



International Civil Aviation Organization

**NINETEENTH MEETING OF THE METEOROLOGY SUB-GROUP
(MET SG/19) OF APANPIRG**

Bangkok, Thailand, 3 - 6 August 2015

Agenda Item 6: Research, development and implementation issues in the MET field

6.1 WAFS (including WAFS TF Report)

**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, WAFS Task Force)

SUMMARY

This paper presents the results of a survey in the Asia/Pacific Region conducted from mid-October 2014 to early-January 2015 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 World Area Forecast System Task Force (WAFS TF) of the Meteorological Sub-group (MET SG) of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) conducted a survey from mid-October 2014 to early-January 2015. This was the fifth 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 25 Contracting States/Territories in the Asia/Pacific Region by email on 12 October 2014. A total of 19 (76%) returns were received: Australia; Bangladesh, China; Hong Kong, China; Macao, China; DPR Korea; Fiji Island; India; Republic of Korea; Malaysia; Republic of Maldives; Mongolia, Nepal, New Caledonia; New Zealand; Pakistan; Singapore; Thailand; and Vietnam.

3.2 Key results include:

- (a) Of the 19 responding States/Territories, 12 use UK WAFS as the primary or only source while 7 use US WAFS as the primary or only source (para. 3.4);
- (b) 14 out of 15 responding States/Territories who gain access to UK WAFS products use Secure SADIS FTP Service. There is one State/Territory using only SADIS 2G without using the Secure SADIS FTP Service (para. 3.5);
- (c) 15 States/Territories (79%) 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 4 States/Territories (21%) said they haven't (para 3.8);
- (d) 17 out of 19 responding States/Territories said utilized gridded global forecasts of SIGWX phenomena in BUFR code form in preparing flight planning documentation for operators while 2 States/Territories (11%) said they haven't (para.3.10);
- (e) 10 States/Territories utilized PNG formatted SIGWX charts from WAFCs as a product, 2 States/Territories as a backup to locally generated SIGWX charts, and 7 States/Territories did not use PNG formatted SIGWX charts from WAFCs (para. 3.12);
- (f) the level of using icing, turbulence and/or CB gridded global forecasts (in GRIB2 code form or in graphical form generated from GRIB2 data) for airline's flight planning was on the low side (details in 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, 12 use UK WAFS as the primary source or only source of WAFS products, while 7 use US WAFS as the primary source or only source of WAFS products.

3.5 Of the 15 States/Territories having access to UK WAFS products (whether as primary source or not), 10 States/Territories use SADIS 2G while 14 States/Territories use Secure SADIS FTP Service. There is one State/Territory using only SADIS 2G without using the Secure SADIS FTP Service.

3.6 No State/Territory not utilizing SADIS 2G before planned to receive UK WAFS products via SADIS 2G satellite beyond year 2015.

3.7 5 States/Territories currently not having access to UK WAFS products via Secured SADIS FTP Service indicated no intention to make use of this Service for the following reasons: (a) already receiving US WAFS products; (b) already receiving UK WAFS products via other channel(s); (c) have no technical expertise to gain access to the service; (d) high implementation cost and (e) high operating cost.

3.8 15 States/Territories (79%) 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 4 States/Territories (21%) said they haven't.

3.9 Out of the 4 States/Territories who have not utilized gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators, 3 have plan to do so in 2015 while the remaining 1 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; and (b) "Our system have not yet upgraded the visualization software so we cannot provide the upper-air wind and temperature from GRIB2 by our system".

3.10 17 out of 19 responding States/Territories said utilized gridded global forecasts of SIGWX phenomena in BUFR code form in preparing flight planning documentation for operators while 2 States/Territories (11%) said they haven't. The latter 2 States/Territories have planned to do so in 2015.

3.11 17 States/Territories generated high-level SIGWX charts from global forecasts of SIGWX phenomena in BUFR code form while 14 States/Territories also generated medium-level SIGWX charts.

3.12 Out of 19 States/Territories, 10 (53%) of them utilized PNG formatted SIGWX charts from WAFCs as a product, 2 (11%) of them utilized PNG formatted SIGWX charts from WAFCs as a backup to locally generated SIGWX charts, and 7 States/Territories did not use PNG formatted SIGWX charts from WAFCs.

