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Editor: Peter Baumann, Stephan Meissl, Jinsongdi Yu

# OGC® Web Coverage Service 2.0 Interface Standard - Earth Observation Application Profile



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# i. Abstract

The OGC *Web Coverage Service (WCS) Application Profile – Earth Observation* (EO-WCS), defines a profile of WCS 2.0 [OGC 09-110r4] for use on Earth Observation data.

Suggested additions, changes, and comments on this draft document are welcome and encouraged. Such suggestions may be submitted by email message or by making suggested changes in an edited copy of this document.

# ii. Keywords

ogcdoc, wcs, profile, eo

# iii. Terms and definitions

This document uses the standard terms defined in Subclause 5.3 of [OGC 06-121r9], which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. 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.

# iv. Submitting organizations

The following organizations have submitted this Interface Specification to the Open GeoSpatial Consortium, Inc.:

- Jacobs University Bremen
- EOX IT Services GmbH
- G.I.M. Geographic Information Management nv/sa
- European Space Agency (ESA)
- Spot Image

Additionally, rasdaman GmbH has made substantial contributions.

# v. Document Contributor Contact Points

| Name | Organization |
|---|---|
| Peter Baumann | Jacobs University Bremen, rasdaman GmbH |
| Jinsongdi Yu | Jacobs University Bremen |
| Stephan Meissl | EOX IT Services GmbH |
| Christian Schiller | EOX IT Services GmbH |

# vi. Changes to the OGC® Abstract Specification

The OGC® Abstract Specification does not require any changes to accommodate the technical contents of this (part of this) document.

 

## vii. Future Work

Among the topics for future development are the following items:

- Allow additional coverage representations (i.e., “multipart” and “special format” coverage encodings) once these are adopted for the GML Application Schema for Coverages [OGC 09-146].
- Extend the current 2-D EO Coverage footprint to 3-D footprints by extending them with elevation; this will involve extending footprints from bounding multi-curves (polygons) to multi-surfaces.
- Specify usage and content of `EOWCS::Lineage` in more detail.
- Align with forthcoming WCS 2.0 extensions once available.
- Add paging mechanism similar to WFS 2.0.

 

## Foreword

This WCS Application Profile for Earth Observation is an OGC Interface Standard which relies on WCS 2.0 (the Core [OGC 09-110r4] plus selected extensions), the GML Application Schema for Coverages [OGC 09-146r2], the Earth Observation Metadata Profile of Observations and Measurements [OGC 10-157r3], and GML 3.2.1 [OGC 07-036].

This document includes three annexes; the first two annexes are normative.

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# Introduction

The OGC *Web Coverage Service (WCS) Application Profile – Earth Observation* (EO-WCS), defines a profile of WCS 2.0 [OGC 09-110r4] for use on Earth Observation data. An Application Profile bundles several specifications and possibly adds additional requirements on an implementation. Extra requirements can be additions (for example, Dataset Series are introduced by this specification) or constraints (for example, coverages offered are restricted to 2-D rasters).

EO-WCS provides the following specification elements:

- Definition of specific Earth Observation coverages (EO Coverages) which have a *latitude/longitude* or projected *x/y* spatial extent and a temporal validity extent. EO Coverages are derived from Referenceable Grid Coverages and Rectified Grid Coverages as defined in the GML Application Schema for Coverages [OGC 09-146r2]. Each EO Coverage has an EO metadata set [OGC 10-157r3] contained in its metadata which describes the coverage on hand on a higher semantic level.

- Definition of a hierarchy which allows to group EO Coverages suitably for an efficient retrieval:

  - Datasets as plain 2-D EO Coverages (and, hence, accessible as coverages);

  - Stitched Mosaics as homogeneous collections of spatially non-overlapping subsets of Datasets, accessible themselves as coverages;

  - Dataset Series as collections of Stitched Mosaics, Datasets, and/or Dataset Series; Dataset Series themselves are not coverages.

- Bundling of several mandatory and optional WCS extensions for EO-WCS implementations.

 

# OGC® Web Coverage Service 2.0 Interface Standard – Earth Observation Application Profile

## 1 Scope

This OGC WCS Application Profile – Earth Observation Interface Standard – henceforth abbreviated as: *WCS Earth Observation Application Profile (EO-WCS)* – defines data structures and operations which together allow retrieval of Earth Observation coverages offered by a WCS 2.0 server.

## 2 Conformance

This document establishes the following requirements and conformance classes:

- *eowcs*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/req/eowcs, defining EO-WCS on conceptual level in Clauses 6, 7, and 8; the corresponding conformance class is *eowcs*, with URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs.

- *eowcs_get-kvp*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/req/eowcs_get-kvp, defining the GET-KVP protocol binding of EO-WCS in Subclause 9.2; the corresponding conformance class is *eowcs_get-kvp*, with URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_get-kvp.

- *eowcs_soap*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/req/eowcs_soap, defining the SOAP protocol binding of EO-WCS on conceptual level in Subclause 9.3; the corresponding conformance class is *eowcs_soap*, with URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_soap.

Standardisation target of all requirements and conformance classes are EO-WCS implementations (currently: servers).

Requirements and conformance test URIs defined in this document are relative to http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/.

Annex A lists the conformance tests which shall be exercised on any software artefact claiming to implement EO-WCS.

## 3 Normative references

This *OGC WCS Application Profile – Earth Observation* specification consists of the present document and an XML Schema. The complete specification is identified by OGC URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0, the document

 

has OGC URI http://www.opengis.net/doc/ISx/WCS_application-profile_earth-observation/1.0.

