICES WORKING GROUP (MET/S WG/6)

Bangkok, Thailand, 9 – 11 March 2016

Agenda Item 4: Planning and implementation of meteorological services

SURVEY ON OPERATIONAL USE OF SERVICES AND PRODUCTS FROM SERVICE PROVIDERS OF WORLD AREA FORECAST SYSTEM (WAFS) IN ASIA/PACIFIC REGION AND WAFS TRAINING NEEDS OF ASIA/PACIFIC STATES

(Presented by Chairman, MET/S WG)

SUMMARY

This paper presents the results of a survey in the Asia/Pacific Region conducted from mid-December 2015 to mid-January 2016 on the operational use of services and products from service providers of the World Area Forecast System (WAFS) in Asia/Pacific Region and the WAFS training needs of Asia/Pacific States.

1. INTRODUCTION

1.1 The Asia/Pacific Meteorological Services Working Group (MET/S WG), a successor of World Area Forecast System Task Force (WAFS TF) of the Meteorological Sub-group (MET/S WG) of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), conducted a survey from mid-December 2015 to mid-January 2016. This was the sixth annual survey to solicit information on:

- (a) the operational use of services and products from service providers of the World Area Forecast System (WAFS) in the Asia/Pacific Region; and
- (b) the training needs of Contracting States/Territories in the Asia/Pacific Region on WAFS.

2. THE QUESTIONNAIRE

2.1 The questionnaire for the survey (Appendix A) covers the following areas:

- (a) Access to WAFS services;
- (b) Utilization of WAFS gridded global forecasts of upper-air wind and temperature;
- (c) Utilization of global forecasts of SIGWX phenomena;

- (d) Utilization of gridded global forecast of icing, turbulence and CB; and
- (e) Training needs.

3. DISCUSSION

3.1 The questionnaire was sent to 29 Contracting States/Territories in the Asia/Pacific Region by email on 15 December 2015. A total of 19 (66%) returns were received: Australia; Bangladesh; Cambodia; China; Hong Kong, China; Macao, China; French Polynesia; India; Japan; Republic of Korea; Malaysia; Republic of Maldives; Mongolia; Nepal; New Caledonia; New Zealand; Pakistan; Thailand; and The United States. There is a small number of response for the Pacific States. For comparison, in the survey of 2014, 25 Contracting States/Territories were invited and there were 19 returns. The numbers of returns are the same for the two surveys.

3.2 Key results include:

- (a) Of the 19 responding States/Territories, 10 use UK WAFS as the primary or only source while 8 use US WAFS as the primary or only source (para. 3.4);
- (b) 14 States/Territories who gain access to UK WAFS products use Secure SADIS FTP Service, 2 of them also use SADIS 2G. (para. 3.6);
- (c) 18 States/Territories (95%) indicated that they have utilized gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators while 1 State/Territory (5%) said they haven't (para 3.9);
- (d) 18 out of 19 responding States/Territories utilized BUFR code form to provide global forecasts of SIGWX phenomena in support of flight planning documentation for operators while 1 State/Territory said they haven't. (para.3.11);
- (e) 9 States/Territories utilized PNG formatted SIGWX charts from WAFCs as a product, 6 States/Territories utilized PNG formatted SIGWX charts from WAFCs as a backup to locally generated SIGWX charts, and 3 States/Territories did not use PNG formatted SIGWX charts from WAFCs. (para. 3.13);

3.3 A summary of results are given in the following paragraphs. More detailed analysis can be found in Appendix B.

3.4 Among the 19 responding States/Territories, 18 have accessed to WAFS products. 10 of them use UK WAFS as the primary source or only source of WAFS products, while 8 use US WAFS as the primary source or only source of WAFS products.

3.5 The State/Territory who has no access to WAFS products planned to do so in 2016 via Secured SADIS FTP Service.

3.6 Of the 14 States/Territories having access to UK WAFS products (whether as primary source or not), all of them said they use Secure SADIS FTP Service. Among these 14 States/Territories, 2 of them also use SADIS 2G.

3.7 There is only one State/Territory indicated that they were not aware that the SADIS 2G service will be discontinued after July 2016.

3.8 12 States/Territories said they have an account of Secured SADIS FTP while 3 States/Territories do not. The latter 3 States/Territories do not plan to have the account because all of them have access to WIFS.

3.9 18 States/Territories (95%) indicated that they have utilized gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators while 1 State/Territory (5%) said they haven't.

3.10 The State/Territory who has not utilized gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators did not have such a plan for the following reasons : (a) Not yet able to decode gridded global forecasts of upper-air wind and temperature in GRIB2 code form; (b) Not yet using gridded global forecasts of upper-air wind and temperature in GRIB2 code form operational but currently evaluating the data; and (c) Limited computing facilities and processing software to process gridded global forecasts of upper-air wind and temperature in GRIB2 code form to generate products for flight documentation.

3.11 18 out of 19 responding States/Territories utilized BUFR code form to provide global forecasts of SIGWX phenomena in support of flight planning documentation for operators while 1 State/Territory said they haven't. The latter State/Territory didn't have a plan to do so for the following reasons: (a) Not yet able to decode global forecasts of SIGWX phenomena in BUFR code form; (b) Not yet using global forecasts of SIGWX phenomena in BUFR code form operational but currently evaluating the data; and (c) Limited computing facilities and processing software to process global forecasts of SIGWX phenomena in BUFR code form to generate products for flight documentation.

3.12 17 States/Territories generated high-level SIGWX charts from global forecasts of SIGWX phenomena in BUFR code form while 15 States/Territories generated medium-level SIGWX charts.

3.13 9 States/Territories utilized PNG formatted SIGWX charts from WAFCs as a product. 6 States/Territories utilized PNG formatted SIGWX charts from WAFCs as a backup to locally generated SIGWX charts, and 3 States/Territories did not use PNG formatted SIGWX charts from WAFCs.

