



International Civil Aviation Organization

**THIRD MEETING OF THE METEOROLOGICAL REQUIREMENTS
TASK FORCE (MET/R TF/3)**

28 – 29 November 2013, Bangkok, Thailand

Agenda Item 3a: Current and future requirements for MET information in support of ATM

AUSTRALIAN AVIATION WEATHER SERVICES FOR AIR TRAFFIC MANAGEMENT

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SUMMARY

This paper presents information of current aviation weather services provided to Airservices Australia by the Australian Bureau of Meteorology.

1. Introduction

1.1 The Bureau of Meteorology (Bureau) as established by the Australian Government's *Meteorology Act 1955* and is both the Meteorological Authority and the primary provider of aviation weather services to Australian aviation. The service is funded by the aviation industry on an incremental cost-recovery basis and is recovered from this industry by Airservices via the Meteorological Service Charge.

1.2 The Aeronautical Services Handbook (ASH) is the Bureau's Aviation Weather Services' operations manual. It specifies national policy and standards, and describes the practices and procedures followed by the Bureau in the provision of meteorological services to aviation. The products listed in the following sections are a summary of information contained in the ASH.

1.3 Airservices was established by and operates under the *Air Services Act 1995*. Airservices, among other things, provides air traffic services and an aeronautical information service (AIS) within Australia.

2. Aviation Observations and Reports

2.1 Aerodrome Weather Reports

2.1.1 Aerodrome weather reports (METAR/SPECI) are based on information originating from Automatic Weather Stations (AWS). At some aerodromes, observers add visual information prior to dissemination.

2.1.2 Fully automated METAR/SPECI messages will be indicated by the inclusion of the word AUTO after the date/time group, and will include any automated visibility, cloud and present weather data in the body of the message.

2.2 Observations for Take-off and Landing

2.2.1 These observations are normally provided by the tower controller and broadcast in Aerodrome Terminal Information Service (ATIS). Control towers usually receive information directly from the AWS, and other anemometers, at the aerodrome. As necessary, the meteorological office may assist the tower controller by providing observations of those elements that are not available in the control tower. Procedures for providing this information are determined by local agreement.

2.3 Aerodrome Weather Information Service (AWIS)

2.3.1 AWIS provides a facility to access real time meteorological observations from the automatic weather station. The observations can be accessed via phone or, at selected locations, via radio transmissions.

2.3.2 Basic AWS provide wind direction and speed, temperature, humidity, pressure setting and rainfall. Some AWS also provide automated weather, cloud and visibility elements.

2.3.3 The Weather and Terminal Information Reciter (WATIR) combines output from the AWS with additional terminal information from the airport operator.

2.4 Aircraft Weather Reports

2.4.1 AIREP

2.4.1.1 Aircraft weather reports (AIREP) augment meteorological observations available from other sources, particularly over data sparse areas. The letters ARP precede a routine AIREP, and ARS a special AIREP.

2.4.1.2 There is a requirement for a pilot to make an AIREP when requested or when certain conditions are encountered. In particular, special AIREP are made as soon as practicable after a pilot encounters any SIGMET condition that has not been forecast, or any other meteorological condition which is likely to affect the safety or markedly affect the efficiency of other aircraft operations.

2.4.2 Reporting by RAAF

2.4.2.1 Reporting by RAAF aircraft is authorised by the RAAF Flight Information Publication (FLIP). The selection of aircraft requested to report is made at the discretion of the Bureau officer briefing the aircrew, taking into account any requests for the information by officers responsible for preparing forecasts over the routes or areas concerned.

3. Aerodrome Forecasts and Briefings

3.1 Aerodrome Forecasts (TAF)

3.1.1 An aerodrome forecast (TAF) is a statement of meteorological conditions expected in the airspace within a radius of five nautical miles of the aerodrome reference point. Australian TAFs are based upon the ICAO standard but also include some additional fields, such as:

- a) INTER to represent significant intermittent variations in prevailing conditions with less than 30 minutes duration,
- b) Temperature for times HH, HH+3, HH=6 and HH+9,
- c) QNH for times HH, HH+3, HH=6 and HH+9.

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TAF YMAY 022230Z 0300/0312 35010KT CAVOK
FM030800 31018KT 9999 SHRA BKN025 OVC100
INTER 0308/0312 31020G40KT 3000 +TSRA BKN010 SCT040CB
RMK FM030600 MOD TURB BLW 5000FT
T 23 24 28 33 Q 1012 1013 1014 1009
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3.1.2 The temperature and QNH field are removed before international dissemination but the INTER remains.

