

United States' IWXXM Extensions for METAR and SPECI

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Change Log

Date	Description
20 December 2022	Corrected code list URLs in examples

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METAR and SPECI

Package «Leaf» in 'US Extensions to IWXXM model'

This package includes the information needed to model the Federal Aviation Administration's filed differences to the International Civil Aviation Organization for the METAR and SPECI products. Two US handbooks document observing practices and were used to guide the development of this package.

The Interagency Council for Advancing Meteorological Services (ICAMS) maintains the Federal Meteorological Handbook No. 1, Surface Weather Observations and Reports used primarily by the National Weather Service, the FAA and its contractors.

The Secretary of the US Air Force maintains the Air Force Manual 15-111, Surface Weather Observations for its airmen.

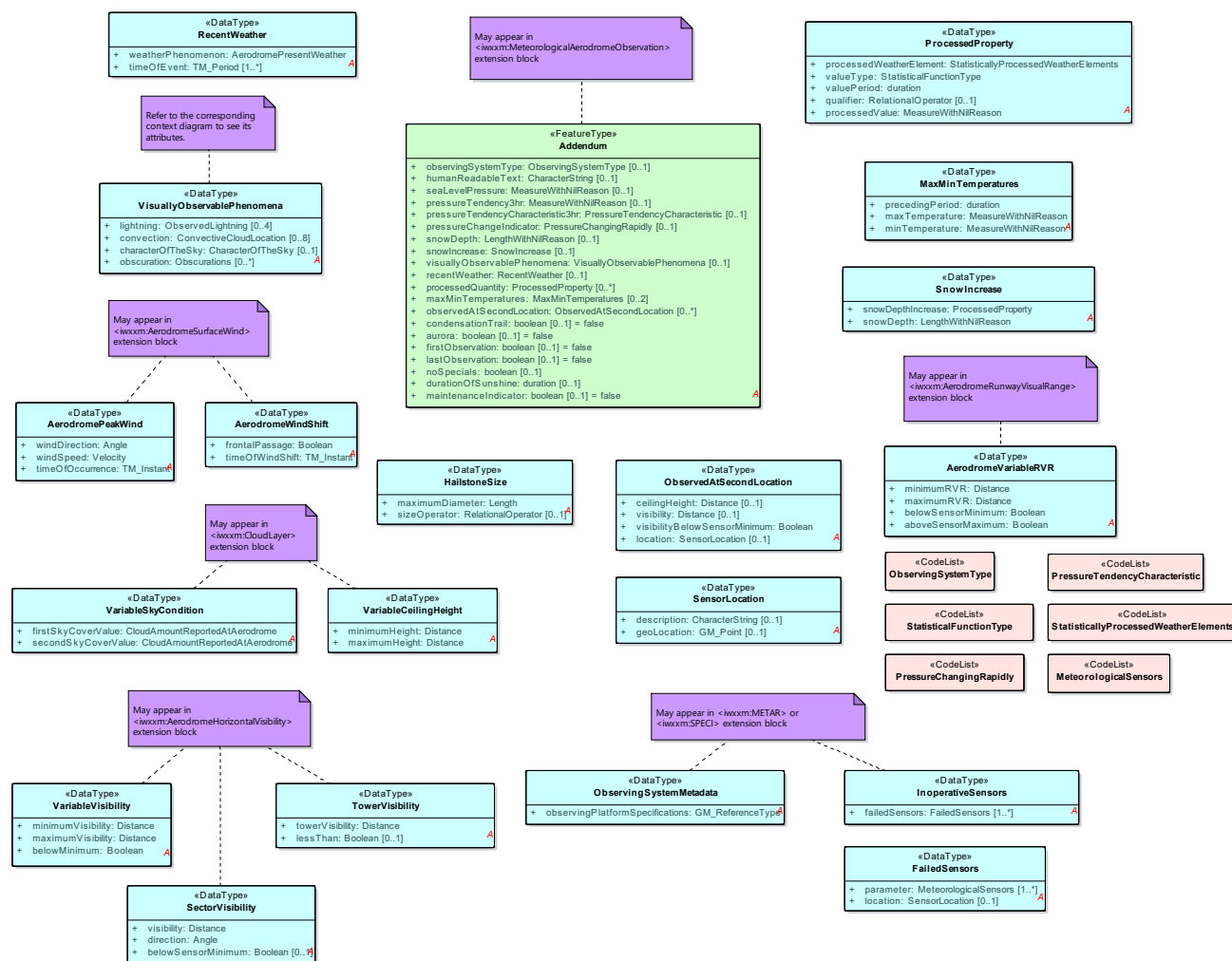
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Context Diagram: US METAR/SPECI Observation Record

GML diagram in package 'METAR and SPECI'

This diagram shows the complete US Observation Record package.

Created: 7/2/2018
 Last modified: 12/19/2022







Addendum

Class «FeatureType»

A UML feature type containing elements for meteorological conditions specified in FMH-1 and AFMAN 15-111 manuals not already encoded elsewhere in this model. This UML type is transformed into XML as a complex type, Addendum.

The Addendum complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/3/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> observingSystemType: ObservingSystemType type Multiplicity: [0..1]</p> <p>Observing system types in use by NWS and US Military</p> <p>Properties: sequenceNumber = 1</p>
<p> humanReadableText: CharacterString type Multiplicity: [0..1]</p> <p>Plaintext, which further elaborate on parameters reported in the body of the report, or contain information in an unstructured format and cannot be easily parsed. Examples include information on volcanic eruptions, funnel and rotor clouds, tornadoes, virga, aircraft mishaps, etc.</p> <p>Properties: sequenceNumber = 2</p>
<p> seaLevelPressure: MeasureWithNilReason type Multiplicity: [0..1]</p> <p>At designated stations, sea-level pressure shall be computed by adjusting the station pressure to compensate for the difference between the station elevation and sea level. This adjustment shall be based on the station elevation and the 12-hour mean temperature at the station. The 12-hour mean temperature shall be the average of the present ambient temperature and the ambient temperature 12 hours ago.</p> <p>Stations within ± 50 feet of sea level may be authorized by their agency to use a constant value to adjust station pressure to sea-level pressure. Otherwise, stations shall use reduction ratios provided by their responsible agency to calculate sea-level pressure.</p> <p>Properties: nillable = true sequenceNumber = 3</p>
<p> pressureTendency3hr: MeasureWithNilReason type Multiplicity: [0..1]</p> <p>Designated stations shall include pressure tendency data in each 3- and 6-hourly report. The pressure tendency includes two parts: the characteristic (an indication of how the pressure has been changing over the past three hours) and the amount of the pressure change in the past three hours. The characteristic shall be based on the observed or recorded (barogram trace) changes in pressure over the past three hours. The amount of pressure change is the absolute value of the change in station pressure or altimeter setting in the past three hours converted to tenths of hectopascals.</p> <p>Properties: nillable = true</p>

ATTRIBUTES

sequenceNumber = 4

- pressureTendencyCharacteristic3hr: **PressureTendencyCharacteristic** type
Multiplicity: [0..1]

Pressure tendency characteristic over the past 3 hours as described in the [WMO Code Registry](#).

Properties:
sequenceNumber = 5

- pressureChangeIndicator: **PressureChangingRapidly** type
Multiplicity: [0..1]

At designated stations, the pressure calculated for each report shall be examined to determine if a pressure change is occurring. If the pressure is rising or falling at a rate of at least 0.06 inch per hour and the pressure change totals 0.02 inch or more at the time of the observation, a pressure change remark shall be reported.

At designated stations, when the pressure is rising or falling rapidly at the time of observation, it shall be also included in the report.

Properties:
sequenceNumber = 6

- snowDepth: **LengthWithNilReason** type
Multiplicity: [0..1]

Total snow depth on the ground if there is more than a trace on the ground.

Properties:
nillable = true
sequenceNumber = 7

- snowIncrease: **SnowIncrease** type
Multiplicity: [0..1]

Reported whenever the snow depth increases at a rate of 1 inch per hour or more. Snow depth increase during the 1-hour period is given along with the total snow depth at the time of the observation.

Properties:
sequenceNumber = 8

- visuallyObservablePhenomena: **VisuallyObservablePhenomena** type
Multiplicity: [0..1]




Visual phenomena sensed or observed that is of importance to aircraft navigation and safety at or surrounding the observing site.

