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TimeseriesML 1.3 – XML Encoding of the Timeseries Profile of Observations and Measurements



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**i. Abstract**

TimeseriesML 1.3 defines an XML encoding that implements the OGC Timeseries Profile of Observations and Measurements, with the intent of allowing the exchange of such data sets across information systems. Through the use of existing OGC standards, it aims at being an interoperable exchange format that may be re-used to address a range of data exchange requirements.

**ii. Keywords**

The following are keywords to be used by search engines and document catalogues.

Timeseries, Observations, Exchange, Interoperability, OGC, TimeseriesML, XML, GML

**iii. Preface**

This standard is an XML implementation of the conceptual model defined in OGC Timeseries Profile of Observations and Measurements. This standard has been developed from work initially undertaken within OGC WaterML 2.0: Part 1 – Timeseries.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium shall not be held responsible for identifying any or all such patent rights.

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**iv. Security Considerations**

This standard includes no explicit security considerations.

**v.** **Submitting Organizations**

The following organizations submitted this Document to the Open Geospatial Consortium Inc.

* Australian Bureau of Meteorology
* Met Office
* Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO)
* Landcare Research
* Météo-France
* KISTERS AG

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**1. Scope**

This document is an OGC® Implementation Standard for the representation of the Timeseries Profile of Observations and Measurements as XML. TimeseriesML 1.3 is implemented as an application schema of the Geography Markup Language version 3.3, making use of the OGC Observations & Measurements standards. TimeseriesML 1.3 is designed as an extensible schema to allow encoding of data to be used in a variety of exchange scenarios. Example areas of usage are: cross-border exchange of observational data; release of data for public dissemination; enhancing disaster management through data exchange; and exchange in support of national reporting. The core aspect of the Timeseries Profile of Observations and Measurements is the correct, precise description of timeseries. This document defines an implementation of this profile.

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**2. Conformance**

This standard defines an XML encoding standard for the OGC Timeseries Profile of Observations and Measurements.

Conformance with this standard shall be checked using all the relevant tests specified in Annex A (normative) of this document. The framework, concepts, and methodology for testing, and the criteria to be achieved to claim conformance are specified in the OGC Compliance Testing Policies and Procedures and the OGC Compliance Testing web site1.

In order to conform to this OGC™ interface standard, a software implementation shall choose to implement:

1. Any one of the conformance classes specified in Annex A (normative).

All requirements-classes and conformance-classes described in this document are owned by the standard(s) identified.

**3. References**

The following normative documents contain provisions that, through reference in this text, constitute provisions of this document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

OGC 15-043 – Timeseries Profile of Observations and Measurements

OGC 08-131r3 – The Specification Model – A Standard for Modular Specification

ISO 19103:2005 – Conceptual Schema Language

ISO 19108:2002 – Geographic information – Temporal schema

ISO 19109:2005 – Geographic information – Rules for application schema

ISO 8601- Data elements and interchange formats – Information interchange – Representation of dates and times

OGC Abstract Specification Topic 20 – Observations and Measurements (OGC Document   
 10-004r3, aka ISO 19156:2011)

OGC Abstract Specification Topic 2 – Spatial Referencing by Coordinates (aka ISO 19111:2007)

OGC Abstract Specification Topic 6 – Schema for Coverage geometry and functions (OGC Document 07-011, aka ISO 19123:2005)

1. [www.opengeospatial.org/cite](http://www.opengeospatial.org/cite)

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OGC Abstract Specification Topic 11 – Geographic information — Metadata (aka ISO 19115:2003)

OGC 07-036 Geography Markup Language (aka ISO 19136:2007)

OGC WaterML2.0 part 1 – timeseries. OGC 10-126r4. [www.opengis.net/standards/waterml](http://www.opengis.net/standards/waterml)

OGC Observations and Measurements v2.0 OGC Document 10-004r1 <http://www.opengis.net/doc/AS/Topic20>(also published as ISO/DIS 19156:2010, Geographic information— Observations and Measurements)

OGC SWE Common Data Model Encoding Standard v2.0 OGC Document 08-094r1 <http://www.opengis.net/doc/IS/SWECommon/2.0>

Unified Code for Units of Measure (UCUM) – Version 1.8, July 2009

Unified Modeling Language (UML). Version 2.3. May 2010.

Extensible Markup Language (XML) – Version 1.0 (Fourth Edition), August 2006

XML Schema – Version 1.0 (Second Edition), October 2004

**4. Terms and Definitions**

This document uses the terms defined in Sub-clause 5.3 of [OGC 06-121r8], which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this standard.

For the purpose of this document, the following additional terms and definitions apply:

**Coverage**

Feature that acts as a function to return values from its range for any direct position within its spatial, temporal or spatiotemporal domain

[ISO 19123:2005, definition 4.17]

**Domain Feature**

Feature of a type defined within a particular application domain

[ISO 19156, definition 4.4]

**Feature**

Abstraction of real-world phenomena

[ISO 19101:2002, definition 4.11]

**Observation**

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Act of observing a property

[ISO 19156, definition 4.10]

**Observation Procedure**

Method, algorithm or instrument, or system of these which may be used in making an observation

[ISO19156, definition 4.11]

**Property <General Feature Model>**

Facet or attribute of an object referenced by a name

EXAMPLE: Abby’s car has the colour red where “colour red” is a property of the car instance

**Sampling Feature**

Feature, such as a station, transect, section or specimen, which is involved in making observations concerning a domain feature

[ISO19156, definition 4.16]

**Sensor**

Type of observation procedure that provides the estimated value of an observed property at its output

*Note: A sensor uses a combination of physical, chemical or biological means in order to estimate the underlying observed property. At the end of the measuring chain electronic devices often produce signals to be processed*

[OGC SWE Common 2.0, definition 4.5.]

**Timeseries**

A sequence of data values which are ordered in time. The sequence typically records (or predicts) the value of a property of a feature over a time interval, with interim values at times within the interval. These times are monotonic and are often, but not always, at regular intervals (e.g. an hourly timeseries).

**5. Conventions**

**5.1 Abbreviated Terms**

In this document the following abbreviations and acronyms are used or introduced:

ISO

International Organization for Standardization

O&M

Observations and Measurements

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OGC

Open Geospatial Consortium

SensorML

Sensor Model Language

SWE

Sensor Web Enablement

TSML

TimeseriesML

TVP

Time-Value Pair

UML

Unified Modeling Language

UTC

Coordinated Universal Time

XML

Extensible Markup Language

**5.2 UML Notation**

The diagrams that appear in this standard are presented using the Unified Modeling Language (UML) static structure diagram.

**Note:** Within the context of this profile, the following colour scheme is used to identify thepackage in which the class exists. This is just for informative purposes.

Blue: Defined within the Timeseries Profile of O&M (conceptual model)

Yellow: Defined within this standard (XML implementation model)

Green: ISO19156 – Observations & Measurements

Red: Other (ISO or GML)

**5.3 Finding Requirements and Recommendations**

This standard is identified as [http://www.opengis.net/spec/timeseriesml/1.3.](http://www.opengis.net/spec/timeseriesml/1.2) For clarity, each normative statement in this standard is in one and only one place and defined within a requirements class table and identified with a URI, whose root is the specification URI. In this

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standard, all requirements are associated to tests in the abstract test suite in Annex A using the URL of the requirement as the reference identifier.

Requirements classes are separated into their own clauses and named, and specified according to inheritance (direct dependencies). The Conformance test classes in the test suite are similarly named to establish an explicit and mnemonic link between requirements classes and conformance test classes.

**6. XML Implementation (normative)**

In addition to the UML conceptual model this standard defines a GML XML Schema implementation that is compliant to the UML conceptual model. The XML Schemas for this implementation are published at:

[http://schemas.opengis.net/tsml/1.3/](http://schemas.opengis.net/timeseriesml/1.2/)

Schematron patterns are implemented for some requirements where appropriate and are published at the same location.

**6.1 XML encoding principles**

The following principles apply to data encoded according to the TimeseriesML 1.3 XML schema.

**6.1.1 Conformance to GML 3.3 encoding rules for codelists**

This XML Schema implementation imports the OGC GML 3.2.1 schemas. However codelists are implemented according to the clarified rules for codelists in the OGC GML 3.3 specification. Namely that items in codelists are referred to using gml:ReferenceType and not encoded with gml:CodeType.

None of the GML 3.3 schema types are used in this implementation and therefore only GML 3.2.1 schemas are imported by the TimeseriesML 1.3 XML schemas. This is consistent with the note in the GML 3.3 specification which reads: *A GML application schema conforming to this* *standard will import the GML 3.2 schema plus zero or more additional GML 3.3 schemas as needed.*

**6.1.2 Extends the OGC Implementation Schema for Coverages**

The TimeseriesML schema supports both an interleaved time-value pair encoding and a domain, range encoding. The domain, range encoding inherits from the coverage schema defined in the OGC Implementation Schema for Coverages (09-146r2). The interleaved timeseries encoding is a representation of a special case of the CV\_DiscreteCoverage class from OGC Abstract Specification Topic 6, in which each GeometryValuePair has a ‘geometry’ which is a timestamp, and a ‘value’ which is a measure or other simple datatype. The OGC CIS v1.1 specification provides alternative representations of coverages, including an option for interleaving coverages, which can be useful for timeseries of more complex values.

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**6.1.3 Virtual typing**

In accordance with OMXML, the specialisation of the OM\_Observation result type is provided through schematron restriction. The om:type element may be used to specify the type of OM\_Observation that is being encoded. This shall be done using the OGC Name URI for the corresponding type from the following table.

**Table 1 - O&M URIs for observation specialisations**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TimeseriesML 1.3** |  | **OGC Name** | | | | | | | | | | **Content of om:result in** |  |
|  |  |  |  |  |  |  |  |  |  |  |  | **TimeseriesML 1.2 XML1** |  |
| MeasurementTimeseriesTVPObservation | [http://www.opengis.](http://www.opengis.net/def/observationType/timeseriesML/1.0/MeasurementTimeseriesTVPObservation) | | | | | | | | | | | type= |  |
|  | [net/def/observationT](http://www.opengis.net/def/observationType/timeseriesML/1.0/MeasurementTimeseriesTVPObservation) | | | | |  |  |  |  |  |  | ’tsml:Timeseries' |  |
|  | [ype/timeseriesML/1.](http://www.opengis.net/def/observationType/timeseriesML/1.0/MeasurementTimeseriesTVPObservation) | | | | | | | | | | |  |
|  |  |  |
|  | [3/MeasurementTime](http://www.opengis.net/def/observationType/timeseriesML/1.0/MeasurementTimeseriesTVPObservation) | | | | | | |  |  |  |  | result.value = |  |
|  | [seriesTVPObservatio](http://www.opengis.net/def/observationType/timeseriesML/1.0/MeasurementTimeseriesTVPObservation) | | | | | | | | | |  |  |
|  |  | 'tsml:MeasurementTVP' |  |
|  | [n](http://www.opengis.net/def/observationType/timeseriesML/1.0/MeasurementTimeseriesTVPObservation) |  | | | | | | | | | |  |
|  |  |  |
|  |  | |  |  |  | | | | |  | |  |  |
| CategoricalTimeseriesTVPObservation | [http://www.opengis.](http://www.opengis.net/def/observationType/timeseriesML/1.0/CategoricalTimeseriesTVPObservation) | | | | | | | | | | | type= |  |
|  | [net/def/observationT](http://www.opengis.net/def/observationType/timeseriesML/1.0/CategoricalTimeseriesTVPObservation) | | | | |  |  | |  |  | | ’tsml:Timeseries’ |  |
|  | [ype/timeseriesML/1.](http://www.opengis.net/def/observationType/timeseriesML/1.0/CategoricalTimeseriesTVPObservation) | | | | | | | | | | |  |
|  |  |  |
|  | [3/CategoricalTimese](http://www.opengis.net/def/observationType/timeseriesML/1.0/CategoricalTimeseriesTVPObservation) | | | | | | |  | |  | | result.value = |  |
|  | [riesTVPObservation](http://www.opengis.net/def/observationType/timeseriesML/1.0/CategoricalTimeseriesTVPObservation) | | | | | |  |  |  |  |  |  |
|  |  | | |  | | 'tsml:CategoricalTVP' |  |
|  |  | |  |  |  | |  |
|  |  | |  | | | | | | |  | |  |  |
| MeasurementTimeseriesDomainRangeObservation | http://www.opengis. | | | | | | | | | | | type= |  |
|  | net/def/observationT | | | | |  | | |  |  | | ’tsml:TimeseriesDomainRange’ |  |
|  | ype/timeseriesML/1. | | | | | | | | | | |  |
|  |  |  |
|  | 3/MeasurementTime | | | | | | |  | |  | |  |  |
|  | seriesDomainRange | | | | | | | |  |  | |  |  |
|  | Observation | | |  |  | | | | |  | |  |  |
|  |  | | | | | | | | | | |  |  |
| CategoricalTimeseriesDomainRangeObservation | http://www.opengis. | | | | | | | | | | | type= |  |
|  | net/def/observationT | | | | |  | | |  |  | | ’tsml:TimeseriesDomainRange’ |  |
|  | ype/timeseriesML/1. | | | | | | | | | | |  |
|  |  |  |
|  | 3/CategoricalTimese | | | | | | |  | |  | |  |  |
|  | riesDomainRangeOb | | | | | | | |  |  | |  |  |
|  | servation | | | | | | | | |  | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Likewise, a *tsml:type* property is present on the TimeseriesDomainRange type to enable a soft-typing approach to this class. The values for this property should be taken from [Table 2.](#page14)

**Table 2 - TimeseriesML URIs for TimeseriesDomainRange specialisations**

|  |  |
| --- | --- |
| **Timeseries Profile of O&M Type** | **tsml:type value in tsml:TimeseriesDomainRange** |

MeasurementTimeseriesDomainRangeTimeseries [http://www.opengis.net/def/timeseriesType/timeseriesML/1.3/Tim](http://www.opengis.net/def/timeseriesType/timeseriesML/1.0/Time/MeasurementTimeseriesDomainRange) [e/MeasurementTimeseriesDomainRange](http://www.opengis.net/def/timeseriesType/timeseriesML/1.0/Time/MeasurementTimeseriesDomainRange)

CategoricalTimeseriesDomainRangeTimeseries [http://www.opengis.net/def/timeseriesType/timeseriesML/1.3/Tim](http://www.opengis.net/def/timeseriesType/timeseriesML/1.0/Time/CategoricalTimeseriesDomainRange) [e/CategoricalTimeseriesDomainRange](http://www.opengis.net/def/timeseriesType/timeseriesML/1.0/Time/CategoricalTimeseriesDomainRange)

**6.1.4 Efficiency of encoding**

This XML Schema implementation takes the approach that, where conceptual classes can be combined without loss of clarity, they are. For example, the same metadata classes are used for both Categorical and Measurement timeseries. This is to avoid a proliferation of similar classes in the XML encoding.

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The following table outlines the mapping between the conceptual model and the XML Schema implementation.

**Table 3 - Mapping of Timeseries Profile of Observations and Measurments toTimeseriesML 1.3 XML Schema types.**

|  |  |
| --- | --- |
| **Timeseries Profile of Observations and Measurements** | **TimeseriesML 1.3 XML** |
|  |  |
| Collection | tsml:Collection |
|  |  |
| DocumentMetadata | tsml:DocumentMetadata |
|  |  |
| CategoricalTimeseriesTVPObservation | om:OM\_Observation\* |
|  |  |
| MeasurementTimeseriesTVPObservation |  |
|  |  |
| CategoricalTimeseriesDomainRangeObservation |  |
|  |  |
| MeasurementTimeseriesDomainRangeObservation |  |
|  |  |
| TimeseriesTVP | tsml:TimeseriesTVP |
|  |  |
| MeasurementTimeseriesTVP |  |
|  |  |
| CategoricalTimeseriesTVP |  |
|  |  |
| TimeseriesDomainRange | tsml:TimeseriesDomainRange |
|  |  |
| MeasurementTimeseriesDomainRange |  |
|  |  |
| CategoricalTimeseriesDomainRange |  |
|  |  |
| PointMetadata | tsml:PointMetadata |
|  |  |
| MeasurementPointMetadata |  |
|  |  |
| CategoricalPointMetadata |  |
|  |  |
| TimeValuePair | tsml:TimeValuePair (abstract) |
|  |  |
| MeasureTimeValuePair | tsml:MeasurementTVP |
|  |  |
| CategoricalTimeValuePair | tsml:CategoricalTVP |
|  |  |
| ObservationProcess | tsml:ObservationProcess |
|  |  |
| MonitoringFeature | tsml:MonitoringFeature |
|  |  |

\* The specialisation of OM\_Observation is provided through Schematron rather than a specialised XML type.

**6.1.5 Abstract requirements and conformances classes**

As noted in the OGC Modular Specification section 6.2, the tests for abstract conformance classes may need to be described in the subclass classes if the base requirements classes are ambiguous for the abstract class. This is the case for the two styles of timeseries conformance classes, domain-range and interleaved (time-value pair). Some requirements for these classes are re-specified in more concrete terms to allow more explicit testing.

**6.2 XML Examples**

XML examples are published alongside the XML schemas at http://schemas.opengis.net/tsml/1.3/. In all examples, the following namespaces are used:

**Table 4 - XML Example Code Namespaces**

Identifier Namespace URL



xsi <http://www.w3.org/2001/XMLSchema-instance>

Gml <http://www.opengis.net/gml/3.2>



Om <http://www.opengis.net/om/2.0>

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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | xlink | <http://www.w3.org/1999/xlink> | | | | | | |
|  |  |  |  |  |  |  |  |  |
|  | tsml | <http://www.opengis.net/timeseriesml/1.0> | | | | |  | |
|  | gmd | <http://www.isotc211.org/2005/gmd> | | |  | | | |
|  |  |  | |  | |  | |  |
|  | gco | <http://www.isotc211.org/2005/gco> | |  | | | | |
|  | sam | <http://www.opengis.net/sampling/2.0> | | | |  | | |
|  |  |  | | | | | |  |
|  | sams | <http://www.opengis.net/samplingSpatial/2.0> | | | | | | |

**6.3 *Requirements Class*: XML Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | | | | | | | | | | |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-xml-rules) | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Name** | |  | XML Rules | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |
|  | **Dependency** | |  | <http://www.w3.org/TR/xmlschema-2> | | | | |  |  | |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | |  | |  |  |  |  |  |
|  | **Dependency** | |  | <http://standards.iso.org/iso/8601/2004/4> | | | | | |  | |  |  |  |  |  |
|  |  |  |  |  |  |  | |  |
|  |  |  |  |  |  |  |  |  | | | |  |  |  |  |  |
|  | **Dependency** | |  | <http://www.opengis.net/doc/IS/GML/3.2#clause-2.4> | | | | | | | | |  |  |  |  |
|  |  |  |  |  |  |  | | | |  |  |
|  |  |  |  |  |  |  |  |  | | | |  | |  |  |  |
|  | **Dependency** | |  | <http://www.opengis.net/spec/GML/3.3/req/definitions> | | | | | | | | | |  |  |  |
|  |  |  |  |  |  |  | | | |  | |  |
|  |  |  |  |  |  |  |  |  | | | |  | | |  |  |
|  | **Dependency** | |  | <http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components> | | | | | | | | | | |  |  |
|  |  |  |  |  |  |  | | | |  | | |  |
|  |  |  |  |  |  |  |  |  | | | |  | | | |  |
|  | **Requirement** |  |  | /req/xsd-xml-rules/iso8601-time | | |  |  | | | |  | | | |  |
|  |  |  | All date-time elements shall be encoded using ISO8601 extended time format. | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | | | |  | | | |  |
|  | **Requirement** |  |  | /req/xsd-xml-rules/time-zone | |  | |  | | | |  | | | |  |
|  |  |  | The value of each time element (defined in the TimeValuePairType ‘time’ element) shall | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | include a time zone definition using a signed 4 digit character or a ‘Z’ to represent Zulu | | | | | | | | | | | |  |
|  |  |  |  | or Greenwich Mean Time (GMT). This is defined by the following regular expression: | | | | | | | | | | | |  |
|  |  |  |  | (Z|[+-]HH:MM) | | | | | | | | | | | |  |
|  |  | |  |  |  |  | |  | | | |  | | | |  |
|  | **Requirement** |  |  | /req/xsd-xml-rules/unit-of-measure | | | |  | | | |  | | | |  |
|  |  |  | All units of measure shall use the appropriate code from the The Unified Code for Units | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | of Measure (UCUM) code system. The unit of measure shall be identified by encoding | | | | | | | | | | | |  |
|  |  |  |  | the UCUM code1 in the ‘code’ attribute of the tsml:uom element. ------------------------- | | | | | | | | | | | |  |
|  |  |  |  | 1 The UCUM base codes are available in XML form here: | | | | | | | | | | | |  |
|  |  |  |  | [http://unitsofmeasure.org/ucum-essence.xml.](http://aurora.regenstrief.org/~ucum/ucum-essence.xml) | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Requirement** |  |  | /req/xsd-xml-rules/swe-types | |  | | | | | | | | | |  |
|  |  |  | When using the SWE Common types, the following elements shall not be used: | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | swe:quality (*AbstractSimpleComponentType)*, swe:nilValues | | | | | | | | | | | |  |
|  |  |  |  | (*AbstractSimpleComponentType)*, swe:constraint (*QuantityType*, *QuantityRangeType*, | | | | | | | | | | | |  |
|  |  |  |  | *CategoryType*). The attributes ‘*optional’* and ‘*updatable’* from the base type | | | | | | | | | | | |  |
|  |  |  |  | ‘*AbstractDataComponent’* shall also not be used. | | | | | | | | | | | |  |
|  |  | |  |  |  | | | | | | | | | | |  |
|  | **Requirement** |  |  | /rec/xsd-xml-rules/xlink-title |  | | | | | | | | | | |  |
|  |  |  | If an xlink:href is used to reference a controlled vocabulary item, the element should | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | encode the xlink:title attribute with a text description of the referenced item. | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
|  |  |  |  | 16 | | | | | |  |  |  |  |  |  |  |
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**Requirement** /rec/xsd-xml-rules/vocabulary-references

When specifying references to vocabulary (code) items using an xlink:href, a resolvable HTTP URL should be used which, when resolved, should provide suitable description of the concept being referenced.

**Requirement** /rec/xsd-xml-rules/xlink-valid-local-reference

If an xlink:href is a local reference then the referenced element must exist.

**6.3.1 Requirements class overview**

This requirements class contains a set of general rules applicable to the XML encoding.

**6.4 *Requirements Class*: Timeseries Observation**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **Requirements Class** | | | | | | | | | | | | | |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-timeseries-observation](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-timeseries-observation) | | | | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Name** | |  | Timeseries Observation | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/OMXML/2.0/req/observation | | | | | |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | |  |
|  |  |  |  |  |  |  |  |  | | |  |  |  |  |  |  |  |  |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-observation | | | | | | | |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | | |  |  |
|  |  |  |  |  | |  |  |  | | |  | |  |  |  |  |  |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-domain-range-timeseries-](http://www.opengis.net/spec/timeseries/1.0/req/uml-domain-range-timeseries-observation) | | | | | | | | |  |  |  |  |  |  |  |
|  |  | [observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-domain-range-timeseries-observation) |  | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | | |  |  | | |  | | |  |  |  |  |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-domain-range-](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-domain-range-timeseries-observation) | | | | | | | | | |  |  |  |  |  |  |
|  |  | [timeseries-observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-domain-range-timeseries-observation) | | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | |  |  |  | | |  | | | |  |  |  |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-domain-range-](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-domain-range-timeseries-observation) | | | | | | | | | | | | |  |  |  |
|  |  | [timeseries-observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-domain-range-timeseries-observation) | | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | |  |  |  | | |  | | | |  |  | |  |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-tvp-observation | | | | | | | | | | |  |  | |  |  |
|  |  |  | | |  |  | | |  | | | |  |
|  |  |  |  |  | | |  |  | | |  | | | | |  | |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-timeseries-tvp-](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-tvp-observation) | | | | | | | | | | | |  | |  |  |
|  |  | [observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-tvp-observation) |  | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | | |  |  | | |  | | | | | | |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-timeseries-tvp-](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-tvp-observation) | | | | | | | | | | | | | |  |  |
|  |  | [observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-tvp-observation) |  | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | | |  |  | | |  | | | | | | | |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | | | |  | | | | | | | |  |
|  |  |  | | |  |  | | |  |
|  |  |  |  |  |  |  |  |  | | |  | |  |  |  |  |  |  |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-observation/procedure | | |  |  | | | | | | | | | | |  |
|  |  |  | The xml element om:procedure shall contain an element which is a subtype of | | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | OM\_Process, such as tsml:ObservationProcess element, or a subtype of SWE | | | | | | | | | | | | | | |  |
|  |  |  |  | AbstractProcess or a reference to an external definition of the process using the | | | | | | | | | | | | | | |  |
|  |  |  |  | xlink:href attribute. | | | | | | | | | | | | | | |  |
|  |  |  |  |  | | |  |  | | | | | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-observation/phenomenonTime | | | |  | | | | | | | | | | |  |
|  |  |  | The om:phenomenonTime element shall contain a gml:TimePeriod element that | | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | represents the temporal extent of the timeseries result of the observation. | | | | | | | | | | | | | | |  |
|  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Requirement** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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**6.4.1 Requirements class overview**

This requirements class restricts the content model for the XML element OM\_Observation relating specifically to timeseries observations. The requirements classes that depend on this class describe specific result types of time series. The restrictions rules for OM\_Observation are captured in the ‘*xsd-timeseries-observation.sch*’ Schematron file.