3.14 In respect of processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning, 19 States/Territories responded to the question and their status is as follows: (a) 2 States/Territories not using any these files; (b) 7 States/Territories providing graphical products from gridded global forecasts of icing, turbulence and CB in GRIB2 code to support flight planning; (c) Operator/vendor within 3 States/Territories accessing gridded global forecasts of icing, turbulence and CB in GRIB2 code form through their flight planning systems; and (d) 4 States/Territories having other status (see para 18 in Appendix B).

3.15 Out of 9 States/Territories not yet processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning, 6 of them planned to do so: 1 would do so in 2016 or 2017; 1 in 2017, 3 beyond 2017 and 1 has not confirmed the time. All of them would process all three parameters, namely, icing, turbulence and CB.

3.16 Out of 19 States/Territories, 13 (68%) said they were processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to assist in forecast operation, while the remaining 6 (32%) did not. Out of the latter 6 States/Territories, 5 planned to do so (2 in 2017, 2 beyond 2017 and 1 has not confirmed the time).

3.17 The most-need topic for training remains ‘Interpretation of WAFS products’ , same as the last survey, followed by ‘WAFS processing software’ and ‘Decoding WAFS data’.

4. ACTION REQUIRED BY THE MEETING

4.1 The meeting is invited to note the results of the survey and discussion in this paper.

Appendix A The Questionnaire

**Questionnaire on
Utilization of Services and Products from Service Providers of
World Area Forecast System (WAFS) in Asia / Pacific Region and
WAFS Training Needs of Asia / Pacific States
(For the period 2015 to 2016)**

INTRODUCTORY NOTE

This questionnaire is developed by the Meteorological Services Working Group (MET/S WG) of the Meteorology Sub-group (MET SG) of the Asia / Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG). It is distributed to Contracting States / Territories in the Asia / Pacific Region to solicit information on:

- (a) Utilization of services and products from the service providers of the World Area Forecast System (WAFS) in the Asia / Pacific Region; and
- (b) training needs of Contracting States / Territories in the Asia / Pacific Region on WAFS.

The results will be presented to the MET SG and will be shared with the Meteorological operations group (MOG) as necessary.

The questionnaire is divided into 7 sections covering the following subjects:

Section 1	General
Section 2	Access to WAFS services
Section 3	Utilization of WAFS gridded global forecasts of upper-air wind and temperature
Section 4	Utilization of global forecasts of SIGWX phenomena
Section 5	Utilization of gridded global forecasts of icing, turbulence and CB
Section 6	Training needs
Section 7	Additional information

All questions should be answered if applicable. It is particularly important that you provide your answers as detail as possible. You can provide such details and any other comments in Section 7.

Please return the completed questionnaire by email to pwchan@hko.gov.hk on or before 15 January 2016. Your valuable inputs are very important to help promoting the use of WAFS services and utilization of WAFS products in the Asia / Pacific Region.

Abbreviation

AFS	Aeronautical Fixed Services
APANPIRG	Asia Pacific Air Navigation Planning and Implementation Regional Group
CB	Cumulonimbus
MET SG	Meteorology Sub-Group
FTP	File Transfer Protocol
GRIB	GRIdded Binary
GRIB2	GRIB Edition 2
SADIS	'Satellite Distribution System for information relating to air navigation' until 31 July 2016; 'Secure Aviation Data Information Service' from 1 August 2016
WAFS	World Area Forecast System
WAFS TF	WAFS Task Force
WIFS	WAFS Internet File Service
WAFC	World Area Forecast Center (that being supported by London for UK and Washington DC for the United States)

SECTION 1 – GENERAL

1. Name of State/Territory:
2. Name of Your Organization¹:
3. Details of Focal Point for **SADIS**, if applicable:
 - (a) Name: (title) Click and select ...
(given name)
(SURNAME)
 - (b) Title/Post:
 - (c) Tel. No.: ()-
 - (d) Fax.No.: ()-
 - (e) Email:
4. Details of Focal Point for **WIFS**, if applicable:
 - (a) Name: (title) Click and select ...
(given name)
(SURNAME)
 - (b) Title/Post:
 - (c) Tel. No.: ()-
 - (d) Fax.No.: ()-
 - (e) Email:

Note: If you are receiving from both SADIS and WIFS, please fill in details of focal point for both SADIS and WIFS.

¹ The word "Organization" is used in the questionnaire to mean the entity in your State / Territory, who responds to this questionnaire. If there are more than one entity in your State / Territory that receive WAFS products, please consolidate the inputs from these entities into one single reply for your State / Territory.

SECTION 2 – ACCESS TO WAFS SERVICES

5. Does your State/Territory currently have access to WAFS products from either the London or Washington World Area Forecast Center or both?

(a) Yes (*go to Q. **Error! Reference source not found.***) (b) No (*go to Q.6*)

[Answer:](#) Click and select ...

6. Does your State/Territory have any plan to access WAFS products from either WIFS or SADIS or both?

(a) Yes (b) No

[Answer:](#) Click and select ...

If **'yes'**, then when:

- (i) 2016
- (ii) 2017
- (iii) beyond 2017

[Answer:](#) Click and select ...

and via which channel(s) (*can select more than one item. Click on checkbox to select. Same for the remaining questions*):

- Secure SADIS FTP Service
- WAFS Internet File Service (WIFS)
- Others (please specify below):

If **'no'**, then

- Whether your State/Territory has filed a difference;
and why:
 - Have no technical expertise on implementation
 - High implementation cost
 - High operating cost
 - Have no expertise in using WAFS products
 - Current AFS provides information to meet operational requirements
 - Other reason(s) (please specify below):

7. Which is the source of WAFS products/information in your State/Territory?

- (a) Both US and UK WAFS, with US WAFS as primary source
- (b) Both US and UK WAFS, with UK WAFS as primary source
- (c) Only UK WAFS
- (d) Only US WAFS
- (e) Others, e.g. gridded data and SIGWX charts from US or UK WAFS, and OPMET from OPMET databanks

[Answer:](#) Click and select ...