Properties:
sequenceNumber = 9

- recentWeather: **RecentWeather** type
Multiplicity: [0..1]

Past history of precipitation types, including showery or convective phenomena, since last METAR report.

ATTRIBUTES
<p>Properties: sequenceNumber = 10</p>
<p>◆ processedQuantity: ProcessedProperty type Multiplicity: [0..*]</p> <p>Report of meteorological parameter(s) subjected to statistical processing.</p> <p>Properties: sequenceNumber = 11</p>
<p>◆ maxMinTemperatures: MaxMinTemperatures type Multiplicity: [0..2]</p> <p>Extremes of air temperatures observed during the preceding time period.</p> <p>Properties: sequenceNumber = 12</p>
<p>◆ observedAtSecondLocation: ObservedAtSecondLocation type Multiplicity: [0..*]</p> <p>Report of cloud base height and coverage and/or horizontal visibility when the secondary sensor suite differs significantly from the primary location.</p> <p>Properties: sequenceNumber = 13</p>
<p>◆ condensationTrail: boolean type Multiplicity: [0..1]</p> <p>True when condensation trails are observed in the past hour.</p> <p>Properties: sequenceNumber = 14</p>
<p>◆ aurora: boolean type Multiplicity: [0..1]</p> <p>True when an aurora is observed in the past hour.</p> <p>Properties: sequenceNumber = 15</p>
<p>◆ firstObservation: boolean type Multiplicity: [0..1]</p> <p>True when this report is the first one after a scheduled interruption.</p> <p>Properties: sequenceNumber = 16</p>
<p>◆ lastObservation: boolean type</p>

ATTRIBUTES
<p>Multiplicity: [0..1]</p> <p>True when this report is the last one before a scheduled interruption.</p> <p>Properties: sequenceNumber = 17</p>
<p> noSpecials: boolean type Multiplicity: [0..1]</p> <p>At manual stations where SPECI's are not taken, this shall set to 'true' to indicate that no changes in weather conditions will be reported until the next METAR.</p> <p>Properties: sequenceNumber = 19</p>
<p> durationOfSunshine: duration type Multiplicity: [0..1]</p> <p>The duration of sunshine, that occurred the previous calendar day.</p> <p>Properties: sequenceNumber = 20</p>
<p> maintenanceIndicator: boolean type Multiplicity: [0..1]</p> <p>True when the automated system detects that maintenance is needed on the system</p> <p>Properties: sequenceNumber = 21</p>

SAMPLE INSTANCES	
Description	XML Fragment
Observation made with ASOS sensors with a precipitation discriminator	<pre><iwxxm-us:Addendum> <iwxxm-us:observingSystemType xlink:href="https://codes.nws.noaa.gov/FMH-1/ObservingSystemType/AO2"/> </iwxxm-us:Addendum></pre>
Plaintext comments made by observer	<pre><iwxxm-us:Addendum> <iwxxm-us:humanReadableText>VIRGA ALQDS</iwxxm-us:humanReadableText> </iwxxm-us:Addendum></pre>
Routine pressure measurement and reduction to sea level	<pre><iwxxm-us:Addendum> <iwxxm-us:seaLevelPressure uom="hPa">1002.7</iwxxm-us:seaLevelPressure> </iwxxm-us:Addendum></pre>
Change of 3.4 hPa during the past 3-hours	<pre><iwxxm-us:Addendum> <iwxxm-us:pressureTendency3hr uom="hPa">3.4</iwxxm-us:pressureTendency3hr> </iwxxm-us:Addendum></pre>
Missing 3-hr change in pressure	<pre><iwxxm-us:Addendum> <iwxxm-us:pressureTendency3hr uom="N/A" nilReason="missing" xsi:nil="true"/> </iwxxm-us:Addendum></pre>
Station pressure decreasing, then steady; or decreasing, then decreasing more slowly.	<pre><iwxxm-us:Addendum> <iwxxm-us:pressureTendencyCharacteristic3hr xlink:href="http://codes.wmo.int/bufr4/codeflag/0-10-063/6"/> </iwxxm-us:Addendum></pre>
Pressure falling rapidly	<pre><iwxxm-us:Addendum> <iwxxm-us:pressureChangeIndicator xlink:href="https://codes.nws.noaa.gov/FMH-1/PressureChangingRapidly/FALLING"/> </iwxxm-us:Addendum></pre>
Pressure rising rapidly	<pre><iwxxm-us:Addendum> <iwxxm-us:pressureChangeIndicator xlink:href="https://codes.nws.noaa.gov/FMH-1/PressureChangingRapidly/RISING"/> </iwxxm-us:Addendum></pre>
Routine measurement of	<pre><iwxxm-us:Addendum></pre>

SAMPLE INSTANCES	
Description	XML Fragment
snow depth on the ground	<code><iwxxm-us:snowDepth uom="[in_i]">30</iwxxm-us:snowDepth> </iwxxm-us:Addendum></code>
Snow depth missing	<code><iwxxm-us:Addendum> <iwxxm-us:snowDepth uom="N/A" nilReason="missing" xsi:nil="true"/> </iwxxm-us:Addendum></code>
Observer reports visible contrails	<code><iwxxm-us:Addendum> <iwxxm-us:condensationTrail>true</iwxxm-us:condensationTrail> </iwxxm-us:Addendum></code>
Observer reports visible aurora	<code><iwxxm-us:Addendum> <iwxxm-us:aurora>true</iwxxm-us:aurora> </iwxxm-us:Addendum></code>
Observer reports first observation of the day at the aerodrome	<code><iwxxm-us:Addendum> <iwxxm-us:firstObservation>true</iwxxm-us:firstObservation> </iwxxm-us:Addendum></code>
Observer reports last observation of the day at the aerodrome	<code><iwxxm-us:Addendum> <iwxxm-us:lastObservation>true</iwxxm-us:lastObservation> </iwxxm-us:Addendum></code>
No SPECI observations will be taken	<code><iwxxm-us:Addendum> <iwxxm-us:noSpecials>true</iwxxm-us:noSpecials> </iwxxm-us:Addendum></code>
Observing system reports 6 hours and 47 minutes of sunshine	<code><iwxxm-us:Addendum> <iwxxm-us:durationOfSunshine>PT6H47M</iwxxm-us:durationOfSunshine> </iwxxm-us:Addendum></code>
Observing system reports that maintenance is needed	<code><iwxxm-us:Addendum> <iwxxm-us:maintenanceIndicator>true</iwxxm-us:maintenanceIndicator> </iwxxm-us:Addendum></code>

AerodromePeakWind

Class «DataType»

A UML data type containing elements to record the maximum instantaneous wind direction and speed greater than 25 knots and the time it occurred since the last observation. This UML type is transformed into XML as a complex type, AerodromePeakWind.

The AerodromePeakWind complex type may appear in the <iwxxm:AerodromeSurfaceWind> extension element.

Created: 7/6/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> windDirection: Angle type</p> <p>Wind direction of the peak gust.</p> <p>Properties: sequenceNumber = 1</p>
<p> windSpeed: Velocity type</p> <p>The maximum instantaneous wind speed.</p> <p>Properties: sequenceNumber = 2</p>
<p> timeOfOccurrence: TM_Instant type</p> <p>Time of peak wind occurrence.</p> <p>Properties: sequenceNumber = 3</p>

SAMPLE INSTANCES	
Description	XML Fragment
Observed Peak Wind 330° at 31 knots on 2020/05/15 21:05:00Z GMT	<pre><iwxxm-us:AerodromePeakWind> <iwxxm-us:windDirection uom="deg">330</iwxxm-us:windDirection> <iwxxm-us:windSpeed uom="[kn_i]">31</iwxxm-us:windSpeed> <iwxxm-us:timeOfOccurrence> <gml:TimeInstant gml:id="uuid.534a0af1-a4d6-4ac6-bd81-35456df2d31d"> <gml:timePosition>2020-05-15T21:05:00Z</gml:timePosition> </gml:TimeInstant> </iwxxm-us:timeOfOccurrence> </iwxxm-us:AerodromePeakWind></pre>

AerodromeVariableRVR





Class «DataType»

A UML data type containing elements for reporting varying Runway Visual Range conditions. This UML type is transformed into XML as a complex type, AerodromeVariableRVR.

