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Geographic information — Schema for coverage geometry and functions —

Part 2: Coverage implementation schema

Information géographique — Schéma de la géométrie et des fonctions de couverture —

Partie 2: Schéma de mise en œuvre de la couverture

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, *Geographic Information,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement), in collaboration with the Open Geospatial Consortium (OGC).

This second edition cancels and replaces the first edition (ISO 19123-2:2018), which has been technically revised.

The main changes are as follows:

— The document is adjusted to the structure established in ISO 19123-1. Among others, a clear separation of logical level (UML structures) and physical level (encodings, such as XML) is established.

— Use of terminology is adjusted to align with ISO 19123-1.

— Coverage type `GeneralGridCoverage` is integrated from OGC CIS 1.1[15] as an additional coverage structure which generalizes and simplifies grid coverage modelling. It adds comprehensive definitions for all possible types of irregular grids, including `RectifiedGridCoverage` and `ReferenceableGridCoverage` as special cases.

— `RectifiedGridCoverage` and `ReferenceableGridCoverage` have been moved into a (normative) annex as their specification follows a different logic which does not easily fit into the structuring given by the Coverage Fundamentals (ISO 19123-1). They form a legacy and will be deprecated in the next edition of this document as `GeneralGridCoverage` covers these cases while simpler in structure.

— Editorial changes have been made to the structure and nomenclature in order to conform to the most recent edition of the ISO/IEC Directives.

— The UML schema is updated to reflect the above updates.

— The XML coverage encoding is complemented with a structurally equivalent JSON encoding, based on modern JSON schema design patterns.

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— The XML and JSON schemas of the coverage range type, which relies on the SWE Common DataRecord, have been copied verbatim from SWE Common into the coverage schema to make this document more self-contained and easier to read.

NOTE The RDF encoding of OGC CIS 1.1 has not been included at this time. It will possibly be added at a later time.

— More general grid identifiers (with punctuation, national character sets, etc.).

— Mixed regular and non-regular grids.

— Added support for non-regularly gridded sensor models.

— Clear regulation for interpolation methods associated with grid coverages, thereby also clarifying a long-standing confusion between discrete and continuous grid coverages.

— Distinction between grid dimension and CRS dimension.

— Introduction of `EnvelopeByAxis`, an envelope type which allows for a convenient handling of any type of coordinates.

— Partitioned ("tiled") coverages, allowing – among others – "interleaved representations" of coverages and datacubes tiled for efficient subsetting.

— Removal of a namespace ambiguity in `ReferenceableGridCoverage` (resolved by introduction of `GeneralGridCoverage`).

— Some GML schema definitions whose generality complicates coverage understanding unnecessarily have been extracted and condensed into the pertaining XML schema. As a consequence, the XML encoding of this document is now a compact, freestanding definition, rather than a GML application schema. Nevertheless, by keeping with the coverage types inherited from the previous edition of this document, it is possible for implementers to remain in the realm of a GML application schema.

A list of all the parts in the ISO 19123 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document specifies an interoperable, conformance-testable information schema for coverages. As defined in ISO 19123-1 (which is equivalent to OGC Abstract Topic 6.1), coverages serve as digital representations of space-time varying phenomena, corresponding to the notion of a “field” in physics. Such coverages can be discrete or continuous. Common examples include 1-D time series, 2-D imagery, 3-D x/y/t image time series and x/y/z geophysical voxel models, as well as 4-D x/y/z/t atmospheric and ocean data. Coverages are independent from service definitions and, therefore, can be accessed through a variety of web based service types, such as the OGC Web Coverage Service (WCS) Standard[12], and through service instantiations realizing ISO 19123-3.

This document is a compliant standardization target of ISO 19123-1:2023 relying on its concepts, terms, definitions, and interfaces to establish a logical schema (via UML) implementing the interfaces defined there. Additionally, this document defines related physical coverage schemas (via format encodings) for the single logical schema. Thus, ISO 19123-1 and this document together establish an abstraction hierarchy:

— conceptual level: ISO 19123-1 defining abstract interfaces;

— logical level: Clauses 5 to 10 of this document, defining data as object classes with attributes;

— physical level: Clauses 11 and 12 of this document, plus further separate coverage encoding standards defined outside this document, defining the mapping of the logical-level data to byte streams (GeoTIFF, netCDF, JPEG2000, etc.).

The content of this document is based on OGC standards CIS 1.0 and CIS 1.1.

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Geographic information — Schema for coverage geometry and functions —

Part 2:
Coverage implementation schema

1 Scope

This document specifies an implementable, conformance-testable coverage structure based on the abstract schema for coverages defined in the ISO 19123-1 coverage fundamentals. This document defines a concrete data structure that is suitable for encoding in many formats.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 19123-1:2023, *Geographic information — Schema for coverage geometry and functions — Part 1: Fundamentals*

OGC 08-094r1, *OGC® SWE Common Data Model Encoding Standard, version 2.0*

OGC 24-014, *OGC® SWE Common Data Model Encoding Standard, version 3.0*

IETF RFC 2387, *The MIME Multipart/Related Content-type, Internet Engineering Task Force, 1998*

IETF RFC 2392, *Content-ID and Message-ID Uniform Resource Locators, Internet Engineering Task Force, 1998*

IETF RFC 7159, *The JavaScript Object Notation (JSON) Data Interchange Format. Internet Engineering Task Force, 2014*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19123-1:2023 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
coverage CRS
coverage coordinate reference system
<coverage> coordinate reference system (CRS) in which all coordinates in a coverage domain are expressed

Note 1 to entry: Sometimes a coverage's CRS is also referred to as the coverage's native CRS to express that this is the CRS to which all the coverage's location data refer.

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3.1.2
displaced grid
<coverage> grid whose direct positions are topologically aligned to a grid, but whose geometric positions can vary arbitrarily

3.1.3
irregular grid
<coverage> grid whose direct positions have individual distances along each grid's axis

3.1.4
partition
<coverage> separately stored coverage acting, by being referenced in another coverage, as one of its components

3.1.5
regular grid
<coverage> grid whose direct positions have a constant distance along each grid's axis

3.1.6
transformation grid
<coverage> grid whose direct positions are given by a transformation

Note 1 to entry: This definition is adapted from OGC 08-094r1.

Note 2 to entry: The transformation algorithm described in this definition is not within the scope of this document.

3.2 Abbreviated terms

CIS	coverage implementation schema
CRS	coordinate reference system
EPSG	European Petroleum Survey Group
GeoTIFF	geo tagged image file format
GML	geography markup language
JSON	JavaScript Object Notation
netCDF	network common data format
OGC	Open Geospatial Consortium
RDF	resource description framework
SWE	sensor web enablement
TIN	triangulated irregular network
UoM	unit of measure
UML	unified modeling language
WCS	web coverage service
WCPS	web coverage processing service

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