User's Guide to US Extensions in IWXXM

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US Extensions in IWXXM

- Why should I know about this?
  - A NTSB Aircraft Accident Report made a following safety recommendation to FAA:

> Require that the remarks section of meteorological aerodrome reports be provided to all dispatchers and pilots in flight dispatcher papers and through the aircraft communication addressing and reporting system. (A-14-77)

  - Shortly thereafter the NWS, directed by the FAA, issued a Notice that supplemental data (encoded after RMK keyword in the TAC form) would no longer be removed from METAR and SPECI reports before transmission over international circuits.
  - To remain consistent with the TAC forms, US IWXXM METAR and SPECI reports will contain supplemental information and be transmitted over international circuits as well.

US Extensions in IWXXM

- Purpose
  - To encode FAA filed differences to WMO 49/ICAO Annex 3 recommendations and standards
  - To encode supplemental data
- Example of US SPECI observation in TAC form

```
SPECI KDCA 221348Z 21004KT 1/8SM R01/1600V2200FT FG VV002 18/18 A3026 RMK AO2
```

  - WMO 49/ICAO Annex 3 content
  - Filed Difference
  - Supplemental Data

- Filed differences w.r.t. prevailing visibility and pressure UOMs in non-SI units for TAC form can be represented in SI units without loss of accuracy, so no special handling in IWXXM is needed for these elements.

IWXXM METAR/SPECI Schema

- The following XML Complex Data Types in the METAR/SPECI schema have <extension> element(s)
- The <extension> element(s) serves as a 'hook' to allow States to add non-Annex 3 content

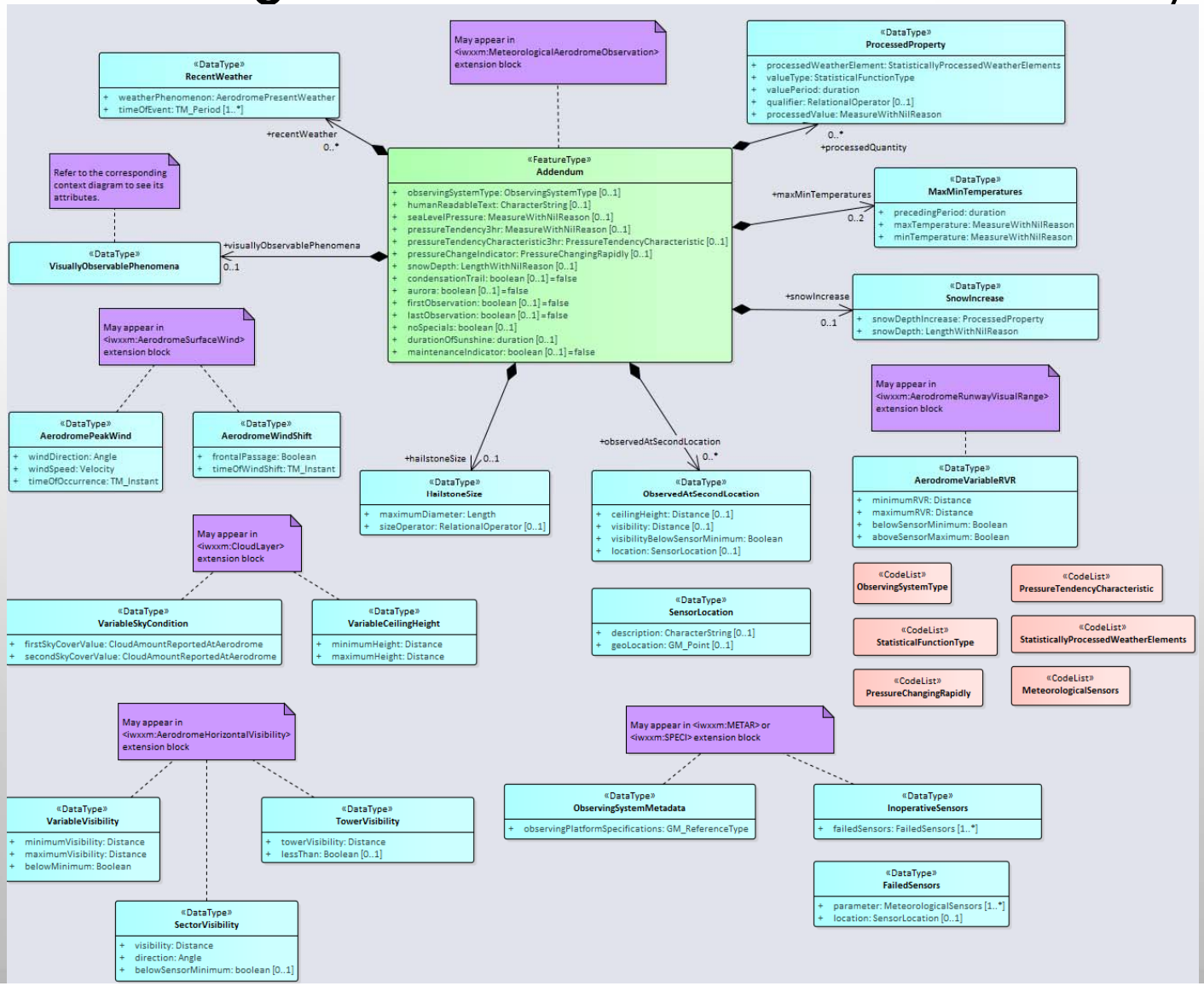
AerodromeCloudForecastType	AerodromeCloudType	AerodromeHorizontalVisibilityType
AerodromeSeaConditionType	AerodromeSurfaceWindTrendForecastType	AerodromeSurfaceWindType
AerodromeWindShearType	CloudLayerType	METARType
MeteorologicalAerodromeObservationType	MeteorologicalAerodromeTrendForecastType	SPECIType