**6.5 *Requirements Class*: Timeseries (TVP) Observation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | |  |
|  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-timeseries-tvp-observation](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-timeseries-tvp-observation) | | | | | | |  |
|  |  |  |  |  |  |  |  |
|  | **Name** | |  | Timeseries (TVP) Observation | | |  |
|  |  |  |  |  |  | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp-observation/result |  | |  |
|  |  |  | The xml element om:result shall contain a concrete subelement in the substitution group | | |  |
|  |  |  |  |  |
|  |  |  |  | tsml:TimeseriesTVP. | | |  |
|  |  |  |  |  |  |  |  |

**6.5.1 Requirements class overview**

This requirements class captures the core type of timeseries observation – one with a result of an interleaved time-value pair timeseries. This restriction is defined in the ‘*xsd-timeseries-tvp-observation.sch*’ Schematron file.

**6.6 *Requirements Class*: Categorical Timeseries (TVP) Observation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | |  |
|  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-categorical-timeseries-tvp-observation](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-categorical-timeseries-tvp-observation) | | | | | | |  |
|  |  |  |  |  |  |  |  |
|  | **Name** | |  | Categorical Timeseries (TVP) Observation | | |  |
|  |  |  |  |  |  | |  |
|  | **Requirement** |  |  | /req/xsd-categorical-timeseries-tvp-observation/result |  | |  |
|  |  |  | The xml element om:result shall have a value that matches the content model defined by | | |  |
|  |  |  |  |  |
|  |  |  |  | tsml:CategoricalTVP. | | |  |
|  |  |  |  |  |  |  |  |

**6.6.1 Requirements class overview**

This requirements class restricts the type of timeseries observation to one with a result of an interleaved time-value pair timeseries where each value is a Category. This restriction is defined in the ‘*xsd-categorical-timeseries-tvp-observation.sch*’ Schematron file.

**6.7 *Requirements Class*: Measurement Timeseries (TVP) Observation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | |  |
|  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-measurement-timeseries-tvp-observation](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-measurement-timeseries-tvp-observation) | | | | | | |  |
|  |  |  |  |  |  |  |  |
|  | **Name** | |  | Measurement Timeseries (TVP) Observation | | |  |
|  |  |  |  |  |  | |  |
|  | **Requirement** |  |  | /req/xsd-measurement-timeseries-tvp-observation/result |  | |  |
|  |  |  | The xml element om:result shall have a value that matches the content model defined by | | |  |
|  |  |  |  |  |
|  |  |  |  | tsml:MeasurementTVP. | | |  |
|  |  |  |  |  |  |  |  |
|  |  |  | 18 | |  |  |  |
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**6.7.1 Requirements class overview**

This requirements class restricts the type of timeseries observation to one with a result of an interleaved time-value pair timeseries where each value is a Measure. This restriction is defined in the ‘*xsd-measurement-timeseries-tvp-observation.sch*’ Schematron file.

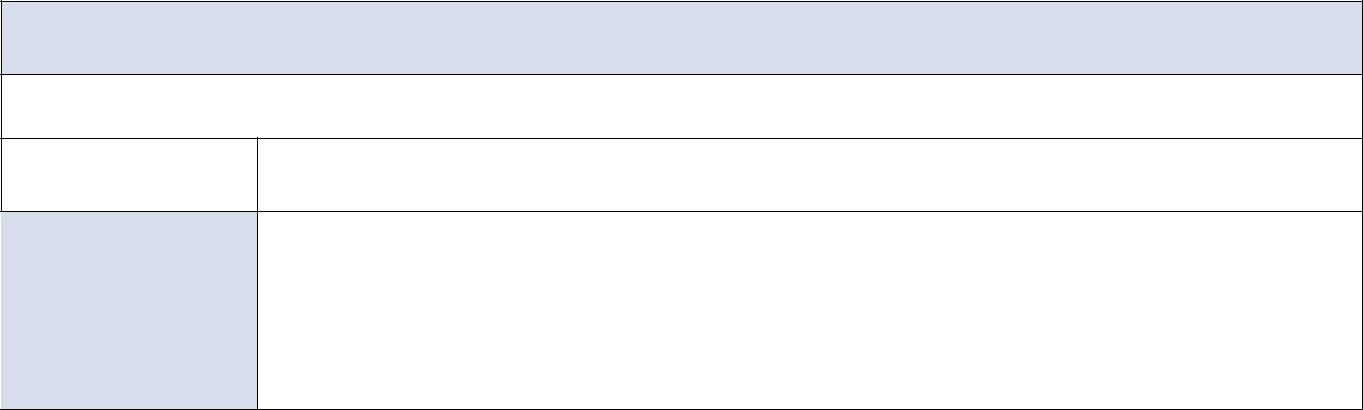
**6.8 *Requirements Class*: Timeseries (Domain Range) Observation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | |  |
|  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-timeseries-domain-range-observation](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-timeseries-domain-range-observation) | | | | | | |  |
|  |  |  |  |  |  |  |  |
|  | **Name** | |  | Timeseries (Domain Range) Observation | | |  |
|  |  |  |  |  |  | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-domain-range-observation/result |  | |  |
|  |  |  | The xml element om:result shall contain a concrete subelement in the substitution group | | |  |
|  |  |  |  |  |
|  |  |  |  | tsml:TimeseriesDomainRange. | | |  |
|  |  |  |  |  |  |  |  |

**6.8.1 Requirements class overview**

This requirements class captures the domain range type of timeseries observation. This restriction is defined in the ‘*xsd-timeseries-domain-range-observation.sch*’ Schematron file.

**6.9 *Requirements Class*: Categorical Timeseries (Domain Range) Observation**



**Requirements Class**

[http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-categorical-timeseries-domain-range-observation](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-categorical-timeseries-domain-range-observation)

|  |  |
| --- | --- |
| **Name** | Categorical Timeseries (Domain Range) Observation |

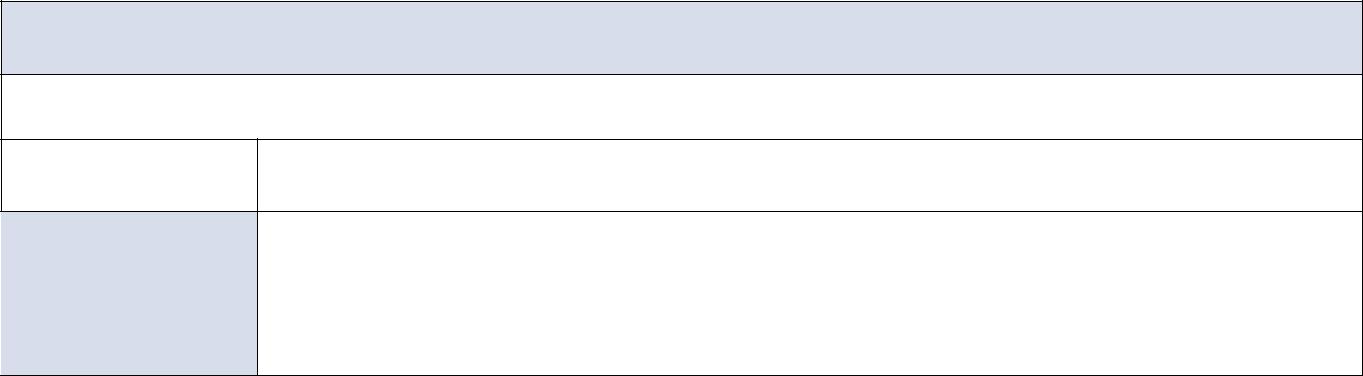
**Requirement** /req/xsd-categorical-timeseries-domain-range-observation/result

The xml element om:result shall contain a concrete subelement in the substitution group tsml:TimeseriesDomainRange with range element values of type Category contained in a (GML) ValueArray

**6.9.1 Requirements class overview**

This requirements class captures the categorical domain range type of timeseries observation.

**6.10 *Requirements Class*: Measurement Timeseries (Domain Range) Observation**



**Requirements Class**

http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-measurement-timeseries-domain-range-observation

|  |  |
| --- | --- |
| **Name** | Measurement Timeseries (Domain Range) Observation |

**Requirement** /req/xsd-measurement-timeseries-domain-range-observation/result

The xml element om:result shall contain a concrete subelement in the substitution group tsml:TimeseriesDomainRange with a rangeset of type QuantityList.

**6.10.1 Requirements class overview**

This requirements class captures the measurement domain range type of timeseries observation.

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**6.11 *Requirements Class*: Timeseries encoded as Time-Value Pairs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | | | | | | | | | | | |  |
|  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-timeseries-tvp](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-timeseries-tvp) | | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Name** | |  | Timeseries encoded as Time-Value Pairs | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |
|  | **Target Type** | |  | XML encoding | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-core](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-core) | | | | | | | | | |  |  |  |  |
|  |  |  |  |  |  |  |  | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  | |  |  | |  |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-tvp](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-tvp) | | | | | | | | |  | |  |  |  |
|  |  |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  |  |  | |  | | |  |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-timeseries-tvp](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-tvp) | | | | | | | | | | |  |  |  |
|  |  |  |  |  |  |  |  | |  | | |  |
|  |  |  |  |  |  |  |  |  |  |  | |  | | | |  |  |
|  | **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-timeseries-tvp](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-tvp) | | | | | | | | | | | |  |  |
|  |  |  |  |  |  |  |  | |  | | | |  |
|  |  |  |  |  |  |  |  |  |  |  | |  | | | | |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | | | | |  | | | | |  |
|  |  |  |  |  |  |  |  | |  |
|  |  |  |  |  |  |  |  |  |  |  | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp/valid |  |  |  |  |  |  | | | | | | |  |
|  |  |  | The content model of this XML element shall have a value that matches the content | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | model defined by tsml:TimeseriesTVP. | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp/time-increasing | | |  |  |  |  | | | | | | |  |
|  |  |  | The domain elements (implemented as the tsml:point element) shall be ordered in | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | increasing time. | | | | | | | | | | | | |  |
|  |  | |  |  | |  |  |  |  |  | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp/record-homogenous | | | |  |  |  | | | | | | |  |
|  |  |  | The type of the tsml:value element (range) shall be the same for each point in the | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | timeseries, with the exception null values which may be used on any value. | | | | | | | | | | | | |  |
|  |  | |  |  | |  | |  |  |  | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp/domain-time | |  | | |  |  | | | | | | |  |
|  |  |  | The domain of the timeseries coverage shall consist only of a temporal component. | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  | |  |  | |  | | |  |  | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp/default-point-metadata | | | | | |  | | | | | | |  |
|  |  |  | If the element defaultPointMetadata is present, the specified metadata elements apply as | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | default values to all subsequent point elements encoded in the timeseries. If a metadata | | | | | | | | | | | | |  |
|  |  |  |  | element is specified for a point then it overrides the default value. For elements with | | | | | | | | | | | | |  |
|  |  |  |  | multiple cardinality (e.g. qualifiers), defaults shall be overridden if a single element is | | | | | | | | | | | | |  |
|  |  |  |  | defined in the metadata. | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  | | | | | | |  |
|  | **Requirement** |  |  | /req/xsd-timeseries-tvp/equidistant-encoding | | | | |  | | | | | | | |  |
|  |  |  | If the *baseTime* and *spacing* elements are defined, the *time* element shall not be encoded. | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  | The time instants shall be calculated according to the following: | | | | | | | | | | | | |  |
|  |  |  |  | time (n) = baseTime + (n \* spacing) | | | | | | | | | | | | |  |
|  |  |  |  | n = zero-based point index. | | | | | | | | | | | | |  |
|  |  |  |  | e.g. baseTime= 2011-01-01T00:00:00, spacing=P15M | | | | | | | | | | | | |  |
|  |  |  |  | points: | | | | | | | | | | | | |  |
|  |  |  |  | [0] - 2011-01-01T00:00:00 | | | | | | | | | | | | |  |
|  |  |  |  | [1] - 2011-01-01T00:15:00 | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 20 | | |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | [2] - 2011-01-01T00:30:00 | | | | |  |
|  |  |  | [3] - 2011-01-01T00:45:00 | | | | |  |
|  |  |  | [4] - 2011-01-01T01:00:00 | | | | |  |
|  |  |  |  |  |  |  |  |  |
| **Requirement** |  |  | /req/xsd-timeseries-tvp/time-mandatory | |  |  |  |  |
|  |  | If the baseTime and spacing elements are not present, the time element shall be encoded. | | | | |  |
|  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| **Requirement** |  |  | /req/xsd-timeseries-tvp/null-value |  | |  |  |  |
|  |  | To indicate a value is null, the xsi:nil attribute shall be set to ‘true’. | | | | |  |
|  |  |  |  |
|  | |  |  |  | |  |  |  |
| **Requirement** |  |  | /req/xsd-timeseries-tvp/null-point-reason | | | |  |  |
|  |  | If a point is specified as null, a nilReason or censoredReason shall be provided. | | | | |  |
|  |  |  |  |
|  | |  |  | | |  |  |  |
| **Requirement** |  |  | /rec/xsd-timeseries-tvp/nil-reason-vocab | | |  | |  |
|  |  | When specifying a null point reason (nilReason), one of the following URLs should be | | | | |  |
|  |  |  |  |
|  |  |  | used: | | | | |  |
|  |  |  | Inapplicable (http://www.opengis.net/def/nil/OGC/0/inapplicable) | | | | |  |
|  |  |  | Missing (http://www.opengis.net/def/nil/OGC/0/missing) | | | | |  |
|  |  |  | Template (http://www.opengis.net/def/nil/OGC/0/template) - value will be available at | | | | |  |
|  |  |  | later date. | | | | |  |
|  |  |  | Unknown (http://www.opengis.net/def/nil/OGC/0/unknown) | | | | |  |
|  |  |  | Withheld (http://www.opengis.net/def/nil/OGC/0/withheld.html) | | | | |  |
|  |  |  |  |  |  |  |  |  |

**6.11.1 Requirements class overview**

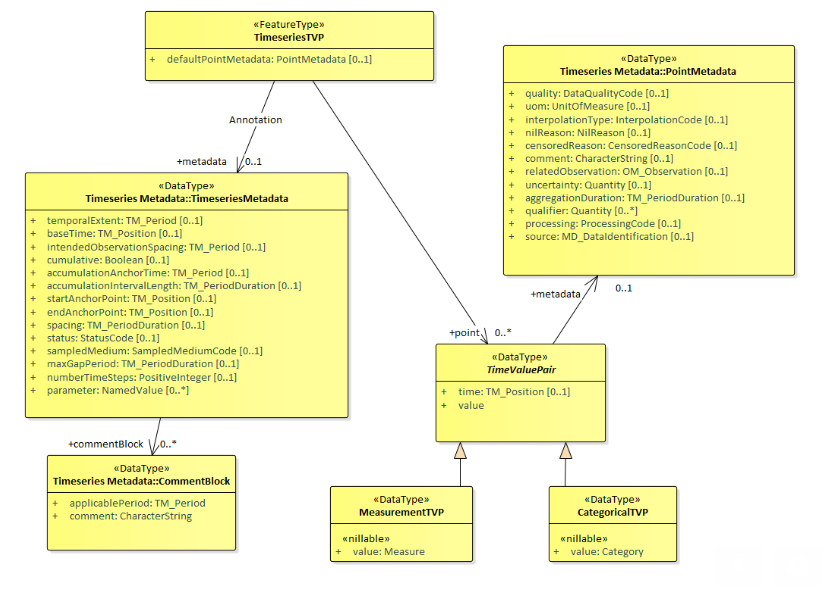
The Time-Value Pair (TVP) Encoding schema contains types suitable for encoding TimeSeries (both Measurement and Categorical) in a sequence of time-value pairs.

Note that this time-value pair encoding of timeseries encoding takes the name 'TimeseriesTVP'.

The domain range encoding equivalent takes the name TimeseriesDomainRange.

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**Figure 1 TVPEncoding**

The complete TVP encoding of timeseries, including associated metadata classes is shown in the figure above.

**6.11.2 CategoricalTVP properties**

CategoricalTVP is the encoding for time,value pairs where the value is a category.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| value | The categorical value of the data point (e.g. | Category | 1..1 |
|  | 'High') |  |  |
|  |  |  |  |

**6.11.3 Measure properties**

Measure is a measure implementation with an optional unit of measure (so that the unit of measure can be set to a default for the whole timeseries rather than repeating the unit for each data value).

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| uom | Unit of measure | Uom | 0..1 |
|  |  |  |  |

**6.11.4 MeasurementTVP properties**

MeasurementTVP is the encoding for time,value pairs where the value is a measure.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |

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|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| Value | The measurement value for this data | Measure | 1..1 |
|  | point (e.g. 5.3m) |  |  |
|  |  |  |  |

**6.11.5 TimeseriesTVP properties**

The core class for the timeseries time-value pair encoding.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| point | Data points (time-value pairs) for the | TimeValuePair | 0..\* |
|  | timeseries. |  |  |
|  |  |  |  |
| metadata | Metadata about the timeseries | TimeseriesMetadata | 0..1 |
|  |  |  |  |
| defaultPointMetadata | Default metadata for each point in the | PointMetadata | 0..1 |
|  | timeseries (can be over-ridden on a per- |  |  |
|  | point basis). |  |  |
|  |  |  |  |

**6.11.6 TimeValuePair properties**

A base class for different time-value pair implementations.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Property** | |  | **Definition** | **Data types and values** | | | **Multiplicity** |  |
|  |  |  |  |  |  |  |  |  |  |
|  | metadata | |  | Point metadata for this point (over-rides | PointMetadata | | | 0..1 |  |
|  |  |  |  | any default point metadata for the |  |  |  |  |  |
|  |  |  |  | timeseries). |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | time | |  | Time component of the time-value pair. |  | TM\_Position | | 0..1 |  |
|  |  |  |  | (A point on the timeseries). |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | value | |  | Value component of the time-value pair |  |  |  | 1..1 |  |
|  |  |  |  | (a value result such as a measurement). |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **6.12 *Requirements Class*: Categorical (TVP) Timeseries** | | | | | | | |  |  |
|  |  |  |  |  | |  |  |  |  |
|  |  |  |  | **Requirements Class** | | | |  |  |
|  |  |  |  |  | |  |  |  |  |
| http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-categorical-timeseries-tvp | | | | | | | |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Name** | |  | Categorical (TVP) Timeseries |  |  |  |  |  |
|  |  |  |  |  | |  | |  |  |
|  | **Requirement** |  |  | /req/xsd-categorical-timeseries-tvp/value-category | |  | |  |  |
|  |  |  | The type of the tsml:value XML element shall be a swe:Category. | | | |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**6.12.1 Requirements class overview**

This requirements class restricts the value type of each time-value pair to be a Category.

**6.13 *Requirements Class*: Measurement (TVP) Timeseries**



**Requirements Class**

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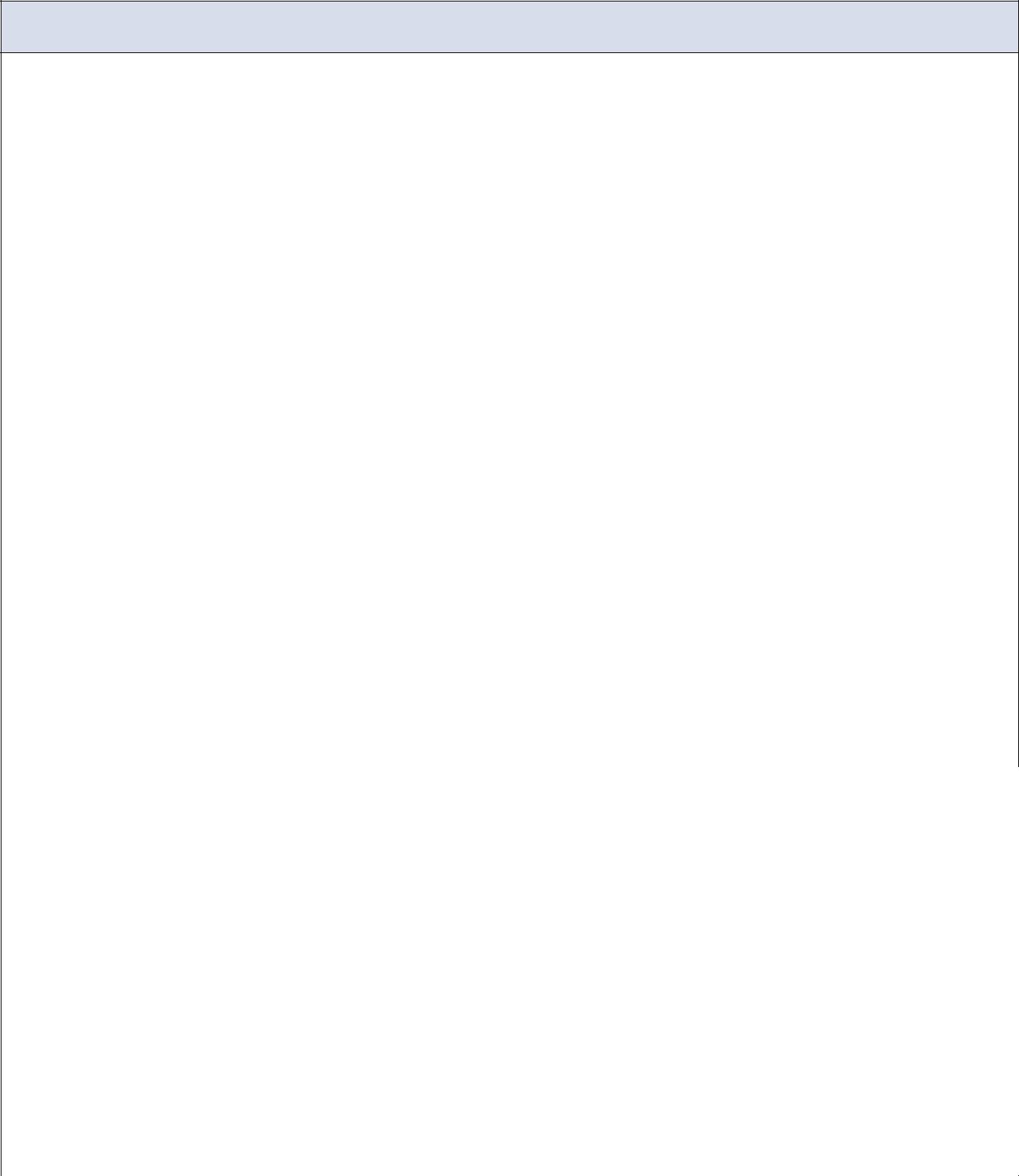
http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-measurement-timeseries-tvp

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | |  | Measurement (TVP) Timeseries | |  |
|  |  |  |  |  |  |
| **Requirement** |  |  | /req/xsd-measurement-timeseries-tvp/value-measure |  |  |
|  |  | The type of the tsml:value element shall be a tsml:Measure. | |  |
|  |  |  |  |
|  |  |  |  |  |  |

**6.13.1 Requirements class overview**

This requirements class restricts the value type of each time-value pair to be a Measure.

