

CR-Form-v3

CHANGE REQUEST

⌘ **O&M- Part 1 CR 08-022** ⌘ rev **1** ⌘ Current version: **1.0.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ AS ☐ Imp Spec ☒ Best Practices Paper ☐ Other ☐

Title:	⌘ Move XML implementation of Observation Schema Extensions to separate namespace
Source:	⌘ CSIRO
Work item code:	⌘ Date: ⌘ 25 February 2008
Category:	⌘ F Use <u>one</u> of the following categories: F (Critical correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification) Detailed explanations of the above categories can be found in the TC Policies and Procedures.

Reason for change:	⌘ The XML Schema implementation of optional/informative elements of the Observation Schema was published in the om/1.0.0/extensions directory, in the same XML namespace as the base schema. Those OGC implementations that have a dependency on the Observation Schema (i.e. Sampling Features, SOS) <import> the “all-components” document om.xsd. However, the all-components stub-schema document “om.xsd” does not include the extensions. Thus, any application which requires one of the dependent OGC schemas (Sampling Features, SOS) may not access the Observation Schema Extensions, since the <import> of om.xsd clashes with any attempt to <import> om_extended.xsd. This problem is a consequence of an error in the modularization strategy for optional elements, combined with the rules for schema document resolution used by standard processing environments.
Summary of change:	⌘ 1. move the Observation Schema Extensions components to a new namespace 2. rearrange Annex D to reflect refactoring 3. correct one example in Annex E 4. minor corrections to namespaces and schemaLocation paths 5. republish om/1.0.0/extensions as omx/1.0.0 in the OGC schema repository Note: this change has NO EFFECT on the published Observation Schema, as reflected by

		the standard “all-components” stub schema imported by external applications.	
Consequences if not approved:	⌘	Observation Schema Extensions are not available to applications that also have Sampling Features or SOS as dependencies	
Clauses affected:	⌘	Annex D, Annex E 3.2	
Other specs Affected:	⌘	☐ Other core specifications ☐ Abstract specifications ☐ Best Practices Document	⌘
Supporting Doc.	⌘		
Other comments:	⌘	Material below provides drop-in replacements for Annex D and Annex E	
Status	⌘		
Disposition	⌘		

ANNEX D (informative)

XML Schema implementation

1 GML Application Schema

The models presented in this specification use the UML profile described in ISO 19103 and ISO DIS 19136. This allows a GML Application Schema to be generated by following the encoding rules in ISO DIS 19136. This implementation provides an explicit representation of the model, with XML elements carrying the literal names that appear in the model.

NOTE: The gml:Observation element provided in ISO 19136 implements a closely related concept. However, gml:Observation does not conform to the model described in this specification in the following ways: (a) the observation target is not constrained to be a feature; (b) the “using” property (corresponding to “procedure”) is optional; (c) the observedProperty is not provided.

Note that the XML Schema presented in this Annex uses GML 3.1.1. This is the GML version used by SensorML v1.0 and by the SWE Common v1.0 components described therein, which are used by the O&M encoding. Schema validity of a set of dependent XML schemas requires that they use common versions.

2 Observation Schema schema

2.1 Namespace

The XML schema for Observation Schema v1.0 is in the namespace
<http://www.opengis.net/om/1.0>

2.2 Dependencies

The Observation Schema v1.0 has direct dependencies on the following externally governed schemas:

Schema	Version	XML namespace	Location of imported schema document
GML	3.1.1	http://www.opengis.net/gml	http://schemas.opengis.net/gml/3.1.1/base/gml.xsd
Swe Common	1.0.1	http://www.opengis.net/swe/1.0.1	http://schemas.opengis.net/swe/1.0.1/swe.xsd
SensorML	1.0.1	http://www.opengis.net/sensorML/1.0.1	http://schemas.opengis.net/sensorML/1.0.1/sensorML.xsd

Issue: The ISO 19115 Metadata XML Implementation described in ISO 19139 is bound to GML 3.2, so cannot be used with this version. Placeholder types and elements have

been used in place of the ISO components in this version of the schema. The upgrade path is indicated at relevant points in the schema documents.

Issue: It has been suggested that the concrete observation feature-type provided as part of GML (viz. gml:Observation) might be replaced by om:Observation. Since om:Observation has dependencies on SWE Common and on SensorML, this would require either (i) that those dependencies were also introduced into GML, (ii) that the content-model be relaxed to take a wild-card (<any> or type="xs:anyType") in place of SWE Common or SensorML components, or (iii) that the observation feature-type be removed from GML, and application developers directed to O&M as a standard cross-domain application schema for Observations, but not in the GML namespace.

2.3 Observation

This document implements the basic Observation and ObservationCollection classes described in sub-clause 6.2 and shown in Figure 2.

Listing 1. observation.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:om="http://www.opengis.net/om/1.0"
xmlns:swe="http://www.opengis.net/swe/1.0.1" xmlns:sml="http://www.opengis.net/sensorML/1.0.1"
targetNamespace="http://www.opengis.net/om/1.0" elementFormDefault="qualified" attributeFormDefault="unqualified"
version="1.0.0">
  <annotation>
    <documentation>observation.xsd
```

An XML implementation of the OandM model from OGC 07-022

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```
</annotation>
<!-- ===== -->
<!-- bring in other schemas -->
<import namespace="http://www.opengis.net/gml"
schemaLocation="http://schemas.opengis.net/gml/3.1.1/base/gml.xsd"/>
<!-- can't use ISO Metadata schema with GML 3.1.1
<import namespace="http://www.isotc211.org/2005/gmd"
schemaLocation="http://schemas.opengis.net/gmd/3.1.1/gmd/gmd.xsd"/>
-->
<import namespace="http://www.opengis.net/swe/1.0.1"
schemaLocation="http://schemas.opengis.net/swe/1.0.1/swe.xsd"/>
<import namespace="http://www.opengis.net/sensorML/1.0.1"
schemaLocation="http://schemas.opengis.net/sensorML/1.0.1/sensorML.xsd"/>
<!-- ===== -->
<!-- ===== Object types for Observations ===== -->
<!-- ===== -->
<complexType name="ObservationType">
  <annotation>
    <documentation>Base type for Observations.
    Observation is an act ("event"), whose result is an estimate of the value of a property of the feature of interest.
    The observed property may be any property associated with the type of the feature of interest.

    The following properties are inherited from AbstractFeatureType:
    <!-- from AbstractGMLType
    <element ref="gml:metaDataProperty" minOccurs="0" maxOccurs="unbounded"/>
    <element ref="gml:description" minOccurs="0"/>
    <element ref="gml:name" minOccurs="0" maxOccurs="unbounded"/>
    <!-- from AbstractFeatureType
    <element ref="gml:boundedBy" minOccurs="0"/>
    --></documentation>
  </annotation>
  <complexContent>
    <extension base="gml:AbstractFeatureType">
```

```

<sequence>
  <element name="metadata" type="om:AnyOrReferenceType" minOccurs="0">
    <!-- <element name="observationMetadata" type="gmd:MD_Metadata_PropertyType" minOccurs="0" -->
    <annotation>
      <documentation>Replace with reference to ISO Metadata entity when GML version 3.2.X has been
formally adopted.</documentation>
    </annotation>
  </element>
  <element name="samplingTime" type="swe:TimeObjectPropertyType">
    <annotation>
      <documentation>The samplingTime is the time that the result applies to the feature-of-interest.
This is the time usually required for geospatial analysis of the result.</documentation>
    </annotation>
  </element>
  <element name="resultTime" type="swe:TimeObjectPropertyType" minOccurs="0">
    <annotation>
      <documentation>The resultTime is the time when the procedure associated with the observation act
was applied.
For some observations this is identical to samplingTime, in which case the resultTime may be omitted.

Example: Where a measurement is made on a specimen in a laboratory, the samplingTime should record the
time the specimen was retrieved from its host, while the resultTime should record the time the laboratory procedure was
applied.

Example: Where sensor observation results are post-processed, the resultTime is the post-processing time,
while the samplingTime preserves the time of initial interaction with the world.

Example: Simulations are often used to estimate the values for phenomena in the future or past. The
samplingTime is the real-world time that the result applies to, while the resultTime is the time that the simulation process
was executed.</documentation>
    </annotation>
  </element>
  <element name="procedure" type="om:ProcessPropertyType">
    <annotation>
      <documentation>The procedure is the description of a process used to generate the result.
It must be suitable for the observed property.
NOTE: At this level we do not distinguish between sensor-observations,
estimations made by an observer, or algorithms, simulations, computations and complex processing
chains.</documentation>
    </annotation>
  </element>
  <element name="resultQuality" type="om:AnyOrReferenceType" minOccurs="0">
    <!-- <element name="resultQuality" type="gmd:DQ_Element_PropertyType" minOccurs="0" -->
    <annotation>
      <documentation>Instance-specific quality assessment or measure.
Allow multiple quality measures if required.

Replace with reference to ISO Metadata entity when GML version 3.2.X has been formally
adopted.</documentation>
    </annotation>
  </element>
  <element name="observedProperty" type="swe:PhenomenonPropertyType">
    <annotation>
      <documentation>Property-type or phenomenon for which the observation result provides an estimate of
its value.

for example "wavelength", "grass-species", "power", "intensity in the waveband x-y", etc.
It must be a property associated with the type of the feature of interest.
This feature-property that provides the (semantic) type of the observation.
The description of the phenomenon may be quite specific and constrained.

The description of the property-type may be presented using various alternative encodings.
If shown inline, the swe:Phenomenon schema is required.
If provided using another encoding (e.g. OWL or SWEET) then the description must be in a remote
repository and xlink reference used.</documentation>
    </annotation>
  </element>
  <element name="featureOfInterest" type="gml:FeaturePropertyType">
    <annotation>
      <documentation>The featureOfInterest is a feature of any type (ISO 19109, ISO 19101), which is a
representation of the observation target, being the real-world object regarding which the observation is made.
such as a specimen, station, tract, mountain, pixel, etc.
The spatial properties (location) of this feature of interest are typically of most interest for spatial analysis
of the observation result.</documentation>
    </annotation>
  </element>
  <element name="parameter" type="swe:AnyDataPropertyType" minOccurs="0" maxOccurs="unbounded">
    <annotation>
      <documentation>An Observation parameter is a general event-specific parameter.

```

This will typically be used to record environmental parameters, or event-specific sampling parameters that are not tightly bound to either the feature-of-interest or the procedure.

NOTE: Parameters that are tightly bound to the procedure should be recorded as part of the procedure description. For example, the SensorML model associates parameters with specific process elements or stages.

NOTE: The semantics of the parameter must be provided as part of its value.

In some applications it is convenient to use a generic or standard procedure, or feature-of-interest, rather than define an event-specific process or feature.