In cases of varying RVR, the **mean value** RVR distance for the runway is withheld and indicated with <iwxxm:meanRVR> attributes nilReason and xsi:nil set to [withheld](#) and true, respectively.

The AerodromeVariableRVR complex type may appear in the <iwxxm:AerodromeRunwayVisualRange> extension element.

Created: 5/16/2019
Last modified: 12/22/2022

ATTRIBUTES
<p> minimumRVR: Distance type</p> <p>Lowest reported RVR distance.</p> <p>Properties: sequenceNumber = 1</p>
<p> maximumRVR: Distance type</p> <p>Highest reported RVR distance.</p> <p>Properties: sequenceNumber = 2</p>
<p> belowSensorMinimum: Boolean type</p> <p>Visibility is less than sensor's minimum limits.</p> <p>Properties: xsdAsAttribute = true</p>
<p> aboveSensorMaximum: Boolean type</p> <p>Visibility is greater than sensor's maximum limits.</p> <p>Properties: xsdAsAttribute = true</p>

SAMPLE INSTANCES	
Description	XML Fragment
Varying Runway Visibility between 1100 ft to 2300 ft	<pre><iwxxm-us:AerodromeVariableRVR> <iwxxm-us:minimumRVR uom="m">335</iwxxm-us:minimumRVR> <iwxxm-us:maximumRVR uom="m">700</iwxxm-us:maximumRVR> </iwxxm-us:AerodromeVariableRVR></pre>
Varying Runway Visibility between 5250 ft and >6000 ft	<pre><iwxxm-us:AerodromeVariableRVR aboveSensorMaximum="true"> <iwxxm-us:minimumRVR uom="m">1600</iwxxm-us:minimumRVR> <iwxxm-us:maximumRVR uom="m">1800</iwxxm-us:maximumRVR> </iwxxm-us:AerodromeVariableRVR></pre>
Varying Runway Visibility between <200 ft to 550 ft	<pre><iwxxm-us:AerodromeVariableRVR belowSensorMinimum="true"> <iwxxm-us:minimumRVR uom="m">60</iwxxm-us:minimumRVR> <iwxxm-us:maximumRVR uom="m">165</iwxxm-us:maximumRVR> </iwxxm-us:AerodromeVariableRVR></pre>



AerodromeWindShift

Class «DataType»

A UML data type containing elements for reporting a wind shift if a change in the wind direction of 45 degrees or more occurred in less than 15 minutes with sustained wind speeds of 10 knots or more. This UML type is transformed into XML as a complex type, AerodromeWindShift.

The AerodromeWindShift complex type may appear in the <iwxxm:AerodromeSurfaceWind> extension element.

Created: 7/6/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> frontalPassage: Boolean type</p> <p>Set to true if it is reasonably certain that the wind shift was caused by a frontal passage.</p> <p>Properties: xsdAsAttribute = true</p>
<p> timeOfWindShift: TM_Instant type</p> <p>Time of observed wind shift.</p>

SAMPLE INSTANCES	
Description	XML Fragment
Wind Shift observed at 2020-05-15T20:59:00Z	<pre><iwxxm-us:AerodromeWindShift> <iwxxm-us:timeOfWindShift> <gml:TimeInstant gml:id="uuid.7fc24278-e52f-402d-9bbf-0ea10ced6aab"> <gml:timePosition>2020-05-15T21:05:00Z</gml:timePosition> </gml:TimeInstant> </iwxxm-us:timeOfWindShift> </iwxxm-us:AerodromeWindShift></pre>
Wind Shift observed at 2019-11-26T02:10:00Z associated with frontal passage	<pre><iwxxm-us:AerodromeWindShift frontalPassage="true"> <iwxxm-us:timeOfWindShift> <gml:TimeInstant gml:id="uuid.03d2a26b-58b2-435b-a142-43d242937a19"> <gml:timePosition>2019-11-26T02:10:00Z</gml:timePosition> </gml:TimeInstant> </iwxxm-us:timeOfWindShift> </iwxxm-us:AerodromeWindShift></pre>

CharacterOfTheSky

Class «DataType»

A UML data type containing elements for providing information on the predominate types of low-, middle- and high-level clouds at the time of the report. This UML type is transformed into XML as a complex type, CharacterOfTheSky.

The CharacterOfTheSky complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES
<p>◆ lowCloudCharacter: CloudTypes type</p> <p>Cloud type of the genera Stratocumulus, Stratus, Cumulus and Cumulonimbus.</p> <p>Properties: sequenceNumber = 1</p>
<p>◆ middleCloudCharacter: CloudTypes type</p> <p>Cloud type of the genera Altopumulus, Altostratus and Nimbostratus.</p> <p>Properties: sequenceNumber = 2</p>
<p>◆ highCloudCharacter: CloudTypes type</p> <p>Cloud type of the genera Cirrus, Cirrocumulus and Cirrostratus.</p> <p>Properties: sequenceNumber = 3</p>

SAMPLE INSTANCES	
Description	XML Fragment
Observed cirrostratus, no mid-level clouds, and cumulus humilis	<pre><iwxxm-us:CharacterOfTheSky> <iwxxm-us:lowCloudCharacter xlink:href="http://codes.wmo.int/bufr4/codeflag/0-20-012/31"/> <iwxxm-us:middleCloudCharacter xlink:href="http://codes.wmo.int/bufr4/codeflag/0-20-012/20"/> <iwxxm-us:highCloudCharacter xlink:href="http://codes.wmo.int/bufr4/codeflag/0-20-012/17"/> </iwxxm-us:CharacterOfTheSky></pre>
Observed stratus, no information on mid- to high-level cloud	<pre><iwxxm-us:CharacterOfTheSky> <iwxxm-us:lowCloudCharacter xlink:href="http://codes.wmo.int/bufr4/codeflag/0-20-012/37"/> <iwxxm-us:middleCloudCharacter nilReason="http://codes.wmo.int/common/nil/notObservable"/> <iwxxm-us:highCloudCharacter nilReason="http://codes.wmo.int/common/nil/notObservable"/> </iwxxm-us:CharacterOfTheSky></pre>

ConvectiveCloudLocation

Class «DataType»

A UML data type containing elements for reporting the distance to, and the subtended angle(s) which thunderstorm(s), cumulonimbus or cumulo-mammatus clouds are observed. This UML type is transformed into XML as a complex type, ConvectiveCloudLocation.

The ConvectiveCloudLocation complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES

◆ cloudType: **ConvectiveCloudTypes** type

Type of convective cloud being reported, e.g., thunderstorm, or cumulonimbus.

Properties:
sequenceNumber = 1

◆ qualitativeDistance: **QualitativeDistance** type

Multiplicity: [0..1]

Qualitative distance estimate from observation location to convective activity, e.g., distant or in the vicinity.

Properties:
sequenceNumber = 2

◆ sector: **Sector** type

Multiplicity: [0..4]

One or more arcs which the convective cloud extends along the local horizon.

Properties:
nillable = true
sequenceNumber = 3

◆ directionOfMotion: **Angle** type

Multiplicity: [0..1]

Direction which the convective cloud is moving *towards* in degrees from true north.

Properties:
sequenceNumber = 4

◆ movingOverhead: **Boolean** type

True if thunderstorm is moving overhead at the observing platform.