3.13 In respect of retrieving icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning, 17 States/Territories responded to the question and their status is as follows: (a) 3 States/Territories not receiving or retrieving any parameter yet; (b) 1 State/Territory 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; (c) 4 States/Territories providing graphical products from gridded global forecasts of icing, turbulence and CB in GRIB2 code to support flight planning systems; (d) Airline(s) within 2 States/Territories accessing gridded global forecasts of icing, turbulence and CB in GRIB2 code form through their flight planning systems; and (e) 7 States/Territories having other status (see para 17 in Appendix B). On the whole, the level of use of icing, turbulence and/or CB gridded global forecasts (in GRIB2 code form or in graphical form generated from GRIB2 data) for airline's flight planning was on the low side.

3.14 Out of 10 States/Territories not yet retrieving icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline's flight planning, 5 would do so in 2015; 1 in 2016 and 1 beyond 2016. All of them would retrieve all three parameters, namely, icing, turbulence and CB.

3.15 Out of 19 States/Territories, 11 (58%) said they were retrieving icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to assist in forecast operation, while the remaining 8 (42%) did not. Out of the latter 8 States/Territories, 6 planned to do so (4 in 2015, 1 in 2016 and 1 beyond 2016).

3.16 The most-need topic for training remains 'Interpretation of WAFS products' followed by 'Generation of products for flight documentation', same as the last survey.

4. Action 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
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**

INTRODUCTORY NOTE

This questionnaire is developed by the WAFS Task Force (WAFS TF) 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 reported to the World Area Forecast System Operations Group (WAFSOPSG) 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 cmcheng@hko.gov.hk on or before 15 January 2015. 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

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
WAFS	World Area Forecast System
WAFS TF	WAFS Task Force
WIFS	WAFS Internet File Service

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?

- (a) Yes (*go to Q.7*) (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) 2015
- (ii) 2016
- (iii) beyond 2016

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*):

- SADIS 2G satellite communications
- Secure SADIS FTP Service
- WAFS Internet File Service (WIFS)
- Others (please specify below):

If **'no'**, then 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 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

[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?

- SADIS 2G satellite communications
- Secure SADIS FTP Service
- Others (please specify below):

9. If your State/Territory is under the footprint of SADIS 2G satellite and your State/Territory has NO access to UK WAFS products via [SADIS 2G satellite](#)², does your State/Territory have any plan to receive UK WAFS products via SADIS 2G satellite?

- (a) Yes
- (b) No

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

If **'yes'**, then when to start reception:

- (i) 2015
- (ii) 2016
- (iii) beyond 2016

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

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

- Planned cessation of SADIS 2G satellite broadcast in 2019
- Already receiving US WAFS products
- Already receiving UK WAFS products via Secure SADIS FTP Service
- Already receiving UK WAFS products via other channel(s) (please specify below):

- Have no technical expertise in implementation
- High implementation cost

² SADIS 2G satellite broadcast is expected to be extended beyond 2015 but NOT beyond November 2019. States/Territories are required to migrate to operational use of the Secure SADIS FTP service in the intervening period.

- High operating cost
- Other reason(s) (please specify below):

10. 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) 2015
- (ii) 2016
- (iii) beyond 2016

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

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

- Already receiving US WAFS products
- Already receiving UK WAFS products via SADIS 2G satellite³
- 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):

³ See footnote 2 on previous page

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

11. Has your State/Territory utilized 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 ...

12. If your answer to Q.11 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) 2015
- (ii) 2016
- (iii) beyond 2016

[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

13. Has your State/Territory utilized global forecasts of SIGWX phenomena in BUFR code form in preparing flight planning documentation for operators?

- (a) Yes (b) No

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

14. If your answer to Q.13 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) 2015
- (ii) 2016
- (iii) beyond 2016

[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):

15. 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):

16. 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 ...

19. Apart from supporting airline's flight planning, is your State/Territory retrieving 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 ...

20. If your answer to Q.19 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) 2015
- (ii) 2016
- (iii) beyond 2016

[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>

21. Has your State/Territory gained access to training via the following resources since the last survey, i.e. March 2014?