In this context, event-specific parameters are bound to the Observation act. </documentation>

```

</annotation>
</element>
<element name="result" type="anyType">
  <annotation>
    <documentation>The result contains the value generated by the procedure.
    The type of the observation result must be consistent with the observed property, and the scale or scope
    for the value must be consistent with the quantity or category type.
    Application profiles may choose to constrain the type of the result. </documentation>
  </annotation>
</element>
</sequence>
</extension>
</complexContent>
</complexType>
<!-- ..... -->
<element name="Observation" type="om:ObservationType" substitutionGroup="gml:_Feature">
  <annotation>
    <documentation>Observation is an act ("event"), whose result is an estimate of the value of a property of the
    feature of interest.
    The observed property may be any property associated with the type of the feature of interest. </documentation>
  </annotation>
</element>
<!-- ..... -->
<complexType name="ObservationPropertyType">
  <sequence minOccurs="0">
    <element ref="om:Observation"/>
  </sequence>
  <attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
<!-- ===== Observation Collection ===== -->
<!-- ===== -->
<complexType name="ObservationCollectionType">
  <annotation>
    <documentation>Collection of arbitrary observations</documentation>
  </annotation>
  <complexContent>
    <extension base="gml:AbstractFeatureType">
      <sequence>
        <element name="member" type="om:ObservationPropertyType" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- ..... -->
<element name="ObservationCollection" type="om:ObservationCollectionType" substitutionGroup="gml:_Feature">
  <annotation>
    <documentation>Collection of arbitrary observations</documentation>
  </annotation>
</element>
<!-- ===== -->
<!-- ===== -->
<complexType name="ProcessPropertyType">
  <annotation>
    <documentation>This property type allows the Observation/procedure property to either
    * contain a SensorML Process,
    * contain a description of a process described using another model, wrapped inside a om:Process element
    * point to a Process either elsewhere in the document or identified by a URI</documentation>
  </annotation>
  <sequence minOccurs="0">
    <choice>
      <element ref="sml:_Process">
        <annotation>
          <documentation>Top of SensorML Process hierarchy</documentation>
        </annotation>
      </element>
      <element name="Process">

```

```

        <annotation>
        <documentation>This element is xs:anyType so may contain a description of a process provided in any
well-formed XML.
        If the process description is namespace qualified, then the namespace must be identified in the instance
document.</documentation>
        </annotation>
    </element>
</choice>
</sequence>
<attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
<!-- ===== -->
<!-- ===== -->
<complexType name="AnyOrReferenceType">
    <annotation>
    <documentation>Placeholder type
        Used in a few places where ISO 19139 metadata classes are used, which will become available with GML
3.2</documentation>
    </annotation>
    <sequence minOccurs="0">
        <any/>
    </sequence>
    <attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
<!-- ===== -->
<!-- ===== -->
</schema>

```

2.4 Schema for import

Listing 2 is a stub schema document that collects Observation Schema components for use in external domain schemas. Use of this document in for external references to the Observation schema package ensures that all components are included, and reduces the risk of conflicting <import> statements.

Listing 2. om.xsd

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:om="http://www.opengis.net/om/0.0"
targetNamespace="http://www.opengis.net/om/0.0" elementFormDefault="qualified" attributeFormDefault="unqualified"
version="0.0">
    <annotation>
    <documentation>om.xsd
    The complete Observations and Measurements schema
    Copyright © 2007 Open Geospatial Consortium - see http://www.opengeospatial.org/about/?page=ipr</documentation>
    </annotation>
    <!-- ===== -->
    <include schemaLocation="./observation.xsd"/> <!--
===== -->
</schema>

```

3 Observation Schema Extensions schema

3.1 Namespace

The XML schema for Observation Schema Extensions v1.0 is in the namespace <http://www.opengis.net/omx/1.0>

3.2 Dependencies

The Observation Schema Extensions schema v1.0 has direct dependencies on the following externally governed schemas:

Schema	Version	XML namespace	Location of imported schema document
GML	3.1.1	http://www.opengis.net/gml	http://schemas.opengis.net/gml/3.1.1/base/gml.xsd
Swe Common	1.0.1	http://www.opengis.net/swe/1.0.1	http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd
SensorML	1.0.1	http://www.opengis.net/sensorML/1.0.1	http://schemas.opengis.net/sensorML/1.0.1/sensorML.xsd
O&M	1.0.0	http://www.opengis.net/om/1.0.0	http://schemas.opengis.net/om/1.0.0/om.xsd
Discrete coverages	0.2.1	http://www.opengis.net/cv/0.2.1	http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd

3.3 Specialized observation

Listing 3 implements the specialized Observation classes described in sub-clause 6.3.3.2, and shown in Figure 3. Specialization is accomplished using Schematron [ISO/IEC 19737-3] constraints to enforce the result type.

NOTE: In earlier versions specialized observations were implemented in the same namespace as the generic observation schema, using W3C XML Schema restriction and redefine elements. In this implementation, the specializations have been refactored into a separate namespace, to aid implementation using standard XML processors.

Listing 3. observationSpecialization.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:omx="http://www.opengis.net/omx/1.0"
  xmlns:swe="http://www.opengis.net/swe/1.0.1"
  xmlns:sch="http://purl.oclc.org/dsdl/schematron"
    targetNamespace="http://www.opengis.net/omx/1.0"
    elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.0.0">
  <annotation>
    <appinfo source="urn:ogc:specification:om:doc-is(07-022r3):1.0.0">
      <sch:title>Schematron validation</sch:title>
      <sch:ns prefix="gml" uri="http://www.opengis.net/gml"/>
      <sch:ns prefix="omx" uri="http://www.opengis.net/omx/1.0"/>
      <sch:ns prefix="om" uri="http://www.opengis.net/om/1.0"/>
      <sch:ns prefix="swe" uri="http://www.opengis.net/swe/1.0.1"/>
      <sch:ns prefix="xs" uri="http://www.w3.org/2001/XMLSchema"/>
      <sch:ns prefix="xsi" uri="http://www.w3.org/2001/XMLSchema-instance"/>
    </appinfo>
    <documentation>observationSpecialization.xsd
```

An implementation of the OandM model for SWE

This document contains various specializations of the basic observation pattern, by fixing the type of the result.

The specialization is achieved by using Schematron to constrain the type of the result element from om:ObservationType

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```

</annotation>
<!-- ===== -->
<!-- bring in other schemas -->
<import namespace="http://www.opengis.net/gml"
schemaLocation="http://schemas.opengis.net/gml/3.1.1/base/gml.xsd"/>
<import namespace="http://www.opengis.net/swe/1.0.1"
schemaLocation="http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd"/>
<import namespace="http://www.opengis.net/om/1.0"
schemaLocation="http://schemas.opengis.net/om/1.0.0/om.xsd"/>
<!-- ===== -->
<!-- ===== -->
<!-- ===== Scalar Observations ===== -->
<!-- ===== -->
<element name="Measurement" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result type must be gml:MeasureType">
        <sch:rule context="//omx:Measurement">
          <sch:assert test="om:result/@xsi:type='gml:MeasureType' ">xsi:Type must be
gml:MeasureType</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation in which the result is a Measure</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="CategoryObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result type must be gml:CodeType">
        <sch:rule context="//omx:CategoryObservation">
          <sch:assert test="om:result/@xsi:type='swe:ScopedNameType' ">xsi:Type must be
swe:ScopedNameType</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a textual value from a controlled
vocabulary</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="CountObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result type must be xs:integer">
        <sch:rule context="//omx:CountObservation">
          <sch:assert test="om:result/@xsi:type='xs:integer' ">xsi:Type must be xs:integer</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is an integer representing the count of the observed
property</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="TruthObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result type must be xs:boolean">
        <sch:rule context="//omx:TruthObservation">
          <sch:assert test="om:result/@xsi:type='xs:boolean' ">xsi:Type must be xs:boolean</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a boolean value representing the truth value
(usually existence) of the observed property</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="GeometryObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a gml:_Geometry and nothing else">
        <sch:rule context="//omx:GeometryObservation">
          <assert test="om:result/@xsi:type='gml:GeometryPropertyType' ">xsi:type of the result element must be

```

```

gml:GeometryPropertyType</assert>
  <sch:assert test="count(om:result/*) = 1">one and only one child element must be present</sch:assert>
  </sch:rule>
</sch:pattern>
</appinfo>
<documentation>Specialized Observation, in which the result is a geometry</documentation>
</annotation>
</element>
<!-- ===== -->
<element name="TemporalObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a gml:_TimeObject and nothing else">
        <sch:rule context="//omx:TemporalObservation">
          <assert test="om:result/@xsi:type='gml:TimePrimitivePropertyType'">xsi:type of the result element must
be gml:TimePrimitivePropertyType</assert>
          <sch:assert test="count(om:result/*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a temporal object</documentation>
  </annotation>
</element>
<!-- ===== -->
<!-- ===== Observation with constant complex result ===== -->
<!-- ===== -->
<element name="ComplexObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a swe:Record and nothing else">
        <sch:rule context="//omx:ComplexObservation">
          <sch:assert test="om:result/swe:DataRecord">swe:DataRecord must be present as child of
om:result</sch:assert>
          <sch:assert test="count(om:result/*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a record representing a multi-component
phenomenon</documentation>
  </annotation>
</element>
<!-- ===== -->
</schema>

```

3.4 Coverage observation types

Listing 4 and Listing 5 implement the specialized observation types with coverage results described in 6.3.3.3 and Figure 3. The Observation result is constrained to be from the Discrete Coverages schema (OGC 06-188r1).

Listing 4. observationCoverage.xsd

```

<?xml version="1.0" encoding="UTF-8"?>
<schema
  xmlns="http://www.w3.org/2001/XMLSchema" xmlns:sch="http://purl.oclc.org/dsdl/schematron"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:om="http://www.opengis.net/om/1.0" xmlns:omx="http://www.opengis.net/omx/1.0"
  xmlns:cv="http://www.opengis.net/cv/0.2.1"
  targetNamespace="http://www.opengis.net/omx/1.0"
  elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.0.0">
  <annotation>
    <appinfo source="urn:ogc:specification:om:doc-is(07-022r3):1.0.0">
      <sch:title>Schematron validation</sch:title>
      <sch:ns prefix="omx" uri="http://www.opengis.net/omx/1.0"/>
      <sch:ns prefix="om" uri="http://www.opengis.net/om/1.0"/>
      <sch:ns prefix="cv" uri="http://www.opengis.net/cv/0.2.1"/>
    </appinfo>
    <documentation>observationCoverage.xsd

```

An implementation of the OandM model for SWE

This document contains specializations of the basic observation pattern, fixing the type of the result to be various discrete

coverage types.

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```
</annotation>
<!-- ===== -->
<!-- bring in other schemas -->
<import namespace="http://www.opengis.net/cv/0.2.1" schemaLocation="http://bp.schemas.opengis.net/06-
188r1/cv/0.2.1/cv.xsd"/>
<import namespace="http://www.opengis.net/om/1.0"
schemaLocation="http://schemas.opengis.net/om/1.0.0/om.xsd"/>
<!-- ===== -->
<!-- ===== -->
<!-- ===== Coverage Observations = sampling a phenomenon that varies on the feature of interest ===== -->
<!-- ===== -->
<!-- ===== -->
<element name="DiscreteCoverageObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a cv:CV_DiscreteCoverage and nothing else">
        <sch:rule context="//omx:DiscreteCoverageObservation">
          <sch:assert test="om:result/cv:CV_DiscreteCoverage">cv:CV_DiscreteCoverage must be present as child
of om:result</sch:assert>
          <sch:assert test="count(om:result*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a generalized discrete coverage</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="PointCoverageObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a cv:CV_DiscretePointCoverage and nothing else">
        <sch:rule context="//omx:PointCoverageObservation">
          <sch:assert test="om:result/cv:CV_DiscretePointCoverage">cv:CV_DiscretePointCoverage must be
present as child of om:result</sch:assert>
          <sch:assert test="count(om:result*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a point coverage which samples a property at
points in the feature of interest</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="TimeSeriesObservation" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a cv:CV_DiscreteTimeInstantCoverage and nothing else">
        <sch:rule context="//omx:TimeSeriesObservation">
          <sch:assert test="om:result/cv:CV_DiscreteTimeInstantCoverage">cv:CV_DiscreteTimeInstantCoverage
must be present as child of om:result</sch:assert>
          <sch:assert test="count(om:result*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a time-instant coverage which samples a property
of the feature of interest at different times</documentation>
  </annotation>
</element>
<!-- ===== -->
<element name="ElementCoverageObservation" type="om:ObservationType"
substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a cv:CV_DiscreteElementCoverage and nothing else">
        <sch:rule context="//omx:ElementCoverageObservation">
          <sch:assert test="om:result/cv:CV_DiscreteElementCoverage">cv:CV_DiscreteElementCoverage must be
present as child of om:result</sch:assert>
          <sch:assert test="count(om:result*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a coverage whose domain elements contain
references to objects encoded elsewhere, which provide the sampling geometry of the feature of
```

```

interest</documentation>
  </annotation>
</element>
<!-- ===== -->
</schema>

