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## **Corrigendum 2 for the OGC Standard Web Coverage Service 1.1 (06-083r8)**

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### **Warning**

This document is an approved Corrigendum to an existing OGC Standard. This document was approved for release by the OGC Membership March 2008.

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## i. Preface

This document is the second corrigendum for the Web Coverage Service OGC Implementation Standard version 1.1. This corrigendum corrects and improves various aspects of WCS 1.1.1 (Corrigendum 1 of WCS 1.1), creating WCS 1.1.2.

## ii. Document terms and definitions

This document uses the specification terms defined in Subclause 5.3 of [OGC 06-121r3]. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this standard.

## iii. Document contributor contact points

All questions regarding this document should be directed to the editor or the contributors:

Name	Organization
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## iv. Revision history

Date	Release	Editor	Primary clauses modified	Description
2007-12-09	07-066r3a	Arliss Whiteside	All	Initial version
2008-02-05	07-066r3b	Arliss Whiteside	7.5, F.2, wcsContents.xsd, wcsDescribeCoverage.xsd	Included change requests 07-149r2 and 07-173r2
2008-02-19	07-066r3c	Arliss Whiteside	i, Introduction, 1, 2.5 (new)	Clean up references to this revision
2008-03-12	07-066r4	Arliss Whiteside	2.7, 2.9	Add three more small changes
2008-03-19	07-066r5	Arliss Whiteside	2.7, 2.9	Remove one change and edit another

## Foreword

This document provides the details of a corrigendum to an OpenGIS Implementation Standard and does not modify the base standard. The OGC Standard that this document provides revision notes for is Web Coverage Service Standard, Version 1.1 Corrigendum 2 [OGC 07-067r5].

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*Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.*

## Introduction

This document specifies the second corrigendum to Web Coverage Service version 1.1.0 [OGC 06-083r8]. The WCS interface standard was approved by the OGC membership on 2006-12-29. The first corrigendum to WCS 1.1.0 was approved by the OGC membership on 2007-07-12. This second corrigendum corrects more of the ambiguities and errors found in the original document, plus a few introduced with corrigendum 1. This document summarizes the corrigendum 2 edits, deficiency corrections, and improvements.

# OGC Web Coverage Service

## 1 Scope

The Web Coverage Service (WCS) supports electronic retrieval of geospatial data as "coverages" – that is, digital geospatial information representing space-varying phenomena. The WCS provides access to potentially detailed and rich sets of geospatial information, in forms that are useful for client-side rendering, multi-valued coverages, and input into scientific models and other clients.

This corrigendum 2 describes the changes between WCS 1.1 corrigendum 2 [OGC 07-067r5] and its predecessor WCS 1.1 corrigendum 1 [OGC 07-067r2]. There are no functional differences intended between these WCS 1.1 corrigenda. The editing changes made fix minor inconsistencies and improve clarity. The changes listed below reference the figures, tables, and clauses in the previous WCS 1.1 Corrigendum 1 [OGC 07-067r2] specification.

## 2 Corrigendum description

### 2.1 Correct referencing of georectification coordinate transformations

The SpatialDomain data structure in the CoverageDescription data structure in wcsDescribeCoverage.xsd is intended to allow inclusion of the concrete elements gml:Transformation or gml:ConcatenatedOperation. However, this was not possible due to an error in encoding the UML model in XML Schema, in the XML Schema Document wcsDescribeCoverage.xsd. This has been corrected by substituting a reference to the gml:\_CoordinateOperation abstract element, for the inline definition of a wcs:Transaction element with the gml:AbstractCoordinateOperationType. This change allows the gml:Transformation or gml:ConcatenatedOperation concrete elements to be substituted for the gml:\_CoordinateOperation element in wcs:SpatialDomainType.

### 2.2 Allow offered unrectified images to have GridCRS referencing ImageCRS

An output unrectified image can clearly have a GridCRS instead of an ImageCRS. This will occur when an unrectified offered coverage is resampled but not georectified. For example, this resampling may change the pixel spacing. Such resampling is specified by a GridCRS, in the Output part of a GetCoverage operation request, that has a GridBaseCRS which is the ImageCRS of the unrectified offered coverage. The output image then has a GridCRS instead of an Image CRS, although it is still unrectified.

An unrectified offered coverage was previously required to have an ImageCRS, and not a GridCRS. However, a GridCRS that has a GridBaseCRS which is an ImageCRS is similar to an ImageCRS. The specification was modified to allow an unrectified offered

coverage to have either an ImageCRS or a GridCRS that has a GridBaseCRS which is an ImageCRS. This ImageCRS will usually be the original ImageCRS of an (unrectified) image, before some subsequent resampling (e.g., to change the pixel spacing).