- 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):

22. If your State/Territory has attended training as indicated in Q.21, 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):

23. What is/are the area(s) of training on WAFS that your State/Territory consider most needed? Please specify the priority of your selected item(s) by inserting '1', '2', '3', etc. to the respective text box in the last column (*Can select more than one area. Please prioritize using '1', '2', '3', etc. **instead of inserting multiple '1's**, etc.*).

Area(s) of training need	Priority (<i>'1' most needed</i>)
(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"/>
(h) Other (please specify):	<input type="text"/>
(i) Other (please specify):	<input type="text"/>
(j) 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-October 2014 – early-January 2015)**

(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?*

All States/Territories (19; 100%) said that they have access to WAFS products.

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

No State/Territory responded to this question since they all have access to WAFS products already.

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

8 States/Territories (42%) said they have access to both US and UK WAFS products. Among them, 3 States/Territories use US WAFS as the primary source while the other 5 States/Territories use UK WAFS as the primary source. There are 7 States/Territories having access to UK WAFS only whereas 4 other States/Territories having access to US WAFS only. See Figure 1.

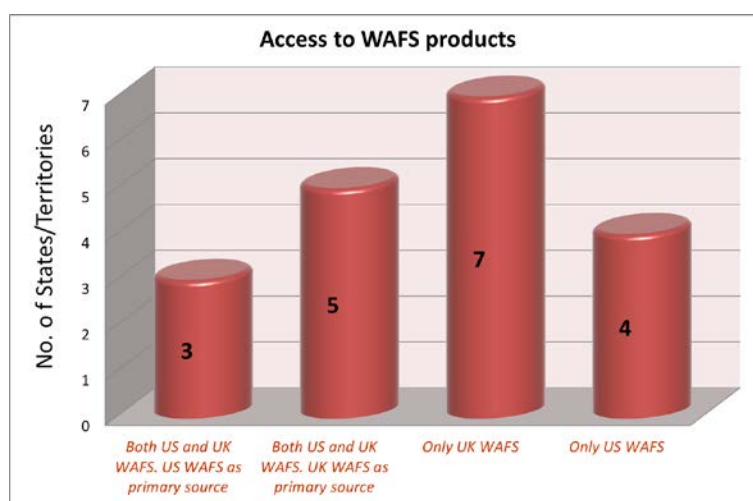


Figure 1

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 15 States/Territories responding to this question. 10 States/Territories (67%) said they gain access to UK WAFS products via SADIS 2G and 14 States/Territories (93%) used Secure FTP Service (Figure 2). There is one State/Territory using SADIS 2G only without using the Secured SADIS FTP Service.

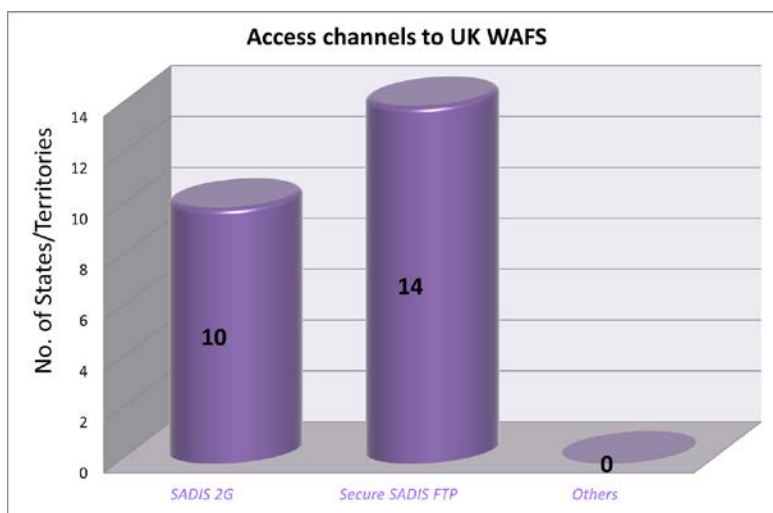


Figure 2

9. *If your State/Territory is under the footprint of SADIS 2G satellite and your State/Territory has NO access to UK WAFS products via SADIS 2G satellite, does your State/Territory have any plan to receive UK WAFS products via SADIS 2G satellite?*

6 States/Territories responded to this question. All of them indicated no plan to use SADIS 2G for the following reasons:

- (a) already receiving US WAFS products (3);
- (b) already receiving UK WAFS products via Secure SADIS FTP Service (2);
- (c) already receiving UK WAFS products via other channel(s) (1; without quoting the channel)
- (d) have no technical expertise in implementation (1);
- (e) high implementation cost (1);
- (f) high operating cost (1).