```

Listing 5. observationCoverageCompact.xsd

```

<?xml version="1.0" encoding="UTF-8"?>
<schema
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:sch="http://purl.oclc.org/dsdl/schematron"
  xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:omx="http://www.opengis.net/omx/1.0"
  xmlns:cv="http://www.opengis.net/cv/0.2.1"
  targetNamespace="http://www.opengis.net/omx/1.0"
  elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.0.0">
  <annotation>
    <appinfo source="urn:ogc:specification:om:doc-is(07-022r3):1.0.0">
      <sch:title>Schematron validation</sch:title>
      <sch:ns prefix="omx" uri="http://www.opengis.net/omx/1.0"/>
      <sch:ns prefix="om" uri="http://www.opengis.net/om/1.0"/>
      <sch:ns prefix="cv" uri="http://www.opengis.net/cv/0.2.1"/>
    </appinfo>
    <documentation>observationCoverageCompact.xsd

```

An implementation of the OandM model for SWE

This document contains specializations of the basic observation pattern, fixing the type of the result to be various discrete coverage types (compact version).

In this schema, the derivation model is ****restriction****

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```

  </annotation>
  <!-- ===== -->
  <!-- bring in other schemas -->
  <import namespace="http://www.opengis.net/cv/0.2.1" schemaLocation="http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd"/>
  <import namespace="http://www.opengis.net/om/1.0"
    schemaLocation="http://schemas.opengis.net/om/1.0.0/om.xsd"/>
  <!-- ===== -->
  <!-- ===== -->
  <!-- === Compact coverage observations = implement the "geometry" element in the result in compact form === -->
  <!-- ===== -->
  <element name="DiscreteCoverageObs" type="om:ObservationType" substitutionGroup="om:Observation">
    <annotation>
      <appinfo>
        <sch:pattern name="result must contain a cv:CompactDiscreteCoverage and nothing else">
          <sch:rule context="//omx:DiscreteCoverageObs">
            <sch:assert test="om:result/cv:CompactDiscreteCoverage">cv:CompactDiscreteCoverage must be present
as child of om:result</sch:assert>
            <sch:assert test="count(om:result*) = 1">one and only one child element must be present</sch:assert>
          </sch:rule>
        </sch:pattern>
      </appinfo>
      <documentation>Specialized Observation, in which the result is a compact representation of a generalized
discrete coverage</documentation>
    </annotation>
  </element>
  <!-- ===== -->
  <element name="PointCoverageObs" type="om:ObservationType" substitutionGroup="om:Observation">
    <annotation>
      <appinfo>
        <sch:pattern name="result must contain a cv:CompactDiscretePointCoverage and nothing else">
          <sch:rule context="//omx:PointCoverageObs">
            <sch:assert test="om:result/cv:CompactDiscretePointCoverage">cv:CompactDiscretePointCoverage must
be present as child of om:result</sch:assert>
            <sch:assert test="count(om:result*) = 1">one and only one child element must be present</sch:assert>
          </sch:rule>
        </sch:pattern>
      </appinfo>
      <documentation>Observation event</documentation>

```

```

</annotation>
</element>
<!-- ===== -->
<element name="TimeSeriesObs" type="om:ObservationType" substitutionGroup="om:Observation">
  <annotation>
    <appinfo>
      <sch:pattern name="result must contain a cv:CompactDiscreteTimeCoverage and nothing else">
        <sch:rule context="//omx:TimeSeriesObs">
          <sch:assert test="om:result/cv:CompactDiscreteTimeCoverage">cv:CompactDiscreteTimeCoverage must
be present as child of om:result</sch:assert>
          <sch:assert test="count(om:result/*) = 1">one and only one child element must be present</sch:assert>
        </sch:rule>
      </sch:pattern>
    </appinfo>
    <documentation>Specialized Observation, in which the result is a compact representation of a time-instant
coverage which samples a property of the feature of interest at different times</documentation>
  </annotation>
</element>
<!-- ===== -->
</schema>

```

3.5 Observation processes

Listing 6 implements the simple model for ObservationProcess shown in Figure 1, which specializes the SensorML Process by adding a property to denote a well-known method and also the expected quality of results from that method. This may be used to denote a procedure when the full detail available through SensorML is not required.

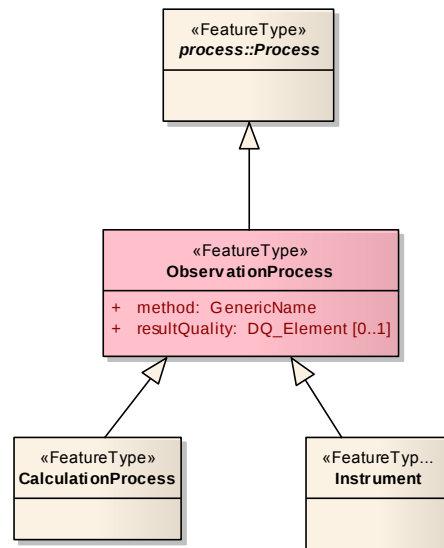


Figure 1. Simple model for Observation Processes

Listing 6. specializedProcedure.xsd

```

<?xml version="1.0" encoding="UTF-8"?>
<schema
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:omx="http://www.opengis.net/omx/1.0"
  xmlns:sml="http://www.opengis.net/sensorML/1.0.1"
  xmlns:gml="http://www.opengis.net/gml"
  targetNamespace="http://www.opengis.net/omx/1.0"
  elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.0.0">
  <annotation>
    <documentation>specializedProcedure.xsd

```

Components to describe procedures used in observations and measurements, and other events.

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```
</annotation>
<!-- ===== -->
<!-- bring in other schemas -->
<import namespace="http://www.opengis.net/gml"
schemaLocation="http://schemas.opengis.net/gml/3.1.1/base/gml.xsd"/>
<!-- can't use ISO Metadata schema with GML 3.1.1
<import namespace="http://www.isotc211.org/2005/gmd"
schemaLocation="http://schemas.opengis.net/gml/3.1.1/gmd/gmd.xsd"/>
-->
<import namespace="http://www.opengis.net/sensorML/1.0.1"
schemaLocation="http://schemas.opengis.net/sensorML/1.0.1/sensorML.xsd"/>
<import namespace="http://www.opengis.net/om/1.0"
schemaLocation="http://schemas.opengis.net/om/1.0.0/om.xsd"/>
<!-- ===== -->
<!-- ===== -->
<!-- === Specialised Procedure types === -->
<!-- ===== -->
<complexType name="ObservationProcessType">
  <annotation>
    <documentation>Head of substitution group of observation procedures.
    Use gml:description element to describe the procedure or link to a definitive description.</documentation>
  </annotation>
  <complexContent>
    <extension base="sml:AbstractProcessType">
      <sequence>
        <element name="method" type="gml:CodeType">
          <annotation>
            <documentation>Code for the particular procedure type. Usually an item from a list or register of
procedures, methods, instrument-types, etc.</documentation>
          </annotation>
        </element>

        <element name="resultQuality" type="om:AnyOrReferenceType" minOccurs="0">
<!-- <element name="resultQuality" type="gmd:DQ_Element_PropertyType" minOccurs="0"> -->
          <annotation>
            <documentation>Quality associated systematically with observations made using this
procedure.</documentation>
          </annotation>
        </element>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- ===== -->
<element name="ObservationProcess" type="omx:ObservationProcessType" substitutionGroup="sml:_Process">
  <annotation>
    <documentation>Head of substitution group of observation procedures.
    Use gml:description element to describe the procedure or link to a definitive description.</documentation>
  </annotation>
</element>
<!-- ===== -->
<complexType name="ObservationProcessPropertyType">
  <sequence minOccurs="0">
    <element ref="omx:ObservationProcess"/>
  </sequence>
  <attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
<!-- ===== -->
<!-- ===== -->
<complexType name="InstrumentType">
  <annotation>
    <documentation>Specialised observation procedure corresponding to a physical instrument or sensor.
    Use gml:description element to describe the procedure or link to a definitive description.</documentation>
  </annotation>
  <complexContent>
    <extension base="omx:ObservationProcessType"/>
  </complexContent>
</complexType>
<!-- ===== -->
<element name="Instrument" type="omx:InstrumentType" substitutionGroup="omx:ObservationProcess">
  <annotation>
    <documentation>Specialised observation procedure corresponding to a physical instrument or sensor.
```

```

        Use gml:description element to describe the procedure or link to a definitive description.</documentation>
    </annotation>
</element>
<!-- ..... -->
<complexType name="InstrumentPropertyType">
    <sequence minOccurs="0">
        <element ref="omx:Instrument"/>
    </sequence>
    <attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
<!-- ===== -->
<complexType name="CalculationProcessType">
    <annotation>
        <documentation>Specialised observation procedure corresponding to an algorithm or computational procedure.
        Use gml:description element to describe the procedure or link to a definitive description.</documentation>
    </annotation>
    <complexContent>
        <extension base="omx:ObservationProcessType"/>
    </complexContent>
</complexType>
<!-- ..... -->
<element name="CalculationProcess" type="omx:CalculationProcessType"
substitutionGroup="omx:ObservationProcess">
    <annotation>
        <documentation>Specialised observation procedure corresponding to an algorithm or computational procedure.
        Use gml:description element to describe the procedure or link to a definitive description.</documentation>
    </annotation>
</element>
<!-- ..... -->
<complexType name="CalculationProcessPropertyType">
    <sequence minOccurs="0">
        <element ref="omx:CalculationProcess"/>
    </sequence>
    <attributeGroup ref="gml:AssociationAttributeGroup"/>
</complexType>
<!-- ===== -->
</schema>

```

3.6 Schema for import

Listing 7 is a stub schema document that collects the Observation Schema Extensions components for use in external domain schemas. Use of this document in for external references to the Observation Schema Extensions package ensures that all components are included, and reduces the risk of conflicting <import> statements.