The complete specification is available for download from http://www.opengeospatial.org/standards/wcs; additionally, the XML Schema is posted online at http://schemas.opengis.net/wcs/wcseo/1.0 as part of the OGC schema repository. In the event of a discrepancy between bundled and schema repository versions of the XML Schema files, the schema repository shall be considered authoritative.

The following normative documents contain provisions that, through reference in this text, constitute provisions of this specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

OGC 06-121r9 *OGC Web Services Common Standard*, version 2.0

OGC 09-146r2, *GML 3.2.1 Application Schema for Coverages*, version 1.0

Conformance classes used:

- gml-coverage

OGC 09-110r4, OGC® *Web Coverage Service 2.0 Interface Standard Core*, version 2.0

Conformance classes used:

- core

OGC 11-053, OGC® *WCS 2.0 Interface Standard – CRS Service Model Extension*, version 1.0

Conformance classes used:

- crs

OGC 12-039, OGC® *WCS 2.0 Interface Standard – Scaling Service Model Extension*, version 1.0

Conformance classes used:

- scaling

OGC 12-040, OGC® *WCS 2.0 Interface Standard – Range Subsetting Service Model Extension*, version 1.0

Conformance classes used:

- range-subsetting

OGC 12-049, OGC® *WCS 2.0 Interface Standard – Interpolation Service Model Extension*, version 1.0

Conformance classes used:

- interpolation

OGC 09-147r3, OGC® *WCS 2.0 Interface Standard – KVP Protocol Binding Extension*, version 1.0

Conformance classes used:

- get-kvp

 

OGC 09-149r1, OGC® *WCS 2.0 Interface Standard – SOAP Protocol Binding Extension*, version 1.0

Conformance classes used:

- soap

OGC 12-100r1, OGC® *GML Application Schema – Coverages – GeoTIFF Coverage Encoding Profile*, version 1.0

Conformance classes used:

- geotiff-coverage

OGC 11-010, OGC® *WCS 2.0 Interface Standard – NetCDF Encoding Format Extension*, version 1.0

Conformance classes used:

- netcdf

OGC 11-011, OGC® *WCS 2.0 Interface Standard – JPEG2000 Encoding Format Extension*, version 1.0

Conformance classes used:

- jpeg2000

OGC 10-157r3, *Earth Observation Metadata Profile of Observations and Measurements*

Conformance classes used:

- eop, sar, opt

NOTE Annex B lists transitional provisions until all of the above specifications are available as adopted OGC documents.

## 4 Terms and definitions

For the purposes of this document, the terms and definitions given in the above references apply. In addition, the following terms and definitions apply. An arrow "" indicates that the following term is defined in this Clause.

### 4.1 Coverage

digital representation of a spatio-temporally varying phenomenon as defined in [OGC 09-146r2]

### 4.2 Dataset

2-D  EO Coverage

NOTE A Dataset usually represents observations obtained by satellite instruments.

### 4.3 Dataset Series

collection of  EO Coverages

 

### 4.4 EO Coverage

Rectified Grid □ Coverage or Referenceable Grid □ Coverage having an □ EO Metadata record and a WGS84 bounding box

### 4.5 EO Metadata

□ EO Coverage's metadata record

### 4.6 Stitched Mosaic

□ EO Coverage composed from subsets of one or more co-referenced □ Datasets

### 4.7 Lineage record

Data structure documenting an operation that has been applied to the □ coverage it is part of

### 4.8 refers to

contains, in its □ EO Metadata element as defined in [OGC 10-157r3], the □ EO Metadata element of

## 5 Conventions

### 5.1 UML notation

Unified Modeling Language (UML) static structure diagrams appearing in this specification are used as described in Subclause 5.2 of OGC Web Services Common [OGC 06-121r9].

### 5.2 Data dictionary tables

The UML model data dictionary is specified herein in a series of tables. The contents of the columns in these tables are described in Subclause 5.5 of [OGC 06-121r9]. The contents of these data dictionary tables are normative, including any table footnotes.

### 5.3 Namespace prefix conventions

The following namespaces are used in this document. The prefix abbreviations used constitute conventions used here, but are **not** normative. The namespaces to which the prefixes refer are normative, however.

**Table 1 — Namespace mappings**

| Prefix | Namespace URI | Description |
|---|---|---|
| xsd | http://www.w3.org/2001/XMLSchema | XML Schema namespace |
| ows | http://www.opengis.net/ows/2.0 | OWS Common 2.0 |

 

| | | |
|---|---|---|
| gml | http://www.opengis.net/gml/3.2 | GML 3.2.1 |
| gmlcov | http://www.opengis.net/gmlcov/1.0 | GML Application Schema for Coverages 1.0 |
| wcs | http://www.opengis.net/wcs/2.0 | WCS 2.0 |
| eop | http://www.opengis.net/eop/2.0 | Earth Observation Metadata Profile of Observations and Measurements |
| opt | http://www.opengis.net/opt/2.0 | Optical Earth Observation Metadata Profile of Observations and Measurements (extension of eop) |
| sar | http://www.opengis.net/sar/2.0 | SAR Earth Observation Metadata Profile of Observations and Measurements (extension of eop) |
| wcseo | http://www.opengis.net/wcs/wcseo/1.0 | WCS Application Profile – Earth Observation 1.0 |

### 5.4 Multiple representations

When multiple representations of the same information are given in a specification document these are consistent. Should this not be the case then this is considered an error, and the XML schema shall take precedence.

## 6 EO data model

### 6.1 Overview

This Clause 6, together with Clauses 7 and 8, establishes the EO-WCS core requirements class, *eowcs*.

The data model of this EO-WCS centers around the data structure of an Earth Observation coverage (EO Coverage), which is a coverage extended with EO Metadata [OGC 10-157r3] and bound to a location on the Earth. EO Coverages are a subtype of either `GML-COV::RectifiedGridCoverage` or `GMLCOV::ReferenceableGridCoverage`.