3.2 Trend Forecasts (TTF)

3.2.1 A TTF is a statement of meteorological conditions expected in the airspace within a radius of 5 nautical miles of the aerodrome reference point. It comprises an aerodrome weather report and a concise statement of any expected significant changes of wind, visibility, weather and cloud and/or a concise statement of moderate or severe low level turbulence expected in the 3 hour period from the time of the report.

3.2.2 The TTF is not compliant with the ICAO Trend forecast. In Australia, the TTF offers operational benefits to pilots in that it can be used for flight (fuel) planning purposes for very short flights as well as a landing forecast.

3.3 Airport Weather Briefings

3.3.1 Airport Weather Briefings (AWB) are provided for some capital city aerodromes and are used by both operators and Air Traffic Services. They are an extension to the TAF service aimed at expanding on the information provided in the TAF.

3.4 Code Grey

3.4.1 The Code Grey advice is a special forecast service intended to supplement the routine 06 to 12 TAF. It is designed to reduce the operational impact, particularly on long-haul flights arriving the following morning, of later amendments to the 06 TAF. 3.4.4 A Code Grey can be amended at any time after issue.

3.4.2 The service gives flight planners some insight into alternative weather scenarios being considered by the forecaster, and as such it provides early advice of a possible later TAF amendment. It is issued when there is a small but realistic chance of fog, thunderstorms, or visibility or cloud (BKN or more) below Special Alternate Minima. The probabilities used will be 5, 10 or 20% only.

3.5 Antarctic Weather Briefing

3.5.1 The Antarctic Meteorological Section issues daily briefings which are written and tailored to the expected flying program. If a particular location is temporarily discontinued it is removed from the briefing page until it is reinstated.

4. Forecasts for Operations Below 20,000 Feet

4.1 Ditching Reports

4.1.1 A Ditching Report is essentially a “nowcast” of conditions at a location where an aircraft in difficulty will attempt a forced landing. This information will assist the pilot to make decisions about how to prepare for landing with minimum risk to safety.

4.2 Search and Rescue Forecasts

4.2.1 Upon request from the Rescue Coordination Centre (RCC), the relevant Meteorological Watch Offices (MWO) will provide a search and rescue (SAR) Forecast. The RCC request will be set out on a Request for a Search and Rescue Forecast form which will be emailed to the relevant generic regional alias which has been set up for this purpose.

4.3 Area Forecasts

4.3.1 Area Forecasts are designed primarily to meet the needs of pilots of general and regional aviation aircraft for operations below FL185 and therefore there is an emphasis on plain language. Forecasts should be concise, although not at the expense of adequately providing all relevant information.

4.3.2 The Area Forecast provides a forecast of weather conditions for the specified area. It is a document whereby pilots and Air Traffic Services staff determine how, when, where and if particular aircraft operations can occur within the ambit of the Air Navigation Act and its Regulations. As it is the basis for critical operational decisions, the Area Forecast must be as lucid and unambiguous as possible.

4.4 Local Area Forecasts

4.4.1 Local Area Forecasts may be prepared for specific purposes, e.g. for a RAAF training area. These forecasts are usually similar to Area Forecasts but may contain additional information and are provided in accordance with local agreements with civil or military aviation authorities.

4.5 Route forecasts

4.5.1 Route Forecasts contain forecast information of wind direction/speed and temperature along a specific route at specific levels.

4.5.2 An Antarctic Low-level Route Forecasts (ROFOR) package is produced on request for flights, both inter-station and deep-field, within Australian Antarctic Territory.

4.6 Flight Forecasts

4.6.1 Flight Forecasts for operations below 20 000 feet are not usually provided if valid Area Forecasts are available.

4.6.2 Flight forecasts contain information for the same elements that make up an Area Forecast, except they are defined along a specific route.

4.7 Area QNH

4.7.1 Aircraft cruising at or below 10 000 feet maintain altitude according to the indication of a pressure-operated altimeter, the sub-scale of which is set to Area QNH.

4.8 International General Aviation

4.8.1 Forecasts for international general aviation are prepared by the MWO responsible for the location in which the flight commences. Assistance may be sought from Melbourne Aviation Weather Centre, or other MWOs as appropriate.