For a complete list of all IWXXM XML Complex Data Types that have <extension> elements, see the wiki page "Encoding supplementary information in IWXXM"

US Extensions in IWXXM

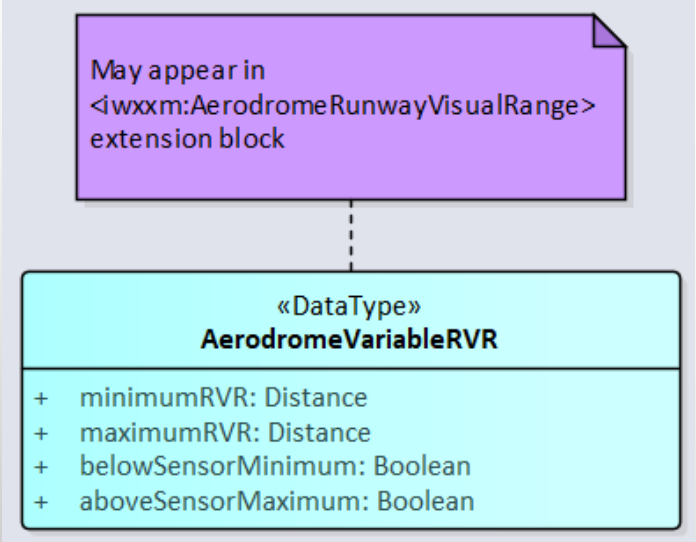
- XML Implementation
  - XML complex data types created to encode the filed differences and supplemental data
    - These XML types are bundled up into a XML schema file
  - Canonical location of US schemas for IWXXM extensions (https://nws.weather.gov/schemas/iwxxm-us)
  - Version 3.0 of US IWXXM extensions in operational use
  - Publically accessible as required for XML schema validation
  - XML not particularly easy to read by humans
- Logical Data Model representation of the XML complex data types
  - Completely optional but easier to read and understand the XML complex data types from LDM perspective
  - US IWXXM extension logical data model online (https://nws.weather.gov/schemas/iwxxm-us/3.0/uml)
  - BTW, WMO IWXXM logical data model online too (https://schemas.wmo.int/iwxxm/3.0/html)