Based on this EO Coverage concept (cf. Subclause 6.3), three main data elements are defined:

- A *Dataset* is a 2-D horizontal EO Coverage, which can represent, for example, a hyperspectral satellite scene; cf. Subclause 6.4. A Dataset can be a Rectified Dataset or a Referenceable Dataset, depending on the type of EO Coverage it is derived from.

- A *Stitched Mosaic* is a collection of 2-D horizontal EO Coverages referring to co-referenced Datasets; cf. Subclause 6.5. A Stiched Mosaic can be a Rectified Stiched Mosaic or a Referenceable Stitched Mosaic, depending on the type of EO Coverage it

 

is derived from. A Stitched Mosaic can be interpreted (i.e. requested) as a single coverage.

- A *Dataset Series* is a collection of coverages and/or Dataset Series; cf. Subclause 6.6. A Dataset Series can refer to any number of Datasets, Stitched Mosaics, and Dataset Series. A Dataset Series is not a coverage itself.

NOTE Annex C provides Use Cases to motivate the definition of these data elements.

Figure 1 informally symbolizes how the concepts of Dataset, Stitched Mosaic, and Dataset Series relate to each other spatio-temporally:

- A – a Dataset with a particular validity in time;
- B – a Stitched Mosaic; all its Datasets have a spatial extent contained in the Stitched Mosaic's spatial extent and a timespan contained in the Stitched Mosaic's time interval. The subsets contributing to the Stitched Mosaic do not overlap in space, but there may be empty (nil) areas.
- C – the overall Dataset Series combining Datasets and Stitched Mosaics.

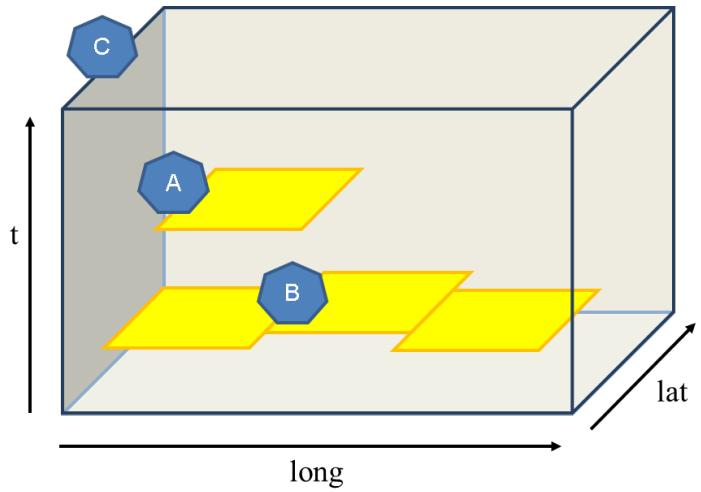


**Figure 1 — Conceptual view of a Dataset Series with Stitched Mosaic and Dataset**

Figure 2 contains the UML diagram defining classes (types) and their correlations in the EO-WCS.

### 6.2 EO Metadata

Every EO Coverage contains *EO Metadata*, consisting of an EarthObservation record as defined in the OGC Earth Observation Metadata Profile of Observations and Measurements [OGC 10-157r3] and a lineage describing the history of operations leading to the coverage on hand.

 

**Requirement 1 /req/eowcs/eo-metadata-structure:**
A `EOWCS::EOMetadata` instance **shall** conform to Table 2, Figure 2, Figure 3, and the XML schema being part of this standard.

**Table 2 — Components of `EOWCS::EOMetadata` structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| earthObservation | EO metadata record for this coverage object | `EOP::EarthObservation` | one (mandatory) |
| lineage | History record describing an operation that has been applied to this object | `EOWCS::Lineage` | zero or more (optional) |