Properties:
xsdAsAttribute = true

SAMPLE INSTANCES

SAMPLE INSTANCES	
Description	XML Fragment
Distant cumulonimbus cloud to the west of station moving northeast.	<pre> <iwxxm-us:ConvectiveCloudLocation> <iwxxm-us:cloudType xlink:href="https://codes.nws.noaa.gov/FMH-1/ConvectiveCloudType/CUMULONIMBUS "/> <iwxxm-us:qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/DISTANT"/> <iwxxm-us:sector> <iwxxm-us:Sector> <iwxxm-us:extremeCCWDirection uom="deg">247.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCWDDirection uom="deg">292.5</iwxxm-us:extremeCWDDirection> </iwxxm-us:Sector> </iwxxm-us:sector> <iwxxm-us:directionOfMotion uom="deg">45</iwxxm-us:directionOfMotion> </iwxxm-us:ConvectiveCloudLocation> </pre>
Thunderstorm in the vicinity south and southwest of the aerodrome moving southeast	<pre> <iwxxm-us:ConvectiveCloudLocation> <iwxxm-us:cloudType xlink:href="https://codes.nws.noaa.gov/FMH-1/ConvectiveCloudType/THUNDERSTORM "/> <iwxxm-us:qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/VICINITY"/> <iwxxm-us:sector> <iwxxm-us:Sector> <iwxxm-us:extremeCCWDirection uom="deg">157.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCWDDirection uom="deg">247.5</iwxxm-us:extremeCWDDirection> </iwxxm-us:Sector> </iwxxm-us:sector> <iwxxm-us:directionOfMotion uom="deg">135</iwxxm-us:directionOfMotion> </iwxxm-us:ConvectiveCloudLocation> </pre>
Thunderstorm overhead and in all quadrants at aerodrome	<pre> <iwxxm-us:ConvectiveCloudLocation> <iwxxm-us:cloudType xlink:href="https://codes.nws.noaa.gov/FMH-1/ConvectiveCloudType/THUNDERSTORM "/> <iwxxm-us:qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/OVERHEAD"/> <iwxxm-us:sector> <iwxxm-us:Sector inAllQuadrants="true"/> </iwxxm-us:sector> </iwxxm-us:ConvectiveCloudLocation> </pre>
Distant cumulonimbus north, south and northwest of the aerodrome moving east	<pre> <iwxxm-us:ConvectiveCloudLocation> <iwxxm-us:cloudType xlink:href="https://codes.nws.noaa.gov/FMH-1/ConvectiveCloudType/CUMULONIMBUS "/> <iwxxm-us:qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/DISTANT"/> <iwxxm-us:sector> <iwxxm-us:Sector> <iwxxm-us:extremeCCWDirection uom="deg">292.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCWDDirection uom="deg">22.5</iwxxm-us:extremeCWDDirection> </iwxxm-us:Sector> </iwxxm-us:sector> <iwxxm-us:sector> <iwxxm-us:Sector> <iwxxm-us:extremeCCWDirection uom="deg">157.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCWDDirection uom="">202.5</iwxxm-us:extremeCWDDirection> </iwxxm-us:Sector> </iwxxm-us:sector> <iwxxm-us:directionOfMotion uom="deg">90</iwxxm-us:directionOfMotion> </iwxxm-us:ConvectiveCloudLocation> </pre>
Thunderstorm overhead at aerodrome moving north	<pre> <iwxxm-us:ConvectiveCloudLocation> <iwxxm-us:cloudType xlink:href="https://codes.nws.noaa.gov/FMH-1/ConvectiveCloudType/THUNDERSTORM"/ > <iwxxm-us:qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/OVERHEAD"/> <iwxxm-us:directionOfMotion uom="deg">360</iwxxm-us:directionOfMotion> </iwxxm-us:ConvectiveCloudLocation> </pre>



FailedSensors

Class «DataType»

A UML data type containing elements for indicating the type of, and optionally the location, the failed sensor(s). This UML type is transformed into XML as a complex type, FailedSensors.

The FailedSensors complex type may appear in the <iwxxm:METAR> or <iwxxm:SPECI> extension elements.

Created: 5/19/2019
Last modified: 12/22/2022

ATTRIBUTES	
<p> parameter: MeteorologicalSensors type Multiplicity: [1..*]</p> <p>The parameter that cannot be measured due to an inoperable sensor.</p> <p>Properties: sequenceNumber = 1</p>	
<p> location: SensorLocation type Multiplicity: [0..1]</p> <p>In case of multiple sensors of the same type at the aerodrome, location provides the position of the inoperable sensor.</p> <p>Properties: sequenceNumber = 2</p>	

SAMPLE INSTANCES	
Description	XML Fragment
Observing system has inoperative freezing precipitation sensor, and inoperative tipping or weighting bucket	<pre><iwxxm-us:FailedSensors> <iwxxm-us:parameter xlink:href="https://codes.nws.noaa.gov/FMH-1/Sensor/FREEZING_PRECIPITATION"/> <iwxxm-us:parameter xlink:href="https://codes.nws.noaa.gov/FMH-1/Sensor/PRECIPITATION"/> </iwxxm-us:FailedSensors></pre>
Inoperative RVR equipment for 07 Center runway	<pre><iwxxm-us:FailedSensors> <iwxxm-us:parameter xlink:href="https://codes.nws.noaa.gov/FMH-1/Sensor/RUNWAY_VISUAL_RANGE"/> <iwxxm-us:location> <iwxxm-us:SensorLocation> <iwxxm-us:description>R07C</iwxxm-us:description> </iwxxm-us:SensorLocation> </iwxxm-us:location> </iwxxm-us:FailedSensors></pre>
Inoperative visibility equipment at R01L touchdown zone	<pre><iwxxm-us:FailedSensors> <iwxxm-us:parameter xlink:href="https://codes.nws.noaa.gov/FMH-1/Sensor/VISIBILITY"/> <iwxxm-us:location> <iwxxm-us:SensorLocation> <iwxxm-us:description>R01L TDZ</iwxxm-us:description> <iwxxm-us:geoLocation> <gml:Point srsDimension="2" srsName="http://www.opengis.net/def/crs/EPSSG/0/4326" axisLabels="Lat Long" gml:id="uuid.f53add31-4a00-46a8-8aaa-ff76042c35e7"> <gml:pos>38.94807 -77.47624</gml:pos> </gml:Point> </iwxxm-us:geoLocation> </iwxxm-us:SensorLocation> </iwxxm-us:location> </iwxxm-us:FailedSensors></pre>



HailstoneSize

Class «DataType»

A UML data type containing elements to convey hailstone's diameter as provided by the observer. This UML type is transformed into XML as a complex type, HailstoneSize.

The HailstoneSize complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 5/30/2019
Last modified: 12/22/2022

ATTRIBUTES
<p> maximumDiameter: Length type</p> <p>All reports of hail must include hailstone size diameter in increments of 1/4 inch</p>
<p> sizeOperator: RelationalOperator type</p> <p>Multiplicity: [0..1]</p> <p>Hail less than 1/4 inch in size, this attribute shall be set to BELOW</p>

SAMPLE INSTANCES	
Description	XML Fragment
Observer reports 1- 3/4 inch diameter hailstones	<pre><iwxxm-us:HailstoneSize> <iwxxm-us:maximumDiameter uom="[in_i]">1.75</iwxxm-us:maximumDiameter> </iwxxm-us:HailstoneSize></pre>
Observer reports hailstones less than 1/4 inch in diameter	<pre><iwxxm-us:HailstoneSize> <iwxxm-us:maximumDiameter uom="[in_i]">0.25</iwxxm-us:maximumDiameter> <iwxxm-us:sizeOperator>BELOW</iwxxm-us:sizeOperator> </iwxxm-us:HailstoneSize></pre>

InoperativeSensors


Class «DataType»

A UML data type containing elements to provide a list of inoperative sensors at the time of the report. This UML type is transformed into XML as a complex type, InoperativeSensors.

The InoperativeSensors complex type may appear in the <iwxxm:METAR> or <iwxxm:SPECI> extension elements.

Created: 12/14/2018
Last modified: 12/23/2022

ATTRIBUTES

 failedSensors: **FailedSensors** type
Multiplicity: [1..*]

An observation system's sensor(s) that failed measurement standards and/or specifications at the time of the report.

SAMPLE INSTANCES

Description	XML Fragment
Observing system has an inoperative ceilometer	<pre><iwxxm-us:InoperativeSensors> <iwxxm-us:failedSensors> <iwxxm-us:FailedSensors> <iwxxm-us:parameter xlink:href="https://codes.nws.noaa.gov/FMH-1/Sensor/CEILING"/> </iwxxm-us:FailedSensors> </iwxxm-us:failedSensors> </iwxxm-us:InoperativeSensors></pre>
See FailedSensors documentation for additional examples.	

MaxMinTemperatures




Class «DataType»

A UML data type containing elements to report maximum and minimum temperatures. This UML type is transformed into XML as a complex type, MaxMinTemperatures.