No State/Territory expressed that they have no plan to use SADIS 2G owing to its planned cessation in 2019.

10. *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?*

5 States/Territories responded to this question. All of them said that they have no plan to use Secure SADIS FTP Service for the following reasons:

- (a) already receiving US WAFS products (4);
- (b) already receiving UK WAFS products via other channel(s) (1; without quoting the channel);
- (c) have no technical expertise to gain access to the service (1);
- (d) high implementation cost (1);
- (e) high operating cost (1).

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

11. *Has your State/Territory utilized gridded global forecasts of upper-air wind and temperature in GRIB2 code form in preparing flight planning documentation for operators?*

15 States/Territories (79%) 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 4 States/Territories (21%) said they haven't. See Figure 3.



Figure 3

12. *If your answer to Q.11 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?*

Out of the 4 responding States/Territories, 3 States/Territories indicated that they have 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 in 2015 while the remaining 1 State/Territory 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; and
- (b) "Our system have not yet upgraded the visualization software so we cannot provide the upper-air wind and temperature from GRIB2 by our system."

Utilization of global forecasts of SIGWX phenomena

13. *Has your State/Territory utilized global forecasts of SIGWX phenomena in BUFR code form in preparing flight planning documentation for operators?*

17 States/Territories (89%) indicated that they have utilized gridded global forecasts of SIGWX phenomena in BUFR code form in preparing flight planning documentation for operators while 2 States/Territories (11%) said they haven't. See Figure 4.

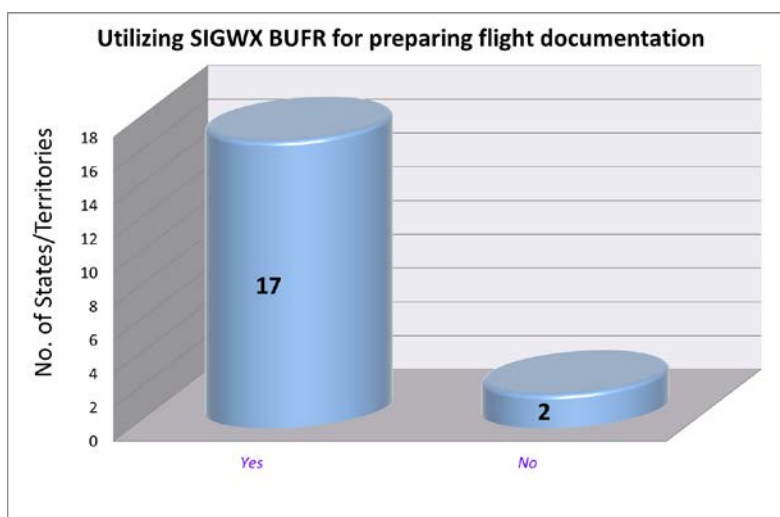


Figure 4

14. *If your answer to Q.13 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?*

2 responding States/Territories indicated that they have plan to make use of global forecasts of SIGWX phenomena in BUFR code form to prepare flight planning documentation for operators in 2015.

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

17 States/Territories responded to this question. All of them generated high-level SIGWX charts from global forecasts of SIGWX phenomena in BUFR code form while 14 of them also generated medium-level SIGWX charts.

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

All 19 States/Territories responded to this question. 10 (53%) of them utilized PNG formatted SIGWX charts from WAFCs as a product. 2 (11%) of them utilized PNG formatted SIGWX charts from WAFCs as a backup to locally generated SIGWX charts. 7 States/Territories did not use PNG formatted SIGWX charts from WAFCs.