Listing 7. om_extended.xsd

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="http://www.opengis.net/omx/1.0"
elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.0.0">
    <annotation>
        <documentation>om_extended.xsd

```

The Observation Schema Extensions schema.

This document includes the

- * the extensions to define specialized observations with constrained result types
- * specialized procedure types
- * coverage-observations

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<http://www.opengeospatial.org/ogc/software></documentation>

```

    </annotation>
    <!-- ===== -->
    <include schemaLocation="./observationSpecialization.xsd"/>
    <include schemaLocation="./observationCoverage.xsd"/>
    <include schemaLocation="./observationCoverageCompact.xsd"/>
    <include schemaLocation="./procedureSpecialization.xsd"/>
    <!-- ===== -->
</schema>

```


ANNEX E (informative)

XML implementation - examples

1 Introduction

The details of the XML implementation may be explored using instance examples. Using the GML implementation rules results in an explicit mapping from the model, using names from the model as element and attribute names. Inspection of sample data is an effective way to assess the effectiveness of the model in capturing the required information. In this clause we present a graduated series of examples to illustrate the model and encoding.

Observations may have many result types. It may also be convenient to provide the result value out-of-band. The details of how the result is encoded is not important to the model, though practical interoperability in data transfer is best served by agreement on the form.

In some examples below alternative encodings with different advantages are shown for “complex” results. These include:

1. a compact record contained within a single XML element, composed of a list of records each corresponding to a set of parameter values whose structure is then repeated. The syntax is taken from SensorML [SensorML]. Item and record separators are explicit, and may be changed. This microformat requires a specific writer and reader to augment standard XML processing
2. a record or discrete coverage in which the items are encoded in separate XML elements. This is verbose, but has the advantage of using the basic XML structuring components that are accessible in all XML processing environments. This makes applications for both writing and reading easier to implement.

In all cases, the record structure is indicated separately.

2 Coding standards

2.1 Dependencies

The instance examples in this clause depend on the following externally governed schemas:

Schema	Version	XML namespace	Location of imported schema document
GML	3.1.1	http://www.opengis.net/gml	http://schemas.opengis.net/gml/3.1.1/base/gml.xsd
Swe	1.0.1	http://www.opengis.net/swe/1.0.1	http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd

Common			
SensorML	1.0.1	http://www.opengis.net/sensorML/1.0.1	http://schemas.opengis.net/sensorML/1.0.1/sensorML.xsd
Discrete Coverages	0.2.1	http://www.opengis.net/cv/0.2.1	http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd
Observations Schema	1.0.0	http://www.opengis.net/om/1.0	http://schemas.opengis.net/om/1.0.0/om.xsd
Observations Schema Extensions	1.0.0	http://www.opengis.net/omx/1.0	http://schemas.opengis.net/omx/1.0.0/om_extended.xsd

3 Simple Observations with scalar results

3.1 Measurements

The document shown in Listing 8 describes a simple observation to determine the mass of a specific banana.

The value of the procedure (“scales”), the observedProperty (“mass”), and the featureOfInterest (a fruit) are all given as references to external objects, using xlink:href attributes following the standard GML pattern. These references are all given as URIs: the first two use the (proposed) OGC URN scheme [OGC 06-023r1], and the third is a (notional) URL.

The type of the result is indicated in the instance using the standard xsi:type attribute [W3C XML Schema]. In this example it is gml:MeasureType, so the required uom attribute is also present. The value of the uom is also given as a URN according to the OGC scheme.

NOTE: In GML 3.2/ISO DIS 19136 the type of the uom attribute is extended to allow unit symbols from the UCUM scheme, allowing the more familiar short symbols like “kg” to appear instead of a URI.

Listing 8. observation1.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="obsTest1"
  xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:gml="http://www.opengis.net/gml"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd">
  <gml:description>Observation test instance: fruit mass</gml:description>
  <gml:name>Observation test 1</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ot1">
      <gml:timePosition>2005-01-11T16:22:25.00</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="http://www.flakey.org/register/process/scales34.xml"/>
  <!-- a notional URL identifying a procedure ... -->
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:mass"/>
</om:Observation>
```

```

<!-- a notional URN identifying the observed property -->
<om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=fruit37f" />
<!-- a notional WFS call identifying the object regarding which the observation was made -->
<om:parameter>
  <swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#Temperature">
    <swe:uom xlink:href="urn:ogc:def:uom:UCUM:Cel"/>
    <swe:value>22.3</swe:value>
  </swe:Quantity>
  <!-- example of optional soft-typed parameter -->
</om:parameter>
<om:result xsi:type="gml:MeasureType" uom="urn:x-ogc:def:uom:OGC:kg">0.28</om:result>
<!-- The XML Schema type of the result is indicated using the value of the xsi:type attribute -->
</om:Observation>

```

3.2 Category observations

The document shown in Listing 9 describes a simple observation to determine the species of an item of market produce.

The observedProperty (“species”) and feature of interest are given as references, following the standard GML pattern using xlink:href attributes. These references are all given as URIs, using the OGC URN scheme.

The description of the procedure is encapsulated using SensorML.

The type of the result is indicated in the instance using the standard xsi:type attribute [W3C XML Schema]. In this example it is swe:ScopedNameType, so the required **codeSpace** attribute is also present. The value of the codeSpace is a reference to a vocabulary from which the value of the result was taken.

Listing 9. observation2.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="obsTest2" xmlns:om="http://www.opengis.net/om/1.0"
xmlns:sml="http://www.opengis.net/sensorML/1.0.1" xmlns:swe="http://www.opengis.net/swe/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/sensorML/1.0 http://schemas.opengis.net/sensorML/1.0.0/sensorML.xsd">
  <gml:description>Observation test instance: fruit identification</gml:description>
  <gml:name>Observation test 2</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ot2t">
      <gml:timePosition>2005-01-11T17:22:25.00</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure>
    <sml:ProcessModel>
      <sml:method xlink:href="http://www.flakey.org/register/party/abc99"/>
    </sml:ProcessModel>
  </om:procedure>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Species"/>
  <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&featureid=fruit37f" />
  <om:result xsi:type="swe:ScopedNameType"
codeSpace="http://en.wikipedia.org/wiki/List_of_fruits">Banana</om:result>
</om:Observation>

```

The document shown in Listing 10 describes the same observation except that this time the description of the procedure is encapsulated in the om:Process element, which provides a generic container for components from any namespace, thus allowing re-use of a pre-existing schema for observation methods.

Listing 10. observation2b.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="obsTest2b" xmlns:om="http://www.opengis.net/om/1.0"
xmlns:sml="http://www.opengis.net/sensorML/1.0.1" xmlns:swe="http://www.opengis.net/swe/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/sensorML/1.0 http://schemas.opengis.net/sensorML/1.0.0/sensorML.xsd">
  <gml:description>Observation test instance: fruit identification</gml:description>
  <gml:name>Observation test 2b</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ot2t">
      <gml:timePosition>2005-01-11T17:22:25.00</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure>
    <om:Process>
      <gml:description>Field worker</gml:description>
      <gml:name>Abby Bachrach-Cox</gml:name>
    </om:Process>
  </om:procedure>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Species"/>
  <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&featureid=fruit37f"/>
  <om:result xsi:type="swe:ScopedNameType"
codeSpace="http://en.wikipedia.org/wiki/List_of_fruits">Banana</om:result>
</om:Observation>
```

The document shown in Listing 11 describes the same observation using the specialized observation type CategoryObservation taken from the Observation Schema Extensions schema shown in ANNEX D sub-clause 3.

Listing 11. observation2c.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<omx:CategoryObservation gml:id="obsTest2c"
xmlns:om="http://www.opengis.net/om/1.0"
xmlns:omx="http://www.opengis.net/omx/1.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/omx/1.0 http://schemas.opengis.net/omx/1.0.0/om_extended.xsd">
  <gml:description>Observation test instance: fruit identification</gml:description>
  <gml:name>Observation test 2c</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ot2t">
      <gml:timePosition>2005-01-11T17:22:25.00</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="http://www.flakey.org/register/party/abc99"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Species"/>
  <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=fruit37f"/>
  <om:result xsi:type="swe:ScopedNameType"
codeSpace="http://en.wikipedia.org/wiki/List_of_fruits">Banana</om:result>
</omx:CategoryObservation>
```

3.3 Observation of a complex property

The document shown in Listing 12 describes an observation of the shape of a banana.

This has the following differences compared to the previous examples: (a) the procedure is identified as “triangulation987” (b) a resultTime is also given, indicating the time when the triangulation procedure was applied, which in this case was the day following when

the item of fruit was actually obtained (c) the observed property is “Shape” and (d) the result is expressed as a gml:Solid (details suppressed for brevity).

This example illustrates the benefit of being able to use any available type in the result of a generic observation. The result is an XML encoded data structure, using a sub-element whose name is explicit, so no xsi:type attribute is required.

Listing 12. observation2shape.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="shapeTest2"
  xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:gml="http://www.opengis.net/gml"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd">
  <gml:description>Observation test instance</gml:description>
  <gml:name>Shape observation test</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ot2t">
      <gml:timePosition>2005-01-11T17:22:25.00</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:resultTime>
    <gml:TimeInstant gml:id="ot2ts">
      <gml:timePosition>2005-01-12T09:25:00.00</gml:timePosition>
    </gml:TimeInstant>
  </om:resultTime>
  <om:procedure xlink:href="http://www.flakey.org/register/process/triangulation987"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Shape"/>
  <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=fruit37f"/>
  <om:result>
    <gml:Solid gml:id="bs">
      <gml:description>An explicit description of a solid. The details of the description of the exterior surface omitted here for brevity.</gml:description>
      <gml:exterior>
        <gml:Surface gml:id="be">
          <gml:patches> ... </gml:patches>
        </gml:Surface>
      </gml:exterior>
    </gml:Solid>
  </om:result>
</om:Observation>
```

4 Observations pointing to results provided out-of-band

These examples shows basic observations where the result is provided external to the observation instance document, and identified using a URI.

The document shown in Listing 13 describes an observation of Relative Humidity at an observation station.

The observation event time is a **gml:TimePeriod**, so the result is likely to be a time-series, potentially with many values. For this reason, it may be convenient to provide the result as a data stream out-of-band from the document describing the observation.

The values of the procedure (an instrument), observedProperty (“Relative Humidity”), and feature of interest (an observation station) are given as references, following the standard GML pattern using xlink:href attributes. These references are all given as URIs: the first two use the OGC URN scheme; the featureOfInterest in this example is obtained via a service call to a WFS service.

The type of the result in this example is gml:ReferenceType. The result value is indicated by the value of the xlink:href attribute. The value of the (optional) xlink:role attribute describes the nature of the external resource, here given as a MIME type.

