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Geografske informacije - Shema za geometrijo podatkovnega sloja in funkcije - 3. del: Osnove obdelave (ISO 19123-3:2023)

Geographic information - Schema for coverage geometry and functions - Part 3: Processing fundamentals (ISO 19123-3:2023)

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European foreword

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ISO 19123-3

First edition
2023-06

Geographic information — Schema for coverage geometry and functions —

Part 3: Processing fundamentals

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

Partie 3: Principes de base du traitement

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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 document 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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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), and in collaboration with the IEEE GRSS Earth Science Informatics Technical Committee.

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Introduction

This document defines, at a high level, implementation-independent operations on coverages, i.e. digital representations of space-time varying geographic phenomena, as defined in ISO 19123-1. Specifically, regular and irregular grid coverages are addressed. The operations can be applied through an expression language allowing composition of unlimited complexity and combining an unlimited number of coverages for data fusion.

The language is functionally defined and free of any side effects. Its conceptual foundation relies on only two constructs: A "coverage constructor" builds a coverage, either from scratch or by deriving it from one or more other coverages. A "coverage condenser" derives summary information from a coverage by performing an aggregation such as count, sum, minimum, maximum and average.

The coverage processing language is independent from any request and response encoding, as no concrete request/response protocol is assumed. Hence, this document does not define a concrete service, but acts as the foundation for defining service standards functionality. One such standardization target is the OGC Web Coverage Service (WCS).[3]

Throughout this document, the following formatting conventions apply.

— Bold-Face in the text, such as **processCoveragesExpr**, represents syntax elements, normatively defined in Annex B.
— Text in italics, such as *succ*(), represents mathematical functions and variables.
— Courier font, such as **`return`** and `encode`(), is used for code in the sense of the coverage processing language.

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Geographic information — Schema for coverage geometry and functions —

Part 3: Processing fundamentals

1 Scope

This document defines a coverage processing language for server-side extraction, filtering, processing, analytics, and fusion of multi-dimensional geospatial coverages representing, for example, spatio-temporal sensor, image, simulation, or statistics datacubes. Services implementing this language provide access to original or derived sets of coverage information, in forms that are useful for client-side consumption.

This document relies on the ISO 19123-1 abstract coverage model. In this edition, regular and irregular multi-dimensional grids are supported for axes that can carry spatial, temporal or any other semantics. Future editions will additionally support further axis types as well as further coverage types from ISO 19123-1, specifically, point clouds and meshes.

2 Normative references

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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 19111, *Geographic information — Referencing by coordinates*

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ISO 19123-1, *Geographic information — Schema for coverage geometry and functions — Part 1: Fundamentals*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19123-1 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
probing function
<coverage> function extracting information from the coverage

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4 Conformance

4.1 Notation

Table 1 lists the other International Standards and packages in which UML classes used in this document have been defined.

Table 1 — Sources of externally defined UML classes

Prefix	International Standard	Package
	ISO 19123-1	Coverage Core, Grid Coverage

4.2 Interoperability and conformance testing

As an abstract standard, this document allows for multiple different implementations and does not define a standardized interoperable implementation. Rather, standardization targets are specifications of coverage operations and services which may use this language to describe the semantics of their operations.

Conformance testing shall be accomplished by validating a candidate concretization against all requirements by exercising the tests set out in Annex A. As a prerequisite, a candidate shall also pass all conformance tests of ISO 19123-1 Coverage Core and Grid Coverage.

4.3 Organization

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Table 2 provides details of the conformance classes described in this document. The name and contact information of the maintenance agency for this document can be found at www.iso.org/maintenance_agencies.

Table 2 — Conformance classes

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Conformance class	Clause	Identifying URL
Coverage Processing	6	https://standards.isotc211.org/19123/-3/1/conf/coverage-processing

5 Coverage model

5.1 Overview

This document defines a language whose expressions accept any number of input coverages (together with further common inputs like numbers and strings) to generate any number of output coverages or non-coverage results. Coverages are defined in ISO 19123-1.

5.2 Coverage model

Following the mathematical notion of a function that maps elements of a domain (such as spatio-temporal coordinates) to a range (such as values of a “pixel”, “voxel”, etc.), a coverage consists of (Figure 1):

— an *identifier* which uniquely identifies a coverage in some context (here, the context of an expression);

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