**6.14 *Requirements Class*: Timeseries encoded as Domain Range**



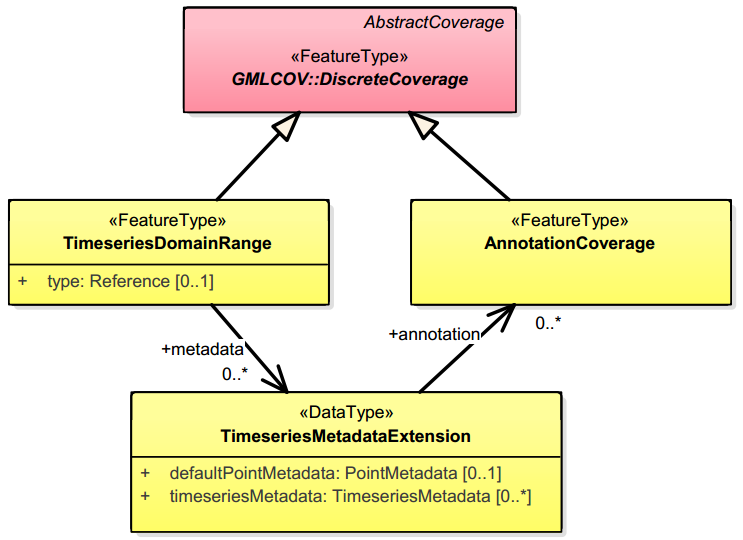
**Requirements Class**

http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-timeseries-dr

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | |  | Timeseries encoded as Domain Range | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Target Type** | |  | XML encoding | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dependency** | |  | http://www.opengis.net/doc/GML/GMLCOV/1.0.1#clause-6 | | | | | | |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-xml-rules) | | | | | | | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | |  |
|  |  |  |  |  |  |  |  |  |  | | |  |  |  |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-core](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-core) | | | | | | | | |  |  |  |  |  |
|  |  |  |  |  |  |  |  | | |  |
|  |  |  |  |  |  |  |  |  |  | | | |  |  |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-domain-range](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-domain-range) | | | | | | | | | |  |  |  |  |
|  |  |  |  |  |  |  |  | | | |  |
|  |  |  |  | |  |  |  |  |  | | | | |  |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-timeseries-domain-](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-domain-range) | | | | | | | | | | |  |  |  |
|  | [range](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-domain-range) | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | | | | | |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-timeseries-domain-range](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-domain-range) | | | | | | | | | | | |  |  |
|  |  | |  |  |  |  |  | | | | | |  |
|  |  |  |  | |  |  |  |  |  | | | | | | |  |
| **Requirement** |  |  | /req/xsd-timeseries-dr/valid | |  |  |  |  |  | | | | | | |  |
|  |  | The content model of this XML element shall have a value that matches the content | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  | model defined by tsml:TimeseriesDomainRange. | | | | | | | | | | | | |  |
|  |  |  |  | |  |  |  |  |  | | | | | | |  |
| **Requirement** |  |  | /req/xsd-timeseries-dr/time-increasing | | | |  |  |  | | | | | | |  |
|  |  | The domain elements shall be ordered in increasing time. | | | | | | | | | | | | |  |
|  |  |  |  |
|  | |  |  | | |  |  |  |  | | | | | | |  |
| **Requirement** |  |  | /req/xsd-timeseries-dr/record-homogenous | | | | |  |  | | | | | | |  |
|  |  | The type of each range element shall be the same for each point in the timeseries, with | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  | the exception null values which may be used on any value. | | | | | | | | | | | | |  |
|  | |  |  | | |  | |  |  | | | | | | |  |
| **Requirement** |  |  | /req/xsd-timeseries-dr/domain-time | | |  | | |  | | | | | | |  |
|  |  | The domain of the timeseries coverage shall consist only of a temporal component. | | | | | | | | | | | | |  |
|  |  |  |  |
|  | |  |  | | |  | | |  | | | | | | |  |
| **Requirement** |  |  | /req/xsd-timeseries-dr/default-point-metadata | | | | | |  | | | | | | |  |
|  |  | If the element defaultPointMetadata is present, the specified metadata elements apply as | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  | default values to all subsequent point elements encoded in the timeseries. If a metadata | | | | | | | | | | | | |  |
|  |  |  | element is specified for a point then it overrides the default value. For elements with | | | | | | | | | | | | |  |
|  |  |  | multiple cardinality (e.g. qualifiers), defaults shall be overridden if a single element is | | | | | | | | | | | | |  |
|  |  |  | defined in the metadata. | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 24 | | | | |  |  |  |  |  |  |  |  |  |  |
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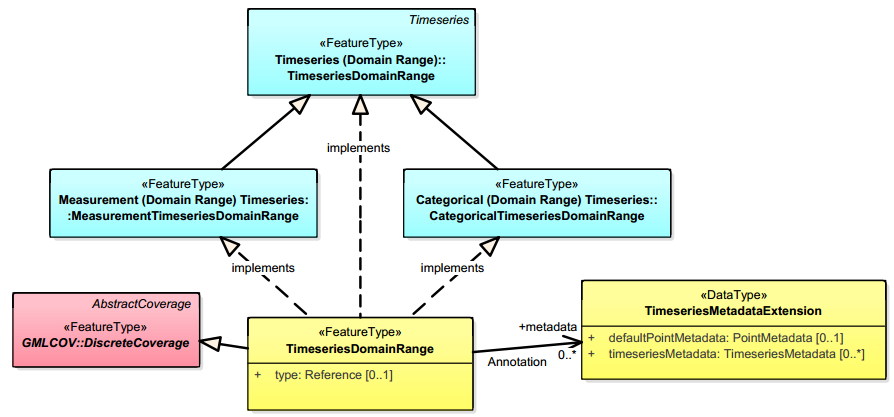
**6.14.1 Requirements class overview**

The Domain Range Encoding schema contains types suitable for encoding TimeSeries (both Measurement and Categorical) in a domain (times), range (values) block. This schema extends the OGC GMLCov schema.



**Figure 2 XML Schema Encoding of Timeseries Domain Range**

The TimeseriesDomainRange encoding extends the OGC Implementation Model for Coverages by adding bespoke metadata and annotation elements.



**Figure 3 TimeSeries (Domain Range) Schema**

The class TimeseriesDomainRange is used for all domain range encodings. It extends the GMLCov DiscreteCoverage with a timeseries metadata extension.

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**6.14.2 TimeseriesMetadataExtension properties**

TimeseriesMetadataExtension enables use of TimeseriesML metadata classes in GMLCov XML schema. The associated XML examples demonstrate how this is applied in practice.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| Annotation | An annotation coverage corresponding to | AnnotationCoverage | 0..\* |
|  | points on the timeseries. |  |  |
|  |  |  |  |
| defaultPointMetadata | Default metadata for each point in the | PointMetadata | 0..1 |
|  | timeseries. |  |  |
|  |  |  |  |
| timeseriesMetadata | Metadata applicable to the whole | TimeseriesMetadata | 0..\* |
|  | timeseries or individual regularly spaced segments of an irregularly spaced whole timeseries. |  |  |
|  |  |  |  |

**6.14.3 AnnotationCoverage properties**

An annotation coverage can be used to apply metadata to individual points in the timeseries.

*Informative note: In the XML Schema the AnnotationCoverage is a specialisation of the gmlcov:AbstractDiscreteGoverage XML Schema type. This standard is not otherwise prescriptive about the content of the AnnotationCoverage beyond that specified in the OGC Coverages Implementation Model but it could be used to provide a value array or list of comments or other values as in the two examples below.*

*<tsml:AnnotationCoverage gml:id="quality\_cov"> <gml:domainSet xlink:href="#temporal\_domain"/> <gml:rangeSet>*

*<gml:CategoryList codeSpace="http://opengis.net/def/waterml/2.0/quali*

*ty/">good bad good missing good bad</gml:CategoryList>*

*</gml:rangeSet>*

*<gmlcov:rangeType/>*

*</tsml:AnnotationCoverage>*

*<tsml:AnnotationCoverage gml:id="comment\_cov"> <gml:domainSet xlink:href="#temporal\_domain"/> <gml:rangeSet>*

*<gml:ValueArray gml:id="comment\_array">*

*<gml:valueComponents>*

*<gml:Category>This is a free text comment</gml:Category> <gml:Category xsi:nil="true"/> <gml:Category>Example comment</gml:Category> <gml:Category>Another one</gml:Category> <gml:Category>Has to be one for each point</gml:Category>*

*</gml:valueComponents>*

*</gml:ValueArray>*

*</gml:rangeSet>*

*<gmlcov:rangeType/>*

*</tsml:AnnotationCoverage>*

**6.14.4 TimeseriesDomainRange properties**

The TimeseriesDomainRange element extends the OGC coverage model with metadata extensions for timeseries data. The metadata classes are the same as for the time-value pair encoding.

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Property** |  | **Definition** | | | **Data types and values** | **Multiplicity** |
|  |  |  |  |  |  |  |
| metadata | Metadata extension to accommodate | | | | TimeseriesMetadataExtension | 0..\* |
|  | TimeseriesML 1.3 metadata classes. | | | |  |  |
|  |  | | | |  |  |
| type | If present, the sub-element 'type' shall indicate | | | | Reference | 0..1 |
|  | the class of timeseries. A register of type | | | |  |  |
|  | identifiers corresponding with the timeseries | | | |  |  |
|  | types in TimeseriesML 1.3, is provided by OGC | | | |  |  |
|  |  | at | | |  |  |
|  | http://www.opengis.net/def/timeseriesType/time | | |  |  |  |
|  |  | seriesML/1.3 | | |  |  |
|  |  |  |  |  |  |  |

**6.15 Requirements Class: Collection**



**Requirements Class**

http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-collection

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | |  | Collection | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Target Type** | |  | XML encoding | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-collection | | | |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  | |  |  |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-sampling-feature-collections | | | | | |  |  |
|  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  | |  | |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | |  | |  |
|  |  |  |  |  | |  |
|  |  |  |  |  |  |  | | | |  |
| **Requirement** |  |  | /req/xsd-collection/valid |  |  |  | | | |  |
|  |  | The content model of this element shall have a value that matches the content model | | | | | | |  |
|  |  |  |  |
|  |  |  | defined by tsml:Collection. | | | | | | |  |
|  |  |  |  |  |  |  | | | |  |
| **Requirement** |  |  | /req/xsd-collection/sampling-feature-single | | |  | | | |  |
|  |  | Single sampling features shall be described using SF\_SpatialSamplingFeature or a | | | | | | |  |
|  |  |  |  |
|  |  |  | derivative thereof. | | | | | | |  |
|  | |  |  | |  |  | | | |  |
| **Requirement** |  |  | /req/xsd-collection/sampling-feature-group | |  | | | | |  |
|  |  | Groups of sampling points shall be described using SF\_SamplingFeatureCollection | | | | | | |  |
|  |  |  |  |
|  |  |  | feature type from ISO19156. | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |

**6.15.1 Requirements class overview**

The Collection schema contains a collection element as well as other document specific types.

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|  |
| --- |
| Conceptual Model |

|  |
| --- |
| XML Implementation Model |

**Figure 4 XML Implementation of Collection and associated classes**

The XML Schema implementation of Collection maps closely to the conceptual model. The key implementation points to note are that all observationMembers are implemented by OM\_Observation, and that ConformanceClass is implemented as a reference (xlink:href) from DocumentMetadata.

**6.15.1.1 Collection properties**

TimeseriesML defines a generic collection feature type, Collection, to allow the grouping of observations and/or sampling features with metadata to describe the nature of the collection. Such collections are required in a number of data exchange scenarios; whether the underlying transport technology is web services, FTP or other technologies.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| observationMember | One or more timeseries | OM\_Observation | 0..\* |
|  | observations |  |  |
|  |  |  |  |
| samplingFeatureMember | A sampling feature or group of | SamplingFeatureMember | 0..\* |
|  | sampling features. |  |  |
|  |  |  |  |
| communityExtension | Use this extension point for | Any | 0..\* |
|  | community-agreed extensions to |  |  |
|  | the schema. |  |  |
|  |  |  |  |
| internalExtension | Use this extension point for | Any | 0..\* |
|  | internal extensions that have not |  |  |
|  | been defined for external use. |  |  |
|  |  |  |  |
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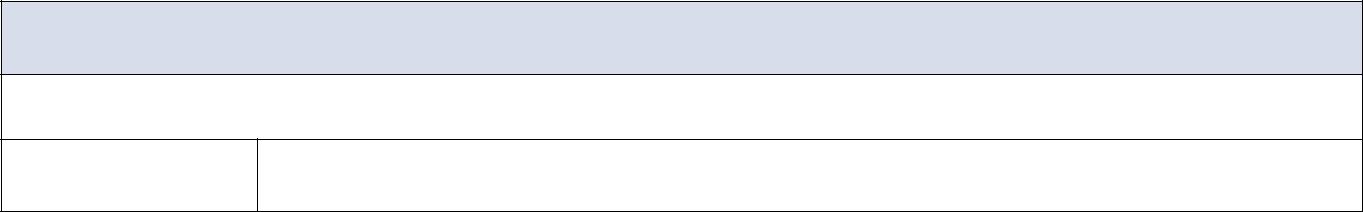
|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| generationDate | The date this data was generated. | TM\_DateAndTime | 1..1 |
|  |  |  |  |
| generationSystem | The system from which this data | CharacterString | 0..1 |
|  | was generated. |  |  |
|  |  |  |  |
| Version | This version property is distinct | Reference | 0..1 |
|  | from the version of the |  |  |
|  | TimeseriesML schema. It is a |  |  |
|  | version of the whole standards |  |  |
|  | package: schema, vocabularies, |  |  |
|  | used profiles etc. I.e. a version to |  |  |
|  | allow specific versions associated |  |  |
|  | with usage of a schema version |  |  |
|  | with other components. |  |  |
|  |  |  |  |
| temporalExtent | Describes the temporal extent of | TM\_Period | 0..1 |
|  | the all the timeseries contained |  |  |
|  | within the collection (if they |  |  |
|  | exist). |  |  |
|  |  |  |  |
| localDictionary | A dictionary containing | Dictionary | 0..\* |
|  | definitions of terms. |  |  |
|  |  |  |  |
| sourceDefinition | Provides a context for | MD\_DataIdentification | 0..\* |
|  | identification of particular data |  |  |
|  | elements through use of |  |  |
|  | MD\_DataIdentification. These can |  |  |
|  | be referenced from individual |  |  |
|  | timeseries values. |  |  |
|  |  |  |  |
| Parameter | A soft-typed parameter for extra | NamedValue | 0..\* |
|  | metadata properties. |  |  |
|  |  |  |  |
| Profile | Profile may be used to reference a | Reference | 0..\* |
|  | definition of a conformance class |  |  |
|  | that this document conforms to. |  |  |
|  |  |  |  |

**6.15.1.2 SamplingFeatureMember properties**

A sampling feature member may be either a single sampling feature (e.g. MonitoringFeature) or a group of features (SF\_SamplingFeatureCollection). This is a Union class.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| byGroup | A group of sampling features. | SF\_SamplingFeatureCollection | 0..1 |
|  |  |  |  |
| byFeature | A sampling feature. | SF\_SpatialSamplingFeature | 0..1 |
|  |  |  |  |

**6.16 *Requirements Class*: MonitoringFeature**



**Requirements Class**

http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-monitoring-feature

**Name** MonitoringFeature

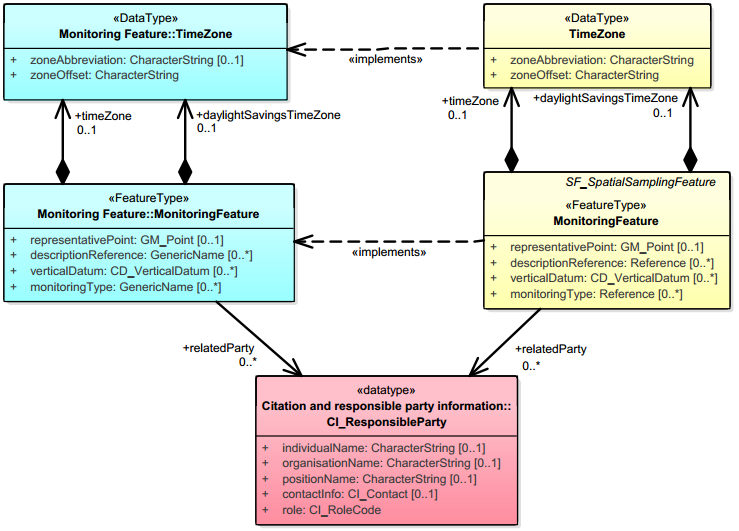
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|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Target Type** | |  | XML encoding | | | |  |
|  |  |  |  |  |  |  |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-monitoring-feature | | |  |  |
|  |  |  |  |
|  |  |  |  |  |  | |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | |  | |  |
|  |  |  |
|  |  |  |  |  | | |  |
| **Requirement** |  |  | /req/xsd-monitoring-feature/valid |  | | |  |
|  |  | The content model of this element shall have a value that matches the content model | | | |  |
|  |  |  |  |
|  |  |  | defined by tsml:MonitoringFeature. | | | |  |
|  |  |  |  |  |  |  |  |

**6.16.1 Requirements class overview**

The Monitoring Feature schema contains the definition of the Monitoring Feature type that is the (sampling) feature of interest of a TimeSeries observation.



**Figure 5 MonitoringFeature Schema**

**6.16.1.1 MonitoringFeature properties**

A MonitoringFeature is a spatial sampling feature (O&M) where observations are recorded. This monitoring feature often corresponds to a fixed instrument or monitoring site but it can also be an anonymous spatial location. The monitoring feature is a proxy for a real world feature.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| daylightSavingsTimeZone | The timezone that the | TimeZone | 0..1 |
|  | MonitoringFeature is located in |  |  |
|  | when daylight savings applies. |  |  |
|  |  |  |  |
| timeZone | The timezone that the | TimeZone | 0..1 |
|  | MonitoringFeature is located in. |  |  |
|  |  |  |  |
| relatedParty | The details of a party related to | CI\_ResponsibleParty | 0..\* |
|  | this MonitoringFeature. Multiple |  |  |
|  | related parties may be described |  |  |
|  | using the role code list (from ISO |  |  |
|  | 19115). The most common |  |  |
|  | relationships are likely to be: |  |  |
|  | owner, originator, pointOfContact, |  |  |
|  | principalInvestigator and |  |  |
|  | 30 |  |  |
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|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
|  | distributor. |  |  |
|  |  |  |  |
| representativePoint | A point location that is | GM\_Point | 0..1 |
|  | representative of the monitoring |  |  |
|  | feature's location. Typically this is |  |  |
|  | used when the shape of the |  |  |
|  | monitoring feature is an area or |  |  |
|  | other non-point geometry. It may |  |  |
|  | also be used to provide an |  |  |
|  | approximate point location in |  |  |
|  | sensitive observation scenarios. |  |  |
|  |  |  |  |
| descriptionReference | Provide extra descriptive | Reference | 0..\* |
|  | information about a monitoring |  |  |
|  | feature. This could be a link to an |  |  |
|  | HTML page describing the |  |  |
|  | location, photos of a monitoring |  |  |
|  | point, history records etc. |  |  |
|  |  |  |  |
| verticalDatum | Specifies the elevation that is used | CD\_VerticalDatum | 0..\* |
|  | as the zero point, or datum, for |  |  |
|  | height-related measurements. The |  |  |
|  | datum is defined using a vertical |  |  |
|  | datum, which may be defined |  |  |
|  | using the ISO19111 type |  |  |
|  | CD\_VerticalDatum, or an agreed |  |  |
|  | upon datum may be reference by |  |  |
|  | its identifier. E.g. the Australian |  |  |
|  | Height Datum (AHD), Tasmania |  |  |
|  | = “EPSG::5112”. |  |  |
|  | The CD\_VerticalDatum type |  |  |
|  | allows specification of the local |  |  |
|  | vertical datum as a height above |  |  |
|  | another reference datum. E.g. |  |  |
|  | local vertical datum is 23m above |  |  |
|  | the AHD. |  |  |
|  |  |  |  |
| monitoringType | A thematic characterisation of the | Reference | 0..\* |
|  | type of monitoring feature. E.g. |  |  |
|  | meteorological, surface water, |  |  |
|  | groundwater, water quality etc. |  |  |
|  |  |  |  |

**6.16.1.2 TimeZone properties**

Representation of a timezone.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| zoneAbbreviation | Abbreviation for a timezone e.g. AEST. | CharacterString | 0..1 |
|  |  |  |  |
| zoneOffset | Time zone offset e.g. +10:00 GMT | CharacterString | 1..1 |
|  |  |  |  |

**6.17 *Requirements Class*: MonitoringFeature as Feature of Interest**



**Requirements Class**

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http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-monitoring-feature-feature-of-interest

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | |  | MonitoringFeature as Feature of Interest | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |
| **Dependency** | |  | http://www.opengis.net/spec/OMXML/2.0/req/observation |  |  |  |  |  |  |
|  |  |
|  |  |  |  | |  |  |  |  |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-observation | | | | |  |  |
|  | |  |  |  |  |
|  |  |  |  | |  |  |  | |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-monitoring-feature-foi](http://www.opengis.net/spec/timeseries/1.0/req/uml-monitoring-feature-foi) | | | |  | |  |
|  | |  |  |  |
|  |  |  |  | |  |  | | |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-xml-rules) | |  |  | | |  |
|  | |  |
|  |  |  |  | | |  | | |  |
| **Requirement** |  |  | /req/xsd-monitoring-feature-feature-of-interest/featureOfInterest | | |  | | |  |
|  |  | The *featureOfInterest* element of TimeseriesObservation shall have a value that matches | | | | | |  |
|  |  |  |  |
|  |  |  | the content model defined by tsml:MonitoringFeature. | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |

**6.17.1 Requirements class overview**

This requirements class captures the restriction of OM\_Observation where the feature of interest is a monitoring feature. This class is to be used for most in-situ style monitoring situations where the TimeseriesML 1.3 monitoring feature is sufficient for representing the location metadata.

**6.18 *Requirements Class*: ObservationProcess**

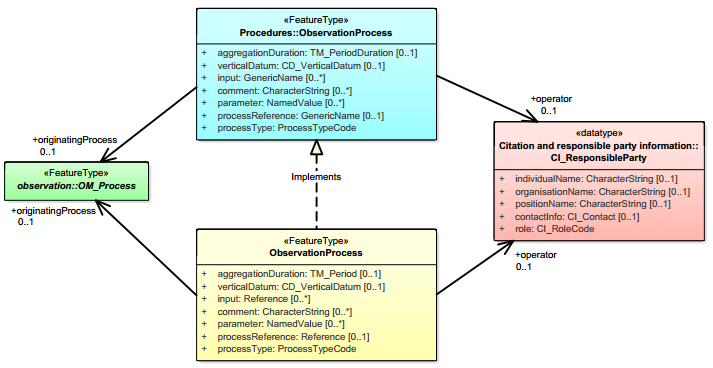
|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Requirements Class** | | | | |  |
|  |  |  |  |  |  |  |  |  |  |
| http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-observation-process | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Name** | |  | ObservationProcess | | | | |  |
|  |  |  |  |  |  | |  |  |  |
|  | **Target Type** | |  | XML encoding | | | | |  |
|  |  |  |  |  |  | |  |  |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-observation-process | | | |  |  |
|  |  |  |  | |  |  |
|  |  |  |  |  |  | |  | |  |
|  | **Dependency** | |  | http://www.opengis.net/spec/timeseriesrml/1.3/req/xsd-xml-rules | | |  | |  |
|  |  |  |  | |  |
|  |  |  |  |  |  | | | |  |
|  | **Requirement** |  |  | /req/xsd-observation-process/valid |  | | | |  |
|  |  |  | The content model of this element shall have a value that matches the content model | | | | |  |
|  |  |  |  |  |
|  |  |  |  | defined by tsml:ObservationProcess. | | | | |  |
|  |  |  |  |  |  |  |  |  |  |

**6.18.1 Requirements class overview**

The ObservationProcess schema defines a basic process type that may be used to describe the procedure used in a TimeSeries Observation event.

