

*International Civil Aviation Organization*

ICAO

**WORKING PAPER**

Asia and Pacific (APAC)

**Twentieth Meeting of the Meteorological Information Exchange Working Group (MET/IE WG/20)**

Online, 28 to 30 March 2022

**Agenda Item 4: Meteorological information exchange in digital form****INCLUSION OF TAF EXTENSIONS IN IWXXM TAF BULLETINS**

(Presented by Australia)

**SUMMARY**

This paper provides an update on the implementation of individual TAF IWXXM products in Australia that contain the Australia TAF extensions. It also invites discussion on any negative impacts of the inclusion of TAF extensions in international TAF bulletins.

**1. INTRODUCTION**

1.1 Australia has been sending ICAO compliant TAF Bulletins in IWXXM format since November 2020. The traditional alphanumeric code (TAC) form of Australian TAFs contain additional parameters as per Australia's registered differences. BoM has recently completed system work to include these additional parameters in the Australian IWXXM, via the IWXXM extension capability (AU TAF Extension).

1.2 For domestic use, Australia is planning to produce individual IWXXM TAF reports from source including these additional parameters. Having access to the Australian extension provides pilots with access to additional information and can reduce the regulatory fuel requirements for conducting the flight.

1.3 Given the operational benefits, Australia would like the Australian TAF bulletins to also include AU TAF Extension but we wanted to seek any concerns from the region before implementing this change.

**2. DISCUSSION**

2.1 The meeting will recall MET/IE WG/19 paper IP/02 which advised that Australia had commenced sending TAF bulletins in IWXXM format and that Australia was planning to implement a solution to generate individual TAF reports from source in IWXXM format.

2.2 The Australian Bureau of Meteorology (BoM) is in the final stages of implementing the solution to generate individual TAF reports from source in IWXXM format. Unlike the current bulletins, individual TAF reports will contain BoM TAF extensions, as allowed by ICAO (refer to the [Guidelines for the Implementation of OPMET Data Exchange Using IWXXM](#)).

2.3 The BoM TAF extensions include support for the inclusion of four temperature parameters (T+3, T+6, T+9, T+12), four QNH parameters (T+3, T+6, T+9, T+12), support for INTER and a TAF3 boolean parameters, which indicates whether the TAF is routinely generated at 3-hourly frequency or 6-hourly frequency. An example of Australian (Sydney) TAF including the AU IWXXM Extension is contained in Appendix A.

2.4 The inclusion of INTER & TAF3 boolean parameters provide significant operational flight planning benefits to Australian users. The inclusion of INTER (for intermittent variations from the prevailing conditions for periods of less than 30 minutes) saves operators 30minutes holding fuel over the use of TEMPO. The TAF3 boolean includes a higher quality TAF service, removing the regulatory requirement to carry an alternate aerodrome when PROB30 or PROB40 is included in the first 3 hours of the TAF.

2.5 Given significant benefit to users, BoM would now like to investigate including these TAF extensions in the international TAF bulletins. Prior to doing so, Australia wishes to seek any concerns from partners of the ROBEX scheme.

### **3. ACTION BY THE MEETING**

- 3.1 The meeting is invited to
- a) Note the information in this paper; and
  - b) Advise any concerns or risks if Australian TAF bulletins include the BoM TAF extensions.