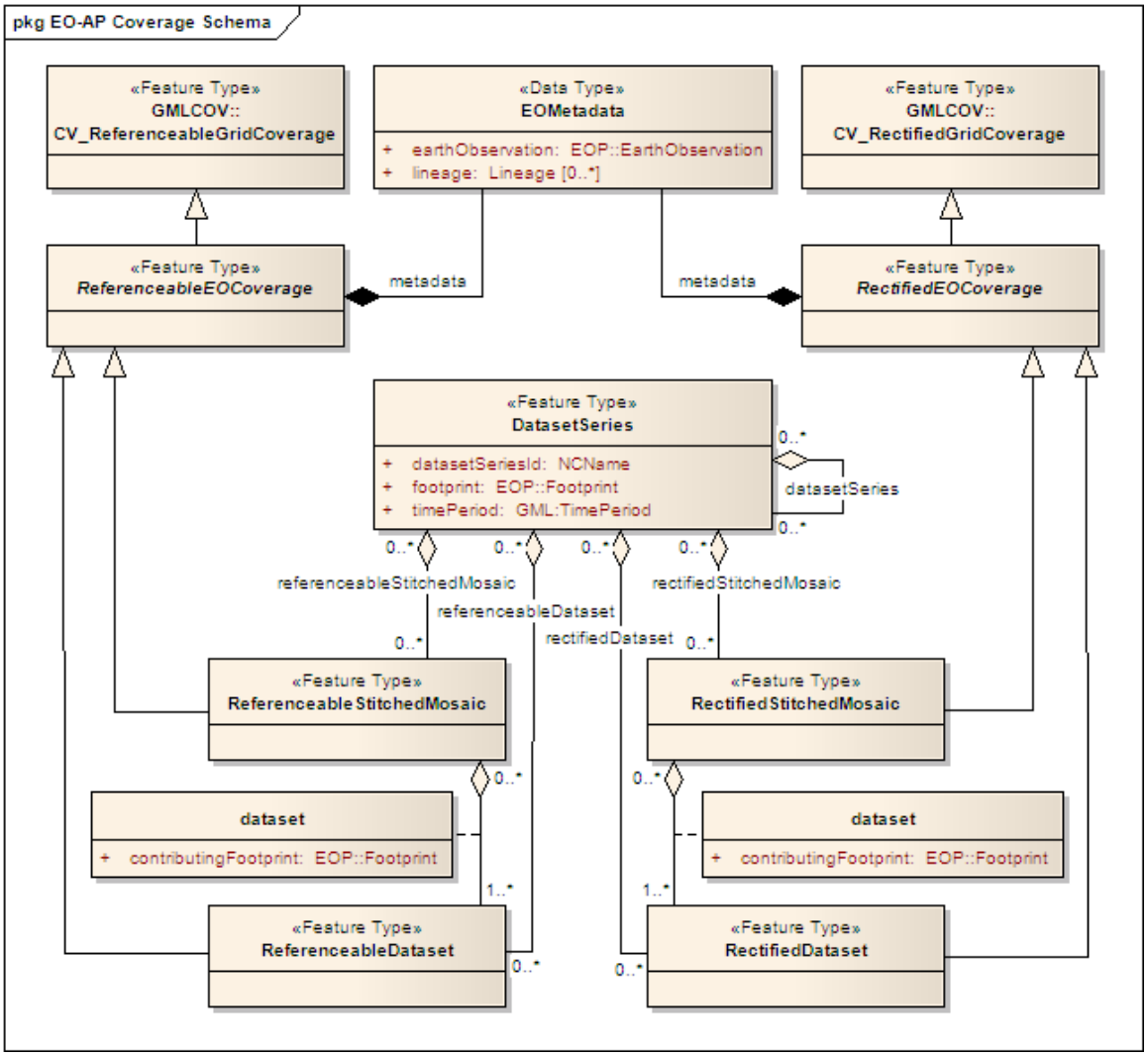


**Figure 2 — UML Model of EO Application Profile Schema**

NOTE Throughout this standard, `eop:` and `EOP::` can be substituted by `opt:` and `OPT::` or `sar:` and `SAR::`, respectively, as in [OGC 10-157r3] `opt` and `sar` are in the substitution group of `eop`.

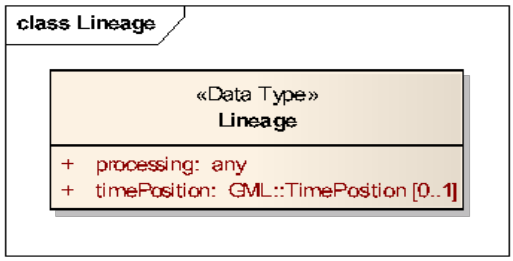


**Figure 3 — UML Lineage class diagram**

NOTE The `lineage` records are supposed to describe the history of processing steps that has led to the coverage on hand. As at the time of this writing there is no canonical format for such histories available in OGC, for the purpose of this specification no assumption is made about the contents of a `lineage` record, except that *GetCoverage* appends its request verbatim as an additional record (see Requirement 46).

The footprint of an EO Coverage, which contains one or more bounding polygons to describe the region of valid data more accurately than the EO Coverage's bounding box, is mandatory as opposed to [OGC 10-157r3].

**Requirement 2 /req/eowcs/footprint-in-eo-metadata:**
The `EOWCS::EOMetadata` element of `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain an `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element.

NOTE As per [OGC 10-157r3], the footprint is always given in WGS84.

### 6.3 EO Coverage

#### 6.3.1 Overview

An *EO Coverage* is a coverage as defined in the GML Application Schema for Coverages [OGC 09-146r2]. EO Coverages appear in two variants:

- *Rectified EO Coverages* are derived from Rectified Grid Coverage as defined in [OGC 09-146r2];
- *Referenceable EO Coverages* are derived from Referenceable Grid Coverage as defined in [OGC 09-146r2].

**Requirement 3 /req/eowcs/eo-coverage-structure:**
`EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** conform to Figure 2, Figure 3, and the XML schema being part of this standard.

#### 6.3.2 EO Metadata

An EO Coverage has an EO Metadata record associated.

 

**Requirement 4 /req/eowcs/eo-metadata-in-eo-coverage:**
`EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain one metadata element of type `EOWCS::EOMetadata`.

NOTE 1 Besides this specific metadata element there may be further metadata elements.

NOTE 2 According to the rules of GML, a xlink:href URI to an accessible element of type `EOWCS::EOMetadata` can be provided instead of the element itself in any place of the XML schema where such a metadata record appears.

The EO Metadata record associated with an EO Coverage contains a back reference to the coverage.

**Requirement 5 /req/eowcs/eop-identifier-in-eo-metadata:**
The `EOWCS::EOMetadata` element of `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain an element `eop:EarthObservation/eop:metadataProperty/eop:EarthObservationMetaData/eop:identifier` whose first word (NCNAME type substring i.e. starting from it's first character up to and excluding the first character which is not allowed in an NCName) is identical to the EO Coverage identifier.

NOTE Normally, this word (i.e. NCName) acting as coverage identifier will be the only contents of the `eop:identifier` string and thus both elements will be equal.

### 6.3.3 Spatio-temporal extent

The EO Coverage's extent of valid data is given by its EO Metadata footprint, which refines the coverage's envelope.

**Requirement 6 /req/eowcs/footprint-inside-boundedBy:**
In `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances, all polygons listed in `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element **shall** be geometrically contained in the bounding box of the `gml:boundedBy` element of the `gml:Envelope`.