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**Figure 6 ObservationProcess Schema**

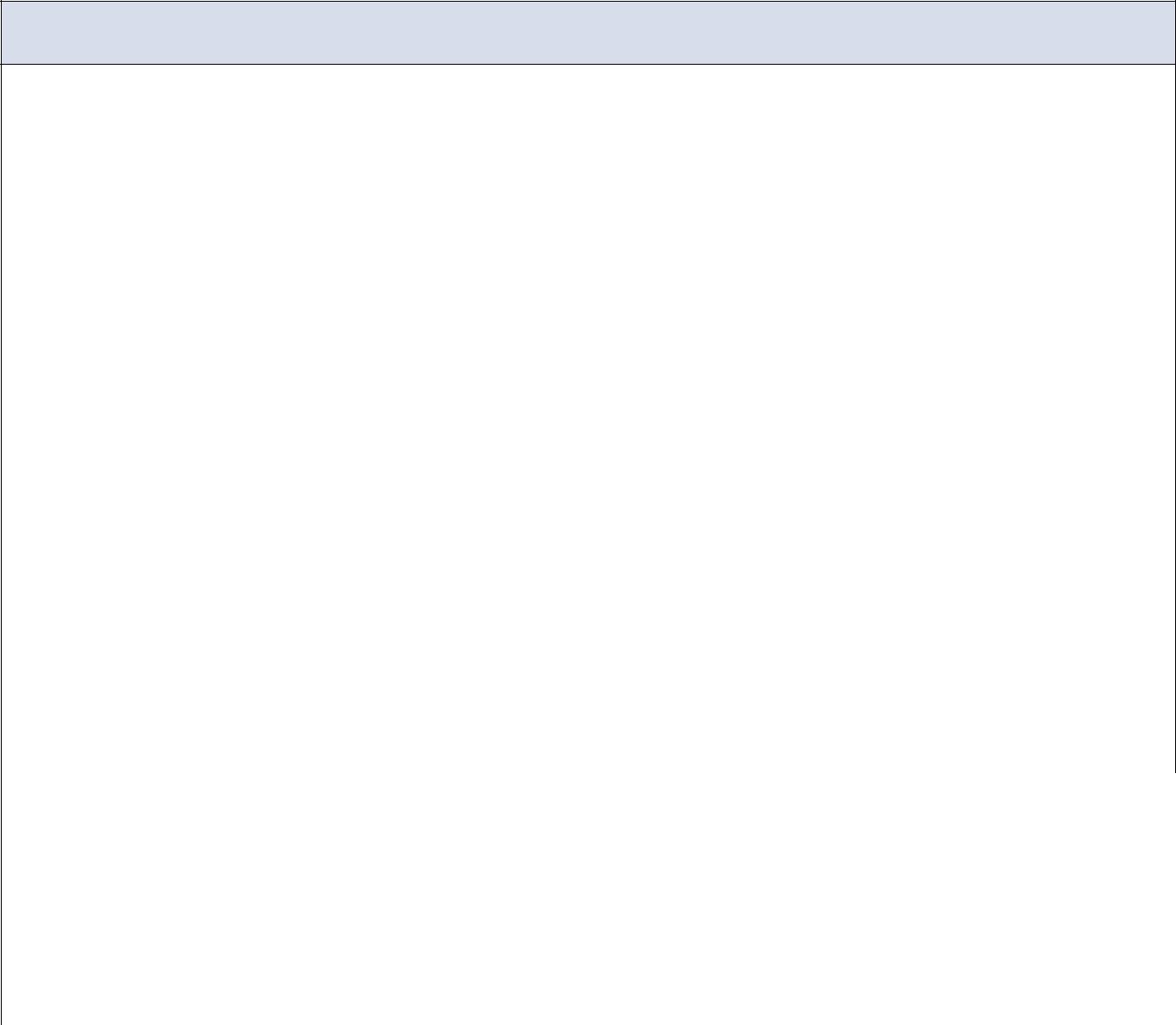
**6.18.1.1 ObservationProcess properties**

Information about the process used in the Observation.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| operator | Describes the party responsible for | CI\_ResponsibleParty | 0..1 |
|  | performing the process. E.g. the person |  |  |
|  | performing the method or operating the |  |  |
|  | sensor. |  |  |
|  |  |  |  |
| originatingProcess | Used to identify a process that is a | OM\_Process | 0..1 |
|  | source to this process. For example an |  |  |
|  | earlier processing step. |  |  |
|  |  |  |  |
| aggregationDuration | A list of the inputs used in the process. | TM\_PeriodDuration | 0..1 |
|  | This may be a list of references to the |  |  |
|  | data sets used (e.g. model input series) |  |  |
|  | or a input array to an algorithm. |  |  |
|  |  |  |  |
| verticalDatum | Specifies the datum that is used as the | CD\_VerticalDatum | 0..1 |
|  | zero point for level measurements. This |  |  |
|  | can be process-specific as opposed the |  |  |
|  | gauge at the actual monitoring point. |  |  |
|  |  |  |  |
| input | A list of the inputs used in the process. | Reference | 0..\* |
|  | This may be a list of references to the |  |  |
|  | data sets used (e.g. model input series) |  |  |
|  | or a input array to an algorithm. |  |  |
|  |  |  |  |
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|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| comment | Comments specific to the process from | CharacterString | 0..\* |
|  | the operator. |  |  |
|  |  |  |  |
| parameter | A definition of the type of process used | NamedValue | 0..\* |
|  | in the observation. This may be a |  |  |
|  | Sensor, ManualMethod, Algorithm or |  |  |
|  | Simulation (including models). |  |  |
|  |  |  |  |
| processReference | Reference to an external process | Reference | 0..1 |
|  | definition. |  |  |
|  |  |  |  |
| processType | A definition of the type of process used | ProcessTypeCode | 1..1 |
|  | in the observation. This may be a |  |  |
|  | Sensor, ManualMethod, Algorithm or |  |  |
|  | Simulation (including models). |  |  |
|  |  |  |  |

**6.19 *Requirements Class*: Timeseries Metadata**



**Requirements Class**

http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-metadata

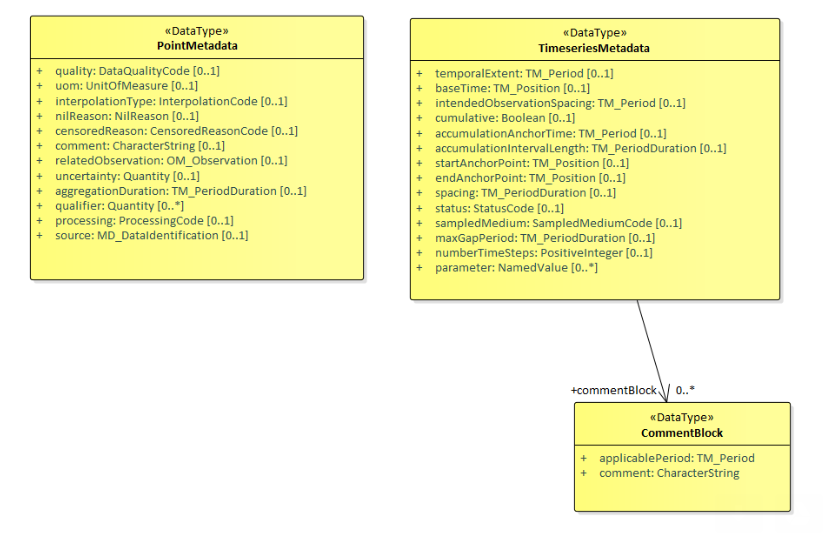
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | |  | Timeseries Metadata | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Target Type** | |  | XML encoding | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dependency** | |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | |  |  |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-core](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-core) | | | | | |  |  |  |  |
|  |  |  |  |  |  | |  |
|  |  |  |  |  |  |  |  | | |  |  |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-metadata](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-metadata) | | | | | | | |  |  |
|  |  |  |  |  |  | | |  |  |
|  |  |  |  |  |  |  |  | | |  | |  |
| **Dependency** | |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-metadata](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-metadata) | | | | | | |  | |  |
|  |  |  |  |  |  | | |  |
|  |  |  |  |  |  |  |  | | | | |  |
| **Requirement** |  |  | /req/xsd-metadata/timeseries-metadata | |  |  |  | | | | |  |
|  |  | Metadata about the entire timeseries shall be provided using the | | | | | | | | |  |
|  |  |  |  |
|  |  |  | tsml:TimeSeriesMetadata type. | | | | | | | | |  |
|  |  |  |  |  |  |  |  | | | | |  |
| **Requirement** |  |  | /req/xsd-metadata/point-metadata |  | |  |  | | | | |  |
|  |  | Metadata about individual data points shall be provided using the tsml:PointMetadata | | | | | | | | |  |
|  |  |  |  |
|  |  |  | type | | | | | | | | |  |
|  | |  |  |  | |  |  | | | | |  |
| **Requirement** |  |  | /req/xsd-metadata/timeseries-comments | | |  |  | | | | |  |
|  |  | Comments about the timeseries may be provided using the tsml:CommentBlock type. | | | | | | | | |  |
|  |  |  |  |
|  | |  |  | | |  |  | | | | |  |
| **Requirement** |  |  | /req/xsd-metadata/timeseries-metadata-extension | | | |  | | | | |  |
|  |  | Metadata about a domain range timeseries shall be provided using the | | | | | | | | |  |
|  |  |  |  |
|  |  |  | tsml:TimeseriesMetadataExtension type. | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

**6.19.1 Requirements class overview**

This requirement captures metadata requirements common across all timeseries classes.

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**Figure 7 TimeSeries Metadata XMLSchema Implementation**

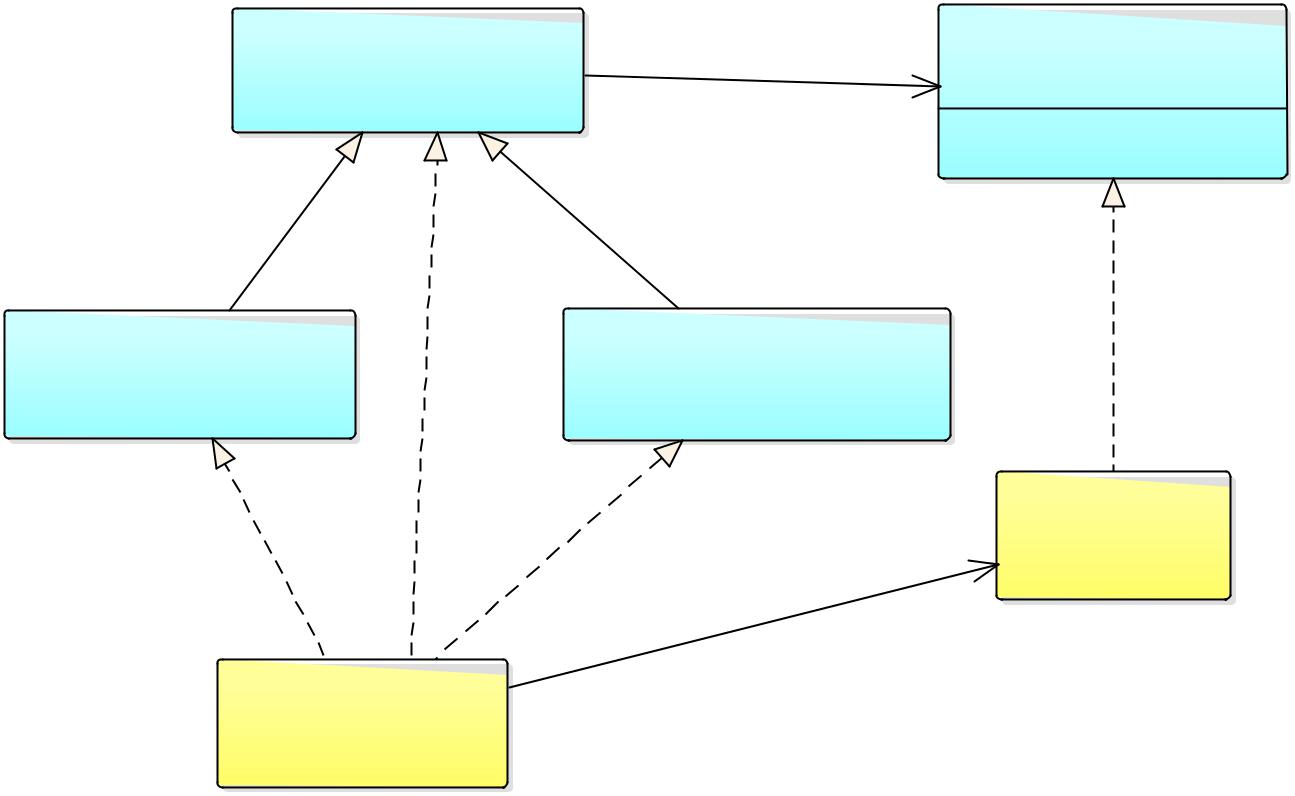
The XML Schema Implementation collapses many of the conceptual model metadata classes together for simplicity of encoding. There are three metadata classes:

* ObservationMetadata: Metadata about the whole timeseries observation
* TimeseriesMetadata: Metadata about the whole timeseries or individual regularly spaced segments of an irregularly spaced whole timeseries.
* PointMetadata: Metadata about individual points in the timeseries. PointMetadata may be set to a default across the whole timeseries and over-ridden for individual points.

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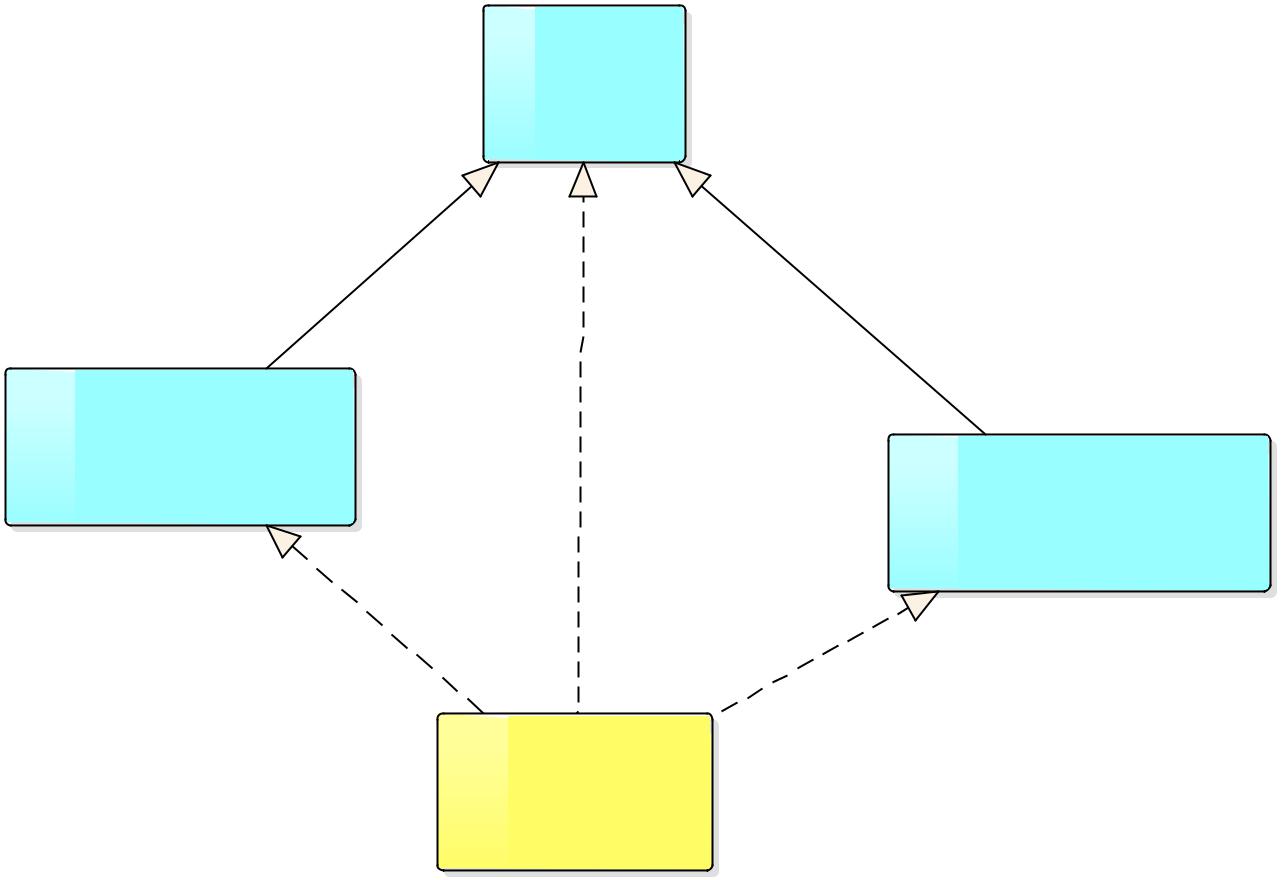
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|  |  |  |  |
| --- | --- | --- | --- |
| «DataType» |  | «DataType» |  |
| **Timeseries (core)::** | +commentBlock | **Timeseries (core)::** |  |
| **TimeseriesMetadata** | 0..\* | **CommentBlock** |  |
|  |  |  |
|  | + | applicablePeriod: TM\_Period |  |
|  | + | comment: CharacterString |  |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | «DataType» | Implements |  |
| «DataType» |  |  |  |  |
| **CategoricalMetadata::** | Implements |  | **MeasurementMetadata::** |  |  |
| **CategoricaTimeserieslMetadata** | **MeasurementTimeseriesMetadata** | |  |  |
|  |  |  |
|  |  |  |  | «DataType» |  |
| Implements |  | Implements | +commentBlock | **CommentBlock** |  |
|  |  |  |
|  |  |  |  |  |
|  |  |  | 0..\* |  |  |
| «DataType» | |  |  |  |  |
| **TimeseriesMetadata** | |  |  |  |  |

**Figure 8 Mapping of TimeseriesMetadata and CommentBlock to Conceptual Model**



«DataType»

**Timeseries**

**(core)::**

**PointMetadata**

«DataType»

**CategoricalMetadata::** Implements

**CategoricalPointMetadata** «DataType,type»

**MeasurementMetadata::**

**MeasurementPointMetadata**

Implements

Implements

«DataType»

**PointMetadata**

**Figure 9 Mapping of XML Schema PointMetadata to Conceptual Model**

**6.19.2 CommentBlock properties**

Comment blocks may be used to make comment about the timeseries. Each comment applies to a specified period of the timeseries (it could apply to the whole timeseries).

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|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| applicablePeriod | The time period to which the | TM\_Period | 1..1 |
|  | comment applies. |  |  |
|  |  |  |  |
| comment | Free text comment about some | CharacterString | 1..1 |
|  | aspect of the timeseries. |  |  |
|  |  |  |  |

**6.19.3 PointMetadata properties**

Metadata relating to individual data points (can be set to a default for the whole timeseries).

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| quality | This property is for specifying a quality | DataQualityCode | 0..1 |
|  | assertion using the TimeseriesML 1.3 |  |  |
|  | defined concepts of quality as described |  |  |
|  | in the DataQualityCode list. When a non- |  |  |
|  | standard quality code is required a SWE |  |  |
|  | Qualifier property shall be used. |  |  |
|  |  |  |  |
| uom | Unit of measure for the point data | UnitOfMeasure | 0..1 |
|  | (typically a default will apply to the |  |  |
|  | whole timeseries). |  |  |
|  |  |  |  |
| interpolationType | Defines the nature of the relationship | InterpolationCode | 0..1 |
|  | between the time instant and the recorded |  |  |
|  | value. For example, the value may |  |  |
|  | represent an average across the time |  |  |
|  | period since the last point (average in |  |  |
|  | preceding interval). This value should be |  |  |
|  | taken from the InterpolationCode list. |  |  |
|  | The interpolation type is defined per |  |  |
|  | point within the time series as it is |  |  |
|  | possible for this to change mid series. |  |  |
|  | Within the XML encoding it is possible |  |  |
|  | to set a default interpolation for the |  |  |
|  | series. |  |  |
|  |  |  |  |
| nilReason | This property describes the reason that a | NilReason | 0..1 |
|  | point has been identified as null. This |  |  |
|  | provides context for interpreting null |  |  |
|  | points (e.g. missing, withheld etc.). |  |  |
|  |  |  |  |
| censoredReason | Used to indicate the reason the value has | CensoredReasonCode | 0..1 |
|  | been censored (e.g. below a threshold). |  |  |
|  |  |  |  |
| comment | Context information that does not fit into | CharacterString | 0..1 |
|  | a controlled list of qualifiers, processing |  |  |
|  | or quality information is often provided |  |  |
|  | in free text per point. The comment |  |  |
|  | property provides a placeholder for such |  |  |
|  | textual information. |  |  |
|  |  |  |  |
| uncertainty | This property allows for a quantitative | Quantity | 0..1 |
|  | assertion of the estimated uncertainty of |  |  |
|  | the measurement value. The term |  |  |
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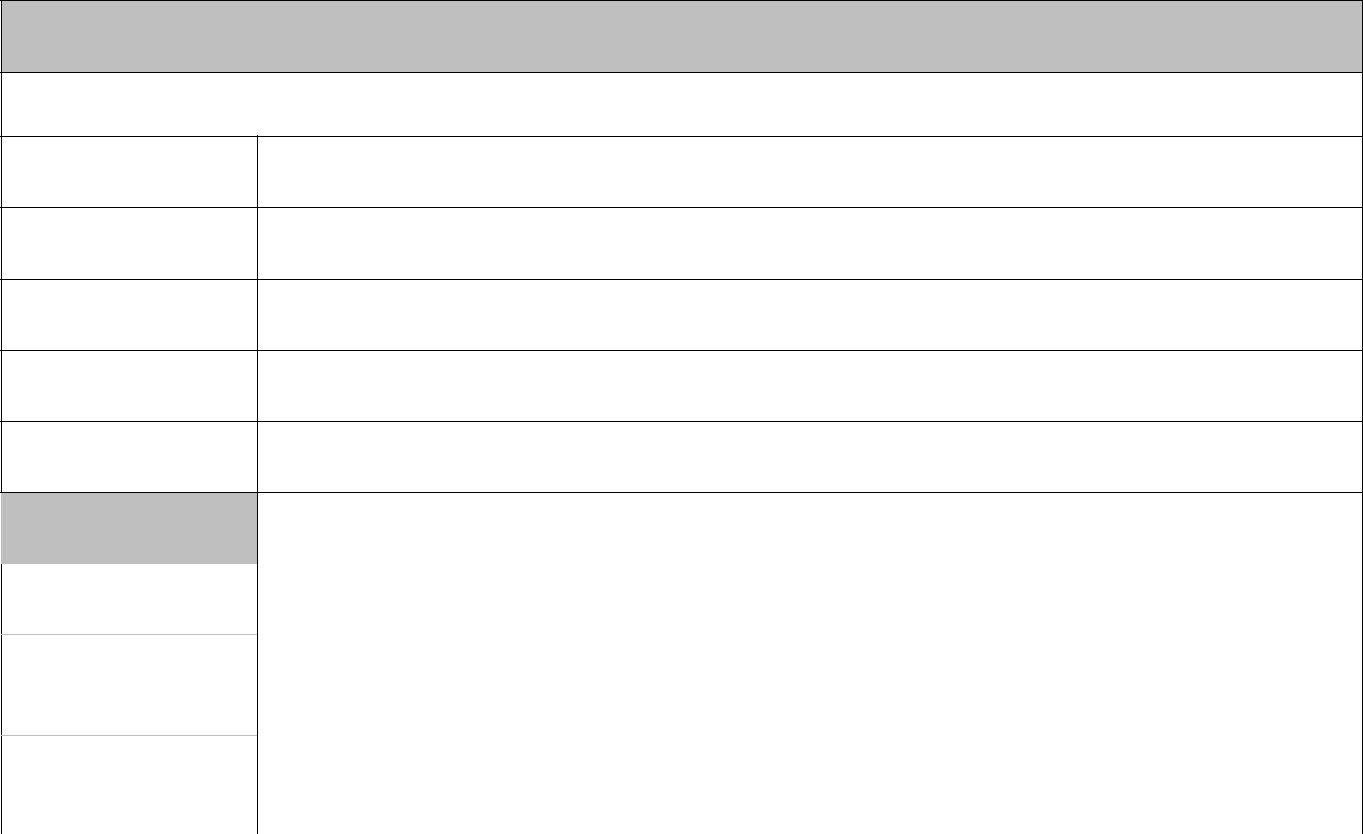
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Property** |  | **Definition** | **Data types and values** | **Multiplicity** | |
|  |  |  |  |  | |
|  | uncertainty is used here in line with | |  |  | |
|  | 'measurement uncertainty' as defined in | |  |  | |
|  | the International Vocabulary of | |  |  | |
|  |  | Metrology (VIM3, |  |  | |
|  | http://www.bipm.org/en/publications/gui | |  |  | |
|  | des/vim.html), however it is | |  |  | |
|  | acknowledged that it is still quite | |  |  | |
|  | common practice (e.g. in instrument | |  |  | |
|  | specifications) for the word accuracy to | |  |  | |
|  | be used in place of uncertainty. | |  |  | |
|  |  |  |  |  | |
| relatedObservation | This property allows individual points to | | OM\_Observation | 0..1 | |
|  | be associated with related observations. | |  |  | |
|  | This is used when a timeseries consists of | |  |  | |
|  | interleaved observations from different | |  |  | |
|  | sources and understanding the | |  |  | |
|  | relationship to existing observation(s) is | |  |  | |
|  |  | important. |  |  | |
|  |  |  |  |  | |
| aggregationDuration | Specifies the time period over which the | | TM\_PeriodDuration | 0..1 | |
|  | values have been aggregated. E.g. 15 | |  |  | |
|  |  | minutely. |  |  | |
|  |  |  |  |  | |
| qualifier | A more loosely-typed qualifier that | | Quantity | 0..\* | |
|  | allows assertions using the SWE | |  |  | |
|  | Common union (quality, categories etc.) | |  |  | |
|  |  |  |  |  | |
| processing | A code item indicating the processing | | ProcessingCode | 0..1 | |
|  | that has occurred to the point. | |  |  | |
|  |  |  |  |  | |
| source | A code item indicating the processing | | MD\_DataIdentification | 0..1 | |
|  | that has occurred to the point. By | |  |  | |
|  |  | reference only. |  |  | |
|  |  |  |  |  | |
| **6.19.4 TimeseriesMetadata properties**  Metadata applicable to the whole timeseries or individual regularly spaced segments of an irregularly spaced whole timeseries. | | | | | |
|  | | | | | |
| **Property** |  | **Definition** | **Data types and values** | **Multiplicity** | |
|  |  |  |  |  | |
| commentBlock |  | Comment blocks may be used to | CommentBlock | 0..\* | |
|  |  | make comment about the |  |  | |
|  |  | timeseries. Each comment applies |  |  | |
|  |  | to a specified period of the |  |  | |
|  |  | timeseries (it could apply to the |  |  | |
|  |  | whole timeseries). |  |  | |
|  |  |  |  |  | |
| temporalExtent |  | The extent of the temporal domain | TM\_Period | 0..1 | |
|  |  | of the timeseries. As the domain |  |  | |
|  |  | of the timeseries is temporal, the |  |  | |
|  |  | temporalExtent is a time period |  |  | |
|  |  | defining the start and end of its |  |  | |
|  |  | temporal domain (i.e. the start and |  |  | |
|  |  | end of the timeseries). Note that |  |  | |
|  |  | this often the same as the |  |  | |
|  |  | phenomenon time as specified in |  |  | |
|  |  | the OM\_Observation; it is still |  |  | |
|  |  | useful here for timeseries that are |  |  | |
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|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
|  | described separately from an |  |  |
|  | OM\_Observation header. |  |  |
|  |  |  |  |
| baseTime | Timeseries that are regularly | TM\_Position | 0..1 |
|  | spaced, such as those that are |  |  |
|  | generated from automatic sensors, |  |  |
|  | can be represented without |  |  |
|  | specifying the individual time |  |  |
|  | instant for each point. The |  |  |
|  | *spacing* property of the time series |  |  |
|  | is used to specify the time |  |  |
|  | between points. This is then used |  |  |
|  | as the spacing for each point |  |  |
|  | encountered, starting from the |  |  |
|  | time set by *baseTime.* |  |  |
|  |  |  |  |
| intendedObservationSpacing | The extent of the temporal domain | TM\_Period | 0..1 |
|  | of the timeseries. As the domain |  |  |
|  | of the timeseries is temporal, the |  |  |
|  | temporalExtent is a time period |  |  |
|  | defining the start and end of its |  |  |
|  | temporal domain (i.e. the start and |  |  |
|  | end of the timeseries). Note that |  |  |
|  | this often the same as the |  |  |
|  | phenomenon time as specified in |  |  |
|  | the OM\_Observation; it is still |  |  |
|  | useful here for timeseries that are |  |  |
|  | described separately from an |  |  |
|  | OM\_Observation header. |  |  |
|  |  |  |  |
| cumulative | This boolean property indicates | Boolean | 0..1 |
|  | whether the series is sequentially |  |  |
|  | increasing and accumulates over |  |  |
|  | time; i.e. each value is added to |  |  |
|  | the last so the value represents the |  |  |
|  | total of a value since |  |  |
|  | accumulation began. |  |  |
|  |  |  |  |
| accumulationAnchorTime | Defines the time at which | TM\_Period | 0..1 |
|  | accumulation begins. e.g. 9am. |  |  |
|  |  |  |  |
| accumulationIntervalLength | Defines the length of time over | TM\_PeriodDuration | 0..1 |
|  | which accumulation is recorded |  |  |
|  | e.g. 24 hours |  |  |
|  |  |  |  |
| startAnchorPoint | StartAnchorPoint specifies a | TM\_Position | 0..1 |
|  | ‘ghost’ point to allow the first |  |  |
|  | value of the timeseries to be |  |  |
|  | interpolated correctly. |  |  |
|  |  |  |  |
| endAnchorPoint | EndAnchorPoint specifies a | TM\_Position | 0..1 |
|  | ‘ghost’ point to allow the last |  |  |
|  | value of the timeseries to be |  |  |
|  | interpolated correctly. |  |  |
|  |  |  |  |
| spacing | The time between points in a | TM\_PeriodDuration | 0..1 |
|  | regularly spaced timeseries. |  |  |
|  |  |  |  |
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|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Definition** | **Data types and values** | **Multiplicity** |
|  |  |  |  |
| status | Indicates the statues of the observation. E.g. unreleased, verified etc. | StatusCode | 0..1 |
| sampledMedium | Indicates the medium that was sampled. E.g. water, air, etc. | SampledMediumCode | 0..1 |
| maxGapPeriod | When any analysis is run over a timeseries it is important to know if it is possible to interpolate between any two adjoining points. If the join period between two adjoining points is greater than the maxGapPeriod then the series should not be interpolated between these adjoining points. | TM\_PeriodDuration | 0..1 |
| numberTimeSteps | The number of time steps in a timeseries, or each homogenous (regularly spaced) segment of an irregularly spaced whole timeseries. | Integer | 0..1 |
| Parameter | This is a named value extension point that allows extra metadata to be added at the timeseries level. The parameters here are soft-typed (i.e. this standard does not define the properties semantics). Commonly used parameters here would be future candidates for definition within later versions or community extensions. | NamedValue | 0..\* |