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**APPENDIX A – Sample Sydney TAF including IWXXM extensions**

```
<?xml version="1.0" encoding="UTF-8"?>
<iwxxm:TAF xmlns:iwxxm=http://icao.int/iwxxm/3.0 xmlns:aixm=http://www.aixm.aero/schema/5.1.1
xmlns:gml=http://www.opengis.net/gml/3.2 xmlns:metce=http://def.wmo.int/metce/2013
xmlns:xlink=http://www.w3.org/1999/xlink xmlns:xsd=http://www.w3.org/2001/XMLSchema
xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance xsi:schemaLocation=http://icao.int/iwxxm/3.0
http://schemas.wmo.int/iwxxm/3.0/iwxxm.xsd http://www.aixm.aero/schema/5.1.1
http://www.aixm.aero/schema/5.1.1\_profiles/AIXM\_WX/5.1.1b/AIXM\_Features.xsd
http://www.opengis.net/gml/3.2 http://schemas.opengis.net/gml/3.2.1/gml.xsd
http://def.wmo.int/metce/2013 http://schemas.wmo.int/metce/1.2/metce.xsd
http://www.w3.org/1999/xlink http://www.w3.org/1999/xlink.xsd gml:id="uuid.e72651e2-5ed0-416b-bf13-
b8a182280b46" permissibleUsage="OPERATIONAL" reportStatus="NORMAL">
  <iwxxm:issueTime>
    <gml:TimeInstant gml:id="uuid.4a416ea8-42eb-4344-80ad-d884fe69697e">
      <gml:timePosition>2022-03-10T21:00:00Z</gml:timePosition>
    </gml:TimeInstant>
  </iwxxm:issueTime>
  <iwxxm:aerodrome>
    <aixm:AirportHeliport gml:id="uuid.5dc3464d-6c06-42da-90b3-ac78507ce10d">
      <aixm:timeSlice>
        <aixm:AirportHeliportTimeSlice gml:id="uuid.0dd834f7-053f-4c50-835e-ffbd66ca5647">
          <gml:validTime/>
          <aixm:interpretation>SNAPSHOT</aixm:interpretation>
          <aixm:designator>YSSY</aixm:designator>
          <aixm:name>SYDNEY AP</aixm:name>
          <aixm:locationIndicatorICAO>YSSY</aixm:locationIndicatorICAO>
          <aixm:ARP>
            <aixm:ElevatedPoint gml:id="uuid.920e81a6-6d7c-4067-9865-c75843b7b336" srsDimension="2"
axisLabels="Lat Long" uomLabels="deg deg" srsName=http://www.opengis.net/def/crs/EPSSG/0/4326>
              <gml:pos>-33.95 151.17</gml:pos>
              <aixm:elevation uom="M">6.0000</aixm:elevation>
              <aixm:verticalDatum>EGM_96</aixm:verticalDatum>
            </aixm:ElevatedPoint>
          </aixm:ARP>
        </aixm:AirportHeliportTimeSlice>
      </aixm:timeSlice>
    </aixm:AirportHeliport>
  </iwxxm:aerodrome>
  <iwxxm:validPeriod>
    <gml:TimePeriod gml:id="uuid.bda5fdea-0bd1-4940-83ca-f97343c072c5">
      <gml:beginPosition>2022-03-10T21:00:00Z</gml:beginPosition>
      <gml:endPosition>2022-03-11T12:00:00Z</gml:endPosition>
    </gml:TimePeriod>
  </iwxxm:validPeriod>
  <iwxxm:baseForecast>
    <iwxxm:MeteorologicalAerodromeForecast gml:id="uuid.2283c785-8cc6-4a23-861d-cd456bc427c5"
cloudAndVisibilityOK="false">
```

```
<iwxxm:phenomenonTime>
<gml:TimePeriod gml:id="uuid.f3c96dd8-5a42-48c4-9b8b-4ae8be994680">
  <gml:beginPosition>2022-03-10T21:00:00Z</gml:beginPosition>
  <gml:endPosition>2022-03-11T12:00:00Z</gml:endPosition>
</gml:TimePeriod>
</iwxxm:phenomenonTime>
<iwxxm:prevailingVisibility uom="m">10000</iwxxm:prevailingVisibility>
<iwxxm:prevailingVisibilityOperator>ABOVE</iwxxm:prevailingVisibilityOperator>
<iwxxm:surfaceWind>