IWXXM-US Logical Data Model for US METAR/SPECI

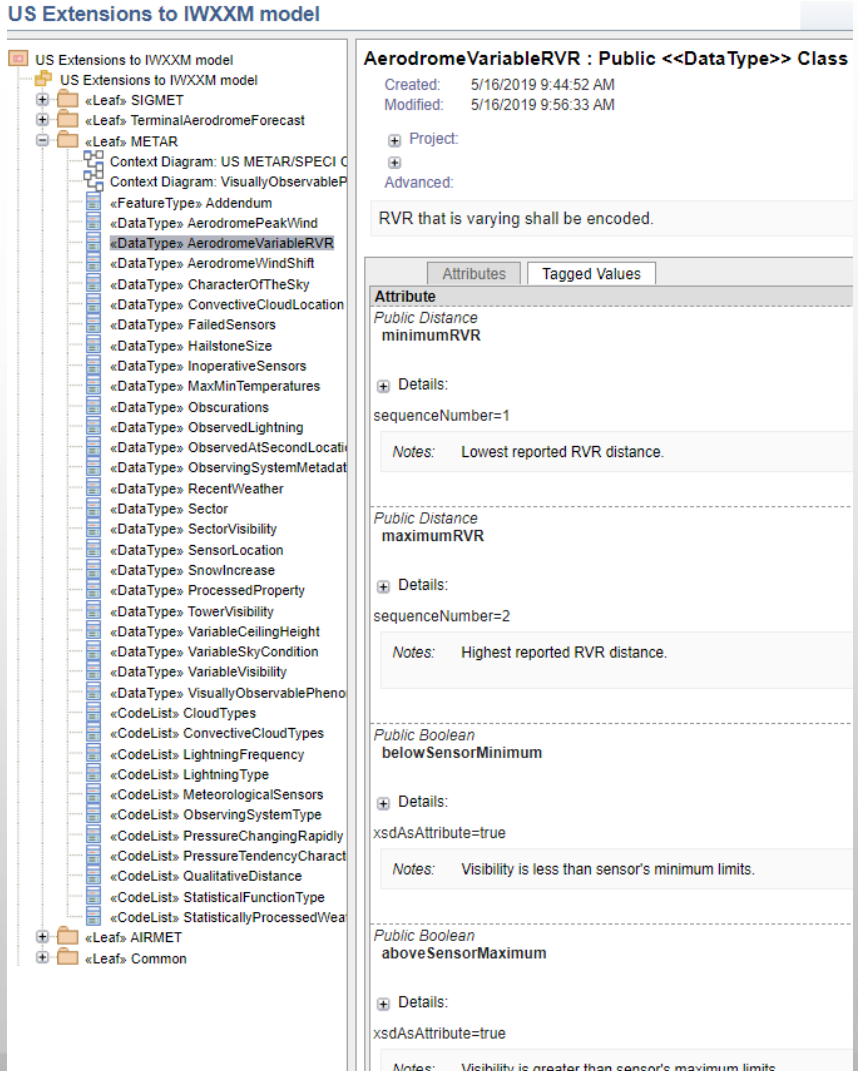


IWXXM-US Logical Data Model for US METAR/SPECI

- Mouse click on any cyan or green box brings up documentation on the complex data type and its components.



Purple boxes are Notes indicating where this (these) complex data type(s) may appear in the IWXXM document.