8. If your State/Territory is having access to UK WAFS products (either as primary or backup source), what is/are the channel(s) through which your State/Territory gains access to UK WAFS products?

- Secure SADIS FTP Service
- Others (please specify below):

9. Are you aware that the SADIS 2G service will be discontinued after July 2016?

- (a) Yes
- (b) No

[Answer: Click and select ...](#)

10. Does your State/Territory have an account of Secured SADIS FTP?

- (a) Yes
- (b) No

[Answer: Click and select ...](#)

11. If your State/Territory has not yet gained access to UK WAFS products via Secure SADIS FTP Service, does your State/Territory have any plan to do so?

- (a) Yes
- (b) No

[Answer: Click and select ...](#)

If **'yes'**, then when to access Secure SADIS FTP Service:

- (i) 2016
- (ii) 2017
- (iii) beyond 2017

[Answer: Click and select ...](#)

If **'no'**, then why:

- Already have access to WIFS
- Already receiving UK WAFS products via other channel(s) (please specify below):

- Have no technical expertise to gain access to the service
- High implementation cost
- High operating cost
- Other reason(s) (please specify below):

SECTION 3 – UTILIZATION OF WAFS GRIDDED GLOBAL FORECASTS OF UPPER-AIR WIND AND TEMPERATURE

12. Does your State/Territory utilize gridded global forecasts of upper-air wind and temperature in GRIB2 code form in support of providing flight planning documentation for operators?

- (a) Yes (b) No

[Answer:](#) Click and select ...

13. If your answer to Q.12 is '**no**', does your State/Territory have any plan to make use of gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators?

- (a) Yes (b) No

[Answer:](#) Click and select ...

If '**yes**', then when:

- (i) 2016
- (ii) 2017
- (iii) beyond 2017

[Answer:](#) Click and select ...

If '**no**', then why:

- Not yet able to decode gridded global forecasts of upper-air wind and temperature in GRIB2 code form
- Not yet using gridded global forecasts of upper-air wind and temperature in GRIB2 code form operational but currently evaluating the data
- Limited computing facilities and processing software to process gridded global forecasts of upper-air wind and temperature in GRIB2 code form to generate products for flight documentation
- Other reason(s) (please specify below):

SECTION 4 – UTILIZATION OF GLOBAL FORECASTS OF SIGWX PHENOMENA

14. Does your State/Territory utilize BUFR code form to provide global forecasts of SIGWX phenomena in support of flight planning documentation for operators?

- (a) Yes (b) No

Answer: Click and select ...

15. If your answer to Q.14 is 'no', does your State/Territory have any plan to make use of global forecasts of SIGWX phenomena in BUFR code form to prepare flight planning documentation for operators?

- (a) Yes (b) No

Answer: Click and select ...

If 'yes', then when:

- (i) 2016
- (ii) 2017
- (iii) beyond 2017

Answer: Click and select ...

If 'no', then why:

- Not yet able to decode global forecasts of SIGWX phenomena in BUFR code form
- Not yet using global forecasts of SIGWX phenomena in BUFR code form operational but currently evaluating the data
- Limited computing facilities and processing software to process global forecasts of SIGWX phenomena in BUFR code form to generate products for flight documentation
- Other reason(s) (please specify below):

16. Which of the following products does your State/Territory generate from global forecasts of SIGWX phenomena in BUFR code form?

- High-level SIGWX charts
- Medium-level SIGWX charts
- Other(s) (please provide details below):

17. Apart from global forecasts of SIGWX phenomena in BUFR code form, does your State/Territory utilize PNG formatted SIGWX charts from WAFCS?

- (a) Yes, as a product
- (b) Yes, as a backup to locally generated SIGWX charts
- (c) No

Answer: Click and select ...

20. Apart from supporting airline's flight planning, is your State/Territory processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to assist in forecast operation?

(a) Yes (b) No

[Answer:](#) Click and select ...

If **'yes'**, then for what purposes (e.g. SIGMET, local forecasts, etc)?

21. If your answer to Q.20 is **'no'**, does your State/Territory have any plan to make use of icing, turbulence and/or CB parameters from the gridded global forecasts in GRIB2 code form to assist in forecast operation?

(a) Yes (b) No

[Answer:](#) Click and select ...

If **'yes'**, then when:

- (i) 2016
- (ii) 2017
- (iii) beyond 2017

[Answer:](#) Click and select ...

If **'no'**, then why:

- Not yet able to decode icing, turbulence and/or CB parameters from the gridded global forecasts in GRIB2 code form
- Not able to interpret the icing, turbulence and/or CB parameters in the gridded global forecasts in GRIB2 code form
- No operational need to utilize the icing, turbulence and/or CB parameters in the gridded global forecasts in GRIB2 code form
- Other reason(s) (please specify below):

SECTION 6 – TRAINING NEEDS

Note: The WAFCS have produced a training module regarding the use of WAFS gridded CB, icing and turbulence forecasts. This guidance is provided via the internet with an English language voiceover. In addition, ICAO has provided PDF versions of the training module in the following languages: Arabic, Chinese, English, French, Russian and Spanish. The training module and the related PDFs are supplemental to the existing guidance material 'Guidance on the Harmonized WAFS Grids for Cumulonimbus Cloud, Icing and Turbulence Forecasts - 11 September 2012'. All the materials can be found at :

<http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx>

22. Has your State/Territory gained access to training via the following resources since the last survey, i.e. January 2015?

