BSI Standards Publication

Geographic information — Content components and encoding rules for imagery and gridded data

Part 1: Content model

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National foreword

This Published Document is the UK implementation of ISO/TS 19163-1:2016.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Geographic information — Content components and encoding rules for imagery and gridded data —

Part 1:
Content model

Information géographique — Composantes de contenu et règles de codage pour l'imagerie et les données maillées —

Partie 1: Modèle de contenu

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics*.

ISO 19163 consists of the following parts, under the general title *Geographic information — Content components and encoding rules for imagery and gridded data*:

— *Part 1: Content model* [Technical Specification]

Other parts are planned, but are not yet specified.

Introduction

Geographic imagery and gridded thematic data are widely used in the geospatial community and related fields.

A preliminary work item on imagery and gridded data components, carried out by ISO/TC 211 in 1999 to 2000, provides a summary of the conceptual classification of gridded data based on spatial and attribute properties and identifies five basic components of imagery and gridded data (ISO/TC 211 N 1017). ISO/TS 19101-2, ISO 19123 and ISO/TS 19129 specify domains and ranges of imagery, grids and coverages, and their associated relationships. ISO/TS 19129 breaks down the metadata into discovery, structural, acquisition and quality metadata. However, there are no detailed descriptions on each category and no clear associations with metadata defined in ISO 19115:2003, ISO 19115-2, ISO/TS 19130 and ISO/TS 19130-2.

Imagery is acquired by remote sensors directly or derived from source imagery. Value-added image processing can be used to derive physical properties of a remote object from images (ISO/TS 19101-2). Besides the derived images, imagery can also be integrated with other data sources to produce new gridded coverage data for a specific theme, called thematic data, which is widely used in various applications. However, the characteristics of thematic data are not covered by the existing International Standards and Technical Specifications noted above.

ISO/TS 19130 identifies the type of remote sensors by the measurand of the sensor, e.g. optical radiation, microwave energy and SONAR (acoustic) energy. Images acquired by optical sensors have different appearances and characteristics compared with those by a microwave sensor, e.g. SAR data.

The framework defined in ISO/TS 19129 describes imagery, gridded and coverage data at multiple levels, including an abstract level, a content model level and an encoding level. The first two levels combine a number of well-defined content structures in accordance with ISO 19123 and define the contents of continuous quadrilateral gridded coverages with grids of both constant and variable cell sizes. However, the content model level does not specify the necessary metadata for common understanding when integrating datasets encoded in different formats. At the encoding level, ISO/TS 19129 does not provide the explicit encoding rules for mapping content model to machine-independent encoding structure, which is crucial for the mapping and translation of images in different formats without losing information.

Based on the frameworks defined in ISO/TS 19101-2 and ISO 19123, this Technical Specification specifies the categories of imagery and gridded data and establishes a corresponding hierarchical content model. Categories of imagery and gridded data are defined based on thematic and spatial attributes and sensor types. The content model is then defined to describe the required content components of each category, including the spatial and attribute structures and the critical metadata entries as well. These metadata entries are specified as the minimum required metadata information for the purpose of common understanding. Traditionally, remote sensing data products generally have a header part and a data part. This Technical Specification describes the minimum content requirements for the header part.

For ease of implementation, this Technical Specification defines encoding rules to map the content models to XML-based encodings, following the general encoding rules defined in ISO 19118 and the encoding rules for UML-to-GML application schema defined in ISO 19136:2007, Annex E. Since GMLCOV schema (OGC 09-146r2) is optimized for handling coverages, the coverage component of the schema can be based on GMLCOV.

An increasingly large volume of image and gridded data, both natural and synthetic, is being produced because more remote sensors are becoming available. These data are encoded in diverse formats, such as GeoTIFF, BIIF, HDF-EOS, JPEG 2000, NetCDF and others as described in ISO/TR 19121. These encoding formats follow different data models, preventing them from being interoperable. In order to encode the contents defined in this Technical Specification into these data formats, ISO 19163 has been split into multiple parts with this Technical Specification defining the content components and general encoding rules and the subsequent parts defining the binding between the contents and individual physical data formats.

Geographic information — Content components and encoding rules for imagery and gridded data —

Part 1:
Content model

1 Scope

This Technical Specification classifies imagery and regularly spaced gridded thematic data into types based on attribute property, sensor type and spatial property, and defines an encoding-neutral content model for the required components for each type of data. It also specifies logical data structures and the rules for encoding the content components in the structures.

The binding between the content and a specific encoding format will be defined in the subsequent parts of ISO 19163.

This Technical Specification does not address LiDAR, SONAR data and ungeoreferenced gridded data.

The logical data structures and the rules for encoding the content components will be addressed in the subsequent parts of ISO 19163.

2 Conformance

This Technical Specification standardizes the categories of imagery and regularly spaced gridded thematic data as well as their core content models. There is one conformance class for each data category. Any set of imagery and regularly spaced gridded thematic data claiming conformance to this Technical Specification shall satisfy the corresponding requirements defined in the abstract test suite in Annex A.

3 Normative references

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

ISO 19103:2015, *Geographic information — Conceptual schema language*

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

ISO 19115-1, *Geographic information — Metadata — Part 1: Fundamentals*

ISO 19115-2[1], *Geographic information — Metadata — Part 2: Extensions for imagery and gridded data*

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

ISO/TS 19101-2:2008, *Geographic information — Reference model — Part 2: Imagery*

ISO/TS 19130:2010, *Geographic information - Imagery sensor models for geopositioning*

ISO/TS 19159-1, *Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 1: Optical sensors*

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[1]   At the publication time of this Technical Specification, only ISO 19115-2:2009, which references to ISO 19115:2003, is available. The new version of ISO 19115-2, which is under revision at the publication time of this Technical Specification, will refer to ISO 19115-1:2014.