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Geografske informacije - Opazovanja in meritve

Geographic information - Observations and measurements

Information géographique - Observations et mesures

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Geographic information — Observations and measurements

Information géographique — Observations et mesures

ICS 35.240.70

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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ISO 19156 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

Introduction

This International Standard arises from work originally undertaken through the Open Geospatial Consortium's Sensor Web Enablement (SWE) activity. SWE is concerned with establishing interfaces and protocols that will enable a "Sensor Web" through which applications and services will be able to access sensors of all types, and observations generated by them, over the Web. SWE has defined, prototyped and tested several components needed for a Sensor Web, namely:

- Sensor Model Language (SensorML)
- Transducer Markup Language (TML)
- Observations & Measurements (O&M)
- Sensor Observation Service (SOS)
- Sensor Planning Service (SPS)
- Sensor Alert Service (SAS)

This International Standard specifies the Observations and Measurements schema, including a schema for Sampling features.

The content presented here has been derived from an earlier version published by Open Geospatial Consortium as OGC 07-022r1 (Observations and Measurements – Part 1 – Observation schema) and 07-002r3 (Observations and Measurements – Part 2 – Sampling Features). A technical note describing the changes from the earlier version is available from Open Geospatial Consortium (see http://www.opengeospatial.org/standards/om).

Geographic information — Observations and measurements

1 Scope

This International Standard defines a conceptual schema for observations, and for features involved in sampling when making observations. These provide models for the exchange of information describing observation acts and their results, both within and between different scientific and technical communities.

Observations commonly involve sampling of an ultimate feature of interest. This International Standard defines a common set of sampling feature types classified primarily by topological dimension, as well as samples for ex-situ observations. The schema includes relationships between sampling features (sub-sampling, derived samples).

This International Standard concerns only externally visible interfaces and places no restriction on the underlying implementations other than what is needed to satisfy the interface specifications in the actual situation.

2 Conformance

2.1 Overview

Clauses 6 to 10 of this International Standard use the Unified Modeling Language (UML) to present conceptual schemas for describing Observations. These schemas define conceptual classes that (i) may be considered to comprise a cross-domain application schema, or (ii) may be used in application schemas, profiles and implementation specifications.

This flexibility is controlled by a set of UML types that can be implemented in a variety of manners. Use of alternative names that are more familiar in a particular application is acceptable, provided that there is a one-to-one mapping to classes and properties in this International Standard.

The UML model in this International Standard defines conceptual classes; various software systems define implementation classes or data structures. All of these reference the same information content. The same name may be used in implementations as in the model, so types defined in the UML model may be used directly in application schemas.

Annex A defines a set of conformance classes that will support applications whose requirements range from the minimum necessary to define data structures to full object implementation.

2.2 Conformance classes related to Application Schemas including Observations and Measurements

The conformance rules for Application Schemas in general are described in ISO 19109:2005. Application Schemas also claiming conformance to this International Standard shall also conform to the rules specified in Clauses 6 to 10 and pass all relevant test cases of the Abstract Test Suite in Annex A.

Depending on the characteristics of an Application Schema, 12 conformance classes are distinguished. Table 1 lists these classes and the corresponding Subclause of the Abstract Test Suite.

Table 1 — Conformance classes related to Application Schemas including Observations and Measurements

Conformance class	Subclause
Generic observation interchange	A.1.1
Measurement interchange	A.1.1, A.1.2
Specialized observation interchange	A.1.1 - A.1.8
Coverage observation interchange	A.1.1, A.1.9, A.1.10
Temporal coverage observation interchange	A.1.1, A.1.11
Sampling feature interchange	A.2.1, A.2.2
Spatial sampling feature interchange	A.2.1 - A.2.3
Sampling point interchange	A.2.1 - A.2.4
Sampling curve interchange	A.2.1 - A.2.3, A.2.5
Sampling surface interchange	A.2.1 - A.2.3, A.2.6
Sampling solid interchange	A.2.1 - A.2.3, A.2.7
Specimen interchange	A.2.1 - A.2.3, A.2.8

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19101:2002, *Geographic information — Reference model*

ISO/TS 19103:2005, *Geographic information — Conceptual schema language*

ISO 19107:2003, *Geographic information — Spatial schema*

ISO 19108:2002, *Geographic information — Temporal schema*

ISO 19109:2005, *Geographic information — Rules for application schemas*

ISO 19111:2007, *Geographic information — Spatial referencing by coordinates*

ISO 19114:2003, *Geographic information — Quality evaluation procedures*

ISO 19115:2003, *Geographic information — Metadata*

ISO 19123:2005, *Geographic information — Schema for coverage geometry and functions*