- Seminar(s)/Workshop(s) organized by ICAO
- Seminar(s)/Workshop(s) organized by other organization(s) (please specify organization(s)):
- On-line training (please specify source(s)):
- Self-study of training materials on Internet (please specify source(s), if available):
- Others (please specify):

23. If your State/Territory has attended training as indicated in Q.22, please provide feedback on the training in the space below (e.g. has the training met your State's/Territory's need for the training, how effective was the training in meeting your State's/Territory's need, what further training your State/Territory hopes to attend)

(Please provide details below):

24. What is/are the area(s) of training on WAFS that your State/Territory consider most needed? Please rank the importance of **individual** training area below by inserting '1' to '5' in the respective text box in the last column ('1' means 'most needed', '3' means 'moderately needed', '5' means 'not needed.'). You can specify additional training area(s) as necessary.

Area(s) of training need	Priority ('1' most needed)
(a) Channels for reception of WAFS products (please provide details of topics of interest:)	<input type="text"/>
(b) WAFS processing software (please provide details of topics of interest:)	<input type="text"/>
(c) Decoding of WAFS data (please provide details of topics of interest:)	<input type="text"/>
(d) Generation of products for flight documentation (please provide details of topics of interest:)	<input type="text"/>
(e) Interpretation of WAFS products (please provide details of topics of interest:)	<input type="text"/>
(f) Other (please specify):	<input type="text"/>
(g) Other (please specify):	<input type="text"/>

Section 7 – ADDITIONAL INFORMATION

Please use this section to describe any further details in your answers in the previous sections and to provide any further comments that you may have. Please specify the section and question numbers when you supplement further details in your previous answers.

===== END OF QUESTIONNAIRE =====

Thank you very much for your valuable inputs !!!

Appendix B
**Results of Survey on Operational Use of Services and Products from Service Providers
of WAFS in Asia/Pacific Region and WAFS Training Needs of Asia/Pacific States
(mid-December 2015 – mid-January 2016)**

(Note: the paragraph numbers below refer to the question numbers in the Questionnaire)

Access to WAFS services

5. *Does your State/Territory currently have access to WAFS products from either the London or Washington World Area Forecast Center or both?*

18 States/Territories (95%) indicated that they have access to WAFS products while 1 State/Territory (5%) said they haven't. See Figure 1.

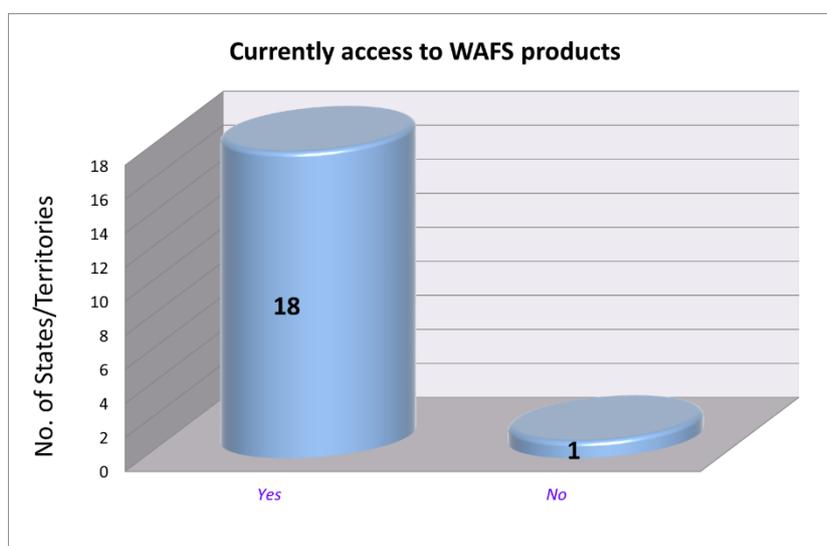


Figure 1

6. *Does your State/Territory have any plan to access WAFS products from either WIFS or SADIS or both?*

The State/Territory who have no access to WAFS products indicated that they have plan to do so in 2016 via Secured SADIS FTP Service.

7. *Which is the source of WAFS products/information in your State/Territory?*

11 States/Territories (61%) said they have access to both US and UK WAFS products. Among them, 5 States/Territories use US WAFS as the primary source while the other 6 States/Territories use UK WAFS as the primary source. There are 4 States/Territories having access to UK WAFS only whereas 3 other States/Territories having access to US WAFS only. See Figure 2

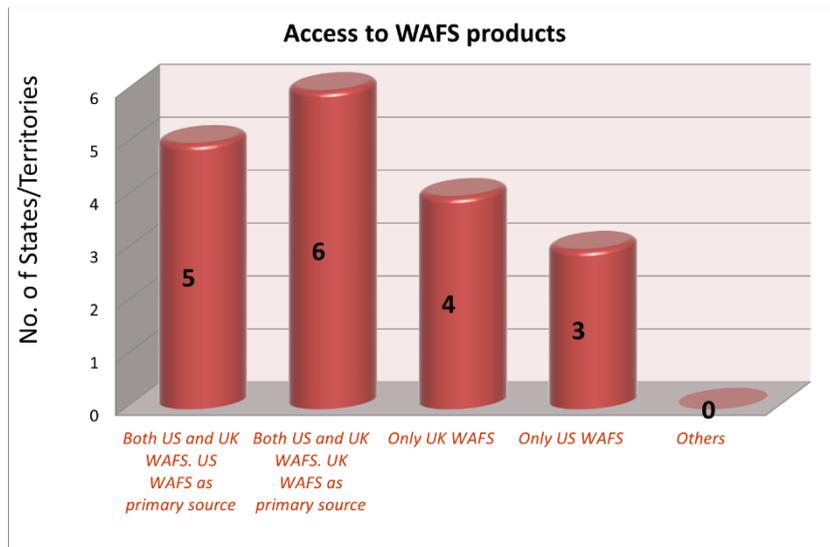


Figure 2

8. *If your State/Territory is having access to UK WAFS products (either as primary or backup source), what is/are the channel(s) through which your State/Territory gains access to UK WAFS products?*

There are 14 States/Territories responding to this question. All of them said they gain access to UK WAFS products via Secured SADIS FTP Service. Among them, 2 States/Territories also use SADIS 2G service (Figure 3).