According to NWS and Air Force Manuals, temperature extremes that occurred in the previous 6 hours shall be determined to the nearest tenth of a degree Celsius for the 0000, 0600, 1200, and 1800 UTC observations. The maximum and minimum temperatures for the previous 24 hours shall be determined to the nearest tenth of a degree Celsius for the 0000 LST observation.

The MaxMinTemperatures complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 6/13/2019
Last modified: 12/22/2022

ATTRIBUTES
<p> precedingPeriod: duration type</p> <p>The preceding time period which the extremes in air temperatures were observed.</p> <p>Properties: sequenceNumber = 1</p>
<p> maxTemperature: MeasureWithNilReason type</p> <p>Highest temperature that occurred during the preceding time period.</p> <p>Properties: nillable = true sequenceNumber = 2</p>
<p> minTemperature: MeasureWithNilReason type</p> <p>Lowest temperature that occurred during the preceding time period.</p> <p>Properties: nillable = true sequenceNumber = 3</p>

SAMPLE INSTANCES	
Description	XML Fragment
Max/Min temperatures for the preceding 6-h period.	<pre><iwxxm-us:MaxMinTemperatures> <iwxxm-us:precedingPeriod>PT6H</iwxxm-us:precedingPeriod> <iwxxm-us:maxTemperature uom="Cel">47</iwxxm-us:maxTemperature> <iwxxm-us:minTemperature uom="Cel">37</iwxxm-us:minTemperature> </iwxxm-us:MaxMinTemperatures></pre>
Max/Min temperatures for the preceding 24-h period missing	<pre><iwxxm-us:MaxMinTemperatures> <iwxxm-us:precedingPeriod>PT24H</iwxxm-us:precedingPeriod> <iwxxm-us:maxTemperature uom="N/A" nilReason="missing" xsi:nil="true"/> <iwxxm-us:minTemperature uom="N/A" nilReason="missing" xsi:nil="true"/> </iwxxm-us:MaxMinTemperatures></pre>




Obscurations

Class «DataType»

A UML data type containing elements for reporting weather phenomenon, either surface-based or aloft, that completely or partially obscure the sky. This UML type is transformed into XML as a complex type, Obscurations.

The Obscurations complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> heightOfWeatherPhenomenon: Distance type</p> <p>Height of obscuring phenomenon above ground level. Value of zero indicates surface-based phenomenon.</p> <p>Properties: sequenceNumber = 1</p>
<p> obscurationAmount: CloudAmountReportedAtAerodrome type</p> <p>Portion of the sky obscured by the phenomenon.</p> <p>Properties: sequenceNumber = 2</p>
<p> weatherCausingObscuration: AerodromePresentWeather type</p> <p>Weather phenomenon (surface-based or aloft) that completely or partially obscures the sky.</p> <p>Properties: sequenceNumber = 3</p>

SAMPLE INSTANCES	
Description	XML Fragment
Broken layer of smoke at 500 feet	<pre><iwxxm-us:Obscurations> <iwxxm-us:heightOfWeatherPhenomenon uom="[ft_i]">500</iwxxm-us:heightOfWeatherPhenomenon> <iwxxm-us:obscurationAmount xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/BKN"/> <iwxxm-us:weatherCausingObscuration xlink:href="http://codes.wmo.int/306/4678/FU"/> </iwxxm-us:Obscurations></pre>

ObservedLightning

Class «DataType»

A UML data type containing elements for recording the location and characteristics of observed lightning. This UML type is transformed into XML as a complex type, ObservedLightning.

The ObservedLightning complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES
<p>◆ qualitativeDistance: QualitativeDistance type Multiplicity: [0..2]</p> <p>Qualitative distance estimate from observation location to lightning activity, e.g., distant or in the vicinity.</p> <p>Properties: sequenceNumber = 1</p>
<p>◆ frequency: LightningFrequency type Multiplicity: [0..1]</p> <p>Qualitative estimate of the number of lightning discharges within a 1-minute period.</p> <p>Properties: sequenceNumber = 2</p>
<p>◆ type: LightningType type Multiplicity: [0..1]</p> <p>Type(s) of lightning discharge activity observed at/surrounding the observation site.</p> <p>Properties: sequenceNumber = 3</p>
<p>◆ sector: Sector type Multiplicity: [0..4]</p> <p>One or more arcs that the lightning activity extends along the local horizon.</p> <p>Properties: nillable = true sequenceNumber = 4</p>
<p>◆ measuredFlashFrequency: Measure type Multiplicity: [0..1]</p> <p>Measured flash frequency as determined by the observation system.</p> <p><i>Currently unused and reserved for the future.</i></p> <p>Properties: sequenceNumber = 5</p>

ATTRIBUTES

SAMPLE INSTANCES

Description	XML Fragment
Observer reports distant lightning occurring to the north and northeast of the aerodrome	<pre><ObservedLightning> <qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/DISTANT"/> <sector> <Sector> <extremeCCWDirection uom="deg">337.5</extremeCCWDirection> <extremeCWDDirection uom="deg">67.5</extremeCWDDirection> </Sector> </sector> </ObservedLightning></pre>
Observer report distant lightning surrounding the aerodrome	<pre><ObservedLightning> <qualitativeDistance xlink:href="https://codes.nws.noaa.gov/FMH-1/QualitativeDistance/DISTANT"/> <sector> <Sector inAllQuadrants="true"/> </sector> </ObservedLightning></pre>
Observer reports continuous in-cloud, cloud-to-cloud and cloud-to-ground lightning to the northeast, east and southeast of the aerodrome. Sensor reports 43 flashes per minute.	<pre><ObservedLightning> <frequency xlink:href="https://codes.nws.noaa.gov/FMH-1/LightningFrequency/CONTINUOUS"/> <type xlink:href="https://codes.nws.noaa.gov/FMH-1/LightningType/CCCGIC"/> <sector> <Sector> <extremeCCWDirection uom="deg">22.5</extremeCCWDirection> <extremeCWDDirection uom="deg">157.5</extremeCWDDirection> </Sector> </sector> <measuredFlashFrequency uom="flash/min">43</measuredFlashFrequency> </ObservedLightning></pre>





ObservedAtSecondLocation

Class «DataType»

A UML data type containing elements to report the ceiling and/or visibilities that are monitored at second location, usually a runway. This UML type is transformed into XML as a complex type, ObservedAtSecondLocation.

The ObservedAtSecondLocation complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES	
<p> ceilingHeight: Distance type Multiplicity: [0..1]</p> <p>Lowest cloud base height of a broken or overcast cloud layer, if present.</p> <p>Properties: sequenceNumber = 1</p>	
<p> visibility: Distance type Multiplicity: [0..1]</p> <p>Horizontal visibility</p> <p>Properties: sequenceNumber = 2</p>	
<p> visibilityBelowSensorMinimum: Boolean type</p> <p>If sensor determines that horizontal visibility is reduced below its ability to measure accurately, this attribute shall be present and set to 'true'.</p> <p>Properties: xsdAsAttribute = true</p>	
<p> location: SensorLocation type Multiplicity: [0..1]</p> <p>Location of second set of ceiling and/or visibility sensors.</p> <p>Properties: sequenceNumber = 4</p>	

SAMPLE INSTANCES	
Description	XML Fragment
Sensor at Runway 11 reports 200 foot ceiling	<pre><iwxxm-us:ObservedAtSecondLocation> <iwxxm-us:ceilingHeight uom="[ft_i]">200</iwxxm-us:ceilingHeight> <iwxxm-us:location> <iwxxm-us:SensorLocation> <iwxxm-us:description>RUNWAY 11</iwxxm-us:description> </iwxxm-us:SensorLocation> </iwxxm-us:location> </iwxxm-us:ObservedAtSecondLocation></pre>
Sensor at Runway 01L reports visibility less than 50 feet	<pre><iwxxm-us:ObservedAtSecondLocation visibilityBelowSensorMinimum="true"> <iwxxm-us:visibility uom="[ft_i]">50</iwxxm-us:visibility> <iwxxm-us:location></pre>

SAMPLE INSTANCES	
Description	XML Fragment
	<pre> <iwxxm-us:SensorLocation> <iwxxm-us:description>RUNWAY 01L</iwxxm-us:description> </iwxxm-us:SensorLocation> </iwxxm-us:location> </iwxxm-us:ObservedAtSecondLocation> </pre>
Sensors at Runway 15R touchdown zone report visibility at 300 feet and ceiling of 100 feet	<pre> <iwxxm-us:ObservedAtSecondLocation> <iwxxm-us:ceilingHeight uom="[ft_i]">100</iwxxm-us:ceilingHeight> <iwxxm-us:visibility uom="[ft_i]">300</iwxxm-us:visibility> <iwxxm-us:location> <iwxxm-us:SensorLocation> <iwxxm-us:description>RUNWAY 15R TDZ</iwxxm-us:description> </iwxxm-us:SensorLocation> </iwxxm-us:location> </iwxxm-us:ObservedAtSecondLocation> </pre>

ObservingSystemMetadata


Class «DataType»

A UML data type containing elements for providing links to external resources describing the geographical and/or technical specifications of the observation platform used to create this observation. This UML type is transformed into XML as a complex type, ObservingSystemMetadata.