The condition for including a GridCRS as the CRS of an offered coverage is now the availability of a GridCRS for that coverage. An offered coverage will always have a GridCRS, and an unrectified offered coverage may have a known GridCRS that has a GridBaseCRS which is an ImageCRS. An offered coverage that has an ImageCRS will always be unrectified.

### **2.3 Correct to better support non-georeferenced coverages**

Use cases 3 and 8 require the ability to support non-georeferenced coverages. However by mistake, the specified lists of SupportedCRS elements in a CoverageDescription and a CoverageSummary did not require that these lists include the ImageCRS of an unrectified image, and thus allowed serving a non-georeferenced image only directly in its ImageCRS.

This change requires that these lists include the ImageCRS of an unrectified image, and thus allow serving non-georeferenced grid coverages in a GridCRS using the ImageCRS as its GridBaseCRS. This change is detailed in change request OGC 07-149r2.

### **2.4 Add summary of CRS uses**

The WCS uses Coordinate Reference Systems (CRSs) in widely distributed parts of the specification, making difficult reader understanding of the CRS usage differences and similarities. This change adds a summary of all CRS uses in Subclause 7.5 of WCS 1.1. This change is detailed in change request OGC 07-173r2.

### **2.5 Clarify TemporalDomain parameter**

Specify that a WCS server should raise an exception if it receives a TemporalSubset parameter (in a GetCoverage request) for an offered coverage which does not identify any TemporalDomain in the offered coverage's CoverageDescription.

### **2.6 Correct and improve Annex G “Use cases”**

The text in informative Annex G “Use cases” was edited in many places, to correct errors and improve clarity.

### **2.7 Correct multiplicities for consistency**

- a) Figures 12 and D.5: Correct multiplicity of axisSubset association from FieldSubset class to AxisSubset class.
- b) Table 17: Correct multiplicity of Axis parameter in "Parts of Field data structure", to read "Zero or more (optional) Include for each axis of a vector field (i.e., one that has axes)"

- c) Table 22: Under “Multiplicity and use” for BoundingBox, remove text “Include when requesting spatial subset.” In addition, improve to existing table footnote b) to read: “To request coverage values at all available spatial locations, use the first BoundingBox supplied in the CoverageDescription for the chosen coverage. WCS use of a BoundingBox is further specified in Subclause 7.6.”
- d) Table 27: Correct multiplicity of BoundingBox parameter to mandatory in “GetCoverage request expressed as Key Value Pairs”. In addition, add to existing table footnote b): “To request coverage values at all available spatial locations, use the first BoundingBox supplied in the CoverageDescription for the chosen coverage. WCS use of a BoundingBox is further specified in Subclause 7.6.”
- e) wcsGetCoverage.xsd: Correct multiplicity of “format” XML attribute to mandatory in wcs:OutputType.
- f) wcsInterpolationMethod.xsd: Correct multiplicity of Default and InterpolationMethod elements in wcs:InterpolationMethods, making the Default mandatory and the InterpolationMethod optional.

## 2.8 Other XML schema and document changes

- a) wcsInterpolationMethod.xsd: Delete obsolete “documentation” element from Default element definition in wcs:InterpolationMethods that read “(Arliiss) Can any string be used to identify an interpolation method in a KVP encoded Get Coverage operation request?”
- b) wcsInterpolationMethod.xsd: Correct wording in “documentation” element in wcs:InterpolationMethods element definition to read “List of the interpolation method(s) that may be used when continuous grid coverage resampling is needed.”
- c) Change namespace identifier to <http://www.opengis.net/wcs/1.1> in all wcs/1.1.2/ XML Schema Documents and XML documents. These changes were also made in the copies of example XML documents in the specification document.
- d) Change version number in all WCS XML Schema Documents and XML documents to version=”1.1.2”, from version=”1.1.1”. These changes were also made in the copies of example XML documents in the specification document.
- e) Correct spelling of word “compliance” in ows:Abstract element in ows:ServiceIdentification element in example XML document Capabilities2.xml

## 2.9 Other specification document changes

- a) Table 2: Correct all Subclause references in “Section name values and contents”.
- b) Table 8: Clarify that single “identifiers” parameter in “DescribeCoverage request URL encoding” corresponds to repeatable “identifier” parameter in Table 7, by changing table footnote b) to read “This single “identifiers” parameter shall correspond to the repeatable “identifier” parameter in the UML model. See footnote b in Table 7.”