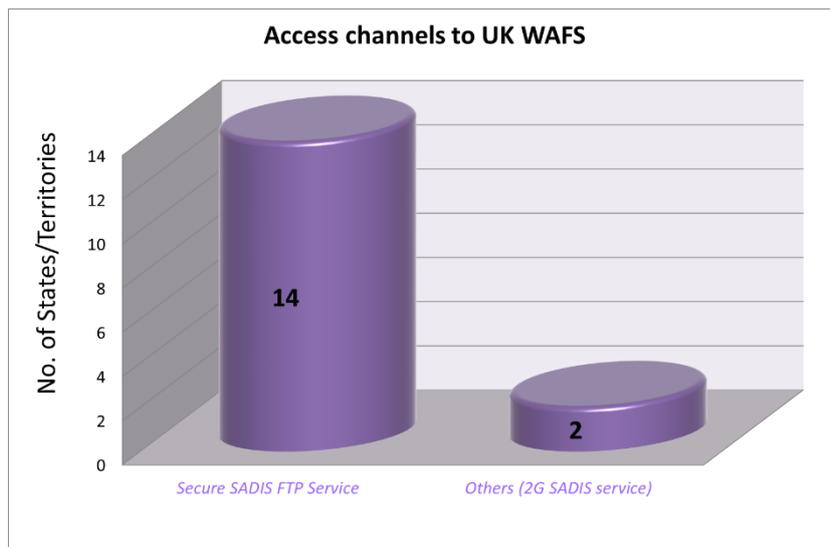


Figure 3

9. *Are you aware that the SADIS 2G service will be discontinued after July 2016?*

14 States/Territories (93%) said they are aware of that SADIS 2G service will be discontinued after July 2016 while one State/Territory (7%) was not aware this. See Figure 4.

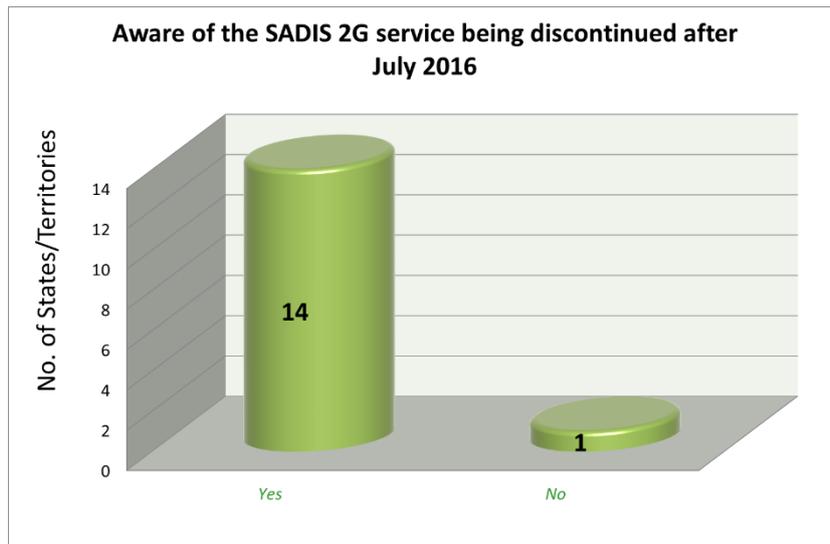


Figure 4

10. *Does your State/Territory have an account of Secured SADIS FTP?*

There are 15 States/Territories responding to this question. 12 States/Territories (80%) stated that they have an account of Secured SADIS FTP while 3 States/Territories (20%) said they haven't. See Figure 5.

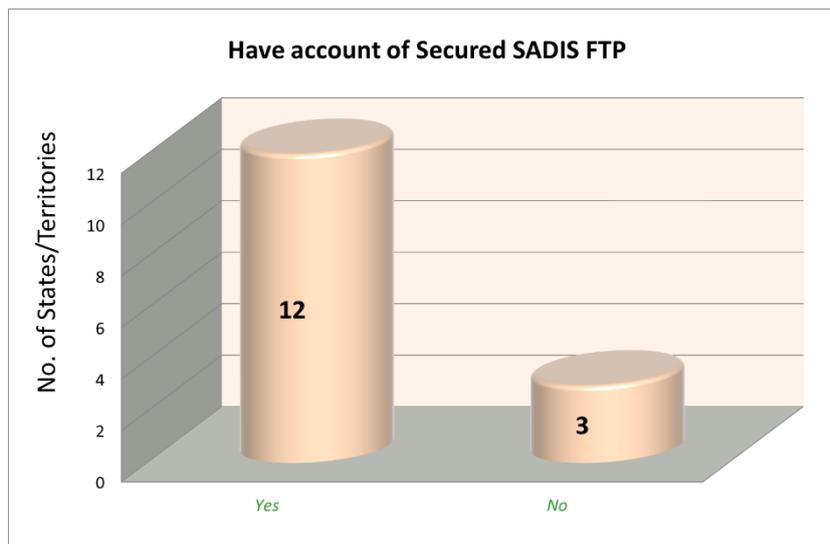


Figure 5

11. *If your State/Territory has not yet gained access to UK WAFS products via Secure SADIS FTP Service, does your State/Territory have any plan to do so?*

Out of the 7 responding States/Territories, 2 States/Territories indicated that they have plan to gain access to UK WAFS products via Secure SADIS FTP Service in 2016; 1 State/Territory planned to do so but did not confirm the time; while the remaining 4 States/Territories did not have such a plan for the following reasons:

- (a) 3 out of 4 stated that they already have access to WIFS; and

- (b) 1 out of 4 said they already receiving UK WAFS products via SADIS 2G Satellite.