Listing 13. pointer1.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="OPTest1"
xmlns:om="http://www.opengis.net/om/1.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0/om.xsd">
  <gml:description>Observation instance with remote result</gml:description>
  <gml:name>Observation Pointer 1</gml:name>
  <om:samplingTime>
    <gml:TimePeriod gml:id="op1t">
      <gml:beginPosition>2005-01-11T17:22:25.00</gml:beginPosition>
      <gml:endPosition>2005-01-11T18:22:25.00</gml:endPosition>
    </gml:TimePeriod>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:3eti:abc45"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:RelativeHumidity"/>
  <om:featureOfInterest xlink:href="http://my.modest.org/wfs%26request=getFeature%26;featureid=789002"
xlink:role="urn:x-ogc:def:featureType:NWS:station"/>
  <om:result xlink:href="http://my.modest.org/results%3f798002%26property=RH" xlink:role="application/xmpp"
xsi:type="gml:ReferenceType"/>
</om:Observation>
```

The document shown in Listing 14 describes an observation of “Stress” in a shallow borehole.

The type of the result in this example is gml:ReferenceType. The result value is indicated by the value of the xlink:href attribute, and the mimeType is indicated using the xlink:role attribute.

Listing 14. pointer2.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="OPTest2"
xmlns:om="http://www.opengis.net/om/1.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0/om.xsd">
  <gml:description>Observation instance with remote result</gml:description>
  <gml:name>Observation Pointer 2</gml:name>
  <om:samplingTime>
    <gml:TimePeriod gml:id="op1t">
      <gml:beginPosition>2005-01-11T17:22:25.00</gml:beginPosition>
      <gml:endPosition>2005-01-11T18:22:25.00</gml:endPosition>
    </gml:TimePeriod>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:SEEGrid:overcoring"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:SEEGrid:stress"/>
  <om:featureOfInterest xlink:href="http://some.datasupplying.org/wfs%26request=getFeature%26id=789002"
xlink:role="urn:x-ogc:def:featureType:SEEGRID:borehole"/>
  <om:result xlink:href="http://some.datasupplying.org/results%3f798002%26property=stress" xlink:role="application/xml"
xsi:type="gml:ReferenceType"/>
</om:Observation>
```

5 Compound observations

5.1 Observation Collection

The document shown in Listing 15 describes a collection of two observations.

Listing 15. Collection1.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:ObservationCollection gml:id="coll1"
  xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:gml="http://www.opengis.net/gml"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd">
  <gml:description>Collection of observations</gml:description>
  <gml:name>Observation Collection 1</gml:name>
  <om:member>
    <om:Observation gml:id="o1">
      <om:samplingTime>
        <gml:TimeInstant gml:id="ot1">
          <gml:timePosition>2005-01-11T17:22:25.00</gml:timePosition>
        </gml:TimeInstant>
      </om:samplingTime>
      <om:procedure xlink:href="http://www.flakey.org/register/process/scales34.xml"/>
      <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:mass"/>
      <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=fruit37f"/>
      <om:result xsi:type="gml:MeasureType" uom="urn:x-ogc:def:uom:OGC:kg">0.28</om:result>
    </om:Observation>
  </om:member>
  <om:member>
    <om:Observation gml:id="o2">
      <om:samplingTime>
        <gml:TimeInstant gml:id="ot2">
          <gml:timePosition>2005-01-11T17:24:25.00</gml:timePosition>
        </gml:TimeInstant>
      </om:samplingTime>
      <om:procedure xlink:href="http://www.flakey.org/register/process/scales34.xml"/>
      <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:mass"/>
      <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=fruit35d"/>
      <om:result xsi:type="gml:MeasureType" uom="urn:x-ogc:def:uom:OGC:kg">0.27</om:result>
    </om:Observation>
  </om:member>
</om:ObservationCollection>
```

5.2 Compound observed property

In these examples, the result of the observation is a complex value because the observed property (weather) requires multiple components.

In Listing 16 the result is given as a swe:Record, which separates the components fields encoded in generic XML elements. The feature of interest is indicated through a link to an entry in an online gazetteer. The observedProperty is given as a link to an entry in a dictionary of property type definitions, the content of which is shown in Listing 17. The RS gives a link to a description of the result structure, shown as a swe:DataRecord in Listing 18.

Listing 16. complexObservation3.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="COTest3" xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:swe="http://www.opengis.net/swe/1.0.1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```

xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd">
  <gml:description>Complex Observation test instance</gml:description>
  <gml:name>Complex Observation test 3</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ot1">
      <gml:timePosition>2005-01-11T17:22:25.00</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="http://www.flakey.org/register/process/weatherStation3"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:SEEGrid:weather1"/>
  <om:featureOfInterest xlink:href="http://www.ga.gov.au/bin/gazd01?rec=293604" xlink:role="urn:x-ogc:def:featuretype:SEEGRID:locality"/>
  <om:result>
    <swe:Record RS="/weatherRecord1.xml">
      <swe:field><swe:Item>35.1</swe:Item></swe:field>
      <swe:field><swe:Item>6.5</swe:Item></swe:field>
      <swe:field><swe:Item>085.0</swe:Item></swe:field>
      <swe:field><swe:Item>950.</swe:Item></swe:field>
      <swe:field><swe:Item>32.0</swe:Item></swe:field>
      <swe:field><swe:Item>clear</swe:Item></swe:field>
    </swe:Record>
  </om:result>
</om:Observation>

```

The document shown in Listing 17 shows a property type description composed of six elements, given as links to concepts identified by URN. The base property type (“Weather”) allows this specialized definition (“weather1”) to be related to its parent. The parent property type may be used by some interfaces to allow discovery of related offerings.

Listing 17. weather1.xml

```

<?xml version="1.0"?>
<swe:CompositePhenomenon
xmlns:swe="http://www.opengis.net/swe/1.0.1"
xmlns:gml="http://www.opengis.net/gml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink"
xsi:schemaLocation="http://www.opengis.net/swe/1.0.1 http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd"
gml:id="weather1" dimension="6">
  <gml:name codeSpace="urn:x-ogc:tc:arch:doc-rp(05-010)"
    >urn:x-ogc:def:phenomenon:SEEGrid:weather1</gml:name>
  <swe:base xlink:href="urn:x-ogc:def:phenomenon:OGC:Weather"/>
  <swe:component xlink:href="urn:x-ogc:def:phenomenon:OGC:AirTemperature"/>
  <swe:component xlink:href="urn:x-ogc:def:phenomenon:OGC:WindSpeed"/>
  <swe:component xlink:href="urn:x-ogc:def:phenomenon:OGC:WindDirection"/>
  <swe:component xlink:href="http://sweet.jpl.nasa.gov/ontology/property.owl#AtmosphericPressure"/>
  <swe:component xlink:href="http://sweet.jpl.nasa.gov/ontology/property.owl#RelativeHumidity"/>
  <swe:component xlink:href="http://sweet.jpl.nasa.gov/ontology/property.owl#Visibility"/>
</swe:CompositePhenomenon>

```

The document shown in Listing 18 shows a record-type description composed of six elements, matching the property type description given above. Each field description binds a definition to a representation (the name of the component child element – i.e. *Quantity*, *Category*) and a scale (the value of the *uom* attribute).

Note that this element plays a different but complementary role: the property type description is primarily concerned with semantics, and would be used for *discovery*; the record description is primarily concerned with data structure, and would be used for *exploitation*.

Listing 18. weatherRecord1.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<swe:DataRecord xmlns:gml="http://www.opengis.net/gml" xmlns:swe="http://www.opengis.net/swe/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
xsi:schemaLocation="http://www.opengis.net/swe/1.0.1 http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd">
  <swe:field name="AirTemperature">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:AirTemperature">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:degC"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="WindSpeed">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:WindSpeed">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:m_s"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="WindDirection">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:WindDirectionToNorth">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:deg"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="AtmosphericPressure">
    <swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#AtmosphericPressure">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:hPa"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="RelativeHumidity">
    <swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#RelativeHumidity">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:percent"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="Visibility">
    <swe:Category definition="http://sweet.jpl.nasa.gov/ontology/property.owl#Visibility">
    </swe:Category>
  </swe:field>
</swe:DataRecord>
```

5.3 Complex feature of interest

In these examples, the result of the observation varies on a feature of interest that is decomposed into multiple elements.

The documents in this sub-clause describe observations of radiance where the feature of interest is a SiteCollection composed of four Stations. The feature of interest is identified using a link to a description provided external to the document.

In Listing 19 and Listing 20 the observation is encoded using the generic Observation, with the result being a swe:CV_DiscreteCoverage. Listing 19 shows a panchromatic radiance observation. The type of the value element in each geometry-value pair is gml:MeasureType, as indicated using the xsi:type attribute.

Listing 19. multiElement1.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="obsTest4" xmlns:cv="http://www.opengis.net/cv/0.2" xmlns:swe="http://www.opengis.net/swe/0"
xmlns:om="http://www.opengis.net/om/1.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:gco="http://www.isotc211.org/2005/gco"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/cv/0.2.1 http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd">
  <gml:description>Observation test instance - multi-element featureOfInterest
  This is the "observation" view including what is normally encoded as a "coverage"
  * coverage domain == observation featureOfInterest
  * coverage range == observation result
  </gml:description>
  <gml:name>Multi-element 1</gml:name>
  <om:samplingTime>
```

```

    <gml:TimeInstant gml:id="ots1t">
      <gml:timePosition>2005-06-17</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:NASA:xyz345"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Radiance"/>
  <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=stc1"/>
  <om:result>
    <cv:CV_DiscreteCoverage>
      <cv:domainExtent
xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=stc1#xpointer(/.boundedBy)"/>
      <cv:rangeType xlink:href="urn:x-ogc:def:phenomenon:OGC:Radiance"/>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry xlink:href="pixel1"/>
          <cv:value xsi:type="gml:MeasureType" uom="uV">10.1</cv:value>
        </cv:CV_GeometryValuePair>
      </cv:element>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry xlink:href="pixel2"/>
          <cv:value xsi:type="gml:MeasureType" uom="uV">15.7</cv:value>
        </cv:CV_GeometryValuePair>
      </cv:element>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry xlink:href="pixel3"/>
          <cv:value xsi:type="gml:MeasureType" uom="uV">20.2</cv:value>
        </cv:CV_GeometryValuePair>
      </cv:element>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry xlink:href="pixel4"/>
          <cv:value xsi:type="gml:MeasureType" uom="uV">27.5</cv:value>
        </cv:CV_GeometryValuePair>
      </cv:element>
    </cv:CV_DiscreteCoverage>
  </om:result>
</om:Observation>

```

Listing 20 shows a two-band radiance observation. The type of the value element in each geometry-value pair is a swe:Record, each containing two items whose type is gml:MeasureType.