Encoding US filed differences in IWXXM

- Continuing with RVR reporting example
  - WMO-49/Annex 3 state that the 10-minute mean RVR value shall be reported when prevailing visibility <1500 m
  - If specific criteria are met, the US observing system may report varying RVR instead of a mean value

TAC FORM

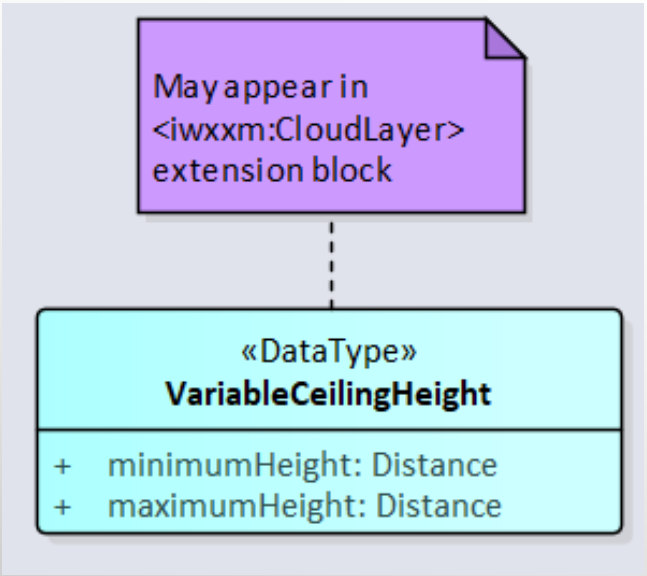
R01/1600V2200FT

IWXXM

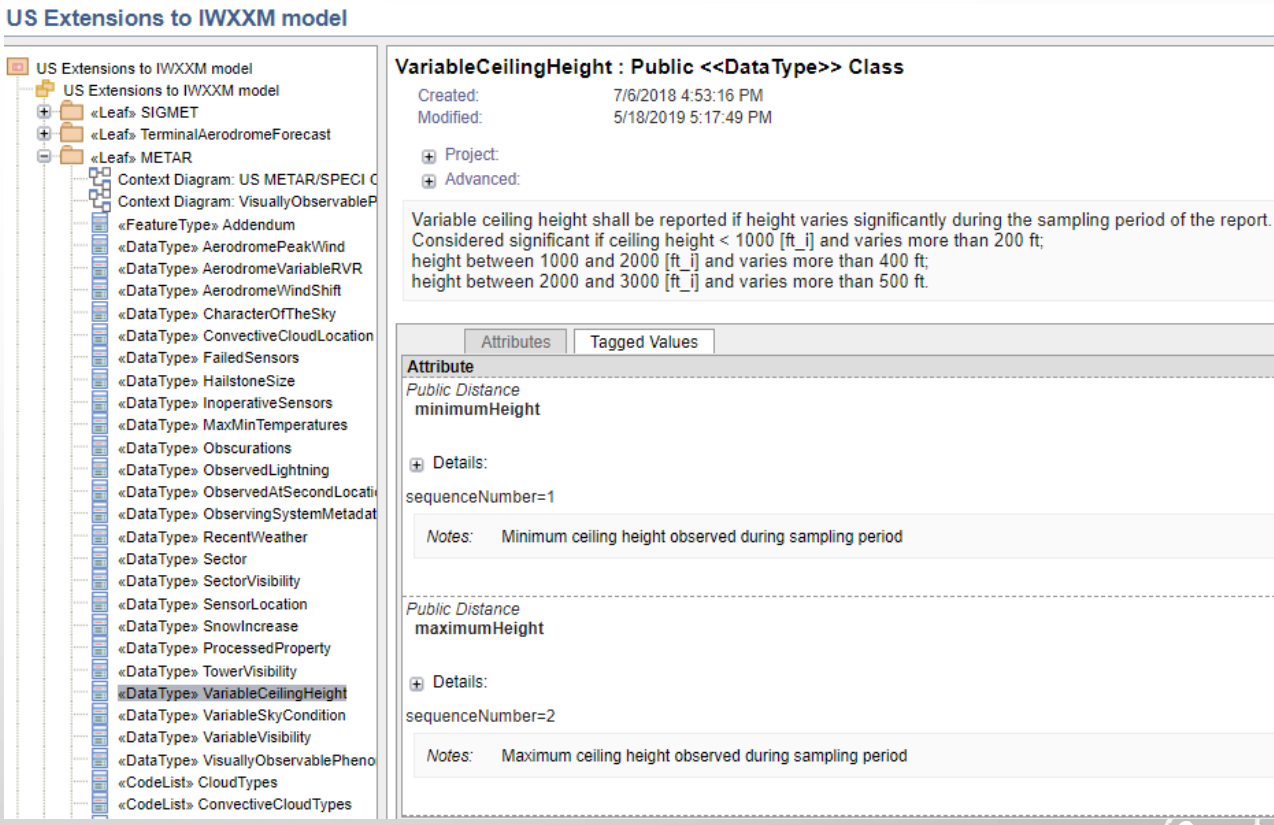
```
<iwxxm:rvr>
    <iwxxm:AerodromeRunwayVisualRange>
        <iwxxm:runway>
            <aixm:RunwayDirection gml:id="uuid.a6c04767-32eb-45ad-a1d3-a24d15415ec3">
                <aixm:timeSlice>
                    <aixm:RunwayDirectionTimeSlice gml:id="uuid.2da030b2-6b7f-4cdd-a457-1a69d70f78e0">
                        <gml:validTime/>
                        <aixm:interpretation>SNAPSHOT</aixm:interpretation>
                        <aixm:designator>01</aixm:designator>
                    </aixm:RunwayDirectionTimeSlice>
                </aixm:timeSlice>
            </aixm:RunwayDirection>
        </iwxxm:runway>
        <iwxxm:meanRVR uom="N/A" nilReason="http://codes.wmo.int/common/nil/withheld" xsi:nil="true"/>
        <iwxxm:extension>
            <iwxxm-us:AerodromeVariableRVR>
                <iwxxm-us:minimumRVR uom="m">490</iwxxm-us:minimumRVR>
                <iwxxm-us:maximumRVR uom="m">670</iwxxm-us:maximumRVR>
            </iwxxm-us:AerodromeVariableRVR>
        </iwxxm:extension>
    </iwxxm:AerodromeRunwayVisualRange>
</iwxxm:rvr>
```