Utilization of WAFS gridded global forecasts of upper-air wind and temperature

- 12. *Does your State/Territory utilize gridded global forecasts of upper-air wind and temperature in GRIB2 code form in support of providing flight planning documentation for operators?*

18 States/Territories (95%) indicated that they have utilized gridded global forecasts of upper-air wind and temperature in GRIB2 code form in support of providing flight planning documentation while 1 State/Territory (1%) said they didn't. See Figure 6.

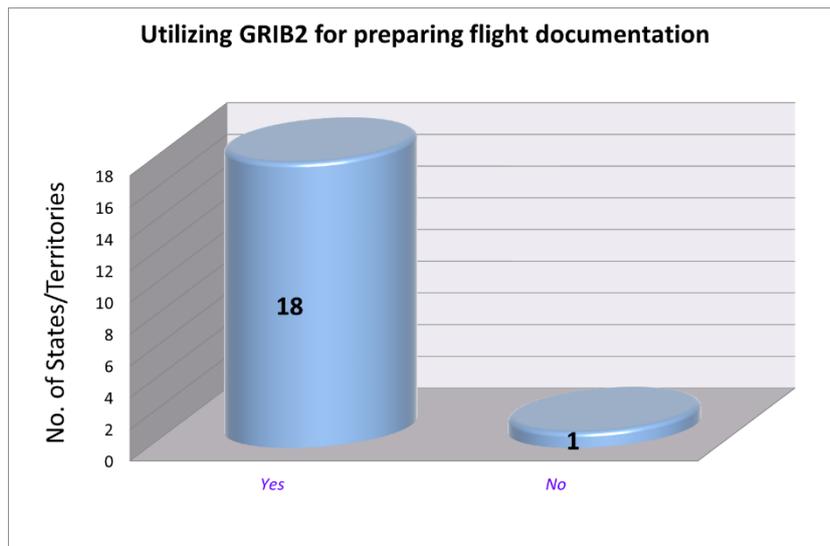


Figure 6

- 13. *If your answer to Q.12 is 'no', does your State/Territory have any plan to make use of gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators?*

1 State/Territory stated that there is no plan to make use of gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators for the following reasons:

- (a) Not yet able to decode gridded global forecasts of upper-air wind and temperature in GRIB2 code form; and
- (b) Not yet using gridded global forecasts of upper-air wind and temperature in GRIB2 code form operational but currently evaluating the data; and
- (c) Limited computing facilities and processing software to process gridded global forecasts of upper-air wind and temperature in GRIB2 code form to generate products for flight documentation.

Utilization of global forecasts of SIGWX phenomena

- 14. *Does your State/Territory utilize BUFR code form to provide global forecasts of SIGWX phenomena in support of flight planning documentation for operators?*

18 States/Territories (95%) indicated that they have utilized BUFR code form to provide global forecasts of SIGWX phenomena in support of flight planning documentation for operators while 1 State/Territory (5%) said they haven't. See Figure 7.

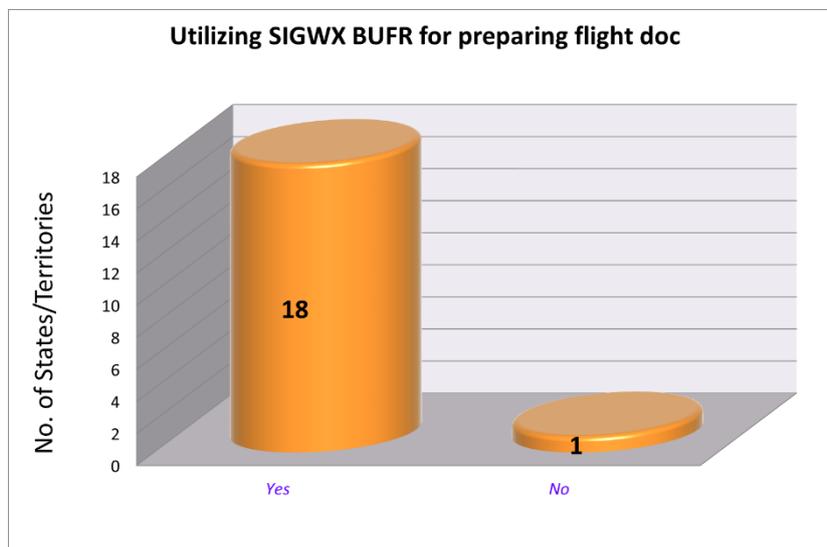


Figure 7

15. *If your answer to Q.14 is 'no', does your State/Territory have any plan to make use of global forecasts of SIGWX phenomena in BUFR code form to prepare flight planning documentation for operators?*

The State/Territory who hasn't utilized BUFR code form has no plan to make use of global forecasts of SIGWX phenomena in BUFR code form to prepare flight planning documentation for operators for the following reasons:

- (a) Not yet able to decode global forecasts of SIGWX phenomena in BUFR code form; and
- (b) Not yet using global forecasts of SIGWX phenomena in BUFR code form operational but currently evaluating the data; and
- (c) Limited computing facilities and processing software to process global forecasts of SIGWX phenomena in BUFR code form to generate products for flight documentation.

16. *Which of the following products does your State/Territory generate from global forecasts of SIGWX phenomena in BUFR code form?*

18 States/Territories responded to this question. 17 of them generated high-level SIGWX charts from global forecasts of SIGWX phenomena in BUFR code form while 15 of them generated medium-level SIGWX charts. 1 of these 18 States/Territories stated that they also generated other products.