The ObservingSystemMetadata complex type may appear in the <iwxxm:METAR> or <iwxxm:SPECI> extension elements.

This element is unused but reserved for the future.

Created: 7/26/2018
Last modified: 12/22/2022

ATTRIBUTES	
 observingPlatformSpecifications: GM_ReferenceType type	Reference to an external source that describes the technical and geographical specifications of the observation platform at the aerodrome.
SAMPLE INSTANCES	
Description	XML Fragment
Simple boilerplate example to illustrate its purpose	<pre><iwxxm-us:ObservingSystemMetadata> <iwxxm-us:observingPlatformSpecifications xlink:href="https://link.to/this/asos/metadata"/> </iwxxm-us:ObservingSystemMetadata></pre>



RecentWeather

Class «DataType»

A UML data type containing elements for recording the starting and ending times of precipitation/thunderstorm events since the last observation. This UML type is transformed into XML as a complex type, RecentWeather.

The RecentWeather complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/6/2018
Last modified: 12/22/2022

ATTRIBUTES	
<p> weatherPhenomenon: AerodromePresentWeather type</p> <p>The weather phenomenon that occurred.</p> <p>Properties: sequenceNumber = 1</p>	
<p> timeOfEvent: TM_Period type</p> <p>Multiplicity: [1..*]</p> <p>The starting (if known) and ending (if known) times of the precipitation/thunderstorm event.</p> <p>Properties: sequenceNumber = 2</p>	

SAMPLE INSTANCES	
Description	XML Fragment
Unknown precipitation started and ended from 28 to 32 minutes after the hour.	<pre><RecentWeather> <weatherPhenomenon xlink:href="http://codes.wmo.int/306/4678/UP"/> <timeOfEvent> <gml:TimePeriod gml:id="uuid.d1bda06e-4d7c-416f-8922-5efed6983248"> <gml:beginPosition>2020-05-13T20:28:00Z</gml:beginPosition> <gml:endPosition>2020-05-13T20:32:00Z</gml:endPosition> </gml:TimePeriod> </timeOfEvent> </RecentWeather></pre>
Freezing rain ended at 13 minutes past the hour.	<pre><RecentWeather> <weatherPhenomenon xlink:href="http://codes.wmo.int/306/4678/FZRA"/> <timeOfEvent> <gml:TimePeriod gml:id="uuid.1871d3ff-5874-47f4-961e-192e52961bdf"> <gml:beginPosition indeterminatePosition="unknown"/> <gml:endPosition>2020-05-13T20:13:00Z</gml:endPosition> </gml:TimePeriod> </timeOfEvent> </RecentWeather></pre>
Snow started and ended 13 and 28 minutes past the hour and then resumed at 32 minutes past the hour.	<pre><RecentWeather> <weatherPhenomenon xlink:href="http://codes.wmo.int/306/4678/SN"/> <timeOfEvent> <gml:TimePeriod gml:id="uuid.09188bc7-739e-4925-8975-183328235e55"> <gml:beginPosition>2020-05-13T20:13:00Z</gml:beginPosition> <gml:endPosition>2020-05-13T20:28:00Z</gml:endPosition> </gml:TimePeriod> </timeOfEvent> <timeOfEvent> <gml:TimePeriod gml:id="uuid.5d01dfb2-7e44-457c-b310-8db1bbc8af36"> <gml:beginPosition>2020-05-13T20:32:00Z</gml:beginPosition> <gml:endPosition indeterminatePosition="unknown"/> </gml:TimePeriod> </timeOfEvent> </RecentWeather></pre>






Sector

Class «DataType»

A UML data type containing elements for specifying the endpoints of the azimuth angles and, optionally, measured distances to the phenomenon that defines the sector This UML type is transformed into XML as a complex type, Sector.

The Sector complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 6/3/2019
Last modified: 12/22/2022

ATTRIBUTES	
<p> extremeCCWDirection: Angle type Multiplicity: [0..1]</p> <p>The counterclockwise-most extent of the observed convective cloud on the local horizon as expressed in degrees from true north.</p>	
<p> extremeCCWDistance: Distance type Multiplicity: [0..1]</p> <p>Measured distance to the phenomena at the extreme counter-clockwise angle.</p>	
<p> extremeCWDirection: Angle type Multiplicity: [0..1]</p> <p>The clockwise-most extent of the observed convective cloud on the local horizon as expressed in degrees from true north.</p>	
<p> extremeCWDistance: Distance type Multiplicity: [0..1]</p> <p>Measured distance to the phenomena at the extreme clockwise angle.</p>	
<p> inAllQuadrants: Boolean type</p> <p>If event is occurring in all quadrants of the horizon, this shall be set to true and no angles or distances provided.</p> <p>Properties: xsdAsAttribute = true</p>	

SAMPLE INSTANCES	
Description	XML Fragment
Phenomenon observed in all quadrants around the aerodrome	<iwxxm-us:Sector inAllQuadrants="true"/>
Phenomenon observed to the north of aerodrome	<iwxxm-us:Sector> <iwxxm-us:extremeCCWDirection uom="deg">337.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCWDirection uom="deg">22.5</iwxxm-us:extremeCWDirection> </iwxxm-us:Sector>
Phenomenon observed 10 statute miles to the northeast of the aerodrome	<iwxxm-us:Sector> <iwxxm-us:extremeCCWDirection uom="deg">22.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCCWDistance uom="[mi_i]">10</iwxxm-us:extremeCCWDistance> <iwxxm-us:extremeCWDirection uom="deg">67.5</iwxxm-us:extremeCWDirection> <iwxxm-us:extremeCWDistance uom="[mi_i]">10</iwxxm-us:extremeCWDistance> </iwxxm-us:Sector>
Phenomenon observed 15	<iwxxm-us:Sector>

SAMPLE INSTANCES	
Description	XML Fragment
statute miles south to 8 statute miles west of the aerodrome	<pre> <iwxxm-us:extremeCCWDirection uom="deg">157.5</iwxxm-us:extremeCCWDirection> <iwxxm-us:extremeCCWDistance uom="[mi_i]">15</iwxxm-us:extremeCCWDistance> <iwxxm-us:extremeCWDDirection uom="deg">292.5</iwxxm-us:extremeCWDDirection> <iwxxm-us:extremeCWDDistance uom="[mi_i]">8</iwxxm-us:extremeCWDDistance> </iwxxm-us:Sector> </pre>

SectorVisibility

Class «DataType»

A UML data type containing elements for reporting sector visibility when it differs from the prevailing visibility by one or more reportable values and either the prevailing or the sector visibility is less than 3 miles. This UML type is transformed into XML as a complex type, SectorVisibility.

The SectorVisibility complex type appears in the <iwxxm:AerodromeHorizontalVisibility> extension element when the reported sector visibility does **not** meet the criteria for using the element <iwxxm:minimumVisibility>. Please refer to ICAO Annex 3 / WMO No. 49-2 Section 4.2.4.4a for the criteria for minimum visibility reporting.