**Annex A - Abstract Test Suite (normative)**

**A.1 Conformance class: XML Rules**



**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-xml-rules](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-xml-rules)

**Dependency** <http://www.w3.org/TR/xmlschema-2>

**Dependency** <http://standards.iso.org/iso/8601/2004/4>

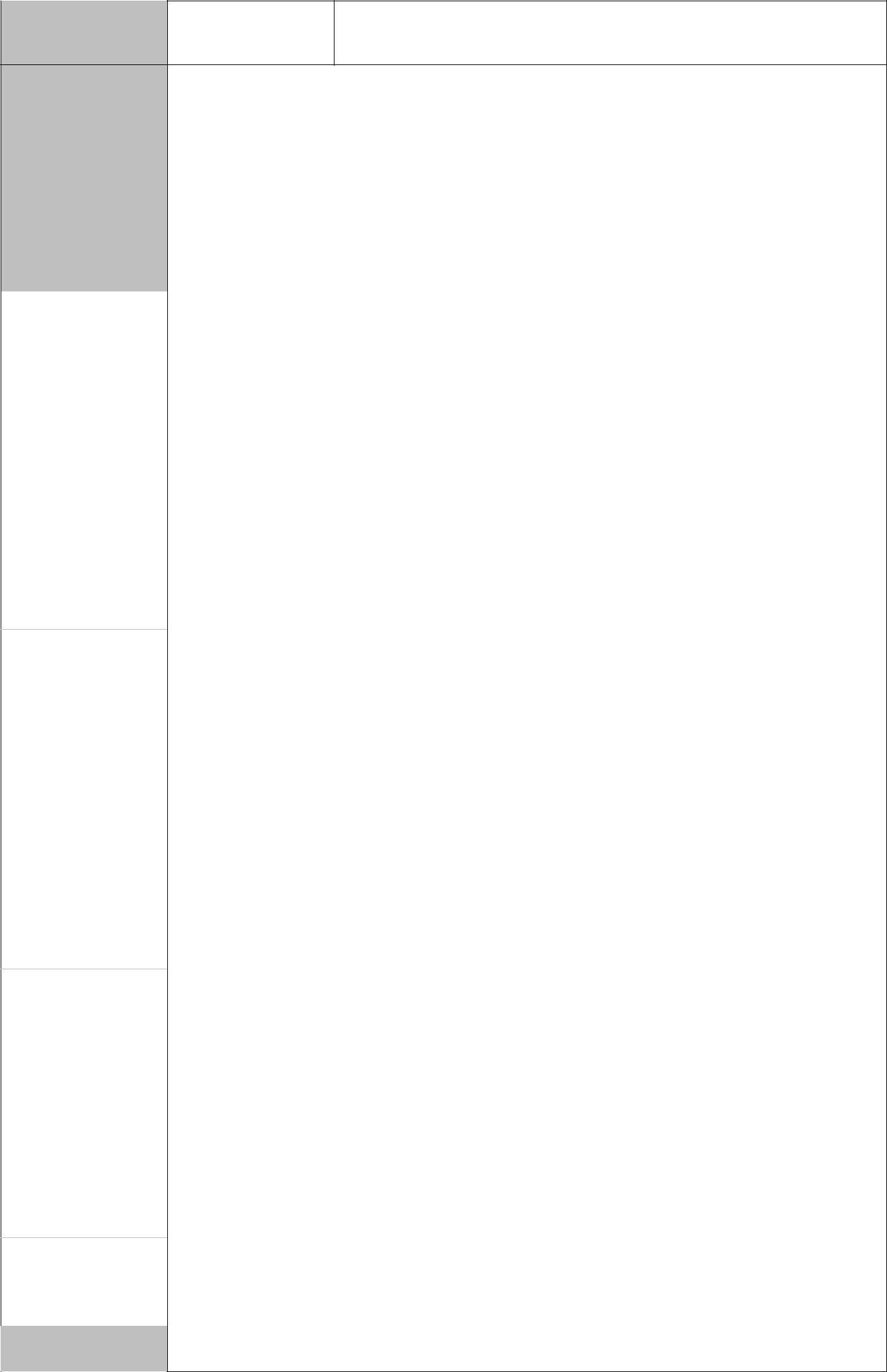
**Dependency** <http://www.opengis.net/doc/IS/GML/3.2#clause-2.4>

**Dependency** <http://www.opengis.net/spec/GML/3.3/req/definitions>

**Dependency** http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components

/conf/timeseriesml/1.3/req/xsd-xml-rules/iso8601-time

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-xml-rules/iso8601-time |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Verify that all time instants are valid according to the XML Schema | |
|  |  |  | implementation of ISO8601. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the content of each time element against the XML Schema | |
|  |  |  | dateTime content type, available here | |
|  |  |  |  |  |
|  |  |  | 40 |  |
|  |  |  | Copyright © 2019 Open Geospatial Consortium | |

http://www.w3.org/TR/xmlschema-2/#schema. Pass if no errors are reported. Fail otherwise.

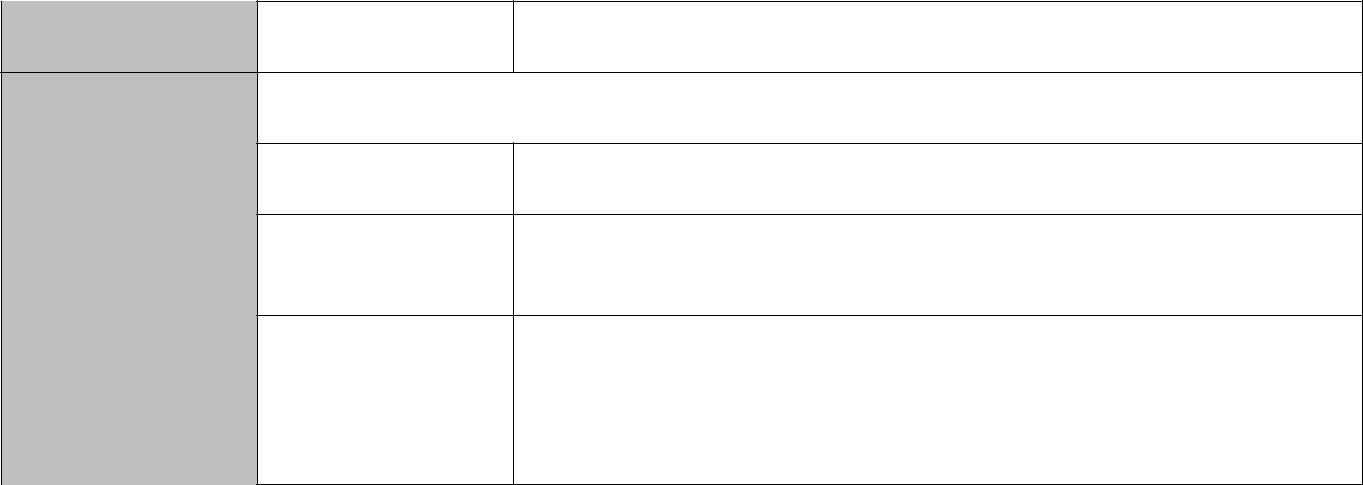
/conf/timeseriesml/1.3/req/xsd-xml-rules/time-zone

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-xml-rules/time-zone | | | |  |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
|  |  |  | **Test Purpose** |  | Verify that all time instants include a time zone specifier. | | | | | |  |
|  |  |  |  |  |  |  |  |  | |  |  |
|  |  |  | **Test Method** |  | Validate the XML document using the Schematron document | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-xml-rules.sch. Pass | | | | | |  |
|  |  |  |  |  |  |
|  |  |  |  |  | if no errors are reported for the “time-zone” test. Fail otherwise. | | | | | |  |
|  |  |  |  |  | |  |  |  | |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-xml-rules/unit-of-measure | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-xml-rules/unit-of-measure | | | | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that all time units are specified using the UCUM units | | | | | |  |
|  |  |  |  |  | system. | | | | | |  |
|  |  |  |  |  |  |  |  | | | |  |
|  |  |  | **Test Method** |  | Inspect the XML document and ensure all units of measure are valid | | | | | |  |
|  |  |  |  |  | according to UCUM. Fail otherwise. (No automated check against | | | | | |  |
|  |  |  |  |  | UCUM currently available). | | | | | |  |
|  |  |  |  |  | |  |  | | | |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-xml-rules/swe-types | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-xml-rules/swe-types | | | |  | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Ensure that only applicable SWE types are used. Some SWE types | | | | | |  |
|  |  |  |  |  | are related specifically to the SWE encoding style, which is not used. | | | | | |  |
|  |  |  |  |  | Verify that following SWE elements are not used in the encoding: | | | | | |  |
|  |  |  |  |  | - swe:quality(AbstractSimpleComponentType) | | | | | |  |
|  |  |  |  |  | - swe:nilValues (AbstractSimpleComponentType) | | | | | |  |
|  |  |  |  |  | - swe:constraint (QuantityType, QuantityRangeType, CategoryType) | | | | | |  |
|  |  |  |  |  | Verify the following SWE attributes are not used: | | | | | |  |
|  |  |  |  |  | - ‘optional’ and ‘updatable’ from the base type | | | | | |  |
|  |  |  |  |  | ‘AbstractDataComponent’ | | | | | |  |
|  |  |  |  |  |  |  | | | | |  |
|  |  |  | **Test Method** |  | Validate the XML document using the Schematron document | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-xml-rules.sch. Pass | | | | | |  |
|  |  |  |  |  | if no errors are reported for the “swe-types” test. Fail otherwise. | | | | | |  |
|  |  |  |  |  | |  | | | | |  |
|  |  |  | /conf/timeseriesml/1.3/rec/xsd-xml-rules/xlink-title | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3**/rec**/xsd-xml-rules/xlink-title | | | |  | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that an element using a xlink:href to encode reference a | | | | | |  |
|  |  |  |  |  | controlled vocabulary item also encodes a xlink:title attribute with a | | | | | |  |
|  |  |  |  |  | text description of the referenced item. | | | | | |  |
|  |  |  |  |  |  | | | | | |  |
|  |  |  | **Test Method** |  | Validate the XML document using the Schematron document | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-xml-rules.sch. Pass | | | | | |  |
|  |  |  |  |  | if no errors are reported for the “xlink-title” test. Report otherwise. | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

/conf/timeseriesml/1.3/rec/xsd-xml-rules/vocabulary-references

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**Requirement** /req/timeseriesml/1.3**/rec**/xsd-xml-rules/vocabulary-references

/conf/timeseriesml/1.3/rec/xsd-xml-rules/xlink-valid-local-reference

**Requirement** /req/timeseriesml/1.3**/rec**/xsd-xml-rules/xlink-valid-local-reference

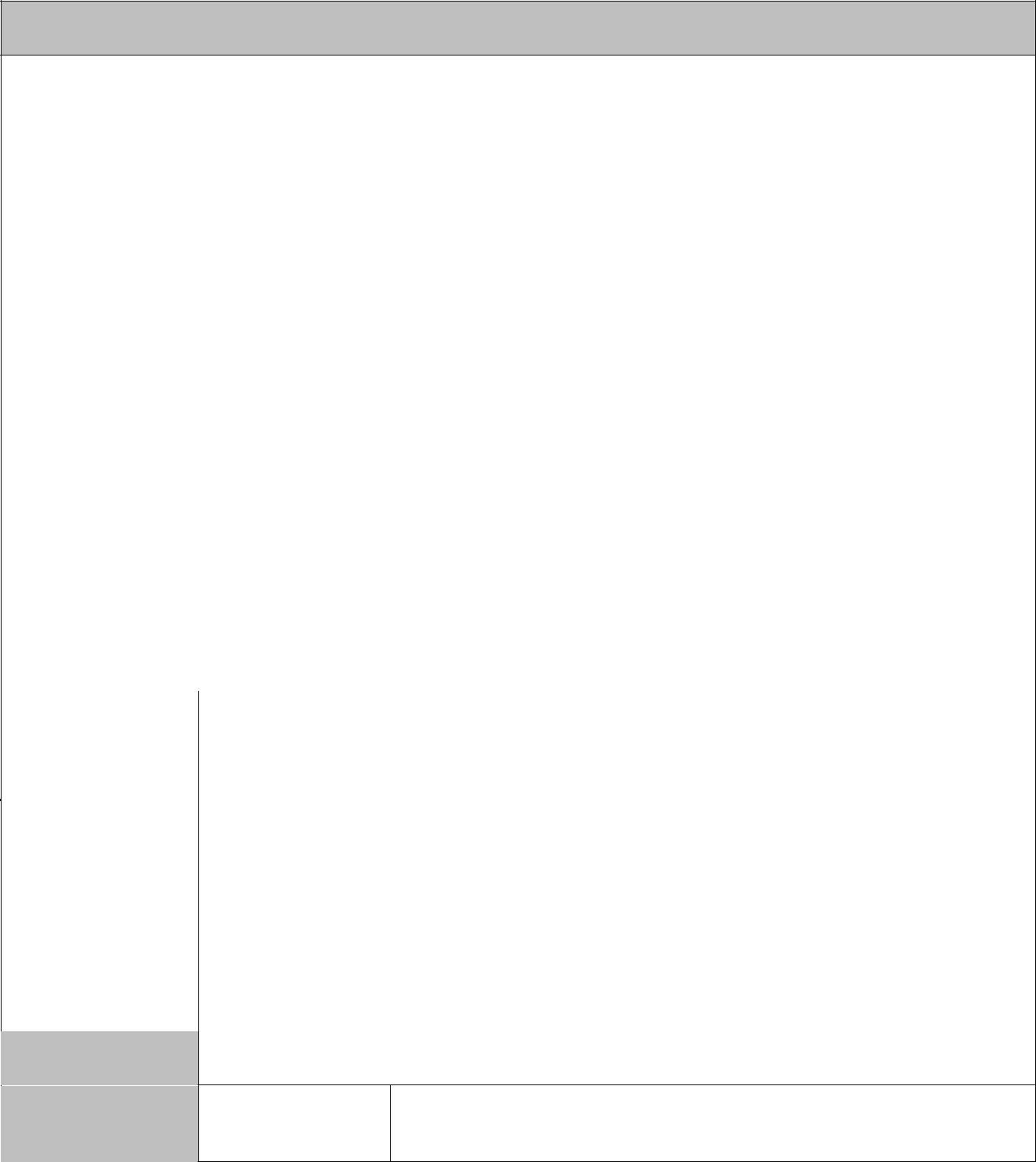
**Test Purpose** Verify that the element referenced by a local xlink:href reference exists.

**Test Method** Validate the XML document using the Schematron document http://schemas.opengis.net/tsml/1.3/schematron/xsd-xml-rules.sch. Pass

if no errors are reported for the “xlink-valid-local-reference” test.

Report otherwise.

**A.2 Conformance class: Timeseries Observation**



**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-timeseries-observation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Dependency** |  | http://www.opengis.net/spec/OMXML/2.0/req/observation | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | |  |  |
|  |  |  |  |  |  | |  | |  |  |  |  |  |  |  |  |  |  |  |
| **Dependency** |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-observation | | | | | | | | |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | |  | |  |  |  |
|  |  |  |  | |  | |  | |  |  | |  |  |  |  |  |  |  |  |
| **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-domain-range-timeseries-](http://www.opengis.net/spec/timeseries/1.0/req/uml-domain-range-timeseries-observation) | | | | | | | | | |  |  |  |  |  |  |  |  |
|  |  | [observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-domain-range-timeseries-observation) | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | |  | | | |  |  | | |  |  |  |  |  |  |  |
| **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-domain-range-](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-domain-range-timeseries-observation) | | | | | | | | | | |  |  |  |  |  |  |  |
|  | [timeseries-observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-domain-range-timeseries-observation) | | | | | | | | | | | | | | | | |  |
|  |  |  |
|  |  |  |  | |  | |  | |  |  | | | |  |  |  |  |  |  |
| **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-domain-range-](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-domain-range-timeseries-observation) | | | | | | | | | | | | | |  |  |  |  |
|  | [timeseries-observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-domain-range-timeseries-observation) | | | | | | | | | | | | | | | | |  |
|  |  |  |
|  |  |  |  | |  | |  | |  |  | | | |  |  | |  |  |  |
| **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-tvp-observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-tvp-observation) | | | | | | | | | | | |  |  | |  |  |  |
|  |  |  | |  | | | |  |  | | | |  |
|  |  |  |  | |  | | | |  |  | | | | |  | |  |  |  |
| **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-timeseries-tvp-](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-tvp-observation) | | | | | | | | | | | | |  | |  |  |  |
|  |  | [observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-tvp-observation) | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | |  | | | |  |  | | | | | | |  |  |  |
| **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-timeseries-tvp-](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-tvp-observation) | | | | | | | | | | | | | | |  |  |  |
|  |  | [observation](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-tvp-observation) | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | |  | | | |  |  | | | | | | | |  |  |
| **Dependency** |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | | | |  |  | | | | | | | |  |  |
|  |  |  | |  | | | |  |
|  |  |  |  |  |  | |  | |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-observation/procedure | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** | |  | /req/timeseriesml/1.3/req/xsd-timeseries-observation/procedure | | | | | | | | | | | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** | |  | Verify that the om:procedure element has a value that matches the | | | | | | | | | | | | |  |
|  |  |  |  |  |  | content model defined by tsml:ObservationProcess or an appropriate | | | | | | | | | | | | |  |
|  |  |  |  |  |  | reference is used. | | | | | | | | | | | | |  |
|  |  |  |  | |  |  | | | | | | | | | | | | |  |
|  |  |  | **Test Method** | |  | Validate the XML document using the Schematron document | | | | | | | | | | | | |  |
|  |  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries- | | | | | | | | | | | | |  |
|  |  |  |  |  |  | observation.sch. Pass if no errors are reported for the “procedure” | | | | | | | | | | | | |  |
|  |  |  |  |  |  | test. Fail otherwise. | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

/conf/timeseriesml/1.3/req/xsd-timeseries-observation/phenomenonTime

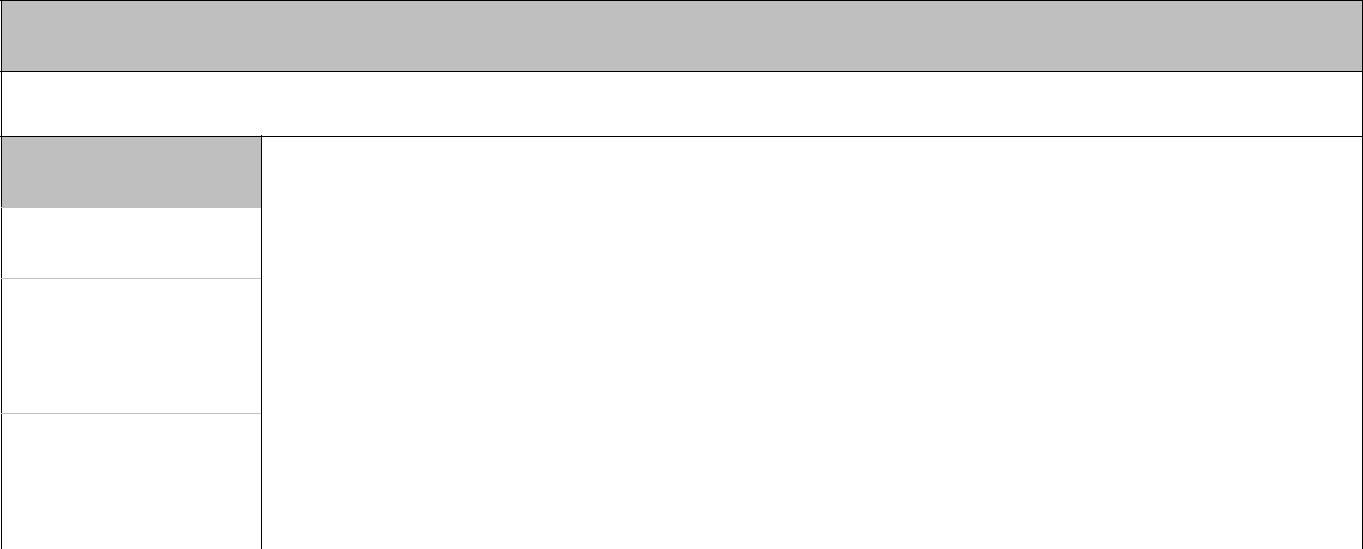
**Requirement** /req/timeseriesml/1.3/req/xsd-timeseries-observation/phenomenonTime