17. *Apart from global forecasts of SIGWX phenomena in BUFR code form, does your State/Territory utilize PNG formatted SIGWX charts from WAFCs?*

18 States/Territories responded to this question. 15 (83%) of them utilized PNG formatted SIGWX charts from WAFCs. Among them, 9 States/Territories utilized PNG formatted

SIGWX charts as a product and 6 States/Territories utilized PNG formatted SIGWX charts as a backup to locally generated SIGWX charts. 1 State/Territory didn't indicate the usage. 3 (17%) States/Territories did not use PNG formatted SIGWX charts from WAFCs.

Utilization of gridded global forecasts of icing, turbulence and CB

18. *What is the status of your State/Territory in processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning?*

All 19 States/Territories responded to this question. Their status in processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form is as follows (Figure 8):

- (a) Not using these files: 2 (11%)
- (b) Providing gridded global forecasts of icing, turbulence and CB in GRIB2 code form to airline(s) who request support for ingestion into their flight planning system(s): 5 (26%)
- (c) Providing graphical products from gridded global forecasts of icing, turbulence and CB in GRIB2 code to support flight planning: 7 (37%). Details of the products:
 - i) Icing, turbulence and CB (3 States/Territories);
 - ii) "High-Level Sigwx (SWH) & Medium-Level Sigwx (SWM)" (1 State/Territory). (the other 3 States/Territories didn't indicate the details of products.)
- (d) Operator/vendor within the State/Territory accessing gridded global forecasts of icing, turbulence and CB in GRIB2 code form through their flight planning system(s): 3 (16%)
- (e) Other(s): 4 (21%)
 - i) "The quality of these forecasts are still being assessed but are yet to be made operationally available to airlines";
 - ii) "Graphical products of WAFS gridded forecasts of (1) maximum CAT, (2) mean in-cloud turbulence, (3) maximum icing, (4) CB horizontal extent and (5) height at CB top in chart form are being provided for reference by operators on trial basis";
 - iii) "Receiving the forecasts but not being used by any airlines";
 - iv) "The main system is not yet upgraded visualization software".

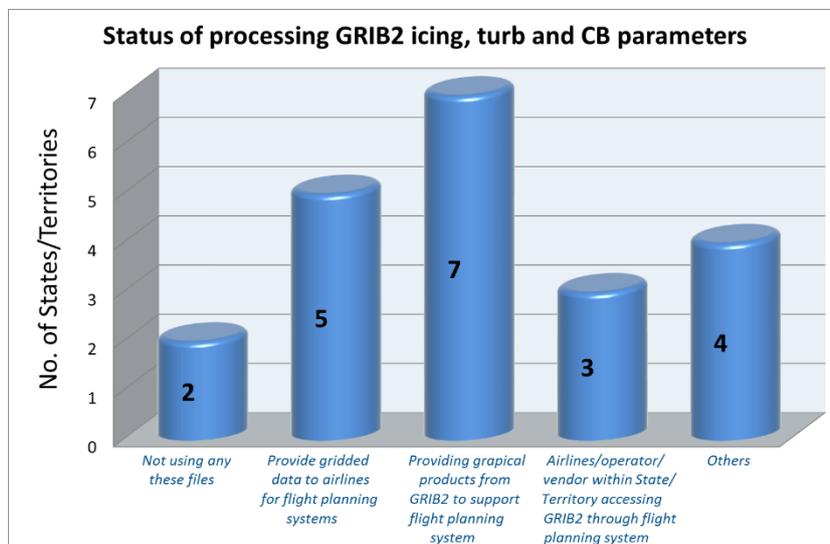


Figure 8

- 19.** *If your State/Territory is not yet processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning, does your State/Territory have any plan to do so?*

9 States/Territories responded to this question. Out of them, 6 States/Territories indicated that they have plan to process icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning: 1 in 2016 or 2017; 1 in 2017; 3 beyond 2017 and 1 has not confirmed the time. All these 6 States/Territories said they would process all three parameters, namely, icing, turbulence and CB.

Some States/Territories provided the following remarks on their plan:

- (a) "Even though Hong Kong China is receiving icing, turbulence and CB gridded global forecasts and providing graphical products for reference, no operators has indicated any interest so far in using these gridded products for flight planning. When such a need arises, Hong Kong China would provide assistance to the operators based on further guidance from WAFCS and our local experience";
- (b) "As noted for Q18, the forecasts are being received and could be processed, however, no airline in New Zealand has requested the forecasts for use in their flight planning systems".

- 20.** *Apart from supporting airline's flight planning, is your State/Territory processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to assist in forecast operation?*

Out of 19 States/Territories responded to this question, 13 (68%) said they were processing icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to assist in forecast operation, while the remaining 6 (32%) did not (Figure 9). For those indicated that they were processing the gridded forecasts, details of proposes as follows:

- (a) SIGMET (5);
- (b) Local forecasts (3);
- (c) "Domestic SIGWX (SWM and SWH) charts" (1);
- (d) "Area Forecast" (1);
- (e) "TREND" (1);
- (f) "Public weather forecast" (1);
- (g) "Warning" (1).

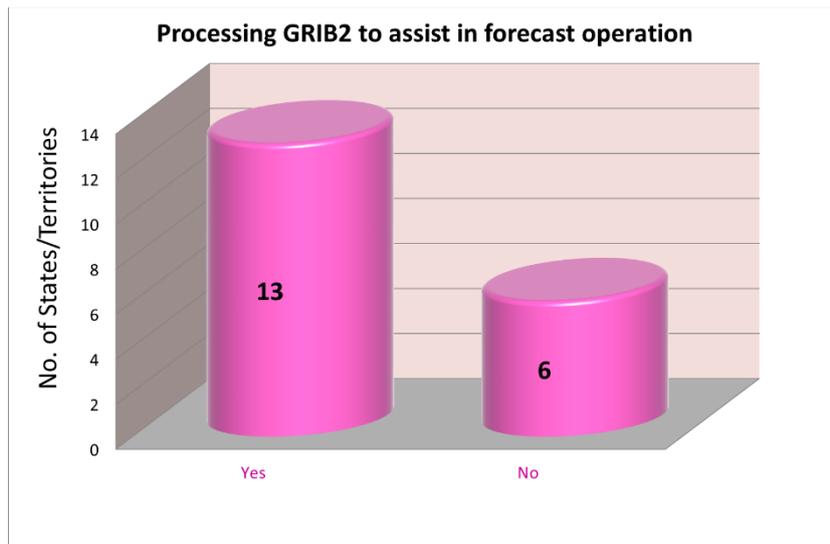


Figure 9

21. *If your answer to Q.20 is 'no', does your State/Territory have any plan to make use of icing, turbulence and/or CB parameters from the gridded global forecasts in GRIB2 code form to assist in forecast operation?*