Listing 20. multiElement2.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="multi2" xmlns:cv="http://www.opengis.net/cv/0.2" xmlns:swe="http://www.opengis.net/swe/1.0.1"
xmlns:om="http://www.opengis.net/om/1.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:gco="http://www.isotc211.org/2005/gco"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/cv/0.2.1 http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd">
  <gml:description>Observation test instance - multi-element featureOfInterest</gml:description>
  <gml:name>Multi-element 2</gml:name>
  <om:samplingTime>
    <gml:TimeInstant gml:id="ots1t">
      <gml:timePosition>2005-06-17</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:NASA:xyz345"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Radiance45"/>
  <om:featureOfInterest xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=stc1"/>
  <om:result>
    <cv:CV_DiscreteCoverage>
      <cv:domainExtent
xlink:href="http://wfs.flakey.org?request=getFeature&#38;featureid=stc1#xpointer(/.boundedBy)"/>
      <cv:rangeType xlink:href="urn:x-ogc:def:phenomenon:OGC:Radiance45"/>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry xlink:href="pixel1"/>

```

```

        <cv:value>
          <swe:Record>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">10.1</swe:Item></swe:field>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">9.1</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
    <cv:element>
      <cv:CV_GeometryValuePair>
        <cv:geometry xlink:href="pixel2"/>
        <cv:value>
          <swe:Record>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">15.7</swe:Item></swe:field>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">8.5</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
    <cv:element>
      <cv:CV_GeometryValuePair>
        <cv:geometry xlink:href="pixel3"/>
        <cv:value>
          <swe:Record>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">20.2</swe:Item></swe:field>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">5.2</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
    <cv:element>
      <cv:CV_GeometryValuePair>
        <cv:geometry xlink:href="pixel4"/>
        <cv:value>
          <swe:Record>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">27.5</swe:Item></swe:field>
            <swe:field><swe:Item xsi:type="gml:MeasureType" uom="uV">6.5</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
  </cv:CV_DiscreteCoverage>
</om:result>
</om:Observation>

```

The document fragment shown in Listing 21 describes a SamplingFeature which acts as the feature of interest for the observation shown in the previous listings. This feature type is from the sampling features schema described in O&M Part 2. The feature is composed of four Station members. The result of the observation supplies a value for each of these elements.

Listing 21. foi.xml#stc1

```

<?xml version="1.0"?>
<sa:SamplingFeatureCollection gml:id="foi" xmlns:sa="http://www.opengis.net/sampling/1.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/sampling/1.0 http://schemas.opengis.net/sampling/1.0.0/sampling.xsd">
  <gml:description>This SamplingFeature serves as a container for a collection composed of a single Station and
  another SamplingFeature containing a collection of Stations</gml:description>
  <gml:boundedBy>
    <gml:Envelope srsName="urn:x-ogc:def:crs:EPSG:6.3:62836405">
      <gml:lowerCorner>-90 -180</gml:lowerCorner>
      <gml:upperCorner>90 180</gml:upperCorner>
    </gml:Envelope>
  </gml:boundedBy>
  <sa:sampledFeature xlink:href="http://wfs.flakey.org?request=getFeature&featureid=tract470"/>
  <sa:surveyDetails xlink:href="urn:x-ogc:def:nil:OGC:unknown"/>
  <sa:member>
    <sa:SamplingPoint gml:id="ot2s">

```

```

<gml:name>8903</gml:name>
<sa:sampledFeature xlink:href="http://wfs.flakey.org?request=getFeature&featureid=tract470"/>
<sa:position>
  <gml:Point gml:id="ot2p">
    <gml:pos srsName="urn:x-ogc:def:crs:EPSG:6.3:62836405">-30.7025065 134.1997256</gml:pos>
  </gml:Point>
</sa:position>
</sa:SamplingPoint>
</sa:member>
<sa:member>
  <sa:SamplingFeatureCollection gml:id="stc1">
    <gml:description>This serves as a container for a set of Stations</gml:description>
    <gml:boundedBy>
      <gml:Envelope srsName="urn:x-ogc:def:crs:EPSG:6.3:62836405">
        <gml:lowerCorner>-30.702 134.199</gml:lowerCorner>
        <gml:upperCorner>-30.692 134.209</gml:upperCorner>
      </gml:Envelope>
    </gml:boundedBy>
    <sa:sampledFeature xlink:href="urn:x-ogc:def:nil:OGC:unknown"/>
    <sa:member>
      <sa:SamplingPoint gml:id="st1">
        <sa:sampledFeature xlink:href="http://wfs.flakey.org?request=getFeature&featureid=tract470"/>
        <sa:position>
          <gml:Point gml:id="st1p">
            <gml:pos>-30.702 134.199</gml:pos>
          </gml:Point>
        </sa:position>
      </sa:SamplingPoint>
    </sa:member>
    <sa:member>
      <sa:SamplingPoint gml:id="st2">
        <sa:sampledFeature xlink:href="http://wfs.flakey.org?request=getFeature&featureid=tract470"/>
        <sa:position>
          <gml:Point gml:id="st2p">
            <gml:pos>-30.692 134.199</gml:pos>
          </gml:Point>
        </sa:position>
      </sa:SamplingPoint>
    </sa:member>
    <sa:member>
      <sa:SamplingPoint gml:id="st3">
        <sa:sampledFeature xlink:href="http://wfs.flakey.org?request=getFeature&featureid=tract470"/>
        <sa:position>
          <gml:Point gml:id="st3p">
            <gml:pos>-30.702 134.209</gml:pos>
          </gml:Point>
        </sa:position>
      </sa:SamplingPoint>
    </sa:member>
    <sa:member>
      <sa:SamplingPoint gml:id="st4">
        <sa:sampledFeature xlink:href="http://wfs.flakey.org?request=getFeature&featureid=tract470"/>
        <sa:position>
          <gml:Point gml:id="st4p">
            <gml:pos>-30.692 134.209</gml:pos>
          </gml:Point>
        </sa:position>
      </sa:SamplingPoint>
    </sa:member>
  </sa:SamplingFeatureCollection>
</sa:member>
</sa:SamplingFeatureCollection>

```

5.4 Time Series

In these examples, the observation samples the phenomenon over a time period.

The documents in this sub-clause describe an observation of a weather property at a station.

In Listing 22 rainfall is observed in a series of TimePeriods. The feature of interest is again indicated through links to elements in the site collection shown in Listing 21. The observation is encoded using the generic Observation.

In Listing 22 the result is given as CV_DiscreteCoverage. The domain is composed of TimePeriods, each covering a 24-hour period. The range values are measures.

Listing 22. timeSeries2.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="timeSeries2" xmlns:cv="http://www.opengis.net/cv/0.2"
xmlns:swe="http://www.opengis.net/swe/1.0.1" xmlns:om="http://www.opengis.net/om/1.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml"
xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/cv/0.2.1 http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd">
  <gml:description>Observation test instance - time series where domain objects are explicit time
periods</gml:description>
  <gml:name>Time series 2</gml:name>
  <om:samplingTime>
    <gml:TimePeriod gml:id="ts2t">
      <gml:beginPosition>2005-06-17T09:00:00.00+08:00</gml:beginPosition>
      <gml:endPosition>2005-06-22T09:00:00.00+08:00</gml:endPosition>
    </gml:TimePeriod>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:BOM:rg23"/>
  <om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:Precipitation"/>
  <om:featureOfInterest xlink:href="http://my.big.org/feature?type=station%26name=st1"/>
  <om:result>
    <cv:CV_DiscreteCoverage>
      <cv:domainExtent xlink:href="http://my.big.org/feature?type=station%26name=st1#xpointer(/.boundedBy)"/>
      <cv:rangeType xlink:href="urn:x-ogc:def:phenomenon:OGC:Precipitation"/>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry>
            <cv:CV_DomainObject>
              <cv:temporalElement>
                <gml:TimePeriod gml:id="tp1">
                  <gml:beginPosition>2005-06-17T09:00:00.00+08:00</gml:beginPosition>
                  <gml:endPosition>2005-06-18T09:00:00.00+08:00</gml:endPosition>
                  <gml:duration>PT24H</gml:duration>
                </gml:TimePeriod>
              </cv:temporalElement>
            </cv:CV_DomainObject>
          </cv:geometry>
          <cv:value xsi:type="gml:MeasureType" uom="mm">10.1</cv:value>
        </cv:CV_GeometryValuePair>
      </cv:element>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry>
            <cv:CV_DomainObject>
              <cv:temporalElement>
                <gml:TimePeriod gml:id="tp2">
                  <gml:beginPosition>2005-06-18T09:00:00.00+08:00</gml:beginPosition>
                  <gml:endPosition>2005-06-19T09:00:00.00+08:00</gml:endPosition>
                  <gml:duration>PT24H</gml:duration>
                </gml:TimePeriod>
              </cv:temporalElement>
            </cv:CV_DomainObject>
          </cv:geometry>
          <cv:value xsi:type="gml:MeasureType" uom="mm">15.7</cv:value>
        </cv:CV_GeometryValuePair>
      </cv:element>
      <cv:element>
        <cv:CV_GeometryValuePair>
          <cv:geometry>
            <cv:CV_DomainObject>
              <cv:temporalElement>
                <gml:TimePeriod gml:id="tp3">
                  <gml:beginPosition>2005-06-19T09:00:00.00+08:00</gml:beginPosition>
```

```

        <gml:endPosition>2005-06-20T09:00:00.00+08:00</gml:endPosition>
        <gml:duration>PT24H</gml:duration>
      </gml:TimePeriod>
    </cv:temporalElement>
  </cv:CV_DomainObject>
</cv:geometry>
<cv:value xsi:type="gml:MeasureType" uom="mm">20.2</cv:value>
</cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:temporalElement>
          <gml:TimePeriod gml:id="tp4">
            <gml:beginPosition>2005-06-20T09:00:00.00+08:00</gml:beginPosition>
            <gml:endPosition>2005-06-21T09:00:00.00+08:00</gml:endPosition>
            <gml:duration>PT24H</gml:duration>
          </gml:TimePeriod>
        </cv:temporalElement>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value xsi:type="gml:MeasureType" uom="mm">27.5</cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:temporalElement>
          <gml:TimePeriod gml:id="tp5">
            <gml:beginPosition>2005-06-21T09:00:00.00+08:00</gml:beginPosition>
            <gml:endPosition>2005-06-22T09:00:00.00+08:00</gml:endPosition>
            <gml:duration>PT24H</gml:duration>
          </gml:TimePeriod>
        </cv:temporalElement>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value xsi:type="gml:MeasureType" uom="mm">45.2</cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
</cv:CV_DiscreteCoverage>
</om:result>
</om:Observation>

```

In Listing 23 air-temperature is observed at a series of time instants. The result is given as CompactDiscreteTimeCoverage. The domain objects are simple time positions. The range values are measures. An om:parameter is used to indicate that the actual sampling point is 3.5m above the station.