  <iwxxm:AerodromeSurfaceWindForecast variableWindDirection="false">
    <iwxxm:meanWindDirection uom="deg">200</iwxxm:meanWindDirection>
    <iwxxm:meanWindSpeed uom="[kn_i]">8</iwxxm:meanWindSpeed>
  </iwxxm:AerodromeSurfaceWindForecast>
</iwxxm:surfaceWind>
<iwxxm:cloud>
  <iwxxm:AerodromeCloudForecast gml:id="uuid.789727c2-05c6-42f6-85b9-bcd5dba2972c">
    <iwxxm:layer>
      <iwxxm:CloudLayer>
        <iwxxm:amount xlink:href=http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/SCT/>
        <iwxxm:base uom="[ft_i]">2000</iwxxm:base>
      </iwxxm:CloudLayer>
    </iwxxm:layer>
  </iwxxm:AerodromeCloudForecast>
</iwxxm:cloud>
</iwxxm:MeteorologicalAerodromeForecast>
</iwxxm:baseForecast>
<iwxxm:changeForecast>
  <iwxxm:MeteorologicalAerodromeForecast gml:id="uuid.39ef5c5b-7644-412d-b993-0ffbd00cdf7f"
changeIndicator="FROM" cloudAndVisibilityOK="false">
    <iwxxm:phenomenonTime>
      <gml:TimePeriod gml:id="uuid.e92b5956-0c85-43fe-9036-991208d46294">
        <gml:beginPosition>2022-03-11T00:00:00Z</gml:beginPosition>
        <gml:endPosition>2022-03-11T12:00:00Z</gml:endPosition>
      </gml:TimePeriod>
    </iwxxm:phenomenonTime>
    <iwxxm:prevailingVisibility uom="m">10000</iwxxm:prevailingVisibility>
    <iwxxm:prevailingVisibilityOperator>ABOVE</iwxxm:prevailingVisibilityOperator>
    <iwxxm:surfaceWind>
      <iwxxm:AerodromeSurfaceWindForecast variableWindDirection="false">
        <iwxxm:meanWindDirection uom="deg">200</iwxxm:meanWindDirection>
        <iwxxm:meanWindSpeed uom="[kn_i]">12</iwxxm:meanWindSpeed>
      </iwxxm:AerodromeSurfaceWindForecast>
    </iwxxm:surfaceWind>
    <iwxxm:cloud>
      <iwxxm:AerodromeCloudForecast gml:id="uuid.76855446-218a-4473-9f20-5fb5cc7190c1">
        <iwxxm:layer>
          <iwxxm:CloudLayer>
            <iwxxm:amount xlink:href=http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/SCT/>
```

```
<iwxxm:base uom="[ft_i]">2500</iwxxm:base>
</iwxxm:CloudLayer>
</iwxxm:layer>
</iwxxm:AerodromeCloudForecast>
</iwxxm:cloud>
</iwxxm:MeteorologicalAerodromeForecast>
</iwxxm:changeForecast>
<iwxxm:changeForecast>
  <iwxxm:MeteorologicalAerodromeForecast gml:id="uuid.ce972e0a-7ab9-4956-9823-dfba2fc4234b"
changeIndicator="FROM" cloudAndVisibilityOK="false">
  <iwxxm:phenomenonTime>
    <gml:TimePeriod gml:id="uuid.c146acc5-28f5-4828-95dd-d798f60bd7da">
      <gml:beginPosition>2022-03-11T04:00:00Z</gml:beginPosition>
      <gml:endPosition>2022-03-11T12:00:00Z</gml:endPosition>
    </gml:TimePeriod>
  </iwxxm:phenomenonTime>
  <iwxxm:prevailingVisibility uom="m">10000</iwxxm:prevailingVisibility>
  <iwxxm:prevailingVisibilityOperator>ABOVE</iwxxm:prevailingVisibilityOperator>
  <iwxxm:surfaceWind>
    <iwxxm:AerodromeSurfaceWindForecast variableWindDirection="false">
      <iwxxm:meanWindDirection uom="deg">170</iwxxm:meanWindDirection>
      <iwxxm:meanWindSpeed uom="[kn_i]">12</iwxxm:meanWindSpeed>
    </iwxxm:AerodromeSurfaceWindForecast>
  </iwxxm:surfaceWind>
  <iwxxm:cloud>
    <iwxxm:AerodromeCloudForecast gml:id="uuid.f4c92381-2bd5-4218-8c1d-b53e88286684">
      <iwxxm:layer>