NOTE By definition, the footprint is expressed in WGS84.

An EO Coverage has a time period of validity associated.

**Requirement 7 /req/eowcs/phenomenonTime-in-eo-metadata:**
The `EOWCS::EOMetadata` element of a `EOWCS::ReferenceableEOCoverage` or `EOWCS::RectifiedEOCoverage` instance **shall** contain elements `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` where `beginPosition` ≤ `endPosition`.

NOTE This typically is the time period where image acquisition has taken place.

**Requirement 8 /req/eowcs/phenomenonTime-iso8601:**
For any given EO Coverage, its temporal validity values **shall** be expressed in ISO 8601 [2].

 

### 6.3.4 Range set

**Requirement 9 /req/eowcs/range-set-of-eo-coverage:**
In `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances, all cells whose locations are outside the EO Metadata footprint when both are evaluated in WGS84, **shall** contain nil values as defined in the bounding EO Coverage's range type.

## 6.4 Dataset

A *Dataset* is an EO Coverage as symbolized in Figure 4. A Dataset is either a Referenceable Dataset or a Rectified Dataset, derived from `EOWCS::ReferenceableEOCoverage` or `EOWCS::RectifiedEOCoverage`, respectively.

NOTE Typically, a Dataset represents a (single- or multi-band) satellite/aerial image scene.

**Requirement 10 /req/eowcs/dataset-structure:**
A `EOWCS::ReferenceableDataset` and a `EOWCS::RectifiedDataset` **shall** conform to Figure 2, Figure 3, and the XML schema being part of this standard.

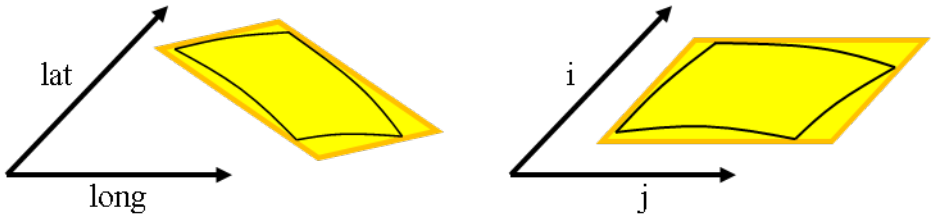


**Figure 4 — Conceptual view of a Dataset as a 2-D coverage: in referenced (left) und unreferenced coordinates (right)**

NOTE This definition includes the "field-of-View" of a sensor, or "cut", according to sensor specific data specification at the resolution of the sensor (also referred to as Level-0 or Level-1 data).

## 6.5 Stitched Mosaic

### 6.5.1 Overview

A *Stitched Mosaic* is an identifiable, queryable, referenced EO Coverage as symbolized in Figure 5. A Stitched Mosaic is either a Referenceable Stitched Mosaic or a Rectified Stitched Mosaic, derived from `EOWCS::ReferenceableEOCoverage` or `EOWCS::RectifiedEOCoverage`, respectively.

Stitched Mosaics *refer to* one or more Datasets. All cells within a Stitched Mosaic which are not located inside any `contributingFootprint` of any of the contained Datasets carry nil values.

 

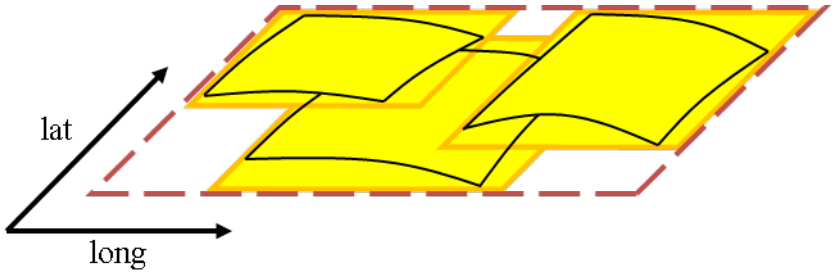


**Figure 5 — Conceptual view of a Stitched Mosaic as a 2-D coverage: composed from Datasets (Stitched Mosaic bounding box dashed)**

**Requirement 11 /req/eowcs/referenceableStitcheMosaic-structure:**
`EOWCS::ReferenceableStitchedMosaic` instances **shall** conform to Figure 2, Figure 3, Table 3, Table 5, and the XML schema being part of this standard.

**Table 3 — Components of `EOWCS::ReferenceableStitchedMosaic` structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| dataset | Reference to a Referenceable Dataset referred to by the Stitched Mosaic on hand | `EOWCS::DatasetReference` | one or more (mandatory) |

**Requirement 12 /req/eowcs/rectifiedStitchedMosaic-structure:**
`EOWCS::RectifiedStitchedMosaic` instances **shall** conform to Figure 2, Figure 3, Table 4, Table 5, and the XML schema being part of this standard.

**Table 4 — Components of `EOWCS::RectifiedStitchedMosaic` structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| dataset | Reference to a Rectified Dataset referred to by the Stitched Mosaic on hand | `EOWCS::DatasetReference` | one or more (mandatory) |

**Table 5 — Components of `EOWCS::DatasetReference` structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| datasetId | Dataset referred to by the Stitched Mosaic on hand | `WCS::CoverageId` | one (mandatory) |
| contributingFootprint | Horizontal bounding polygon enclosing data areas of the Dataset contributing to the Stitched Mosaic on hand | `EOP::Footprint` | zero or one (optional) |

The Dataset references of an EO Coverage shall be consistent with the coverage's EO Metadata references.

**Requirement 13 /req/eowcs/composedOf-in-stitched-mosaic:**
In `EOWCS::ReferenceableStitchedMosaic` and `EOWCS::RectifiedStitchedMosaic` instances with at least one `eop:EarthObservation/eop:metaDataProperty/eop:EarthObservationMetaData/eop:composedOf`, the set of these elements **shall** be equal to the set of `dataset` identifiers of the Stitched Mosaic.