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|  |  |  |  |
| --- | --- | --- | --- |
|  | **Test Purpose** | Verify that the phenomenon time describes the temporal extent of |  |
|  |  |
|  |  | the observation result. |  |
|  |  |  |  |
|  | **Test Method** | Validate the XML document using the Schematron document |  |
|  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries- |  |
|  |  | observation.sch. Pass if no errors are reported for the |  |
|  |  | “phenomenonTime" test. Fail otherwise. |  |
|  |  |  |  |

**A.3 Conformance class: Timeseries (TVP) Observation**



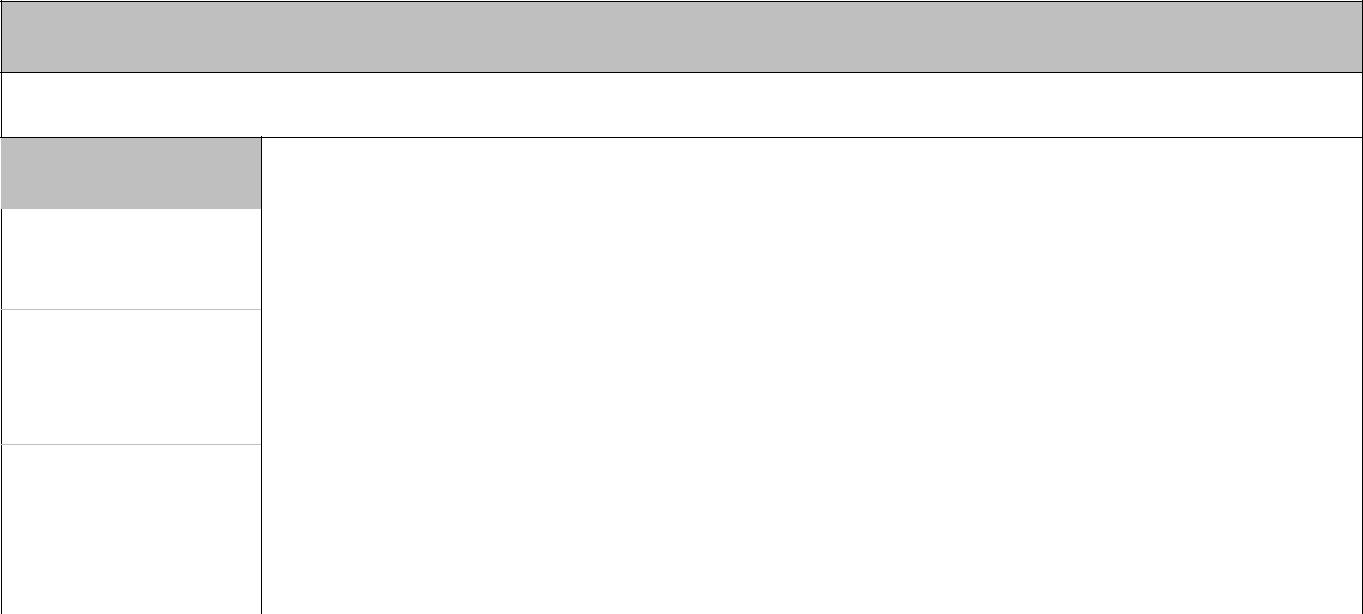
**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-timeseries-tvp-observation](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-timeseries-tvp-observation)

/conf/timeseriesml/1.3/req/xsd-timeseries-tvp-observation/result

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp-observation/result |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Verify that the om:result element has a value that matches the | |
|  |  |  | content model defined by tsml:TimeseriesTVPType or is in the | |
|  |  |  | substitution group tsml:TimeseriesTVP. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-tvp- | |
|  |  |  | observation.sch. Pass if no errors are reported. Fail otherwise. | |
|  |  |  |  |  |

**A.4 Conformance class: Categorical Timeseries (TVP) Observation**



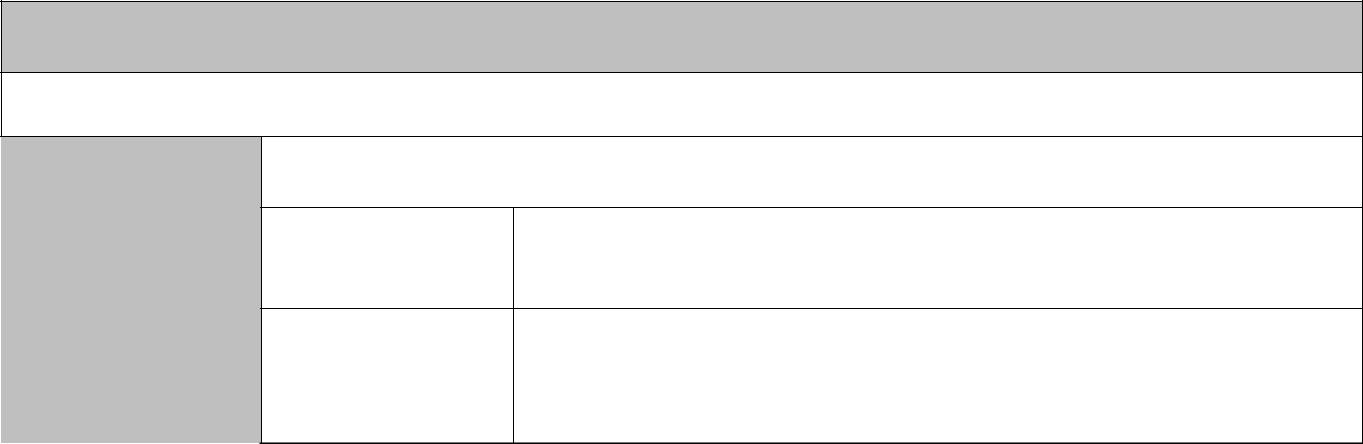
**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-categorical-timeseries-tvp-observation

/conf/timeseriesml/1.3/req/xsd-categorical-timeseries-tvp-observation/result

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-categorical-timeseries-tvp- | |  |
|  |  |  | observation/result |  | |
|  |  |  |  | | |
|  | **Test Purpose** |  | Verify that the om:result element has a value that matches the | | |
|  |  |  | content model defined by tsml:CategoricalTVPType or is in the | | |
|  |  |  | substitution group tsml:CategoricalTVP. | | |
|  |  |  |  | | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-categorical- | | |
|  |  |  | timeseries-tvp-observation.sch. Pass if no errors are reported. Fail | | |
|  |  |  | otherwise. | | |
|  |  |  |  |  |  |

**A.5 Conformance class: Measurement Timeseries (TVP) Observation**



**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-measurement-timeseries-tvp-observation](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-measurement-timeseries-tvp-observation)

/conf/timeseriesml/1.3/req/xsd-measurement-timeseries-tvp-observation/result

**Requirement** /req/timeseriesml/1.3/req/xsd-measurement-timeseries-tvp-observation/result

**Test Purpose** Verify that the om:result element has a value that matches the content model defined by tsml:MeasurementTVPType or is in the

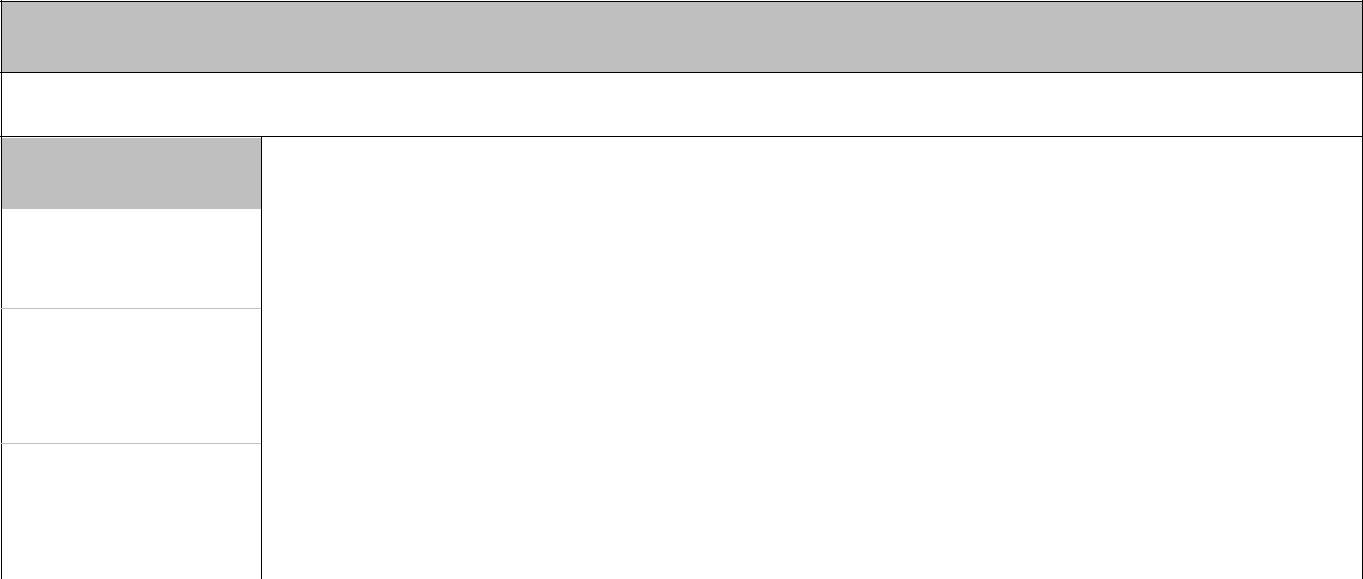
substitution group tsml:MeasurementTVP.

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|  |  |  |
| --- | --- | --- |
|  | **Test Method** | Validate the XML document using the Schematron document |
|  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-measurement- |
|  |  | timeseries-tvp-observation.sch. Pass if no errors are reported. Fail |
|  |  | otherwise. |
|  |  |  |

**A.6 Conformance class: Timeseries (Domain Range) Observation**



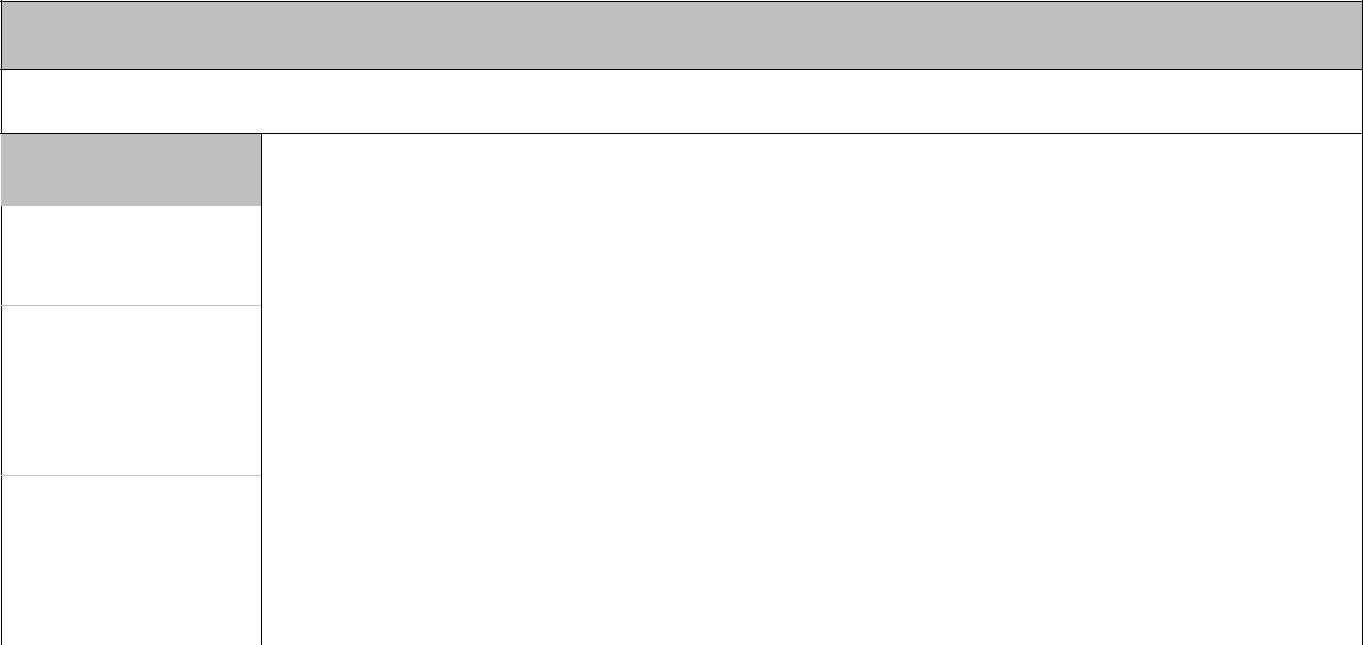
**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-timeseries-domain-range-observation

/conf/timeseriesml/1.3/req/xsd-timeseries-domain-range-observation/result

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-domain-range- | |  |
|  |  |  | observation/result |  | |
|  |  |  |  | | |
|  | **Test Purpose** |  | Verify that the om:result element has a value that matches the | | |
|  |  |  | content model defined by tsml:TimeseriesDomainRangeType or is in | | |
|  |  |  | the substitution group tsml:TimeseriesDomainRange. | | |
|  |  |  |  | | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-domain- | | |
|  |  |  | range-observation.sch. Pass if no errors are reported. Fail otherwise. | | |
|  |  |  |  |  |  |

**A.7 Conformance class: Categorical Timeseries (Domain Range) Observation**



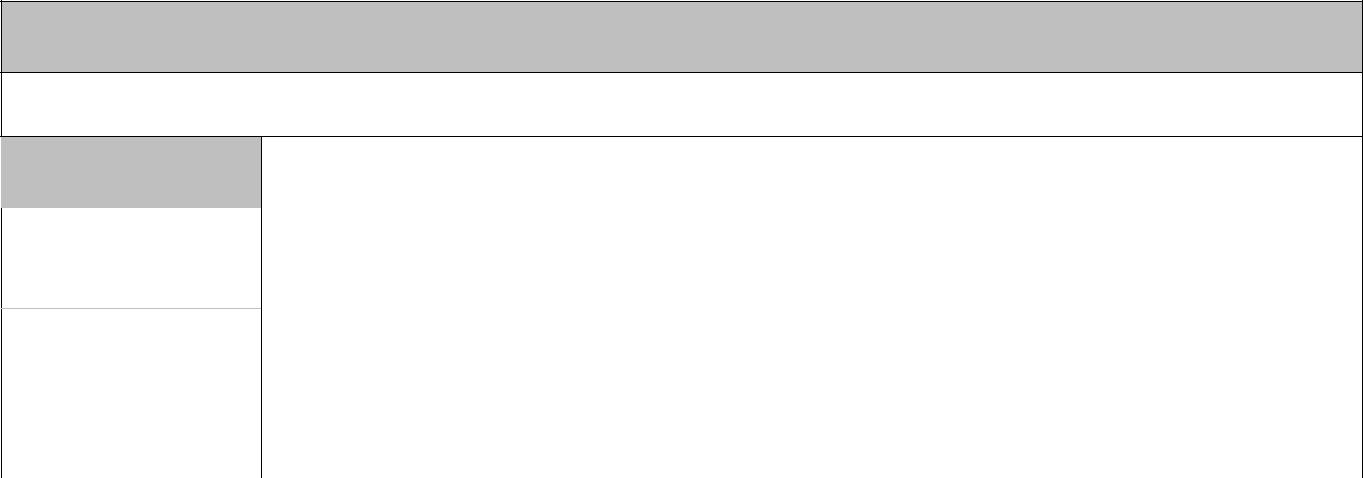
**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-categorical-timeseries-domain-range-observation](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-categorical-timeseries-domain-range-observation)

/conf/timeseriesml/1.3/req/xsd-categorical-timeseries-domain-range-observation/result

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-categorical-timeseries-domain-range- | |  |
|  |  |  | observation/result |  | |
|  |  |  |  | | |
|  | **Test Purpose** |  | Verify that the om:result element has a value that matches the | | |
|  |  |  | content model defined by tsml:TimeseriesDomainRangeType or is in | | |
|  |  |  | the substitution group tsml:TimeseriesDomainRange and that all the | | |
|  |  |  | range elements are of type Category. | | |
|  |  |  |  | | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-categorical- | | |
|  |  |  | timeseries-domain-range-observation.sch. Pass if no errors are | | |
|  |  |  | reported. Fail otherwise. | | |
|  |  |  |  |  |  |

**A.8 Conformance class: Measurement Timeseries (Domain Range) Observation**

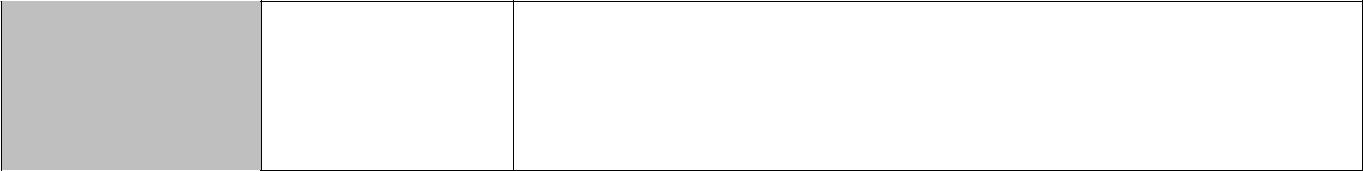


**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-measurement-timeseries-domain-range-observation](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-measurement-timeseries-domain-range-observation)

/conf/timeseriesml/1.3/req/xsd-measurement-timeseries-domain-range-observation/result

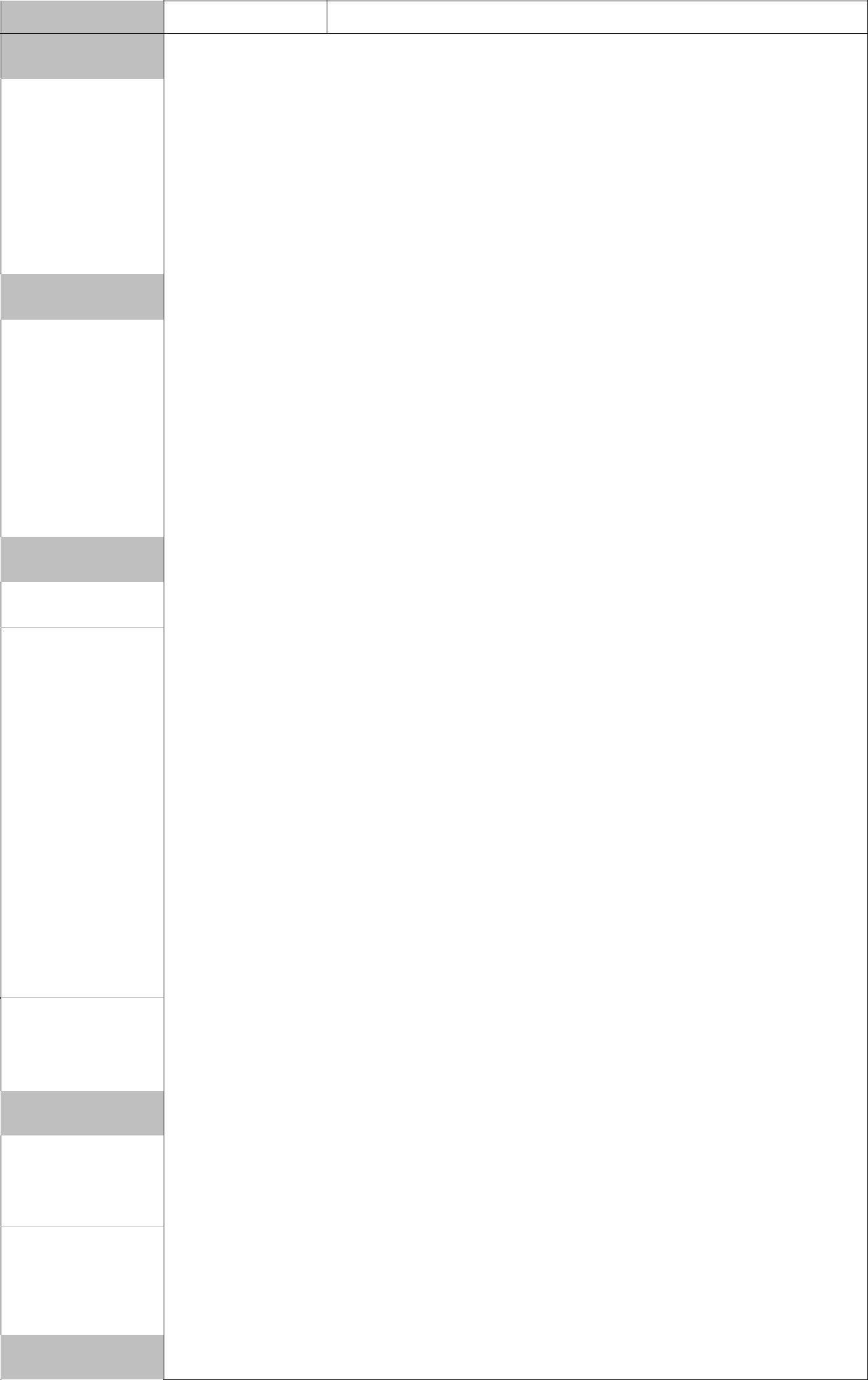
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-measurement-timeseries-domain- | |  |
|  |  |  | range-observation/result |  | |
|  |  |  |  | | |
|  | **Test Purpose** |  | Verify that the om:result element has a value that matches the | | |
|  |  |  | content model defined by tsml:TimeseriesDomainRangeType or is in | | |
|  |  |  | the substitution group tsml:TimeseriesDomainRange and that all the | | |
|  |  |  | range elements are of type Quantity. | | |
|  |  |  |  |  |  |
|  |  |  | 44 |  |  |
|  |  |  |  | Copyright © 2019 Open Geospatial Consortium | |

**Test Method** Validate the XML document using the Schematron document http://schemas.opengis.net/tsml/1.3/schematron/xsd-measurement-

timeseries-domain-range-observation.sch. Pass if no errors are reported. Fail otherwise.

**A.9 Conformance class: Timeseries encoded as Time-Value Pairs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **Conformance Class** | | | | | | | | | | | | | | |  |
|  |  |  | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| [http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-timeseries-tvp](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-timeseries-tvp) | | | | | | | | | | | | | | | | | | | |  |
|  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-core](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-core) | | | | | | | | | |  |  |  |  |  |  |  |  |
|  |  |  | | |  |  |  |  |  |  |  |
|  |  |  |  |  | | |  |  |  |  |  |  | |  |  |  |  |  |  |  |
|  | **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-tvp](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-tvp) | | | | | | | | |  | |  |  |  |  |  |  |  |
|  |  |  | | |  |  |  |  |  |  |
|  |  |  |  |  | | |  |  |  |  |  | | |  |  |  |  |  |  |  |
|  | **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-timeseries-tvp](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-tvp) | | | | | | | | | | | |  |  |  |  |  |  |
|  |  |  |  | | |  |  |  |  |  | | |  |  |
|  |  |  |  |  | | |  |  |  |  |  | | |  | |  |  |  |  |  |
|  | **Dependency** |  | [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-timeseries-tvp](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-tvp) | | | | | | | | | | | | | |  |  |  |  |
|  |  |  |  | | |  |  |  |  |  | | |  | |  |  |
|  |  |  |  |  | | |  |  |  |  |  | | |  | |  | |  |  |  |
|  | **Dependency** |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | | | |  |  | | |  | |  | |  |  |  |
|  |  |  |  | | |  |  |  |  |
|  |  |  |  |  | | |  |  |  | |  | | |  | |  | |  |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-tvp/valid | | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/valid | | | | | | | | |  | |  | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that the XML instance is a valid timeseries. | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  | | |  |  | |  | | | | |  | |  |  |  |
|  |  |  | **Test Method** |  | Validate the XML document using the XML Schema document | | | | | | | | | | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd. Pass | | | | | | | | | | | | | | |  |
|  |  |  |  |  | if no errors are reported. Fail otherwise. | | | | | | | | | | | | | | |  |
|  |  |  |  |  | | | |  |  | |  | | | | |  | |  |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-tvp/time-increasing | | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/time-increasing | | | | | | | | | | | | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that each point in the timeseries is increasing in time. | | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  |  | | |  | | |  | | | | |  | | |  |  |
|  |  |  | **Test Method** |  | Inspect the value of each tsml:time element in the series and ensure | | | | | | | | | | | | | | |  |
|  |  |  |  |  | the time instant is after the previous tsml:time instant. | | | | | | | | | | | | | | |  |
|  |  |  |  |  | | | |  | | |  | | | | |  | | |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-tvp/record-homogenous | | | | | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/record-homogenous | | | | | | | | | | | | | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that the record type for each point in the series is the same. | | | | | | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | E.g. all of type MeasurementTVP or CategoricalTVP. | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  | | |  | | | | | | | |  | | | |  |
|  |  |  | **Test Method** |  | Validate the XML document using the XML Schema document | | | | | | | | | | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd. Pass | | | | | | | | | | | | | | |  |
|  |  |  |  |  | if no errors are reported. Fail otherwise. | | | | | | | | | | | | | | |  |
|  |  |  |  |  | | | |  | | | | | | | |  | | | |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-tvp/domain-time | | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/domain-time | | | | | | | | | | |  | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that the XML instance is a valid coverage timeseries | | | | | | | | | | | | | | |  |
|  |  |  |  |  | consisting of single temporal element. | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  | | | | | | | | | | | | | | |  |
|  |  |  | **Test Method** |  | Validate the XML document using the XML Schema document | | | | | | | | | | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd. Pass | | | | | | | | | | | | | | |  |
|  |  |  |  |  | 45 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | Copyright © 2019 Open Geospatial Consortium | | | | | | | | | | | | |  |

if no errors are reported. Fail otherwise.