        <iwxxm:CloudLayer>
          <iwxxm:amount xlink:href=http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/SCT/>
          <iwxxm:base uom="[ft_i]">3000</iwxxm:base>
        </iwxxm:CloudLayer>
      </iwxxm:layer>
    </iwxxm:AerodromeCloudForecast>
  </iwxxm:cloud>
</iwxxm:MeteorologicalAerodromeForecast>
</iwxxm:changeForecast>
<iwxxm:changeForecast>
  <iwxxm:MeteorologicalAerodromeForecast gml:id="uuid.fd0dfd17-2cae-4f8a-806e-a5facfca778"
changeIndicator="FROM" cloudAndVisibilityOK="false">
  <iwxxm:phenomenonTime>
    <gml:TimePeriod gml:id="uuid.0053b289-904b-4cb2-acb6-6a1a050727da">
      <gml:beginPosition>2022-03-11T09:00:00Z</gml:beginPosition>
      <gml:endPosition>2022-03-11T12:00:00Z</gml:endPosition>
    </gml:TimePeriod>
  </iwxxm:phenomenonTime>
  <iwxxm:prevailingVisibility uom="m">10000</iwxxm:prevailingVisibility>
  <iwxxm:prevailingVisibilityOperator>ABOVE</iwxxm:prevailingVisibilityOperator>
  <iwxxm:surfaceWind>
```

```
<iwxxm:AerodromeSurfaceWindForecast variableWindDirection="false">
  <iwxxm:meanWindDirection uom="deg">110</iwxxm:meanWindDirection>
  <iwxxm:meanWindSpeed uom="[kn_i]">8</iwxxm:meanWindSpeed>
</iwxxm:AerodromeSurfaceWindForecast>
</iwxxm:surfaceWind>
<iwxxm:cloud>
  <iwxxm:AerodromeCloudForecast gml:id="uuid.3de4fcc6-bbed-463a-97ad-73fb27534e7c">
    <iwxxm:layer>
      <iwxxm:CloudLayer>
        <iwxxm:amount xlink:href=http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/SCT/>
        <iwxxm:base uom="[ft_i]">2500</iwxxm:base>
      </iwxxm:CloudLayer>
    </iwxxm:layer>
  </iwxxm:AerodromeCloudForecast>
</iwxxm:cloud>
</iwxxm:MeteorologicalAerodromeForecast>
</iwxxm:changeForecast>
<iwxxm:changeForecast>
  <iwxxm:MeteorologicalAerodromeForecast gml:id="uuid.cb04d6f7-2ece-4fde-838d-52fdd64224b7"
  changeIndicator="TEMPORARY_FLUCTUATIONS" cloudAndVisibilityOK="false">
    <iwxxm:phenomenonTime>
      <gml:TimePeriod gml:id="uuid.dfa7c536-5d23-4c9f-bed8-f6f1bf762599">
        <gml:beginPosition>2022-03-10T21:00:00Z</gml:beginPosition>
        <gml:endPosition>2022-03-11T00:00:00Z</gml:endPosition>
      </gml:TimePeriod>
    </iwxxm:phenomenonTime>
    <iwxxm:prevailingVisibility uom="m">5000</iwxxm:prevailingVisibility>
    <iwxxm:weather xlink:href=http://codes.wmo.int/306/4678/-SHRA/>
    <iwxxm:cloud>
      <iwxxm:AerodromeCloudForecast gml:id="uuid.8abcf93a-b2a3-4fdb-b866-5948e6684353">
        <iwxxm:layer>
          <iwxxm:CloudLayer>
            <iwxxm:amount xlink:href=http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/SCT/>
            <iwxxm:base uom="[ft_i]">1500</iwxxm:base>
          </iwxxm:CloudLayer>
        </iwxxm:layer>
      </iwxxm:AerodromeCloudForecast>
    </iwxxm:cloud>
    <iwxxm:extension>
      <iwxxm-au:MeteorologicalAerodromeForecastExtension xmlns:iwxxm-au=http://www.bom.gov.au/iwxxm-au/1.0
      xsi:schemaLocation=http://www.bom.gov.au/iwxxm-au/1.0
      http://www.bom.gov.au/iwxxm-au/1.0/taf.xsd isINTER="true"/>
    </iwxxm:extension>
  </iwxxm:MeteorologicalAerodromeForecast>
</iwxxm:changeForecast>
<iwxxm:extension>
```