- c) Table 10: Improve wording of Definition of SupportedCRS parameter in "Parts of CoverageDescription data structure", to read "Reference to GridBaseCRS of GridCRSs in which GetCoverage operation outputs may be expressed".
- d) Table 12: Improve wording of table footnote b) in "Parts of SpatialDomain data structure", to read  
 “The first bounding box shall exactly specify the spatial domain in the (one offered) CRS of the offered coverage, thus specifying the available grid row and column indices. For a georectified coverage (that has a GridCRS), this bounding box shall specify the spatial domain in that GridCRS. For an image that is not georectified, this bounding box shall specify the spatial domain in the ImageCRS or GridCRS of that image, whether or not that image is georeferenced.

Additional bounding boxes, if any, shall specify the spatial domain in other CRSs. These additional bounding boxes may be approximate, but should be as accurate as practical. One bounding box could simply duplicate the information in the `ows:WGS84BoundingBox` in the CoverageSummary; but the intent is to describe the spatial domain in more detail (e.g., in several different CRSs, or several rectangular areas instead of one overall bounding box). Multiple bounding boxes with the same CRS shall be interpreted as an unordered list of bounding boxes whose union covers spatial domain of this coverage. WCS use of this BoundingBox is further specified in specification Subclause 7.6.”

- e) Table 23: Improve condition wording in “Multiplicity and use column” for GridCRS parameter, to read "Zero or one (optional) Include unless requesting ImageCRS or GridCRS of offered coverage”.
- f) Table 29: Improve wording of Definition of Transformation parameter in “Required output coverage metadata”, to read "Definition of georeferencing coordinate transformation for output coverage"
- g) Subclause 8.3.2.2: Clarify wording concerning inclusion of Constraint elements in OperationsMetadata section, to read  
 “All WCS servers shall specify the encodings that may be sent using HTTP POST transfer of operation requests. Specifically, an `ows:Constraint` element shall be included, with “PostEncoding” as the value of the “name” attribute and specifying different allowed values for each allowed encoding:
  - a) The value “SOAP” shall indicate that SOAP encoding is allowed, as specified in Annex E.
  - b) The value “XML” shall indicate that XML encoding is allowed (without SOAP message encapsulation).

NOTE 1 The value “KVP” is not used, since this WCS standard does not allow KVP encodings of operation requests to be transferred using HTTP POST.

When the HTTP POST connect point URL is different for different encodings of the operation requests, this `ows:Constraint` element shall be included in each Post



element. When the connect point URL is the same for all encodings of all operation requests, this `ows:Constraint` element should be included in the `OperationsMetadata` element.

NOTE 2 No `ows:Constraint` element with the “name” parameter (and XML attribute) value of “InputFormat” is used, since no WCS operation uses an `InputFormat` parameter (for data).”

- h) Subclause 9.3.2.2: Change “WCS encoding profiles” to “WCS encoding extensions”, to match TC terminology change from “(extension” profile” to “extension”.
- i) Subclause 10.2.2.2: Add second informative note “NOTE 2 The '[' and ']' characters are not allowed in URLs, and thus need to be encoded according to Subclause 11.3 of [OGC 06-121r3].
- j) Subclause 10.3.8: Improve wording of first paragraph in Subclause "Output coverage range", to read  
 “The range of an output coverage is controlled by the `RangeSubset` data structure. The output coverage range shall consist of all and only the fields specified in the `RangeSubset` of the `GetCoverage` request, ordered as they appear there. When the `GetCoverage` request has no `RangeSubset` data structure, the output coverage range shall contain all fields of the offered coverage, in the sequence defined in the `CoverageDescription`, and with the default interpolation method(s) applied whenever interpolation is required”
- k) Subclause 9.3.1.1: Correct table reference in NOTE 1, to read "To reduce the need for readers to refer to other parts of this document, the first three parameters listed below are largely copied from Table 5 of this document."
- l) Subclause 9.3.2.1: Improve wording of NOTE 1, to read "For instance, atmospheric pressure, water temperature, and land ownership require distinct fields in a coverage range."
- m) Subclause H.3.2: Correct the EXAMPLE XML document in Subclause H.3.2, to include four `InterpolationMethod` elements.
- n) `interpolationMethods.xml`: Improve many definitions in `interpolationMethods.xml` file, eliminating references to the 2D-specific bilinear, bicubic, and biquadratic interpolation methods.
- o) Correct “baseCRS” to “GridBaseCRS”, many places in document and in XML schema.
- p) Correct multiple references to Subclauses, Tables, and Figures now in Annex H, instead of Annex I.
- q) Numerous small wording corrections and improvements.

## 2.10 Deferred change requests

This WCS corrigendum is the result of emails and discussions within the WCS 1.2 RWG mailing list and teleconferences. All other changes are deferred for later consideration in the next version of the WCS specification, tentatively labelled version 1.2.