/conf/timeseriesml/1.3/req/xsd-timeseries-tvp/default-point-metadata

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/default-point-metadata |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Ensure the default metadata is applied to each point in the timeseries | |
|  |  |  | unless it has been overridden. | |
|  |  |  |  | |
|  | **Test Method** |  | This requirement describes the logic for defaulting behavior. | |
|  |  |  | Conformance is to be tested when creating or parsing the instance | |
|  |  |  | document, rather than directly on an instance document. | |
|  |  |  |  |  |

/conf/timeseriesml/1.3/req/xsd-timeseries-tvp/equidistant-encoding

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/equidistant-encoding |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Ensure the equidistant timeseries metadata has been sufficiently | |
|  |  |  | defined. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-tvp.sch. | |
|  |  |  | Pass if no errors are reported for the ‘equidistant-encoding’ test. Fail | |
|  |  |  | otherwise. | |
|  |  |  |  |  |

/conf/timeseriesml/1.3/req/xsd-timeseries-tvp/time-mandatory

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/time-mandatory | | |  |
|  |  |  |  |  |  |  | |
|  |  | **Test Purpose** |  | Ensure that the time component of the timeseries coverage is | | | |
|  |  |  |  | sufficiently specified.Ensure each point in the series has a time | | | |
|  |  |  |  | specified, either through definition of an equidistant series or | | | |
|  |  |  |  | explicitly for each point. | | | |
|  |  |  |  |  |  |  | |
|  |  | **Test Method** |  | Validate the XML document using the Schematron document | | | |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-tvp.sch. | | | |
|  |  |  |  | Pass if no errors are reported for the ‘equidistant-encoding' test. Fail | | | |
|  |  |  |  | otherwise. | | | |
|  |  |  |  | |  |  | |
|  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-tvp/null-value | | | | | |
|  |  |  |  |  |  |  |  |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/null-value | |  | |
|  |  |  |  |  |  |  |  |
|  |  | **Test Purpose** |  | Ensure that @xsi:nil = 'true' is specified for each point that is defined | | | |
|  |  |  |  | as null. | | | |
|  |  |  |  |  | |  | |
|  |  | **Test Method** |  | Validate the XML document using the Schematron document | | | |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-tvp.sch. | | | |
|  |  |  |  | Pass if no errors are reported for the ‘null-value’ test. Fail otherwise. | | | |
|  |  |  |  |  |  |  |  |

/conf/timeseriesml/1.3/req/xsd-timeseries-tvp/null-point-reason

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-tvp/null-point-reason |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Ensure that a reason is specified for each point that is defined as null. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-tvp.sch. | |
|  |  |  | Pass if no errors are reported for the ‘null-point-reason’ test. Fail | |
|  |  |  | otherwise. | |
|  |  |  |  |  |

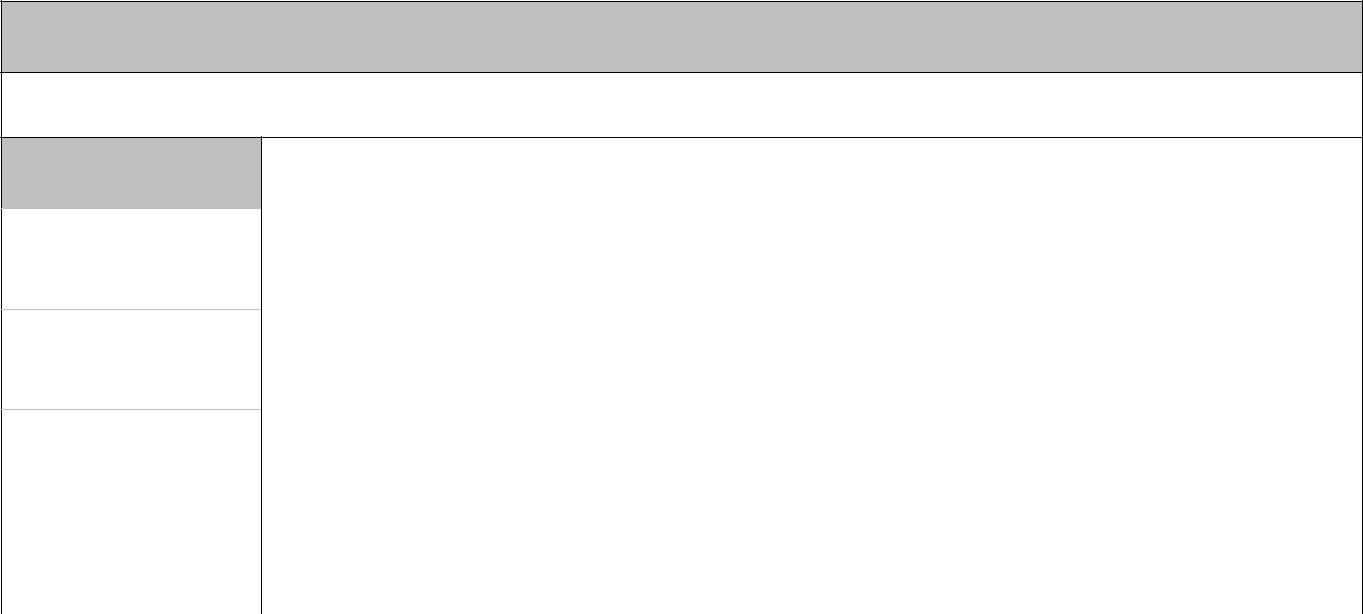
/conf/timeseriesml/1.3/rec/xsd-timeseries-tvp/nil-reason-vocab

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3**/**rec/xsd-timeseries-tvp/nil-reason-vocab |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Ensure that where a nilreason is provided it comes from the OGC | |
|  |  |  | nils vocabulary at <http://www.opengis.net/def/nil/> | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-timeseries-tvp.sch. | |
|  |  |  | Pass if no errors are reported for the ‘nil-reason-vocab’ test. Fail | |
|  |  |  | otherwise | |
|  |  |  |  |  |

**A.10 Conformance class: Categorical (TVP) Timeseries**



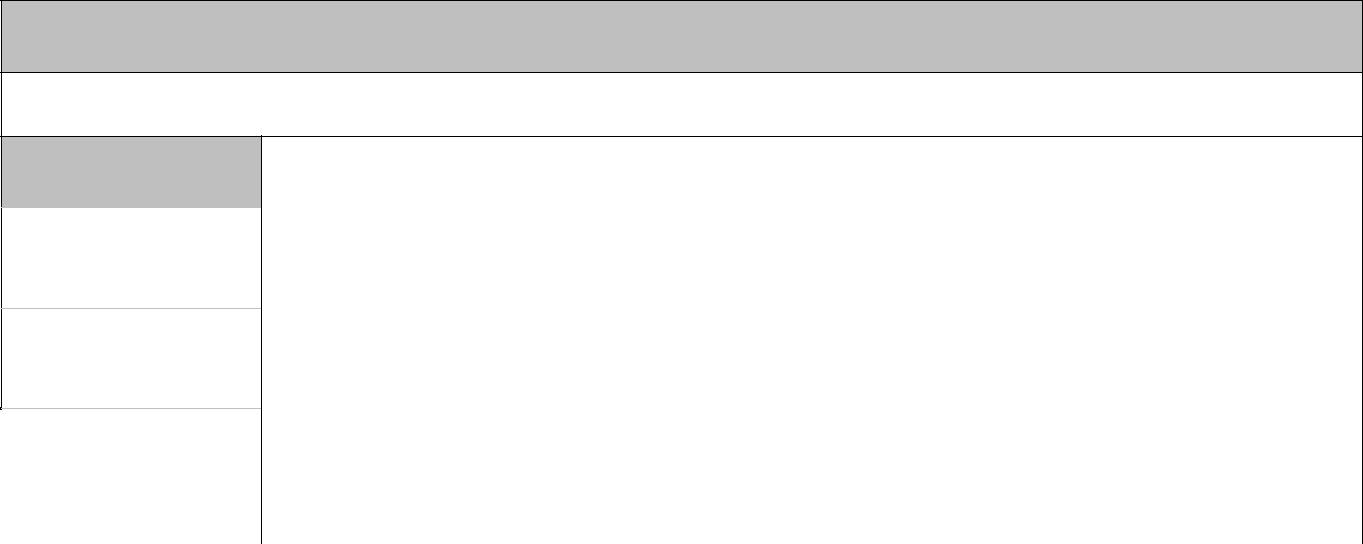
**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-categorical-timeseries-tvp](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-categorical-timeseries-tvp)

/conf/timeseriesml/1.3/req/xsd-categorical-timeseries-tvp/value-category

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-categorical-timeseries-tvp/value- | |  |
|  |  |  | category |  | |
|  |  |  |  | | |
|  | **Test Purpose** |  | Verify that each point in the timeseries has a value-type of a | | |
|  |  |  | category. | | |
|  |  |  |  | | |
|  | **Test Method** |  | Validate the XML document using the XML Schema document | | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd and | | |
|  |  |  | the Schematron document | | |
|  |  |  | http://schemas.opengis.net/waterml/2.0/xsd-categorical-timeseries- | | |
|  |  |  | tvp.sch. Pass if no errors are reported. Fail otherwise. | | |
|  |  |  |  |  |  |

**A.11 Conformance class: Measurement (TVP) Timeseries**



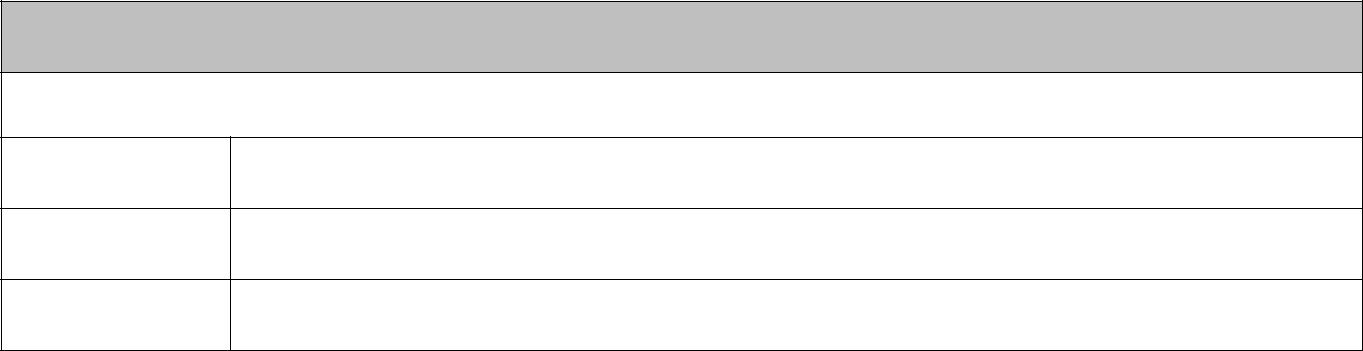
**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-measurement-timeseries-tvp

/conf/timeseriesml/1.3/req/xsd-measurement-timeseries-tvp/value-measure

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-measurement-timeseries-tvp/value- | |  |
|  |  |  |  | measure |  | |
|  |  |  |  |  | | |
|  |  | **Test Purpose** |  | Verify that each point in the timeseries has a value-type of a | | |
|  |  |  |  | measure. | | |
|  |  |  |  |  | | |
|  |  | **Test Method** |  | Validate the XML document using the XML Schema document | | |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd. Pass | | |
|  |  |  |  | if no errors are reported. Fail otherwise. | | |
|  |  |  |  |  |  |  |

**A.12 Conformance class: Timeseries encoded as Domain Range**



**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-timeseries-dr](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-timeseries-dr)

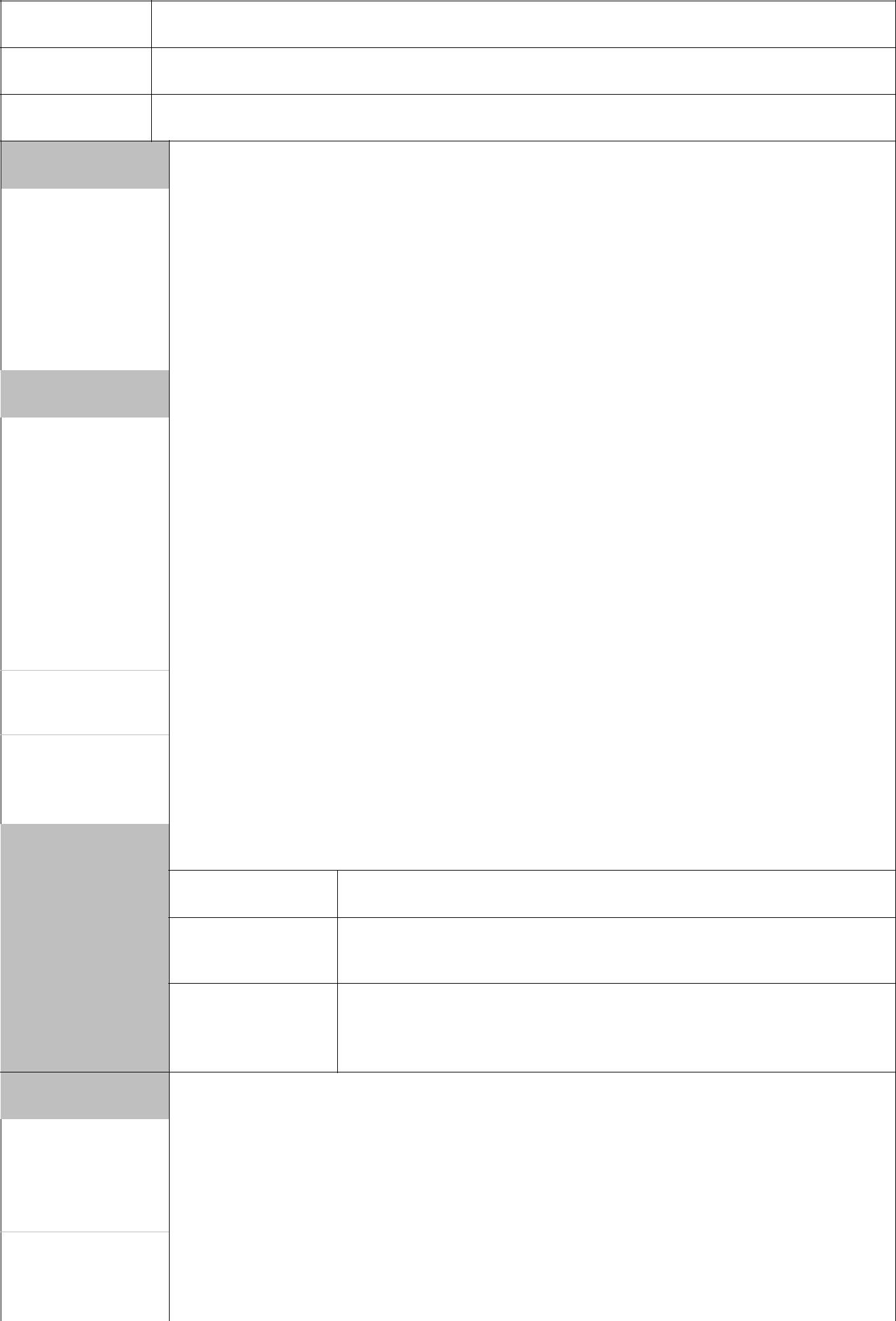
**Dependency** http://www.opengis.net/doc/GML/GMLCOV/1.0.1#clause-6

**Dependency** [http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules](http://www.opengis.net/spec/timeseriesml/1.0/req/xsd-xml-rules)

**Dependency** [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-core](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-core)

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**+Dependency** [http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-domain-range](http://www.opengis.net/spec/timeseries/1.0/req/uml-timeseries-domain-range)

**Dependency** [http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-timeseries-domain-range](http://www.opengis.net/spec/timeseries/1.0/req/uml-measurement-timeseries-domain-range)

**Dependency** [http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-timeseries-domain-range](http://www.opengis.net/spec/timeseries/1.0/req/uml-categorical-timeseries-domain-range)

/conf/timeseriesml/1.3/req/xsd-timeseries-dr/valid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-dr/valid |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Verify that the XML instance is a valid timeseries. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the XML Schema document | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesDR.xsd. Pass | |
|  |  |  | if no errors are reported. Fail otherwise. | |
|  |  |  |  |  |

/conf/timeseriesml/1.3/req/xsd-timeseries-dr/time-increasing

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-dr/time-increasing | |  |  |
|  |  |  |  |  |  | |  |
|  |  | **Test Purpose** |  | Verify that each point in the timeseries is increasing in time. | | | |
|  |  |  |  |  |  | |  |
|  |  | **Test Method** |  | Inspect the value of each element in the coverage domain and ensure | | | |
|  |  |  |  | the time instant is after the previous instant. | | | |
|  |  |  |  | |  | |  |
|  |  | /conf/timeseriesml/1.3/req/xsd-timeseries-dr/record-homogenous | | | | | |
|  |  |  |  |  |  |  |  |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-dr/record-homogenous | | |  |
|  |  |  |  |  |  |  |  |
|  |  | **Test Purpose** |  | Verify that the record type for each point in the series is the same. | | | |
|  |  |  |  |  |  |  |  |
|  |  | **Test Method** |  | Validate the XML document using the XML Schema document | | | |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesDR.xsd. Pass | | | |
|  |  |  |  | if no errors are reported. Fail otherwise. | | | |
|  |  |  |  |  |  |  |  |

/conf/timeseriesml/1.3/req/xsd-timeseries-dr/domain-time

**Requirement** /req/timeseriesml/1.3/req/xsd-timeseries-dr/domain-time

**Test Purpose** Verify that the XML instance is a valid coverage timeseries

consisting of single temporal element.

**Test Method** Validate the XML document using the XML Schema document http://schemas.opengis.net/tsml/1.3/timeseriesDR.xsd. Pass

if no errors are reported. Fail otherwise.

/conf/timeseriesml/1.3/req/xsd-timeseries-dr/default-point-metadata

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-timeseries-dr/default-point-metadata |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Ensure the default metadata is applied to each point in the timeseries | |
|  |  |  | unless it has been overridden. | |
|  |  |  |  | |
|  | **Test Method** |  | This requirement describes the logic for defaulting behavior. | |
|  |  |  | Conformance is to be tested when creating or parsing the instance | |
|  |  |  | document, rather than directly on an instance document. | |
|  |  |  |  |  |

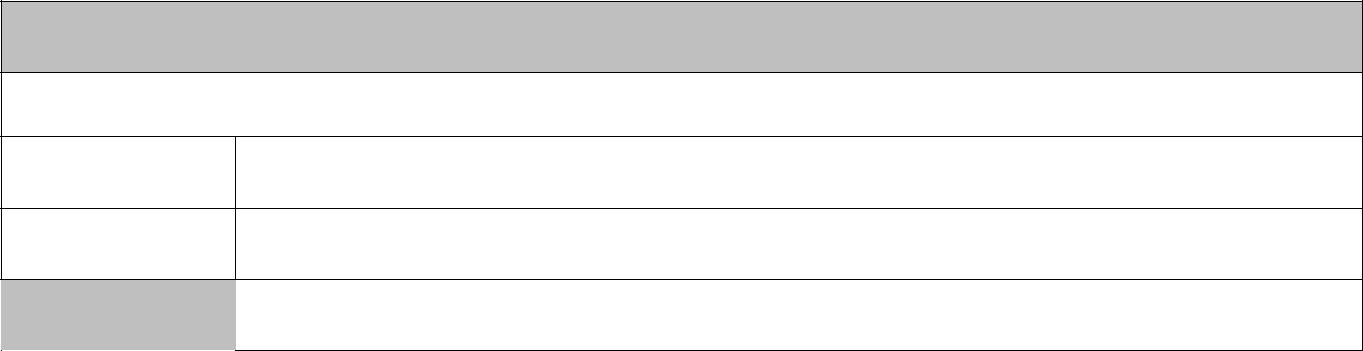
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**A.13 Conformance class: Collection**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **Conformance Class** | | | | | | | | | |  |
|  |  |  | |  | |  |  |  |  |  |  |  |  |  |  |
| http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-collection | | | | | | | | | | | | | | |  |
|  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | **Dependency** |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-collection | | | | |  |  |  |  |  |  |  |  |
|  |  |  | | |  |  |
|  |  |  |  |  | | |  | |  |  |  |  |  |  |  |
|  | **Dependency** |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-sampling-feature-collections | | | | | | | | |  |  |  |  |
|  |  |  | | |  | |  |  |  |  |
|  |  |  |  |  | | |  | |  |  |  | |  |  |  |
|  | **Dependency** |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | | |  |  |  | |  |  |  |
|  |  |  |  | | |  | |  |
|  |  |  |  |  | | |  | | |  |  | |  |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-collection/valid | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-collection/valid | | | | | |  | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that the tsml:Collection is valid. | | | | | | | | | |  |
|  |  |  |  |  |  | | | | |  | | |  |  |  |
|  |  |  | **Test Method** |  | Validate the XML document using the XML Schema document | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/collection.xsd. Pass if | | | | | | | | | |  |
|  |  |  |  |  | no errors are reported. Fail otherwise. | | | | | | | | | |  |
|  |  |  |  |  | | | | | |  | | |  |  |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-collection/sampling-feature-single | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-collection/sampling-feature-single | | | | | | | | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that the tsml:samplingFeatureMember element has a value | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | that matches the content model defined by | | | | | | | | | |  |
|  |  |  |  |  | sams:SF\_SamplingFeature (or derivative) or an appropriate | | | | | | | | | |  |
|  |  |  |  |  | reference is used. | | | | | | | | | |  |
|  |  |  |  |  |  | | | | |  | | |  | |  |
|  |  |  | **Test Method** |  | Validate the XML document using the XML Schema Document | | | | | | | | | |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/collection.xsd. Pass if | | | | | | | | | |  |
|  |  |  |  |  | no errors are reported. Fail otherwise. | | | | | | | | | |  |
|  |  |  |  |  | | | | | |  | | |  | |  |
|  |  |  | /conf/timeseriesml/1.3/req/xsd-collection/sampling-feature-group | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-collection/sampling-feature-group | | | | | | | |  | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Test Purpose** |  | Verify that the tsml:samplingFeatureMember element has a value | | | | | | | | | |  |
|  |  |  |  |  | that matches the content model defined by | | | | | | | | | |  |
|  |  |  |  |  | sams:SF\_SamplingFeatureCollection or an appropriate reference is | | | | | | | | | |  |
|  |  |  |  |  | used. | | | | | | | | | |  |
|  |  |  |  |  |  | | | | |  | | |  |  |  |
|  |  |  | **Test Method** |  | Validate the XML document using the XML Schema Document | | | | | | | | | |  |
|  |  |  |  |  |
|  |  |  |  |  | http://schemas.opengis.net/tsml/1.3/collection.xsd. Pass if | | | | | | | | | |  |
|  |  |  |  |  | no errors are reported. Fail otherwise. | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**A.14 Conformance class: MonitoringFeature**



**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-monitoring-feature

**Dependency** http://www.opengis.net/spec/timeseries/1.3/req/uml-monitoring-feature **Dependency** http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules

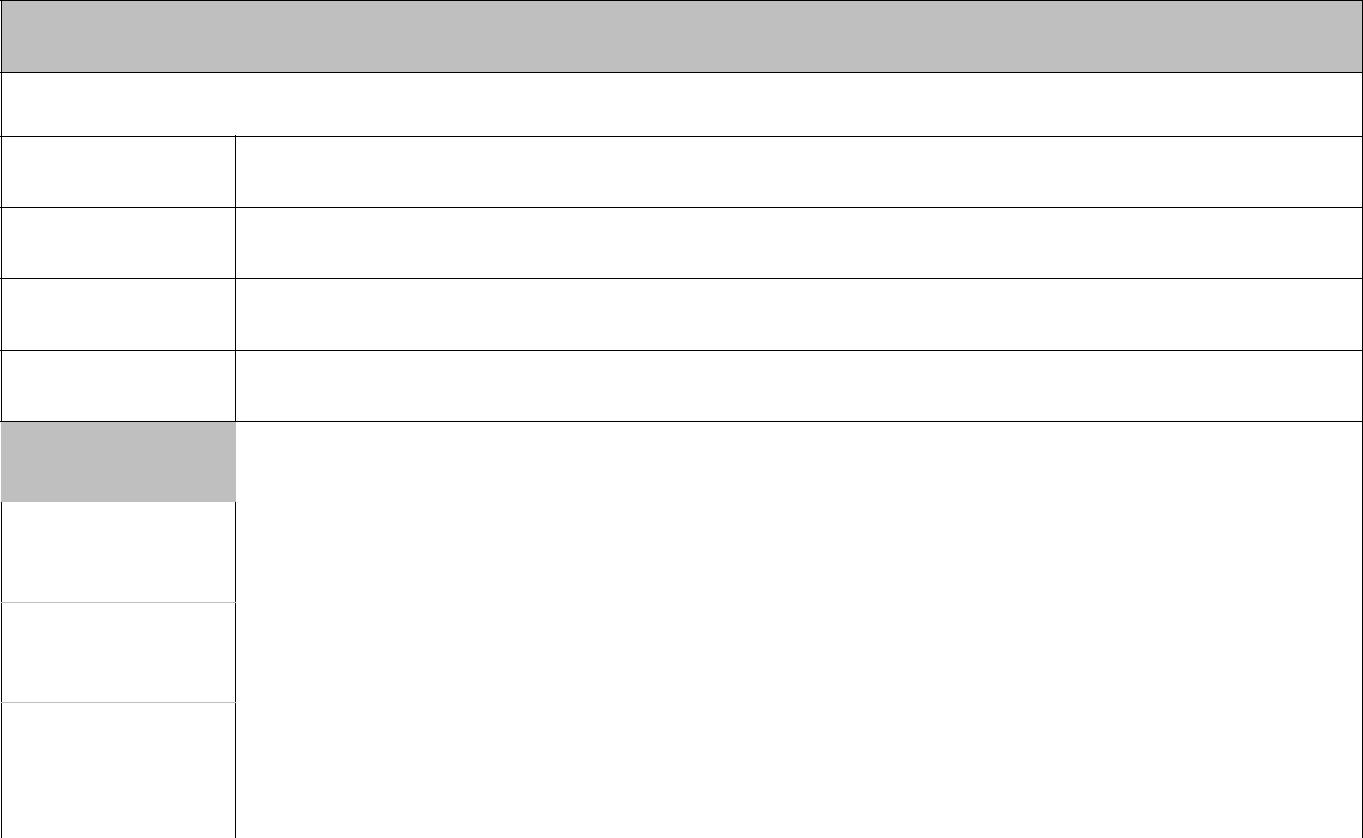
/conf/timeseriesml/1.3/req/xsd-monitoring-feature/valid

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-monitoring-feature/valid |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Verify that the tsml:MonitoringFeature is valid. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the XML Schema document | |
|  |  |  | http://schemas.opengis.net/tsml/2.0/monitoringFeature.xsd. | |
|  |  |  | Pass if no errors are reported. Fail otherwise. | |
|  |  |  |  |  |

**A.15 Conformance class: MonitoringFeature as Feature of Interest**



**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-monitoring-feature-feature-of-interest

**Dependency** http://www.opengis.net/spec/OMXML/2.0/req/observation

**Dependency** http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-observation

**Dependency** http://www.opengis.net/spec/timeseries/1.3/req/uml-monitoring-feature-foi

**Dependency** http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules

/conf/timeseriesml/1.3/req/xsd-monitoring-feature-feature-of-interest/featureOfInterest

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-monitoring-feature-feature-of- | |  |
|  |  |  | interest/featureOfInterest |  | |
|  |  |  |  | | |
|  | **Test Purpose** |  | Verify that the om:featureOfInterest element has a value that | | |
|  |  |  | matches the content model defined by tsml:MonitoringFeature. | | |
|  |  |  |  | | |
|  | **Test Method** |  | Validate the XML document using the Schematron document | | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/schematron/xsd-monitoring-feature- | | |
|  |  |  | feature-of-interest.sch. Pass if no errors are reported. Fail otherwise. | | |
|  |  |  |  |  |  |

**A.16 Conformance class: ObservationProcess**



**Conformance Class**

[http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-observation-process](http://www.opengis.net/spec/timeseriesml/1.0/conf/xsd-observation-process)

**Dependency** http://www.opengis.net/spec/timeseries/1.3/req/uml-observation-process **Dependency** http://www.opengis.net/spec/timeseriesrml/1.3/req/xsd-xml-rules

/conf/timeseriesml/1.3/req/xsd-observation-process/valid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-observation-process/valid |  |
|  |  |  |  | |
|  | **Test Purpose** |  | Verify that the tsml:ObservationProcess is valid. | |
|  |  |  |  | |
|  | **Test Method** |  | Validate the XML document using the XML Schema document | |
|  |  |  | http://schemas.opengis.net/tsml/1.3/observationProcess.xsd. | |
|  |  |  | Pass if no errors are reported. Fail otherwise. | |
|  |  |  |  |  |

**A.17 Conformance class: Timeseries Metadata**



**Conformance Class**

http://www.opengis.net/spec/timeseriesml/1.3/conf/xsd-metadata

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Dependency** |  | http://www.opengis.net/spec/timeseriesml/1.3/req/xsd-xml-rules | | | | | | |  |  |  |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |
|  |  |  |  | |  |  |  |  | |  |  |  |  |  |  |  |  |  |
| **Dependency** |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-timeseries-core | | | | | | | |  |  |  |  |  |  |  |  |  |
|  |  | |  |  |  |  | |  |
|  |  |  |  | |  |  |  |  | | |  |  |  |  |  |  |  |  |
| **Dependency** |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-measurement-metadata | | | | | | | | | | |  |  |  |  |  |  |
|  |  |  | |  |  |  |  | | |  |  |  |
|  |  |  |  | |  |  |  |  | | |  |  | |  |  |  |  |  |
| **Dependency** |  | http://www.opengis.net/spec/timeseries/1.3/req/uml-categorical-metadata | | | | | | | | | |  | |  |  |  |  |  |
|  |  |  | |  |  |  |  | | |  |  |
|  |  |  |  | |  |  |  |  | | |  | | |  |  |  |  |  |
|  |  | /conf/timeseriesml/1.3/req/xsd-metadata/timeseries-metadata | | | | | | | | | | | | | | | |  |
|  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-metadata/timeseries-metadata | | | | | | | | | | |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Test Purpose** |  | Verify that the tsml:Timeseries/tsml:metadata element has a value | | | | | | | | | | | | | |  |
|  |  |  |  | that matches the content model defined by tsml:TimeseriesMetadata. | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  | |  | | |  | | |  | |  |  |  |
|  |  | **Test Method** |  | Validate the XML document using the XML Schema Document | | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd. Pass | | | | | | | | | | | | | |  |
|  |  |  |  | if no errors are reported. Fail otherwise. | | | | | | | | | | | | | |  |
|  |  |  |  | |  |  | |  | | |  | | |  | |  |  |  |
|  |  | /conf/timeseriesml/1.3/req/xsd-metadata/point-metadata | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-metadata/point-metadata | | | | | | | | | |  | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Test Purpose** |  | Verify that the tsml:CategoricalTVP/tsml:metadata and | | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  | tsml:MeasurementTVP/tsml:metadata elements have a value that | | | | | | | | | | | | | |  |
|  |  |  |  | matches the content model defined by tsml:PointMetadata. | | | | | | | | | | | | | |  |
|  |  |  |  |  |  | | |  | | |  | | | | |  |  |  |
|  |  | **Test Method** |  | Validate the XML document using the XML Schema Document | | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesTVP.xsd. Pass | | | | | | | | | | | | | |  |
|  |  |  |  | if no errors are reported. Fail otherwise. | | | | | | | | | | | | | |  |
|  |  |  |  | |  | | |  | | |  | | | | |  |  |  |
|  |  | /conf/timeseriesml/1.3/req/xsd-metadata/timeseries-comments | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-metadata/timeseries-comments | | | | | | | | | | | | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Test Purpose** |  | Verify that the tsml:TimeseriesMetadata/tsml:commentBlock | | | | | | | | | | | | | |  |
|  |  |  |  | element has a value that matches the content model defined by | | | | | | | | | | | | | |  |
|  |  |  |  | tsml:TimeseriesMetadata. | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Test Method** |  | Validate the XML document using the XML Schema Document | | | | | | | | | | | | | |  |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesMetadata.xsd. | | | | | | | | | | | | | |  |
|  |  |  |  | Pass if no errors are reported. Fail otherwise. | | | | | | | | | | | | | |  |
|  |  |  |  | |  | | | | | |  | | | | |  | |  |
|  |  | /conf/timeseriesml/1.3/req/xsd-metadata/timeseries-metadata-extension | | | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Requirement** |  | /req/timeseriesml/1.3/req/xsd-metadata/timeseries-metadata- | | | | | | | | | | | |  | |  |
|  |  |  |  | extension | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **Test Purpose** |  | Verify that the tsml:TimeseriesDomainRange/tsml:metadata element | | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  | has a value that matches the content model defined by | | | | | | | | | | | | | |  |
|  |  |  |  | tsml:TimeseriesMetadataExtension. | | | | | | | | | | | | | |  |
|  |  |  |  |  | | | | | | | | | | | | | |  |
|  |  | **Test Method** |  | Validate the XML document using the XML Schema Document | | | | | | | | | | | | | |  |
|  |  |  |  |
|  |  |  |  | http://schemas.opengis.net/tsml/1.3/timeseriesDR.xsd. Pass | | | | | | | | | | | | | |  |
|  |  |  |  | if no errors are reported. Fail otherwise. | | | | | | | | | | | | | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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**Annex B - Codelists (informative)**

This annex contains copies of codelists that are initially defined in the OGC Timeseries Profile of Observations and Measurements and used in the TimeseriesML XML encoding.

They are reproduced in this standard for convenience only. The normative definitions are not maintained in this standard.

Normative definitions can be found at http://opengis.net/def/timeseries/1.3 and are maintained outside of this specification.

**B.1 DataQualityCode Codelist**

Terms in this codelist are used to indicate the quality of individual data points.

**Table 5 - Values from the DataQualityCode codelist**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Label** | **Definition** |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Good | The data has been examined and represents a |  |
| /DataQualityCode/Good |  | reliable measurement. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Suspect | The data should be treated as suspect. |  |
| /DataQualityCode/Suspect |  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Estimate | The data is an estimate only, not a direct |  |
| /DataQualityCode/Estimate |  | measurement. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Poor | The data should be considered as low quality |  |
| /DataQualityCode/Poor |  | and may have been rejected. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Unchecked | The data has not been checked by any |  |
| /DataQualityCode/Unchecked |  | qualitative method. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Missing | The data is missing. |  |
| /DataQualityCode/Missing |  |  |  |
|  |  |  |  |

**B.2 InterpolationCode Codelist**

Terms in this codelist are used to indicate how data should be interpolated between neigbouring points in a timeseries.

**Table 6 - Values from the InterpolationCode codelist**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Label** | **Definition** |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Continuous | A continuous time series indicates the |  |
| /InterpolationCode/Continuous |  | observation result is the value of a property |  |
|  |  |  |
|  |  | at the indicated instant in time. The points |  |
|  |  | are essentially connected and interpolation |  |
|  |  | may occur between points in order to |  |
|  |  | estimate the value of the property between |  |
|  |  | points. The appropriate time spacing |  |
|  |  | between successive points to minimise |  |
|  |  | interpolation errors is related to rate of |  |
|  |  | change (wrt time) of the property. |  |
|  |  |  |  |
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|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Label** | **Definition** |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Discontinuous | The sampling of the property occurs such |  |
| /InterpolationCode/Discontinuous |  | that it is not possible to regard the series as |  |
|  |  |  |
|  |  | continuous. The time between samples is too |  |
|  |  | large to classify the measurements as |  |
|  |  | continuous. |  |
|  |  | Example: An infrequent water sample |  |
|  |  | measuring pH. |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Instant Total | Value represents a total attributed to a |  |
| /InterpolationCode/InstantTotal |  | specific time instant. This is normally |  |
|  |  |  |
|  |  | generated from an event based measuring |  |
|  |  | device. |  |
|  |  | Example: An individual tip of a tipping |  |
|  |  | bucket rain gauge. |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Average Preceding | Value represents the average value over the |  |
| /InterpolationCode/AveragePrec |  | preceding interval. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Maximum Preceding | Value represents the maximum value that |  |
| /InterpolationCode/MaxPrec |  | was measured during the preceding time |  |
|  |  |  |
|  |  | interval. |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Minimum Preceding | Value represents the minimum value that |  |
| /InterpolationCode/MinPrec |  | was measured during the preceding time |  |
|  |  |  |
|  |  | interval. |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Preceding Total | Value represents the total of measurements |  |
| /InterpolationCode/PrecTotal |  | taken within the previous time interval. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Average Succeeding | Value represents the average value over the |  |
| /InterpolationCode/AverageSucc |  | following interval. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Total Succeeding | Value represents the average value over the |  |
| /InterpolationCode/TotalSucc |  | following interval. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Minimum Succeeding | Value represents the minimum value for the |  |
| /InterpolationCode/MinSucc |  | following interval. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Maximum Succeeding | Value represents the maximum value for the |  |
| /InterpolationCode/MaxSucc |  | following interval. |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Constant Preceding | Value is constant in the preceding interval. |  |
| /InterpolationCode/ConstPrec |  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Constant Succeeding | Value is constant in the succeeding interval. |  |
| /InterpolationCode/ConstSucc |  |  |  |
|  |  |  |  |

**B.3 ProcessTypeCode Codelist**

Terms from this codelist are used to indicate the type of process that was used in an observation.

**Table 7 - Values from the ProcessTypeCode codelist**

|  |  |  |
| --- | --- | --- |
| **Code** | **Label** | **Definition** |
|  |  |  |

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|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Label** | **Definition** |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Algorithm | Timeseries data is generated by applying an |  |
| /ProcessTypeCode/Algorithm |  | algorithm to input data |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Manual Method | Timeseries data is collected manually |  |
| /ProcessTypeCode/ManualMethod |  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Sensor | Timeseries data is collected from an |  |
| /ProcessTypeCode/Sensor |  | automated sensor |  |
|  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Simulation | Timeseries is generated from a simulation |  |
| /ProcessTypeCode/Simulation |  |  |  |
|  |  |  |  |
| http://opengis.net/def/timeseries/1.3 | Unknown | Timeseries is collected or generated by an |  |
| /ProcessTypeCode/Unknown |  | unknown process |  |
|  |  |  |
|  |  |  |  |

**B.4 ProcessingCode Codelist**

The contents of this codelist is not defined in the Timeseries Profile. It is a stub for any community or vendor specific codelist that defines processing codes relevant to timeseries observations (for example to indicate what processing level or step has been reached).

**B.5 SampledMediumCode Codelist**

The contents of this codelist is not defined in the Timeseries Profile. It is a stub for any community or vendor specific codelist that defines codes for sampled media relevant to timeseries observations.

**B.6 StatusCode Codelist**

The contents of this codelist is not defined in the Timeseries Profile. It is a stub for any community or vendor specific codelist that defines status codes relevant to timeseries observations (for example to indicate what verification checks have taken place).

**Annex C - Mapping of TimeseriesML 1.0 XML Schema types to WaterML2.0 XML Schema types**

This annex contains a mapping of the TimeseriesML1.0 XML Schema to the WaterML 2.0 XML Schema.

In the TimeseriesML XML Schema implementation emphasis has been placed on minimizing the number of classes. This has been achieved by a combination of soft typing and by merging classes where appropriate (e.g. ObservationMetadata and TimeseriesMetadata are merged in the Timeseries conceptual model).

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| WaterML2.0 Part 1 | TimeseriesML | | | Notes |
| XML Schema Type | XML Schema Type | | |  |
|  |  |  |  |  |
| DocumentMetadata | None | | | DocumentMetadata has |
|  |  |  |  | been removed as a |
| collection.xsd |  |  |  | separate type. Properties |
|  |  |  |  | of the WML2 |
|  |  |  |  | DocumentMetadata class |
|  |  |  |  | have been included in the |
|  |  |  |  | TSML Collection. |
|  |  |  |  |  |
| Collection | Collection | | | Addition of |
|  |  |  |  | DocumentMetadata |
| collection.xsd |  | *collection.xsd* | | properties to the |
|  |  |  |  | Collection type. |
|  |  |  |  |  |
| SamplingFeatureMember | SamplingFeatureMember | | |  |
| *collection.xsd* |  | *collection.xsd* | |  |
|  |  |  |  |  |
| Timeseries | TimeseriesTVP | | |  |
|  |  |  | |  |
| timeseries.xsd |  | timeseries.xsd |  |  |
|  |  | | |  |
| MeasurementTimeseries | TimeseriesTVP | | | Soft typing, primary |
|  |  |  |  | distinction is in the |
| timeseries.xsd |  | timeseries.xsd | | encoding of the time- |
|  |  |  |  | value pairs. |
|  |  | | |  |
| CategoricalTimeseries | TimeseriesTVP | | | Soft typing, primary |
|  |  |  |  | distinction is in the |
|  |  |  |  | encoding of the time-value |
| timeseries.xsd |  | timeseries.xsd | | pairs. |
|  |  |  |  |  |

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|  |  |  |
| --- | --- | --- |
| TimeseriesMetadata | TimeseriesMetadata |  |
| timeseries.xsd | timeseriesMetadata.xsd |  |
|  |  |  |
| MeasurementTimeseriesMetadata | TimeseriesMetadata | No distinction made |
|  |  | between timeseries-level |
| timeseries.xsd | *timeseriesMetadata.xsd* | metadata type for |
|  |  | Measure and Categorical |
|  |  | timeseries. |
|  |  |  |
| ObservationMetadata | None | ObservationMetadata has |
|  |  | been removed however |
| *timeseriesObservationMetadata.xsd* |  | properties of the class |
|  |  | were retained and added |
|  |  | to TimeseriesMetadata. |
|  |  | ObservationMetadata in |
|  |  | WaterML2 specialized |
|  |  | 19115 MD\_Metadata. |
|  |  | 19115 MD\_Metadata may |
|  |  | still be supplied using the |
|  |  | om:metadata association |
|  |  | role of OM\_Observation. |
|  |  |  |
| TVPMetadata | PointMetadata |  |
| timeseries.xsd | *timeseriesMetadata.xsd* |  |
|  |  |  |
| TVPMeasurementMetadata | PointMetadata | No distinction made |
|  |  | between point-level |
| timeseries.xsd | *timeseriesMetadata.xsd* | metadata type for |
|  |  | Measure and Categorical |
|  |  | timeseries. Both use the |
|  |  | same PointMetadata type. |
|  |  |  |
| DefaultCategoricalTVPMetadata | PointMetadata | No distinction made |
|  |  | between point-level |
| timeseries.xsd | *timeseriesMetadata.xsd* | metadata type for |
|  |  | Measure and Categorical |
|  |  | timeseries. Both use the |
|  |  | same PointMetadata type. |
|  |  |  |

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|  |  |  |
| --- | --- | --- |
| MeasurementTVP | MeasurementTVP |  |
| timeseries.xsd | *timeseriesTVP.xsd* |  |
|  |  |  |
| CategoricalTVP | CategoricalTVP |  |
| timeseries.xsd | *timeseriesTVP.xsd* |  |
|  |  |  |
| Measure | Measure |  |
| timeseries.xsd | *timeseriesTVP.xsd* |  |
|  |  |  |
| CommentBlock | CommentBlock |  |
| timeseries.xsd | timeseriesMetadata.xsd |  |
|  |  |  |
| ObservationProcess | ObservationProcess | Schema is not restricted to |
|  |  | use of |
| observationProcess.xsd | observationProcess.xsd | ObservationProcess. Any |
|  |  | valid derivation of |
|  |  | OM\_Process or SWE |
|  |  | AbstractProcess may be |
|  |  | used. |
|  |  |  |
| MonitoringPoint | MonitoringFeature | No longer restricted to |
|  |  | point monitoring features. |
| monitoringPoint.xsd | *monitoringFeature.xsd* | Same inheritance from |
|  |  | SF\_SpatialSamplingFeatu |
|  |  | re. |
|  |  |  |
| TimeZone | TimeZone |  |
| monitoringPoint.xsd | monitoringFeature.xsd |  |
|  |  |  |
| TimeListSimple | TimeListSimple |  |
| timeseries-domain-range.xsd | timeseriesDR.xsd |  |
| [Informative] |  |  |
|  |  |  |
| TimePositionList | TimePositionList |  |
| timeseries-domain-range.xsd | *timeseriesDR.xsd* |  |
| *[Informative]* |  |  |
|  |  |  |
| AnnotationCoverage | AnnotationCoverage |  |
| timeseries-domain-range.xsd |  |  |
|  |  |  |

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|  |  |  |  |
| --- | --- | --- | --- |
| *[Informative]* | *timeseriesDR.xsd* |  |  |
|  |  |  |  |
| TimeseriesCoverage | None | No new coverage types |  |
| timeseries-domain-range.xsd | timeseriesDR.xsd | are defined. |  |
|  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| TimeseriesDomainRange | TimeseriesDomainRange |  |  |
| timeseries-domain-range.xsd | *timeseriesDR.xsd* |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| MeasurementTimeseriesCoverage | *None* | No new coverage types |  |
| timeseries-domain-range.xsd |  | are defined. |  |
|  |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| MeasurementTimeseriesDomainRange | TimeseriesDomainRange | Soft-typing |  |
| timeseries-domain-range.xsd | *timeseriesDR.xsd* |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| CategoricalTimeseriesCoverage | None | No new coverage types |  |
|  |  | are defined. |  |
| timeseries-domain-range.xsd |  |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| CategoricalTimeseriesDomainRange | TimeseriesDomainRange | Soft-typing |  |
| timeseries-domain-range.xsd | *timeseriesDR.xsd* |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| MeasurementTimeseriesMetadataExtension | TimeseriesMetadataExtensi | Soft-typing |  |
|  | on |  |  |
| timeseries-domain-range.xsd | *timeseriesDR.xsd* |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |
| CategoricalTimeseriesMetadataExtension | TimeseriesMetadataExtensi | Soft-typing |  |
|  | on |  |  |
| timeseries-domain-range.xsd | *timeseriesDR.xsd* |  |  |
| *[Informative]* |  |  |  |
|  |  |  |  |

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**Annex D - Additions/Modifications to TimeseriesML 1.0 XML Schema**

This annex contains additions/modifications to the TimeseriesML 1.0 XML Schema.

|  |  |  |
| --- | --- | --- |
| Updated TimeseriesML  XML Schema Type | TimeseriesML  XML Schema | Notes |
| TimePeriodList (Version 1.2) | timeseriesDR.xsd | Previously, the  TimeseriesML Domain-  Range schema only  allowed for a list of  instantaneous time  positions to be encoded  under the gml:domainSet  element (TimePositionList).  An amendment to the  timeseriesDR.xsd allows  the encoding of a list of  Time Periods, which  contain both a beginning dateTime and an ending dateTime. This has been added primarily to denote an observation's valid time  that spans a range in  time. For example, a  maximum temperature  that is valid from 12Z to  00Z needs a valid time  that is denoted by both a  beginning and ending  time. Version 1.2 contains this update. |

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|  |  |  |
| --- | --- | --- |
| timeseriesMetadata (Version 1.2) | timeseriesDR.xsd  timeseriesMetadata.xsd | In order to accommodate  metadata applicable to an  irregularly spaced whole  timeseries for Domain- Range encoding, an amendment to increase the  cardinality of  timeseriesMetadata from  "1" to "unbounded" has been added to timeseriesDR.xsd.  The amendment allows for  dividing the entire irregularly spaced timeseries  with different time spacings into segments that do contain regularly spaced time steps. Metadata can then be used to describe each of these individual segments. The amendment also necessitates an update to the documentation of  both timeseriesMetadata in  timeseriesDR.xsd and its'  child element  TimeseriesMetadata in  timeseriesMetadata.xsd to  denote that metadata can be  applied to the whole  timeseries or individual  regularly spaced segments of the whole irregularly spaced timeseries. Version 1.2 contains this update. |
| numberTimeSteps (Version 1.3) | timeseriesMetadata.xsd | This amendment allows for a specific ‘count’ of the number of time steps in a timeseries, or each homogenous (regularly spaced) segment of an  irregularly spaced whole  timeseries.  It is an optional TimeseriesMetadata property of type Integer for both the TVP and Domain-Range encodings.  TimeseriesMetadata is of type "tsml:TimeseriesMetadataType". The additional property will be added to this type. Version 1.3 contains this update. |

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