Utilization of gridded global forecasts of icing, turbulence and CB

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

17 States/Territories responded to this question. Their status in retrieving icing, turbulence and/or CB gridded global forecasts in GRIB2 code form is as follows (Figure 5):

- (a) Not receiving or retrieving any parameter yet: 3 (18%)
- (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) : 1 (6%)
- (c) Providing graphical products from gridded global forecasts of icing, turbulence and CB

in GRIB2 code to support flight planning system(s): 4 (24%)

(d) Airline(s) within the State/Territory accessing gridded global forecasts of icing, turbulence and CB in GRIB2 code form through their flight planning system(s): 2 (12%)

(e) Other(s) : 7 (41%). Details of status as follows:

- i) “An airline has samples of these datasets and is reviewing if/how these datasets can be used operationally”;
- ii) “Receiving and retrieving icing, turbulence or CB parameters; but not using them to assist in forecast operations yet; research on how to use these data effectively is still under way”;
- iii) “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”;
- iv) “Receiving icing, turbulence and CB parameters. And plan to do using them to assist in forecast operations in 2015”;
- v) “Receiving but not wanted by airlines”;
- vi) “Receiving and retrieving the gridded forecasts for icing, turbulence and CB in GRIB2 format, and not using them operationally”;
- vii) “Our system can receive the GRIB2 data from SADIS 2G satellite and Secure SADIS FTP but software cannot decode GRIB2 parameters”.

On the whole, the level of use of icing, turbulence and/or CB gridded global forecasts (in GRIB2 code form or in graphical form generated from GRIB2 data) for airline’s flight planning was on the low side (7; 41%).

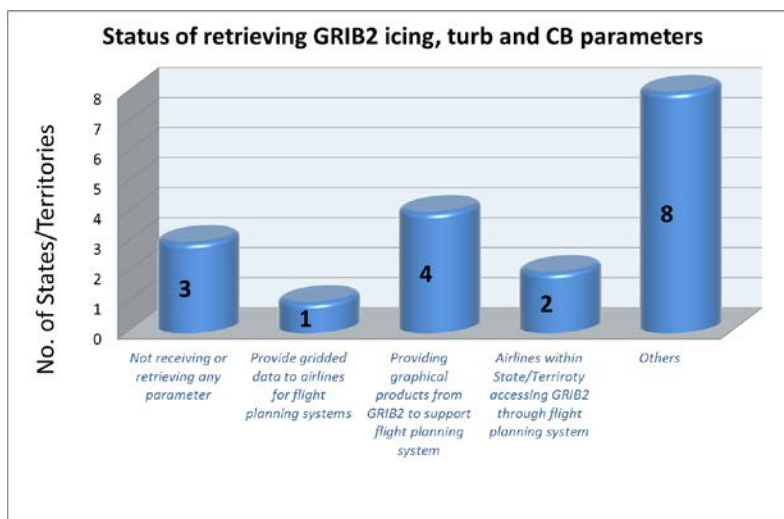


Figure 5

18. *If your State/Territory is not yet retrieving 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??*

10 States/Territories responded to this question. Out of them, 7 States/Territories indicated that they have plan to retrieve icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to support airline’s flight planning, 5 in 2015; 1 in 2016 and 1 beyond 2016. Among these 7 States/Territories, 6 responded to the question on which parameters they would retrieve. All 6 States/Territories indicated all three parameters, namely, icing, turbulence and CB, would be retrieved.

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

- (a) “Installation of IBL software application in 2015”;
- (b) “Despite 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 the use of these gridded products in the flight planning system. When such a need arises, Hong Kong China would provide assistance to the operators based on further guidance from WAFCs and our local experience”;
- (c) “We have a plan for updating of SADIS processing software”;
- (d) “We plan to request the budget for upgrading our system and software after 2016 due to the budget for our request in the fiscal year 2015 and 2016 not be approved”.

19. *Apart from supporting airline’s flight planning, is your State/Territory retrieving 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, 11 (58%) said they were retrieving icing, turbulence and/or CB gridded global forecasts in GRIB2 code form to assist in forecast operation, while the remaining 8 (42%) did not (Figure 6).