6 States/Territories responded to this question. 5 States/Territories planned to make use of icing, turbulence and/or CB parameters from the gridded global forecasts in GRIB2 code form to assist in forecast operation: 2 in 2017, 2 beyond 2017 and 1 has not confirmed the time. The State which has not confirmed the time has the following remarks: "NWP products for those element developed by JMA is used for the assistance for the forecast operation."

1 State/Territory did not have any plan yet for the following reasons:

- (a) Not yet able to decode icing, turbulence and/or CB parameters from the gridded global forecasts in GRIB2 code form;
- (b) Not able to interpret the icing, turbulence and/or CB parameters in the gridded global forecasts in GRIB2 code form.

Training needs

22. *Has your State/Territory gained access to training via the following resources since the last survey, i.e. January 2015?*

11 States/Territories responded to this question and indicated that they have gained access to training in WAFS via the following sources:

- (a) Seminar(s)/Workshop(s) organized by ICAO (1 response);
- (b) Seminar(s)/Workshop(s) organized by other organization(s) (1 response, organized by CMA);
- (c) On-line training (2 responses):
 - UK Met. Office College Online – Guidance on WAFS Gridded Forecasts of Icing, Turbulence and Cumulonimbus;
 - <http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx>.
- (d) Self-study of training materials on Internet (6 responses):

- MetEd;
 - GST expert on the job training in Cambodia;
 - <http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx>;
 - SADIS User Guide;
 - Secure SADIS FTP User Guide;
 - Guidance on the Harmonized WAFS Grids for CB Cloud, Icing and Turbulence Forecasts;
 - Representing WAFS Significant Weather Data in BUFR;
 - WAFS London WAFS Upper Air Forecast GRIB2 Dataset Guide;
 - WAFS GRIB2 Specification;
 - WIFS User Guide;
 - PDF version of training module regarding gridded forecasts for CB, icing and turbulence.
- (e) Others (4 responses):
- Departmental training;
 - The US as WAFS Provider State developed the training material.
 - Meteo France

23. *If your State/Territory has attended training as indicated in Q.22, please provide feedback on the training in the space below.*

6 States/Territories responded to this question and gave their feedback as follows:

- (a) “State Secretariat of Civil Aviation need training for technicians and user for forecasters for system and product of WAFS”;
- (b) “For training materials on the use of WAFS gridded forecasts for CB, icing and turbulence, more information on regional variation in performance of the gridded forecasts and more guidance on establishment of threshold for specific region are required”;
- (c) “The self study training fulfills only preliminary requirements. However, further detailed training is needed”;
- (d) “The on-line training met our need and was effective”;
- (e) “ICAO Asia/Pacific Meteorology/Air Traffic Management (MET/ATM) Seminar, (Tokyo, Japan, 29 June – 1 July 2015.)”;
- (f) It was very useful as refresher course and we need more such opportunities in 2016.

24. *What is/are the area(s) of training on WAFS that your State/Territory consider most needed?*

The table below summarizes the priority of areas of training on WAFS as indicated by the States/Territories:

Areas	No. of States/Territories quoting this area as priority ‘1’	No. of States/Territories quoting this area as priority ‘2’	No. of States/Territories quoting this area as priority ‘3’	No. of States/Territories quoting this area as priority ‘4’	No. of States/Territories quoting this area as priority ‘5’ or lower
Channels for reception of WAFS products (see Note(1))	1	1	3	2	4

WAFS processing software (see Note(2))	3	4	3	3	1
Decoding of WAFS data (see Note(3))	3	2	5	1	2
Generation of products for flight documentation (see Note(4))	2	5	4	3	1
Interpretation of WAFS products (see Note(5))	9	4	1	0	1
Others (see Note(6))			1		

Notes:

- (1) Topics of interest for ‘Channels for reception of WAFS products’:
 - “more product from WAFC”.
- (2) Topics of interest for ‘WAFS processing software’:
 - “METlab Version2 and MET briefing”.
- (3) Topics of interest for ‘Decoding of WAFS data’:
 - “METlab V2 GST”.
- (4) Topics of interest for ‘Generation of products for flight documentation’:
 - “METlab version2 GST company”.
- (5) Topics of interest for ‘Interpretation of WAFS products’:
 - “for forecasters”;
 - “With regard to the gridded forecasts of CB, icing and turbulence:
 - (1) establishment of threshold for specific application given the performance of gridded products;
 - (2) visualization of the products;
 - (3) use of gridded products in flight planning system)”;
- (6) Other topics of interest:
 - “Weather Satellite Data”;
 - “Other sources from WAFC for forecasters”.

Additional Information

Please use this section to describe any further details in your answers in the previous sections and to provide any further comments that you may have.

2 States/Territories responded to this question. Their comments are as follows:

- (a) “At present, we are getting WAFS products from www.aviationweather.gov and www.aamets.org. Procurement process to purchase SADIS software is going on and hope to complete in next three months.”
- (b) “New Zealand does not have a requirement for any external WAFS training as fully qualified meteorological instructors provide this in-house in MetService”.