### 6.5.2 Spatio-temporal extent

A Stitched Mosaic is defined through a collection of spatially non-overlapping subsets of Datasets it refers to.

**Requirement 14 /req/eowcs/contributingFootprint-inside-footprint:**
For all Stitched Mosaics *sm* referring to some Datasets *d* with an associated `contributingFootprint`, this `contributingFootprint` **shall** be geographically contained in the footprint of *d*.

**Requirement 15 /req/eowcs/contributingFootprint-pairwise-disjoint:**
For all Stitched Mosaics *sm* referring to Datasets $d_1$ and $d_2$, with an associated `contributingFootprint`, the `contributingFootprints` of the $d_1$ and $d_2$ references **shall** be pair-wise disjoint.

**Requirement 16 /req/eowcs/contributingFootprint-union-of-footprints:**
The footprint of a Stitched Mosaic **shall** be given by the union of the `contributingFootprints` of the Datasets this Stitched Mosaic refers to.

**Requirement 17 /req/eowcs/dataset-domain-set-in-stitched-mosaic-domain-set:**
For all Datasets *d* referred to by some Stitched Mosaics *sm*, all cells of *d* as defined by the domain set of *d* **shall** be contained in the set of cells of *sm* as defined by the domain set of *sm*.

Datasets referred to by a Stitched Mosaic shall have aligned cell locations:

- In case of Rectified EO Coverages, the grids of Datasets of a Stitched Mosaics shall have the same resolution.

  **Requirement 18 /req/eowcs/datasets-in-rectifiedStitcheMosaic-same-offset-Vector:**
  All Datasets referred to by a Rectified Stitched Mosaic **shall** have identical values in the `gml:offsetVector` elements of their domain sets.

  **Requirement 19 /req/eowcs/rectifiedStitchedMosaic-offsetVector:**
  In a Rectified Stitched Mosaic instance, the value of the `gml:offsetVector` elements of the domain set **shall** be given by the corresponding values of the Rectified Datasets the Rectified Stitched Mosaic refers to.

- In case of Referenceable EO Coverages, Datasets of Stitched Mosaics shall have aligned cell locations in overlapping areas.

  **Requirement 20 /req/eowcs/referenceableStitchedMosaic-domain-set:**
  For any pair $d_1$ and $d_2$ of Datasets referred to by a given Stitched Mosaic, the set of

 

point locations in the geographic overlap of the $d_1$ and $d_2$ domain set **shall** be identical.

The temporal validity of Stitched Mosaics is defined by the temporal validities of the Datasets the Stitched Mosaic refers to.

**Requirement 21 /req/eowcs/temporal-validity-stitched-mosaic:**
For any given Stitched Mosaic, its temporal validity given by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata` **shall** be defined as the minimal time interval containing the temporal validities of all Datasets the Stitched Mosaic refers to.

### 6.5.3 Range type

Stitched Mosaics and their Datasets share the same range type.

**Requirement 22 /req/eowcs/datasets-in-stitched-mosaic-same-range-type:**
For all Datasets *d* some Stitched Mosaic *sm* refers to the following **shall** hold: The range type of *d* is identical to the range type of *sm*.

### 6.5.4 Range set

The content of a Stitched Mosaic is given by the Datasets it refers to; cells of a Stitched Mosaic with domain coordinates outside of any embedded Dataset's contributingFootprint carry nil values (cf. Figure 6).

**Requirement 23 /req/eowcs/nil-values-in-stitched-mosaic:**
If the domain set of a Stitched Mosaic contains locations which are not inside any contributingFootprint of any Dataset the Stitched Mosaic refers to then the nil value set of that Stitched Mosaic **shall** not be empty.

**Requirement 24 /req/eowcs/range-values-of-stitched-mosaic:**
For a Stitched Mosaic *sm* its range values of cells with location *p*, expressed in any of the CRSs supported by *sm*, **shall** be given as follows:
- if *p* is located within the contributingFootprint of some Dataset *d* referred to by *sm* then it is the range value of *d* at *p*;
- if *p* is not located within the contributingFootprint of any Dataset *d* referred to by *sm* then it is one of the range values contained in the nil value set of *sm*.

## 6.6 Dataset Series

A *Dataset Series* is an identifiable, queryable collection of EO Coverages and Dataset Series.

NOTE A Dataset referred to by a Stitched Mosaic referred to by a Dataset Series is not per se referred to by that Dataset Series. However, it is allowed that such a Dataset is also referred to by the enclosing Dataset Series.

 

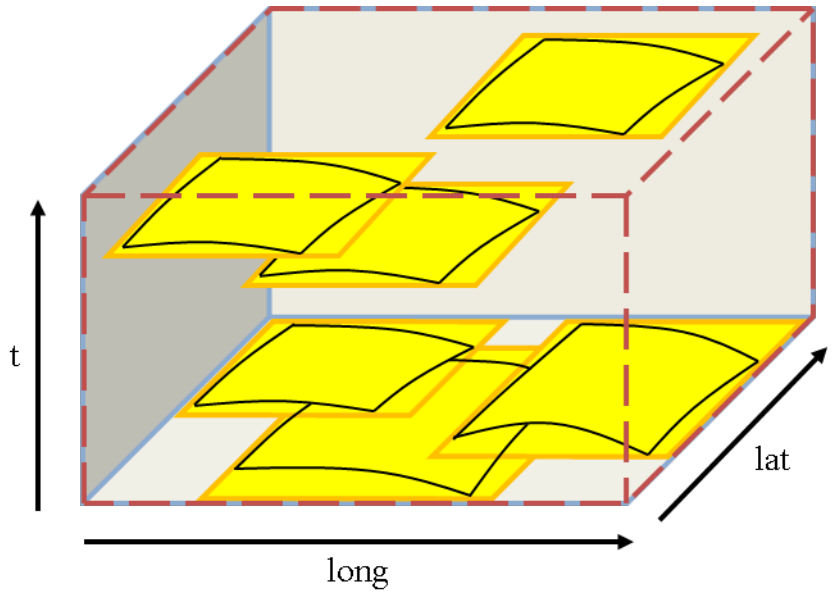


**Figure 6 — Conceptual view of a Dataset Series referring to Datasets and Stitched Mosaics (Dataset Series domain boundary dashed)**