5. Forecasts for Operations Above 20,000 Feet

5.1 Aviation Weather Centre functions

5.1.1 The Standards and Recommended Practices of ICAO Annex 3 are observed with respect to Australian practice for forecasts above 20,000 feet.

5.1.2 The AWC has the following functions:

- a) Receive upper air wind and temperature forecasts from a World Area Forecast Centre (WAFC) in London or Washington,
Note: No modification shall be made to WAFC forecasts. Significant errors or variations are to be notified to the WAFC for amendment action.
- b) Prepare forecast charts, and as required, route forecasts,
- c) Issue SIGMET for severe turbulence and severe icing above FL185, and
- d) Prepare significant weather prognoses for the area south of equator to latitude 50 degrees S bounded by longitudes 100 degrees E to 180 degrees E.

5.1.3 Specialised products such as Route Sector Winds and Temperatures (RSWT) derived from upper air wind and temperature forecasts and services to Extended Twin Engine Operations (ETOPS) to facilitate flight planning are provided as required.

5.1.4 The Darwin Volcanic Ash Advisory Centre (VAAC) maintains a watch for volcanic ash.

5.2 Route forecasts

5.2.1 Route Forecasts (ROFORs) contain forecast information of wind direction/speed and temperature at various levels for specified times along a specific route.

5.2.2 A high-level graphical ROFOR package is produced on request for the A319 Hobart/Wilkins flights.

5.3 Flight forecasts

5.3.1 Flight Forecasts for operations above 20 000 feet are not usually provided if valid SIGWX, Grid Point Winds and Temperatures, Route Sector Winds and Temperatures, and Wind and Temperature Charts are available.

5.4 Significant weather charts

5.4.1 Significant Weather (SIGWX) charts are produced in accordance with the Standards and Recommended Practices of ICAO Annex 3.

5.4.2 The Aviation Weather Centre (AWC) located within NMOC produces mid-level SIGWX charts for the area south of equator to latitude 50 degrees S bounded by longitudes 100 degrees E to 180 degrees E for operations between FL100 and FL250. It also automatically produces high-level SIGWX charts for the same region from WAFS BUFR data for operations between FL250 and FL630.

5.4.3 The forecast policy depicted in Mid-level Significant Weather Charts may be used as guidance in preparation of domestic Area Forecasts, however the Area Forecast shall reflect the latest opinion of forecast policy.

5.5 Wind and Temperature Charts

5.5.1 ICAO's World Area Forecast System (WAFS) produces global wind and temperature data in gridded binary (GRIB) format.

5.5.2 The Aviation Weather Centre (AWC) in NMOC automatically produces Wind and Temperature charts for ICAO regions E, F and K. The AWC also produces an Australian region chart from the GRIB data.

6. Meteorological Watch and Warning Services

6.1 Meteorological watch

6.1.1 Meteorological watch services involve the following functions:

- a) Continuous surveillance of observations and reports, and
- b) Review and amendment of forecasts and warnings.

6.2 SIGMET

6.2.1 SIGMET is a warning issued to provide urgent advice to aircraft in flight, or prior to departure, of actual or expected potentially hazardous weather developments or trends. SIGMET must be available to aircraft in ample time to ensure that any possible avoidance or precautionary action can be taken, and therefore forecasters endeavour to issue SIGMETs advising of forecast phenomena at least one hour prior to the validity commencement. It is intended that the information provided will serve all operations by civil and military aircraft.

6.3 AIRMET

6.3.1 AIRMET advices are issued to provide pilots with plain language warnings of certain meteorological phenomena that are not contained within the valid area forecast. AIRMET are complementary to the routine issue and amendment of low-level area forecasts and are issued by the office responsible for the low-level area forecast affected. The advice must be available to aircraft in ample time to ensure that any possible avoidance or precautionary action can be taken.

6.3.2 AIRMET information is passed on to pilots by Air Traffic Services and as such provides a good method by which the onset of phenomena that may affect the safety of low-level flights can be passed to aircraft operating in the affected area.

6.4 Aerodrome Warnings

6.4.1 Aerodrome Warnings are issued to provide operators, aerodrome services and others with concise information of meteorological conditions - regardless of the intensity of the phenomenon or the extent of any reduced visibility - which could adversely affect aircraft on the ground (including parked aircraft) and aerodrome facilities and services.