ISO 19136:2007, *Geographic information — Geography Markup Language*

ISO/TS 19138:2006, *Geographic information — Data quality measures*

ISO/IEC 19501:2005, *Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2*

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
application schema
conceptual schema for data required by one or more applications

[ISO 19101:2002, definition 4.2]

4.2
coverage
feature that acts as a function to return **values** from its range for any direct position within its spatial, temporal or spatiotemporal domain

[ISO 19123:2005, definition 4.17]

4.3
data type
specification of a **value** domain with operations allowed on values in this domain

[ISO/TS 19103:2005, definition 4.1.5]

EXAMPLE Integer, Real, Boolean, String, Date (conversion of a date into a series of codes).

NOTE Data types include primitive predefined types and user-definable types. All instances of a data types lack identity.

4.4
domain feature
feature of a type defined within a particular application domain

NOTE This may be contrasted with **observations** and **sampling features**, which are features of types defined for cross-domain purposes.

4.5
feature
abstraction of real-world phenomena

[ISO 19101:2002, definition 4.11]

NOTE A feature may occur as a type or an instance. **Feature type** or feature instance should be used when only one is meant.

4.6
feature type
class of **features** having common characteristics

4.7
measurand
particular quantity subject to **measurement**

[ISO/TS 19138:2006, definition 4.5]

NOTE Specialization of observable **property type**.

4.8
measure
value described using a numeric amount with a scale or using a scalar reference system

[ISO 19136:2007, definition 4.1.41]

4.9
measurement
set of operations having the object of determining the **value** of a quantity

[ISO/TS 19101-2:2008, definition 4.20]

4.10
observation
act of observing a **property**

NOTE The goal of an observation may be to **measure** or otherwise determine the **value** of a property

4.11
observation procedure
method, algorithm or instrument, or system of these which may be used in making an **observation**

4.12
observation protocol
combination of a sampling strategy and an **observation procedure** used in making an **observation**

4.13
observation result
estimate of the **value** of a **property** determined through a known observation procedure

4.14
property
facet or attribute of an object referenced by a name

[ISO 19143:2010, definition 4.21]

EXAMPLE Abby's car has the colour red, where "colour red" is a property of the car instance

4.15
property type
characteristic of a **feature type**

EXAMPLE cars (a feature type) all have a characteristic colour, where "colour" is a property type

NOTE 1 The **value** for an instance of a property type may be estimated through an act of **observation**

NOTE 2 In chemistry-related applications, the term ‘determinand’ or ‘analyte’ is often used.

[Adapted from ISO 19109:2005]

4.16
sampling feature
feature, such as a station, transect, section or specimen, which is involved in making **observations** concerning a **domain feature**

NOTE A sampling feature is purely an artefact of the observational strategy, and has no significance independent of the observational campaign.

4.17
value
element of a type domain

[ISO/IEC 19501:2005]

NOTE 1 A value may consider a possible state of an object within a class or type (domain).

NOTE 2 A data value is an instance of a **datatype**, a value without identity.

NOTE 3 A value may use one of a variety of scales including nominal, ordinal, ratio and interval, spatial and temporal. Primitive datatypes may be combined to form aggregate datatypes with aggregate values, including vectors, tensors and images

5 Symbols and abbreviated terms

5.1 Abbreviated terms

GFM	General Feature Model
GML	Geography Markup Language
O&M	Observations and Measurements
OGC	Open Geospatial Consortium
SensorML	Sensor Model Language
SOS	Sensor Observation Service
SWE	Sensor Web Enablement
TML	Transducer Markup Language
UML	Unified Modeling Language
XML	Extensible Markup Language
XSD	W3C XML Schema Definition Language
1D	One Dimensional
2D	Two Dimensional
3D	Three Dimensional

5.2 Schema language

The conceptual schema specified in this International Standard is described using the Unified Modelling Language (UML) ISO/IEC 19501:2005, following the guidance of ISO/TS 19103:2005.

The UML is conformant with the profile described in ISO 19136:2007, Annex E. Use of this restricted idiom supports direct transformation into a GML Application Schema. ISO 19136:2007 introduces some additional stereotypes. In particular «FeatureType» implies that a class is an instance of the «metaclass» GF_FeatureType (ISO 19109:2005), and therefore represents a feature type.