**Requirement 25 /req/eowcs/datasetSeries-structure:**
A `EOWCS::DatasetSeries` **shall** conform to Figure 2, Figure 3, Table 6, and the XML schema being part of this standard.

**Table 6 — Components of `EOWCS::DatasetSeries` structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| datasetSeriesId | Identifier of the Dataset Series on hand | `NCName` | one (mandatory) |
| footprint | Horizontal bounding polygon enclosing valid data areas of the Dataset Series | `EOP::Footprint` | one (mandatory) |
| timePeriod | Temporal period of validity of all data in the Dataset Series | `GML::TimePeriod` | one (mandatory) |
| referenceable-StitchedMosaic | Referenceable Stitched Mosaic to which the Dataset Series on hand refers | `WCS::CoverageId` | zero or more (optional) |
| rectified-StitchedMosaic | Rectified Stitched Mosaic to which the Dataset Series on hand refers | `WCS::CoverageId` | zero or more (optional) |
| referenceable-Dataset | Referenceable Dataset to which the Dataset Series on hand refers | `WCS::CoverageId` | zero or more (optional) |

 

| | | | |
|---|---|---|---|
| rectifiedDataset | Rectified Dataset to which the Dataset Series on hand refers | `WCS::CoverageId` | zero or more (optional) |
| datasetSeries | Dataset Series to which the Dataset Series on hand refers | `EOWCS::datasetSeriesId` | zero or more (optional) |

NOTE A Dataset Series and a Stitched Mosaic contained therein may both refer to the same Dataset.

The spatial extent of a Dataset Series shall enclose the spatial extents of all Stitched Mosaics, Datasets, and Dataset Series the Dataset Series refers to.

**Requirement 26 /req/eowcs/footprint-in-datasetSeries:**
The `footprint` of a Dataset Series instance **shall** enclose the union of the footprints of all Stitched Mosaics, Datasets, and Dataset Series the Dataset Series refers to, expressed in WGS84.

NOTE As opposed to Stitched Mosaics, Dataset Series do not require disjointness of the EO Coverages they refer to.

The temporal validity of a Dataset Series is defined by the union of the temporal validities of all Stitched Mosaics, Datasets, and Dataset Series the Dataset Series refers to.

**Requirement 27 /req/eowcs/timePeriod-in-datasetSeries:**
For any given Dataset Series, the `timePeriod` element **shall** enclose the temporal validities of all Stitched Mosaics, Datasets, and Dataset Series the Dataset Series refers to, expressed in ISO 8601 [2].

A Dataset Series shall not refer to any Dataset Series that refers to it either directly or via other Dataset Series i.e. there shall be no circular references.

**Requirement 28 /req/eowcs/nocircularreference-of-datasetSeries:**
A Dataset Series **shall** only refer to Dataset Series that do not refer to the Dataset Series at hand either directly or via other Dataset Series.

# 7 EO service model

## 7.1 Overview

This Clause defines request types and their responses for operations on EO Coverages. EO Coverages can be offered by a WCS server alongside with any other type of coverages. Behavior of the service on non-EO Coverages remains unchanged.

## 7.2 *GetCapabilities* operation

### 7.2.1 *GetCapabilities* request

The *GetCapabilities* request is extended over WCS Core [OGC 09-110r4] as follows:

- In the `sections` request parameter, values “DatasetSeriesSummary“ and “CoverageSummary” are allowed in addition to those defined in OWS Common [06-121r9].

 

**Requirement 29 /req/eowcs/getCapabilities-request-sections:**
If a *GetCapabilities* request contains an ows:`Sections` element then this element **shall** contain ows:`Section` elements with the values defined in OWS Common, or "DatasetSeriesSummary", or "CoverageSummary".
**Dependency:** [OGC 06-121r9] clause 7.3.3

### 7.2.2 *GetCapabilities* response

The *GetCapabilities* response is extended over WCS Core [OGC 09-110r4] as follows:

- There is an additional `DatasetSeriesSummary` section reporting identifiers of Dataset Series offered by the service on hand.
- There is an optional constraint `CountDefault` specifiying the maximum number of `CoverageDescription` and `DatasetSeriesDescription` elements reported in a `DescribeEOCoverageSet` response.

NOTE An EO-WCS server may choose to not report, in the `CoverageSummary` section of a *GetCapabilities* response, the identifiers of Stitched Mosaic coverages referred to by some Dataset Series and the identifiers of Dataset coverages referred to by some Stitched Mosaic or Dataset Series.

In a *GetCapabilities* response, a server announces availability of this EO-WCS like an extension.