Listing 23. timeSeries1.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="timeSeries1" xmlns:cv="http://www.opengis.net/cv/0.2"
xmlns:swe="http://www.opengis.net/swe/1.0.1" xmlns:om="http://www.opengis.net/om/1.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis.net/gml"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd
http://www.opengis.net/cv/0.2.1 http://bp.schemas.opengis.net/06-188r1/cv/0.2.1/cv.xsd">
  <gml:description>Observation test instance - time series</gml:description>
  <gml:name>Time series 1</gml:name>
  <om:samplingTime>
    <gml:TimePeriod gml:id="ts1t">
      <gml:beginPosition>2005-06-17T09:00:00+08:00</gml:beginPosition>
      <gml:endPosition>2005-06-21T09:00:00+08:00</gml:endPosition>
    </gml:TimePeriod>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:BOM:t_2a"/>
  <om:observedProperty xlink:href="http://sweet.jpl.nasa.gov/ontology/property.owl#Temperature"/>
  <om:featureOfInterest xlink:role="urn:x-ogc:def:featureType:OGC:Station"
  xlink:href="http://my.big.org/feature?type=station%26name=st1"/>
  <om:parameter>

```

```

<swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#Elevation">
  <swe:uom xlink:href="urn:ogc:def:uom:UCUM:m"/>
  <swe:value>3.45</swe:value>
</swe:Quantity>
</om:parameter>
<om:result>
  <cv:CompactDiscreteTimeCoverage>
    <cv:domainExtent xlink:href="http://my.big.org/feature?type=station%26name=st1#xpointer(../boundedBy)"/>
    <cv:rangeType xlink:href="http://sweet.jpl.nasa.gov/ontology/property.owl#Temperature"/>
    <cv:element>
      <cv:CompactTimeValuePair>
        <cv:geometry>2005-06-17T09:00:00+08:00</cv:geometry>
        <cv:value xsi:type="gml:MeasureType" uom="Cel">19.3</cv:value>
      </cv:CompactTimeValuePair>
    </cv:element>
    <cv:element>
      <cv:CompactTimeValuePair>
        <cv:geometry>2005-06-18T09:00:00+08:00</cv:geometry>
        <cv:value xsi:type="gml:MeasureType" uom="Cel">17.1</cv:value>
      </cv:CompactTimeValuePair>
    </cv:element>
    <cv:element>
      <cv:CompactTimeValuePair>
        <cv:geometry>2005-06-19T09:00:00+08:00</cv:geometry>
        <cv:value xsi:type="gml:MeasureType" uom="Cel">16.5</cv:value>
      </cv:CompactTimeValuePair>
    </cv:element>
    <cv:element>
      <cv:CompactTimeValuePair>
        <cv:geometry>2005-06-20T09:00:00+08:00</cv:geometry>
        <cv:value xsi:type="gml:MeasureType" uom="Cel">25.8</cv:value>
      </cv:CompactTimeValuePair>
    </cv:element>
    <cv:element>
      <cv:CompactTimeValuePair>
        <cv:geometry>2005-06-21T09:00:00+08:00</cv:geometry>
        <cv:value xsi:type="gml:MeasureType" uom="Cel">29.2</cv:value>
      </cv:CompactTimeValuePair>
    </cv:element>
  </cv:CompactDiscreteTimeCoverage>
</om:result>
</om:Observation>

```

In Listing 24 the same information is shown with the value of the result provided out-of-band, using the xlink pattern shown earlier.

Listing 24. timeSeries1r.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="timeSeries1" xmlns:om="http://www.opengis.net/om/1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:gml="http://www.opengis.net/gml" xsi:schemaLocation="http://www.opengis.net/om/1.0
  http://schemas.opengis.net/om/1.0.0/om.xsd">
  <gml:description>Observation test instance - time series</gml:description>
  <gml:name>Time series 1</gml:name>
  <om:samplingTime>
    <gml:TimePeriod gml:id="ts1t">
      <gml:beginPosition>2005-06-17T09:00:00+08:00</gml:beginPosition>
      <gml:endPosition>2005-06-21T09:00:00+08:00</gml:endPosition>
    </gml:TimePeriod>
  </om:samplingTime>
  <om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:BOM:t_2a"/>
  <om:observedProperty xlink:href="http://sweet.jpl.nasa.gov/ontology/property.owl#Temperature"/>
  <om:featureOfInterest xlink:role="urn:x-ogc:def:featureType:OGC:Station"
  xlink:href="http://my.big.org/feature?type=station%26name=st1"/>
  <om:parameter>
    <swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#Elevation">
      <swe:uom xlink:href="urn:ogc:def:uom:UCUM:m"/>
      <swe:value>3.45</swe:value>
    </swe:Quantity>
  </om:parameter>

```

```

    <om:result xlink:href="http://www.flakey.org/opendap/378.cdf"/>
</om:Observation>

```

Listing 25 presents an observation whose result is a time-series of weather observations. The result is shown in compact form in a SWE Common “TextBlock”. The observed property definition was given earlier in Listing 17. In contrast to the previous examples, the result is not specifically tagged as a “coverage”. As the items in the swe:values element are not XML-tagged, use of the result requires that this be separately parsed, using the item separators indicated in the swe:encoding.

Listing 25. weatherObservation.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<om:Observation xmlns="http://www.opengis.net/om/1.0" xmlns:gml="http://www.opengis.net/gml"
  xmlns:om="http://www.opengis.net/om/1.0" xmlns:swe="http://www.opengis.net/swe/1.0.1"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/om/1.0 http://schemas.opengis.net/om/1.0.0/om.xsd">
  <gml:name>Weather Data</gml:name>
  <om:samplingTime>
    <gml:TimePeriod>
      <gml:beginPosition>2007-04-01T00:00:00.000-06:00</gml:beginPosition>
      <gml:endPosition>2007-04-01T03:40:00.000-06:00</gml:endPosition>
    </gml:TimePeriod>
  </om:samplingTime>
  <om:procedure xlink:href="urn:vast:sensor:weatherStation"/>
  <om:observedProperty xlink:href="weather1.xml"/>
  <om:featureOfInterest xlink:href="http://www.ga.gov.au/bin/gazd01?rec=293604" xlink:role="urn:x-ogc:def:featuretype:SEEGRID:locality"/>
  <om:result>
    <swe:DataArray>
      <swe:elementCount>
        <swe:Count>
          <swe:value>23</swe:value>
        </swe:Count>
      </swe:elementCount>
      <swe:elementType name="WeatherRecordType" xlink:href="weatherRecord1_t.xml"/>
      <swe:encoding>
        <swe:TextBlock decimalSeparator="." tokenSeparator="," blockSeparator=" "/>
      </swe:encoding>
      <swe:values>
2007-04-01T00:00:00.000-06:00,30.4,28.8,155.8,1055.32,55,haze
2007-04-01T00:00:10.000-06:00,30.4,28.8,155.8,1055.4,59,haze
2007-04-01T00:00:20.000-06:00,30.4,28.8,155.7,1055.47,65,haze
2007-04-01T00:00:30.000-06:00,30.3,28.9,155.7,1055.55,66,haze
2007-04-01T00:00:40.000-06:00,30.3,28.9,155.6,1055.62,61,haze
2007-04-01T00:00:50.000-06:00,30.3,28.9,155.6,1055.69,55,haze
2007-04-01T00:01:00.000-06:00,30.3,28.9,155.5,1055.77,51,haze
2007-04-01T00:01:10.000-06:00,30.2,28.9,155.5,1055.84,48,haze
2007-04-01T00:01:20.000-06:00,30.2,28.9,155.4,1055.91,43,haze
2007-04-01T00:01:30.000-06:00,30.2,28.9,155.4,1055.99,44,haze
2007-04-01T00:01:40.000-06:00,30.2,29,155.3,1056.06,46,haze
2007-04-01T00:01:50.000-06:00,30.1,29,155.3,1056.13,48,haze
2007-04-01T00:02:00.000-06:00,30.1,29,155.2,1056.2,44,haze
2007-04-01T00:02:10.000-06:00,30.1,29,155.2,1056.27,41,haze
2007-04-01T00:02:20.000-06:00,30.1,29,155.1,1056.34,40,haze
2007-04-01T00:02:30.000-06:00,30,29,155.1,1056.41,36,clear
2007-04-01T00:02:40.000-06:00,30,29,155,1056.48,39,clear
2007-04-01T00:02:50.000-06:00,30,29.1,155,1056.55,50,haze
2007-04-01T00:03:00.000-06:00,30,29.1,155,1056.62,65,haze
2007-04-01T00:03:10.000-06:00,30,29.1,154.9,1056.69,70,haze
2007-04-01T00:03:20.000-06:00,29.9,29.1,154.9,1056.76,71,haze
2007-04-01T00:03:30.000-06:00,29.9,29.1,154.8,1056.83,75,haze
2007-04-01T00:03:40.000-06:00,29.9,29.1,154.8,1056.89,75,haze
      </swe:values>
    </swe:DataArray>
  </om:result>
</om:Observation>

```

As the time of each element in the result array is embedded in the result, the record definition shown in Listing 26 has an explicit “time” element.

Listing 26. weatherRecord1_t.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<swe:DataRecord xmlns:gml="http://www.opengis.net/gml" xmlns:swe="http://www.opengis.net/swe/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
xsi:schemaLocation="http://www.opengis.net/swe/1.0.1
http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd">
  <swe:field name="time">
    <swe:Time definition="urn:x-ogc:def:phenomenon:time:iso8601"/>
  </swe:field>
  <swe:field name="AirTemperature">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:AirTemperature">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:degC"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="WindSpeed">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:WindSpeed">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:m_s"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="WindDirection">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:WindDirectionToNorth">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:deg"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="AtmosphericPressure">
    <swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#AtmosphericPressure">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:hPa"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="RelativeHumidity">
    <swe:Quantity definition="http://sweet.jpl.nasa.gov/ontology/property.owl#RelativeHumidity">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:percent"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="Visibility">
    <swe:Category definition="http://sweet.jpl.nasa.gov/ontology/property.owl#Visibility">
    </swe:Category>
  </swe:field>
</swe:DataRecord>
```

5.5 Multiple compounding axes

In these examples, observations were made at a sequence of times, on elements of a compound feature of interest, and concerning a compound phenomenon.

The documents shown in Listing 27 describe an observation of a (raw) radiance spectrum corresponding to the LandsatTM bands, made on four stations at three time instants. The result is encoded as a CV_DiscreteCoverage. The domain objects iterate over time and space explicitly, and the range value is a Record composed of seven items.

Listing 27. spectrumSeries3.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<om:Observation gml:id="specSeries3" xmlns:cv="http://www.opengis.net/cv/0.2.1"
xmlns:swe="http://www.opengis.net/swe/1.0.1" xmlns:om="http://www.opengis.net/om/0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml" xsi:schemaLocation="http://www.opengis.net/om/0.0
http://schemas.opengis.net/om.xsd http://www.opengis.net/cv/0.2.1http://bp.schemas.opengis.net/06-
188r1/cv/0.2.1/cv.xsd http://www.opengis.net/swe/1.0.1 http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd ">
  <gml:description>Observation test instance - Multiple compounding axes
  A Landsat TM spectrum is observed on 4 stations at 5 time instants</gml:description>
```