<iwxxm-au:RemarkSectionExtension xmlns:iwxxm-au=<http://www.bom.gov.au/iwxxm-au/1.0>  
xmlns:gml=<http://www.opengis.net/gml/3.2> xmlns:xsi=<http://www.w3.org/2001/XMLSchema-instance>  
xsi:schemaLocation=<http://www.bom.gov.au/iwxxm-au/1.0> <http://www.bom.gov.au/iwxxm-au/1.0/taf.xsd>>

<iwxxm-au:temperature>  
<iwxxm-au:airTemperature uom="Cel">17</iwxxm-au:airTemperature>  
<iwxxm-au:airTemperatureTime gml:id="uuid.fb13846d-52f9-42d5-ae46-191e0adaa035">  
<gml:timePosition>2022-03-10T21:00:00Z</gml:timePosition>  
</iwxxm-au:airTemperatureTime>  
</iwxxm-au:temperature>  
<iwxxm-au:temperature>  
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<iwxxm-au:airTemperatureTime gml:id="uuid.9a492b77-714f-49b3-80ec-2f758ce7f058">  
<gml:timePosition>2022-03-11T00:00:00Z</gml:timePosition>  
</iwxxm-au:airTemperatureTime>  
</iwxxm-au:temperature>  
<iwxxm-au:temperature>  
<iwxxm-au:airTemperature uom="Cel">21</iwxxm-au:airTemperature>  
<iwxxm-au:airTemperatureTime gml:id="uuid.043aab00-1556-4980-a369-858a219c4d8e">  
<gml:timePosition>2022-03-11T03:00:00Z</gml:timePosition>  
</iwxxm-au:airTemperatureTime>  
</iwxxm-au:temperature>  
<iwxxm-au:temperature>  
<iwxxm-au:airTemperature uom="Cel">22</iwxxm-au:airTemperature>  
<iwxxm-au:airTemperatureTime gml:id="uuid.d92963a5-b21b-4613-859f-29a9e317309e">  
<gml:timePosition>2022-03-11T06:00:00Z</gml:timePosition>  
</iwxxm-au:airTemperatureTime>  
</iwxxm-au:temperature>  
<iwxxm-au:qnh>  
<iwxxm-au:qnh uom="hPa">1019</iwxxm-au:qnh>  
<iwxxm-au:qnhTime gml:id="uuid.f393d5b8-0f18-4299-8903-749177f60301">  
<gml:timePosition>2022-03-10T21:00:00Z</gml:timePosition>  
</iwxxm-au:qnhTime>  
</iwxxm-au:qnh>  
<iwxxm-au:qnh>  
<iwxxm-au:qnh uom="hPa">1019</iwxxm-au:qnh>  
<iwxxm-au:qnhTime gml:id="uuid.fd2c20b9-dbda-43ed-94c0-537e84df4183">  
<gml:timePosition>2022-03-11T00:00:00Z</gml:timePosition>  
</iwxxm-au:qnhTime>  
</iwxxm-au:qnh>  
<iwxxm-au:qnh>  
<iwxxm-au:qnh uom="hPa">1018</iwxxm-au:qnh>  
<iwxxm-au:qnhTime gml:id="uuid.e7c8dd75-022d-4165-9dcc-fa1b7a4ef8fa">  
<gml:timePosition>2022-03-11T03:00:00Z</gml:timePosition>  
</iwxxm-au:qnhTime>  
</iwxxm-au:qnh>  
<iwxxm-au:qnh>  
<iwxxm-au:qnh uom="hPa">1018</iwxxm-au:qnh>  
<iwxxm-au:qnhTime gml:id="uuid.4766837c-99fe-4126-8f9e-0426438dcf17">

```
<gml:timePosition>2022-03-11T06:00:00Z</gml:timePosition>  
</iwxxm-au:qnhTime>  
</iwxxm-au:qnh>  
<iwxxm-au:TAF3 isTAF3="true"/>  
</iwxxm-au:RemarkSectionExtension>  
</iwxxm:extension>  
</iwxxm:TAF>
```

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