6.5 Thunderstorm Alert for Aviation Ground Staff (TAAGS)

6.5.1 TAAGS is a manually-produced service comprising a 15nm alert, a 5nm alert and a cancellation product. It is only issued for Alice Springs, by the Darwin RFC. The service will cease with the implementation of ATSAS at this airport.

6.6 Automated Thunderstorm Alert Service (ATSAS)

6.6.1 At a number of major Australian airports there has been an increased awareness of the risks associated with lightning strikes on ground crew and their equipment. In response to this the Bureau has developed an automated thunderstorm alerting service that is designed to streamline the communication of relevant information to the industry so as to allow industry or airline representatives to assess the risks in an independent nature. The system provides alerts of Thunderstorms within 30NM, 10NM and 5NM of the aerodrome.

6.7 Tropical Cyclone Advisories

6.7.1 Tropical Cyclone Advisories (TCA) provide information concerning the position of the cyclone centre, its direction and speed of movement, central pressure and maximum surface wind near the centre.

6.7.2 The TCA should provide updated advisory information to meteorological watch offices for each tropical cyclone as necessary, but at least every six hours.

6.8 Wind Shear Warnings

6.8.1 A Wind Shear Warning shall give concise information of observed, reported or expected wind shear, between runway level and (normally) 1600 feet above that level, which could adversely affect aircraft on the approach or take-off paths, on the runway during the landing or take-off phases and during circling approach. Where local topography has been shown to produce significant shear at heights in excess of 1600 feet above runway level, then 1600 feet should not be considered restrictive.

6.8.2 Wind Shear Warnings are provided for the major international airports (Adelaide, Brisbane, Cairns, Darwin, Melbourne, Perth, Sydney).

6.9 Marked Temperature Inversion Advice

6.9.1 At Defence Bases and other locations by local agreement advices are issued on 1st occurrence of a marked temperature inversion.

6.9.2 The criterion for a marked temperature inversion advice (MTIA) is a change of ten degrees in a thousand foot layer within 2000 feet of the surface. Advice is provided on the forecast or actual surface temperature and the likely duration of the marked inversion.

6.10 Volcanic Ash Advisories

6.10.1 The Darwin Volcanic Ash Advisory Centre (VAAC) is one of nine ICAO-designated VAACs set up within the framework of the International Airways Volcano Watch (IAVW). The Darwin VAAC area of responsibility includes Indonesia, Papua New Guinea and the southern Philippines. Advisories provide information on the location, extent and movement of ash cloud. Although primarily intended as guidance for MWO to formulate volcanic ash SIGMET for their own areas of responsibility, advisory messages have become a direct source of ash cloud warning information for many airlines. VAAC Tokyo and Wellington provide reciprocal backup arrangements with VAC Darwin.

7. Future Services

7.1 SIGMET Graphical Presentation

7.1.1 ICAO requires production of text-based SIGMETs, however there is no requirement for graphical SIGMET products. Based on requests from the Australian Aviation Industry the Bureau has developed SIGMETs over the Australian flight information region (FIR) in graphical form.

7.1.2 The Australian Bureau of Meteorology is currently trialing three different level graphic representations of all SIGMETs over the Australian FIR:

- a) High level – FL100-FL630;
- b) Low level – SFC-FL100; and,
- c) All levels – SFC-FL630.

7.2 Graphical AREA Forecast (ARFOR) Presentation

7.2.1 The Bureau currently generate text-based ARFORs for 29 areas across Australia often containing many subdivisions and lines of weather moving across defined areas in the forecast period. The Bureau is currently planning the implementation of an ICAO compliant graphical Low-level SIGWX or Graphical ARFOR (GAF).

7.3 Weather Information Exchange Models (WXXM)

7.3.1 Early planning is currently being undertaken in consideration for the implementation of WXXM.

7.3.2 Changes to forecasting systems and the associated impact on the Australian pilot briefing system are under review being mindful of desired timelines, new Air Traffic Control systems and pilot requirements.

7.4 Graphic Centric Services

7.4.1 Wherever possible, graphical representations of complex weather descriptions will be produced to more readily communicate actual and forecast weather conditions to end users.

7.4.2 A potential benefit of these graphic centric services is the combination or consolidation of existing services into a reduced number of products that better informs casual users and to a degree, automates the assimilation required for all users.

8. Action by the Meeting

The meeting is invited to note the information contained in this paper.