```

<gml:name>Spectrum Series</gml:name>
<om:samplingTime>
  <gml:TimePeriod gml:id="tpss1">
    <gml:beginPosition>2005-06-17</gml:beginPosition>
    <gml:endPosition>2005-06-21</gml:endPosition>
  </gml:TimePeriod>
</om:samplingTime>
<om:procedure xlink:href="urn:x-ogc:object:feature:Sensor:NASA:Landsat7"/>
<om:observedProperty xlink:href="urn:x-ogc:def:phenomenon:OGC:DiscreteSpectrumTM"/>
<om:featureOfInterest xlink:href="foi.xml#stc1"/>
<om:resultDefinition xlink:href="tm7c.xml"/>
<om:result>
  <cv:CV_DiscreteCoverage>
    <cv:element>
      <cv:CV_GeometryValuePair>
        <cv:geometry>
          <cv:CV_DomainObject>
            <cv:spatialElement xlink:href="/foi.xml#st1"/>
            <cv:temporalElement xlink:href="/toi.xml#ti1"/>
          </cv:CV_DomainObject>
        </cv:geometry>
        <cv:value>
          <swe:Record>
            <swe:field><swe:Item>9</swe:Item></swe:field>
            <swe:field><swe:Item>8</swe:Item></swe:field>
            <swe:field><swe:Item>7</swe:Item></swe:field>
            <swe:field><swe:Item>6</swe:Item></swe:field>
            <swe:field><swe:Item>5</swe:Item></swe:field>
            <swe:field><swe:Item>4</swe:Item></swe:field>
            <swe:field><swe:Item>3</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
    <cv:element>
      <cv:CV_GeometryValuePair>
        <cv:geometry>
          <cv:CV_DomainObject>
            <cv:spatialElement xlink:href="/foi.xml#st3"/>
            <cv:temporalElement xlink:href="/toi.xml#ti1"/>
          </cv:CV_DomainObject>
        </cv:geometry>
        <cv:value>
          <swe:Record>
            <swe:field><swe:Item>1</swe:Item></swe:field>
            <swe:field><swe:Item>2</swe:Item></swe:field>
            <swe:field><swe:Item>3</swe:Item></swe:field>
            <swe:field><swe:Item>4</swe:Item></swe:field>
            <swe:field><swe:Item>5</swe:Item></swe:field>
            <swe:field><swe:Item>6</swe:Item></swe:field>
            <swe:field><swe:Item>7</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
    <cv:element>
      <cv:CV_GeometryValuePair>
        <cv:geometry>
          <cv:CV_DomainObject>
            <cv:spatialElement xlink:href="/foi.xml#st2"/>
            <cv:temporalElement xlink:href="/toi.xml#ti1"/>
          </cv:CV_DomainObject>
        </cv:geometry>
        <cv:value>
          <swe:Record>
            <swe:field><swe:Item>1</swe:Item></swe:field>
            <swe:field><swe:Item>9</swe:Item></swe:field>
            <swe:field><swe:Item>2</swe:Item></swe:field>
            <swe:field><swe:Item>8</swe:Item></swe:field>
            <swe:field><swe:Item>3</swe:Item></swe:field>
            <swe:field><swe:Item>7</swe:Item></swe:field>
            <swe:field><swe:Item>4</swe:Item></swe:field>
          </swe:Record>
        </cv:value>
      </cv:CV_GeometryValuePair>
    </cv:element>
  </cv:element>
</om:result>

```

```

<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:spatialElement xlink:href="/foi.xml#st4"/>
        <cv:temporalElement xlink:href="/toi.xml#ti1"/>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value>
      <swe:Record>
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        <swe:field><swe:item>6</swe:item></swe:field>
        <swe:field><swe:item>3</swe:item></swe:field>
        <swe:field><swe:item>7</swe:item></swe:field>
        <swe:field><swe:item>2</swe:item></swe:field>
        <swe:field><swe:item>8</swe:item></swe:field>
        <swe:field><swe:item>1</swe:item></swe:field>
      </swe:Record>
    </cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:spatialElement xlink:href="/foi.xml#st1"/>
        <cv:temporalElement xlink:href="/toi.xml#ti3"/>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value>
      <swe:Record>
        <swe:field><swe:item>9</swe:item></swe:field>
        <swe:field><swe:item>8</swe:item></swe:field>
        <swe:field><swe:item>7</swe:item></swe:field>
        <swe:field><swe:item>6</swe:item></swe:field>
        <swe:field><swe:item>5</swe:item></swe:field>
        <swe:field><swe:item>4</swe:item></swe:field>
        <swe:field><swe:item>3</swe:item></swe:field>
      </swe:Record>
    </cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:spatialElement xlink:href="/foi.xml#st3"/>
        <cv:temporalElement xlink:href="/toi.xml#ti3"/>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value>
      <swe:Record>
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        <swe:field><swe:item>2</swe:item></swe:field>
        <swe:field><swe:item>3</swe:item></swe:field>
        <swe:field><swe:item>4</swe:item></swe:field>
        <swe:field><swe:item>5</swe:item></swe:field>
        <swe:field><swe:item>6</swe:item></swe:field>
        <swe:field><swe:item>7</swe:item></swe:field>
      </swe:Record>
    </cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:spatialElement xlink:href="/foi.xml#st2"/>
        <cv:temporalElement xlink:href="/toi.xml#ti3"/>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value>
      <swe:Record>
        <swe:field><swe:item>1</swe:item></swe:field>
        <swe:field><swe:item>9</swe:item></swe:field>
        <swe:field><swe:item>2</swe:item></swe:field>

```

```

        <swe:field><swe:Item>8</swe:Item></swe:field>
        <swe:field><swe:Item>3</swe:Item></swe:field>
        <swe:field><swe:Item>7</swe:Item></swe:field>
        <swe:field><swe:Item>4</swe:Item></swe:field>
    </swe:Record>
</cv:value>
</cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
    <cv:CV_GeometryValuePair>
        <cv:geometry>
            <cv:CV_DomainObject>
                <cv:spatialElement xlink:href="/foi.xml#st4"/>
                <cv:temporalElement xlink:href="/toi.xml#ti3"/>
            </cv:CV_DomainObject>
        </cv:geometry>
    </cv:value>
        <swe:Record>
            <swe:field><swe:Item>5</swe:Item></swe:field>
            <swe:field><swe:Item>6</swe:Item></swe:field>
            <swe:field><swe:Item>3</swe:Item></swe:field>
            <swe:field><swe:Item>7</swe:Item></swe:field>
            <swe:field><swe:Item>2</swe:Item></swe:field>
            <swe:field><swe:Item>8</swe:Item></swe:field>
            <swe:field><swe:Item>1</swe:Item></swe:field>
        </swe:Record>
    </cv:value>
</cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
    <cv:CV_GeometryValuePair>
        <cv:geometry>
            <cv:CV_DomainObject>
                <cv:spatialElement xlink:href="/foi.xml#st1"/>
                <cv:temporalElement xlink:href="/toi.xml#ti5"/>
            </cv:CV_DomainObject>
        </cv:geometry>
    </cv:value>
        <swe:Record>
            <swe:field><swe:Item>9</swe:Item></swe:field>
            <swe:field><swe:Item>8</swe:Item></swe:field>
            <swe:field><swe:Item>7</swe:Item></swe:field>
            <swe:field><swe:Item>6</swe:Item></swe:field>
            <swe:field><swe:Item>5</swe:Item></swe:field>
            <swe:field><swe:Item>4</swe:Item></swe:field>
            <swe:field><swe:Item>3</swe:Item></swe:field>
        </swe:Record>
    </cv:value>
</cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
    <cv:CV_GeometryValuePair>
        <cv:geometry>
            <cv:CV_DomainObject>
                <cv:spatialElement xlink:href="/foi.xml#st3"/>
                <cv:temporalElement xlink:href="/toi.xml#ti5"/>
            </cv:CV_DomainObject>
        </cv:geometry>
    </cv:value>
        <swe:Record>
            <swe:field><swe:Item>1</swe:Item></swe:field>
            <swe:field><swe:Item>2</swe:Item></swe:field>
            <swe:field><swe:Item>3</swe:Item></swe:field>
            <swe:field><swe:Item>4</swe:Item></swe:field>
            <swe:field><swe:Item>5</swe:Item></swe:field>
            <swe:field><swe:Item>6</swe:Item></swe:field>
            <swe:field><swe:Item>7</swe:Item></swe:field>
        </swe:Record>
    </cv:value>
</cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
    <cv:CV_GeometryValuePair>
        <cv:geometry>
            <cv:CV_DomainObject>
                <cv:spatialElement xlink:href="/foi.xml#st2"/>

```

```

        <cv:temporalElement xlink:href="/toi.xml#ti5"/>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value>
      <swe:Record>
        <swe:field><swe:Item>1</swe:Item></swe:field>
        <swe:field><swe:Item>9</swe:Item></swe:field>
        <swe:field><swe:Item>2</swe:Item></swe:field>
        <swe:field><swe:Item>8</swe:Item></swe:field>
        <swe:field><swe:Item>3</swe:Item></swe:field>
        <swe:field><swe:Item>7</swe:Item></swe:field>
        <swe:field><swe:Item>4</swe:Item></swe:field>
      </swe:Record>
    </cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
<cv:element>
  <cv:CV_GeometryValuePair>
    <cv:geometry>
      <cv:CV_DomainObject>
        <cv:spatialElement xlink:href="/foi.xml#st4"/>
        <cv:temporalElement xlink:href="/toi.xml#ti5"/>
      </cv:CV_DomainObject>
    </cv:geometry>
    <cv:value>
      <swe:Record>
        <swe:field><swe:Item>5</swe:Item></swe:field>
        <swe:field><swe:Item>6</swe:Item></swe:field>
        <swe:field><swe:Item>3</swe:Item></swe:field>
        <swe:field><swe:Item>7</swe:Item></swe:field>
        <swe:field><swe:Item>2</swe:Item></swe:field>
        <swe:field><swe:Item>8</swe:Item></swe:field>
        <swe:field><swe:Item>1</swe:Item></swe:field>
      </swe:Record>
    </cv:value>
  </cv:CV_GeometryValuePair>
</cv:element>
</cv:CV_DiscreteCoverage>
</om:result>
</om:Observation>

```

The document shown in Listing 28 describes the details of the representation of the value of the observed property, as a swe:DataRecord.

Listing 28. tm7c.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<swe:DataRecord gml:id="TM7c"
  xmlns:swe="http://www.opengis.net/swe/1.0.1"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xsi:schemaLocation="http://www.opengis.net/swe/1.0.1 http://schemas.opengis.net/sweCommon/1.0.1/swe.xsd">
  <swe:field name="TMBand1">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand1">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
      <swe:constraint>
        <swe:AllowedValues id="SINGLE_BYTE">
          <swe:interval>0 255</swe:interval>
        </swe:AllowedValues>
      </swe:constraint>
    </swe:Quantity>
  </swe:field>
  <swe:field name="TMBand2">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand2">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
      <swe:constraint xlink:href="#SINGLE_BYTE"/>
    </swe:Quantity>
  </swe:field>
  <swe:field name="TMBand3">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand3">
      <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
    </swe:Quantity>
  </swe:field>
</swe:DataRecord>

```

```

        <swe:constraint xlink:href="#SINGLE_BYTE"/>
    </swe:Quantity>
</swe:field>
<swe:field name="TMBand4">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand4">
        <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
        <swe:constraint xlink:href="#SINGLE_BYTE"/>
    </swe:Quantity>
</swe:field>
<swe:field name="TMBand5">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand5">
        <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
        <swe:constraint xlink:href="#SINGLE_BYTE"/>
    </swe:Quantity>
</swe:field>
<swe:field name="TMBand6">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand6">
        <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
        <swe:constraint xlink:href="#SINGLE_BYTE"/>
    </swe:Quantity>
</swe:field>
<swe:field name="TMBand7">
    <swe:Quantity definition="urn:x-ogc:def:phenomenon:OGC:TMBand7">
        <swe:uom xlink:href="urn:x-ogc:def:uom:OGC:count"/>
        <swe:constraint xlink:href="#SINGLE_BYTE"/>
    </swe:Quantity>
</swe:field>
</swe:DataRecord>

```