Created: 7/5/2019
Last modified: 12/22/2022

ATTRIBUTES
<p>visibility: Distance type</p> <p>Horizontal visibility in this sector</p>
<p>direction: Angle type</p> <p>The sector's mid-point direction as expressed in degrees from true north.</p>
<p>belowSensorMinimum: Boolean type</p> <p>Multiplicity: [0..1]</p> <p>If visibility in this sector is less than the nearest visual reference for distance or below sensors' minimum, this attribute shall be set to true.</p>

SAMPLE INSTANCES	
Description	XML Fragment
Observer reports 1200 meter visibility northeast of the aerodrome	<pre><iwxxm-us:SectorVisibility> <iwxxm-us:visibility uom="m">1200</iwxxm-us:visibility> <iwxxm-us:direction uom="deg">45</iwxxm-us:direction> </iwxxm-us:SectorVisibility></pre>



SensorLocation

Class «DataType»

A UML data type containing elements for recording the location of secondary suite of visibility and/or ceiling sensors. This UML type is transformed into XML as a complex type, SensorLocation.

The SensorLocation complex type may appear in the <iwxxm:METAR>, <iwxxm:SPECI> or the <iwxxm:MeteorologicalAerodromeObservation> extension elements.

Created: 1/28/2019
Last modified: 12/22/2022

ATTRIBUTES	
<p> description: <code>CharacterString</code> type Multiplicity: [0..1]</p> <p>Concise description of the secondary sensor location. Intended use is for further elucidation in conjunction with other attributes, e.g. 'Adjacent to runway touch down zone'. Alternatively, it can be used by itself if the sensor's location cannot be indicated with the other attributes of this data type.</p>	
<p> geoLocation: <code>GM_Point</code> type Multiplicity: [0..1]</p> <p>Geo-spatial location of secondary sensor(s).</p>	

SAMPLE INSTANCES	
Description	XML Fragment
Sensor at Runway 14C Touchdown Zone	<pre><iwxxm-us:SensorLocation> <iwxxm-us:description>RUNWAY 14C TDZ</iwxxm-us:description> </iwxxm-us:SensorLocation></pre>
Sensor adjacent to Runway 01L with latitude/longitude provided	<pre><iwxxm-us:SensorLocation> <iwxxm-us:description>RUNWAY 01L TDZ</iwxxm-us:description> <iwxxm-us:geoLocation> <gml:Point srsDimension="2" srsName="http://www.opengis.net/def/crs/EPSSG/0/4326" axisLabels="Lat Long" gml:id="uuid.f53add31-4a00-46a8-8aaa-ff76042c35e7"> <gml:pos>38.94807 -77.47624</gml:pos> </gml:Point> </iwxxm-us:geoLocation> </iwxxm-us:SensorLocation></pre>



SnowIncrease

Class «DataType»

A UML data type containing elements to report the snow depth increases by 1 inch per hour or more, in the past hour. Additionally, the total snow depth on the ground is provided. This UML type is transformed into XML as a complex type, SnowIncrease.

The SnowIncrease complex type may appear in the <iwxxm:MetereologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> snowDepthIncrease: ProcessedProperty type</p> <p>Measured increased in snow depth during the past hour.</p> <p>Properties: sequenceNumber = 1</p>
<p> snowDepth: LengthWithNilReason type</p> <p>Snow depth on the ground.</p> <p>Properties: nillable = true sequenceNumber = 2</p>

SAMPLE INSTANCES	
Description	XML Fragment
Observer reports 11 inches of snow on the ground with 2 inch accumulation in the preceding hour.	<pre><SnowIncrease> <snowDepthIncrease> <ProcessedProperty> <processedWeatherElement xlink:href="https://codes.nws.noaa.gov/FMH-1/StatisticallyProcessedWeatherElement/SNOW"/> <valueType xlink:href="http://codes.wmo.int/grib2/codeflag/4.10/1"/> <valuePeriod>PT1H</valuePeriod> <processedValue uom="[in_i]">2</processedValue> </ProcessedProperty> </snowDepthIncrease> <snowDepth uom="[in_i]">11</snowDepth> </SnowIncrease></pre>
Observer reports snowfall rate of 1 inch per hour but does not provide snow depth	<pre><SnowIncrease> <snowDepthIncrease> <ProcessedProperty> <processedWeatherElement xlink:href="https://codes.nws.noaa.gov/FMH-1/StatisticallyProcessedWeatherElement/SNOW"/> <valueType xlink:href="http://codes.wmo.int/grib2/codeflag/4.10/1"/> <valuePeriod>PT1H</valuePeriod> <processedValue uom="[in_i]">1</processedValue> </ProcessedProperty> </snowDepthIncrease> <snowDepth uom="N/A" nilReason="missing" xsi:nil="true"/> </SnowIncrease></pre>

ProcessedProperty

Class «DataType»

A UML data type containing elements for reporting statistically processed quantities such as maximum/minimum temperatures, precipitation amounts over a duration, etc. This UML type is transformed into XML as a complex type, ProcessedProperty.

The ProcessedProperty complex type may appear in the <iwxxm:MetereologicalAerodromeObservation> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES	
<p>◆ processedWeatherElement: StatisticallyProcessedWeatherElements type</p> <p>The meteorological parameter subjected to the statistical procedure.</p> <p>Properties: sequenceNumber = 1</p>	
<p>◆ valueType: StatisticalFunctionType type</p> <p>Type of extreme value, e.g., minimum or maximum.</p> <p>Properties: sequenceNumber = 2</p>	
<p>◆ valuePeriod: duration type</p> <p>The time duration of the set of values that the statistical processing was applied.</p> <p>Properties: sequenceNumber = 3</p>	
<p>◆ qualifier: RelationalOperator type</p> <p>Multiplicity: [0..1]</p> <p>If the measurement system specification(s) for the processed quantity is exceeded, i.e., ABOVE or BELOW.</p> <p>Properties: sequenceNumber = 4</p>	
<p>◆ processedValue: MeasureWithNilReason type</p> <p>The measured value of the meteorological parameter.</p> <p>Properties: nillable = true sequenceNumber = 5</p>	

SAMPLE INSTANCES	
Description	XML Fragment
Sensor reports 0.02" of ice	<ProcessedProperty>

SAMPLE INSTANCES	
Description	XML Fragment
accumulation in the past hour	<pre> <processedWeatherElement xlink:href="https://codes.nws.noaa.gov/FMH-1/StatisticallyProcessedWeatherElement/ICE"/> <valueType xlink:href="http://codes.wmo.int/grib2/codeflag/4.10/1"/> <valuePeriod>PT1H</valuePeriod> <processedValue uom="[in_i]">0.02</processedValue> </ProcessedProperty> </pre>
Rain gauge reports less than 0.01" of precipitation in the past hour	<pre> <ProcessedProperty> <processedWeatherElement xlink:href="https://codes.nws.noaa.gov/FMH-1/StatisticallyProcessedWeatherElement/PRECIPITATION"/> <valueType xlink:href="http://codes.wmo.int/grib2/codeflag/4.10/1"/> <valuePeriod>PT1H</valuePeriod> <qualifier>BELOW</qualifier> <processedValue uom="[in_i]">0.01</processedValue> </ProcessedProperty> </pre>
Observing system reports 0.35" of precipitation in the last 3 hour period	<pre> <ProcessedProperty> <processedWeatherElement xlink:href="https://codes.nws.noaa.gov/FMH-1/StatisticallyProcessedWeatherElement/PRECIPITATION"/> <valueType xlink:href="http://codes.wmo.int/grib2/codeflag/4.10/1"/> <valuePeriod>PT3H</valuePeriod> <processedValue uom="[in_i]">0.35</processedValue> </ProcessedProperty> </pre>

TowerVisibility


Class «DataType»

A UML data type containing elements to report tower visibility when controller cab visibility differs markedly from surface visibility and may affect airport operation. This UML type is transformed into XML as a complex type, TowerVisibility.

The TowerVisibility complex type may appear in the <iwxxm:AerodromeHorizontalVisibility> extension element.

Created: 7/5/2018
Last modified: 12/22/2022

ATTRIBUTES

 towerVisibility: **Distance** type

Horizontal or slant visibility from the aerodrome air traffic control tower.

 lessThan: **Boolean** type
Multiplicity: [0..1]

To indicate visibility less than the nearest visibility marker.