IWXXM-US Supplemental Data Example

- Supplemental data contained in the METAR/SPECI reports are encoded in the same manner
  - Such as variable ceiling heights



Purple boxes are Notes indicating where this (these) complex data type(s) may appear in the IWXXM document.



Encoding US supplemental content in IWXXM

- Continuing with Variable Cloud Ceiling Height

TAC FORM

METAR KICR 132053Z 01021G27KT 2SM BR **OVC004** 01/M01 A2923 RMK AO2 PK WND 01030/2031 **CIG 003V008** $=

IWXXM

```
<iwxxm:cloud>
    <iwxxm:AerodromeCloud>
        <iwxxm:layer>
            <iwxxm:CloudLayer>
                <iwxxm:amount xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/OVC"/>
                <iwxxm:base uom="[ft_i]">400</iwxxm:base>
                <iwxxm:extension>
                    <iwxxm-us:VariableCeilingHeight>
                        <iwxxm-us:minimumHeight uom="[ft_i]">300</iwxxm-us:minimumHeight>
                        <iwxxm-us:maximumHeight uom="[ft_i]">800</iwxxm-us:maximumHeight>
                    </iwxxm-us:VariableCeilingHeight>
                </iwxxm:extension>
            </iwxxm:CloudLayer>
        </iwxxm:layer>
    </iwxxm:AerodromeCloud>
</iwxxm:cloud>
```

Encoding US supplemental content in IWXXM

- Many more examples of encoding extra content into IWXXM METAR/SPECI documents
- US TAFs and SIGMET make use of IWXXM extensions as well
  - But much fewer filed differences and supplemental content for these products
- US TCAs, VAAs and SWAs have no filed differences or additional content
- For information on versioning of IWXXM-US please see the README file

Thank you for your attention.

Additional questions on US Extensions in IWXXM, please contact Michael Graf