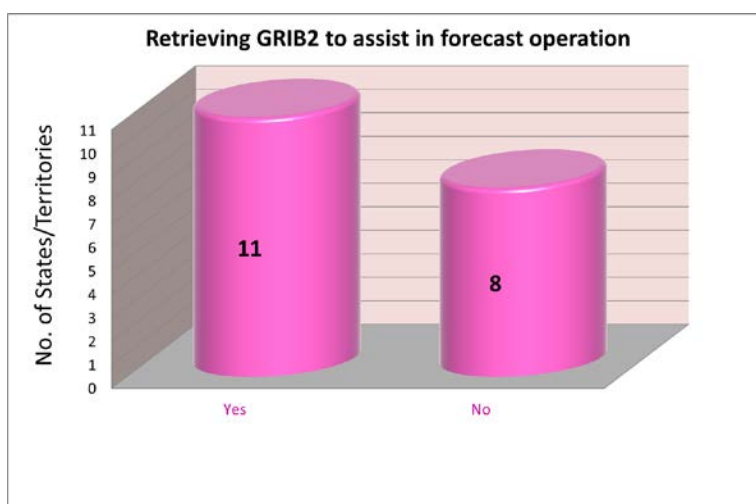


Figure 6

20. *If your answer to Q.19 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?*

8 States/Territories responded to this question. 6 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, 4 in 2015, 1 in 2016 and 1 beyond 2016. 2 Territories 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 (1);
- (b) No operational need to utilize the icing, turbulence and/or CB parameters in the gridded global forecasts in GRIB2 code form (1);
- (c) Other reason: “Research on how to interpret and use these data effectively is still under way” (1).

Training needs

21. *Have your State/Territory gained access to training via the following resource since the last survey, i.e. March 2014?*

15 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) (2 responses; from WMO and UKMO)
- (c) on-line training (3 responses):
 - Training on WAFS Grid point forecasts for CB Icing and Turbulence – English;
 - UK Met. Office College online training module regarding gridded forecasts of CB, icing and turbulence;
- (d) self-study of training materials on Internet (9 responses):
 - MetED;
 - (i) SADIS User Guide; (ii) Secure SADIS FTP User Guide; (iii) Guidance on the Harmonized WAFS Grids for Cumulonimbus Cloud, Icing and Turbulence Forecasts; (iv) Representing WAFS Significant Weather (SIGWX) Data in BUFR; (v) WAFS London WAFS Upper Air Forecast GRIB2 Dataset Guide; (vi) WAFS GRIB2 Specification; (vii) WIFS User Guide; (viii) PDF version of training module regarding gridded forecasts for CB, icing and turbulence;
 - WAFSOPSG website;
 - <http://www.icao.int/safety/meteorology/WAFSOPSG/pages/GuidanceMaterial.aspx>;
 - <http://www.wmo-sat.info/vlab/2014/06/introduction-to-the-harmonized-world-area-forecast-system>
 - <http://www.wmo.int/aemp/>
 - http://www.nws.noaa.gov/iao/iao_intlSatCommSys.php
 - <http://www.metoffice.gov.uk/aviation>
 - <http://www.wmo-sat.info/vlab/2014/06/introduction-to-the-harmonized-world-area-forecast-system>
 - <http://www.wmo.int/aemp/>
 - http://www.nws.noaa.gov/iao/iao_intlSatCommSys.php
 - <http://www.metoffice.gov.uk/aviation>
 - <http://www.wmo-sat.info/vlab/2014/06/introduction-to-the-harmonized-world-area-forecast-system>
 - <http://www.wmo.int/aemp/>
 - http://www.nws.noaa.gov/iao/iao_intlSatCommSys.php
 - <http://www.metoffice.gov.uk/aviation>
- (e) Others: (3 responses):
 - Departmental training;
 - MeteoFrance;
 - Seminar/Workshop organized by WMO.

22. *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
Interpretation of WAFS products (see Note (1))	10	5	1	0	1
Generation of products for flight documentation	5	7	3	2	0
WAFS processing software	3	3	4	1	0
Decoding of WAFS data	3	2	5	2	1
Channels for reception of WAFS products	1	3	1	2	3

Note :

- (1) Remarks from States/Territories on 'Interpretation of WAFS products':
- With regard to the gridded forecasts of CB, icing and turbulence:
 - (1) establishment of the threshold for specific application given the performance of these gridded products;
 - (2) visualization of the products; and
 - (3) use of these gridded products in the flight planning system