SAMPLE INSTANCES

Description	XML Fragment
Tower visibility of 400 meters	<pre><iwxxm-us: TowerVisibility> <iwxxm-us: towerVisibility uom="m">400</iwxxm-us: towerVisibility> </iwxxm-us: TowerVisibility></pre>
Tower visibility less than 50 meters	<pre><iwxxm-us: TowerVisibility> <iwxxm-us: towerVisibility uom="m">50</iwxxm-us: towerVisibility> <iwxxm-us: lessThan>true</iwxxm-us: lessThan> </iwxxm-us: TowerVisibility></pre>

VariableCeilingHeight



Class «DataType»

A UML data type containing elements to report variable ceiling height when the height varies significantly during the sampling period of the report. This UML type is transformed into XML as a complex type, VariableCeilingHeight.

The variability is considered significant if the ceiling height is: less than 1000 feet and varies more than 200 feet; or height is between 1000 and 2000 feet and varies more than 400 feet; or height is between 2000 and 3000 feet and varies more than 500 feet.

The VariableCeilingHeight complex type may appear in the <iwxxm:CloudLayer> extension element.

Created: 7/6/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> minimumHeight: Distance type</p> <p>Minimum ceiling height observed during sampling period</p> <p>Properties: sequenceNumber = 1</p>
<p> maximumHeight: Distance type</p> <p>Maximum ceiling height observed during sampling period</p> <p>Properties: sequenceNumber = 2</p>

SAMPLE INSTANCES	
Description	XML Fragment
Cloud base heights varying from 300 to 800 feet	<pre><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></pre>



VariableSkyCondition

Class «DataType»

A UML data type containing elements for reporting sky cover if it changes by one or more reportable values during the evaluation period. This UML type is transformed into XML as a complex type, VariableSkyCondition.

The VariableSkyCondition complex type may appear in the <iwxxm:CloudLayer> extension element.

Created: 7/6/2018
Last modified: 12/22/2022

ATTRIBUTES
<p> firstSkyCoverValue: CloudAmountReportedAtAerodrome type</p> <p>The first of the operationally significant sky cover condition.</p> <p>Properties: sequenceNumber = 1</p>
<p> secondSkyCoverValue: CloudAmountReportedAtAerodrome type</p> <p>The second of the operationally significant sky cover condition.</p> <p>Properties: sequenceNumber = 2</p>

SAMPLE INSTANCES	
Description	XML Fragment
Cloud layer that is varying between broken and overcast.	<pre><iwxxm-us:VariableSkyCondition> <iwxxm-us:firstSkyCoverValue xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/BKN"/> <iwxxm-us:secondSkyCoverValue xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/OVC"/> </iwxxm-us:VariableSkyCondition></pre>




VariableVisibility

Class «DataType»

A UML data type containing elements to report variable prevailing visibility if the prevailing visibility is less than 3 miles and rapidly increases or decreases by 1/2 statute mile or more during the time of observation. This UML type is transformed into XML as a complex type, VariableVisibility.

The VariableVisibility complex type may appear in the <iwxxm:AerodromeHorizontalVisibility> extension element.

Created: 7/6/2018
 Last modified: 12/22/2022

ATTRIBUTES
<p> minimumVisibility: Distance type</p> <p>The lower bound value of the prevailing visibility during the sampling period.</p> <p>Properties: sequenceNumber = 1</p>
<p> maximumVisibility: Distance type</p> <p>The upper bound value of the prevailing visibility during the sampling period.</p> <p>Properties: sequenceNumber = 2</p>
<p> belowMinimum: Boolean type</p> <p>If minimum visibility is below sensor limitations or, for the human observer, the nearest reference point, this attribute shall be set to true.</p> <p>Properties: xsdAsAttribute = true</p>

SAMPLE INSTANCES	
Description	XML Fragment
Visibility varying between 1600 and 4800 meters	<pre><iwxxm-us:VariableVisibility> <iwxxm-us:minimumVisibility uom="m">1600</iwxxm-us:minimumVisibility> <iwxxm-us:maximumVisibility uom="m">4800</iwxxm-us:maximumVisibility> </iwxxm-us:VariableVisibility></pre>
Visibility varying between less than 100 meters to 300 meters	<pre><iwxxm-us:VariableVisibility belowMinimum="true"> <iwxxm-us:minimumVisibility uom="m">100</iwxxm-us:minimumVisibility> <iwxxm-us:maximumVisibility uom="m">300</iwxxm-us:maximumVisibility> </iwxxm-us:VariableVisibility></pre>

VisuallyObservablePhenomena

Class «DataType»

A UML data type containing elements to report visual information of the environment, which may affect aircraft safety, or navigability of airspace surrounding the aerodrome. This UML type is transformed into XML as a complex type, VisuallyObservablePhenomena.

The VisuallyObservablePhenomena complex type may appear in the <iwxxm:MeteorologicalAerodromeObservation> extension element.

Created: 7/3/2018
Last modified: 12/22/2022

ATTRIBUTES
<p>⚡ lightning: ObservedLightning type Multiplicity: [0..4]</p> <p>Report of sensed or observed lightning activity surrounding or occurring at the observing site. See bookmark.</p> <p>Properties: sequenceNumber = 1</p>
<p>⚡ convection: ConvectiveCloudLocation type Multiplicity: [0..8]</p> <p>Report of observed convective clouds or convection surrounding or occurring at the observing site. See bookmark.</p> <p>Properties: sequenceNumber = 2</p>
<p>⚡ characterOfTheSky: CharacterOfTheSky type Multiplicity: [0..1]</p> <p>Report of cloud types at low-, mid- and high-levels surrounding the observing site. See bookmark.</p> <p>Properties: sequenceNumber = 3</p>
<p>⚡ obscuration: Obscurations type Multiplicity: [0..*]</p> <p>Report of obscuring phenomenon at the observing site. See bookmark.</p> <p>Properties: sequenceNumber = 4</p>

CloudTypes

Class «CodeList»

The WMO International Cloud Atlas.

Created: 7/5/2018
Last modified: 12/22/2022

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.wmo.int/bufr4/codeflag/0-20-012

ConvectiveCloudTypes

Class «CodeList»

List of convective cloud types which may affect the safety and navigability of aircraft surrounding the aerodrome.

Created: 6/4/2019
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/ConvectiveCloudType

LightningFrequency

Class «CodeList»

List of qualifiers for lightning frequency.

Created: 7/6/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/LightningFrequency

LightningType

Class «CodeList»

List of lightning phenomena.

Created: 7/6/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/LightningType

MeteorologicalSensors

Class «CodeList»

List of specialized equipment/sensors for recording or observing meteorological phenomena.

Created: 12/14/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/Sensor

ObservingSystemType

Class «CodeList»

List of commonly situated meteorological observation platforms.

Created: 12/14/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/ObservingSystemType

PressureChangingRapidly

Class «CodeList»

An enumeration of falling or rising.

Created: 7/5/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/PressureChangingRapidly

PressureTendencyCharacteristic

Class «CodeList»

A list of the 3-hourly pressure tendency groups.

Created: 7/5/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.wmo.int/bufr4/codeflag/0-10-063

QualitativeDistance

Class «CodeList»

For phenomena of, or associated with, a convective nature such as cumulonimbus clouds or lightning, a list of distance qualifiers.

Created: 7/6/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/QualitativeDistance

StatisticalFunctionType

Class «CodeList»

A list of statistical functions.

Created: 7/5/2018
Last modified: 3/20/2021

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.wmo.int/grib2/codeflag/4.10

StatisticallyProcessedWeatherElements

Class «CodeList»

List of weather parameters that are statistically processed in the report.

Created: 7/5/2018
Last modified: 7/6/2018

CODE LIST ATTRIBUTES	
asDictionary	true
extensibility	none
vocabulary	https://codes.nws.noaa.gov/FMH-1/StatisticallyProcessedWeatherElement

Glossary of Externally Defined Data Types

UML Name	XML Data Type
Angle	gml:AngleType
Boolean	xsd:boolean
boolean	xsd:boolean
CharacterString	xsd:string
Distance	gml:LengthType
duration	xsd:duration
GM_LineString	gml:LineStringSegmentType
GM_Point	gml:PointPropertyType
GM_Reference	gml:ReferenceType
Length	gml:LengthType
Measure	gml:Measure
TM_Instant	gml:TimeInstantPropertyType
TM_Period	gml:TimePeriodPropertyType
TM_Primitive	gml:TimePrimitivePropertyType
Velocity	gml:SpeedType