**Requirement 30 /req/eowcs/getCapabilities-response-conformance-class-in-profile:**
A WCS service implementing this extension **shall** include the following URI in a `Profile` element in the `ServiceIdentification` in a *GetCapabilities* response:
`http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs`

**Requirement 31 /req/eowcs/getCapabilities-response-structure:**
The response to a successful *GetCapabilities* request **shall** consist of a data structure as defined in Figure 7, Table 7, and the XML Schema being part of this standard.
**Dependency:** [OGC 09-110r4] Clause 8 (http://www.opengis.net/doc/IS/wcs-core-2.0.1/clause/8)

 

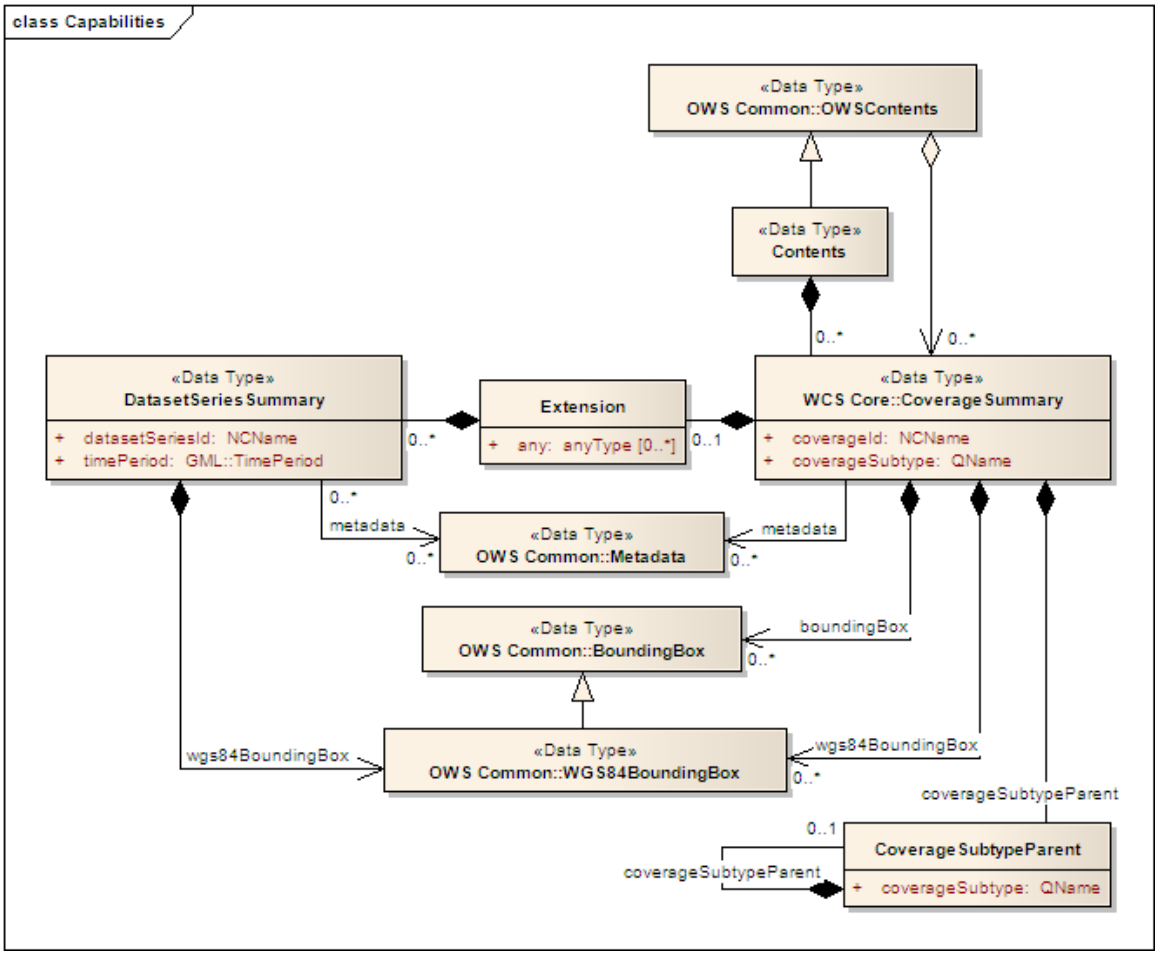


**Figure 7 — *GetCapabilities* response UML class diagram**

**Table 7 — Components of `EOWCS::DatasetSeriesSummary` structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| datasetSeriesId | Identifier of a Dataset Series offered by this service | `NCName` | one (mandatory) |
| wgs84-BoundingBox | Spatial extent of the Dataset Series | `OWS Common::WGS84-BoundingBox` | one (mandatory) |
| timePeriod | Time interval of validity of the Dataset Series | `GML:TimePeriod` | one (mandatory) |
| metadata | Reference to more metadata about this Dataset Series | `OWS Common::Metadata` | zero or one (optional) |

**Requirement 32 /req/eowcs/getCapabilities-response-datasetSeriesSummary:**
In the response to a successful *GetCapabilities* request containing a `EOWCS::Dataset-`

 

SeriesSummary section, each Dataset Series identifier listed **shall** refer to a Dataset Series offered by the server.

**Requirement 33 /req/eowcs/getCapabilities-response-datasetSeriesSummary-no-duplicates:**
A response to a successful *GetCapabilities* request containing a EOWCS::Dataset-SeriesSummary section **shall** not contain any duplicate Dataset Series identifier.

**Requirement 34 /req/eowcs/getCapabilities-response-coverageSummary:**
In the response to a successful *GetCapabilities* request containing an EO Coverage in a WCS::CoverageSummary section, each coverage identifier listed as EO Coverage **shall** refer to an EO Coverage offered by the server.

The response shall respect the sections request parameter.

**Requirement 35 /req/eowcs/getCapabilities-response-coverageSummary-section:**
If a *GetCapabilities* request contains a sections parameter then a successful response **shall** contain wcs:CoverageSummary elements if and only if the section parameter list contains one of the values "CoverageSummary", "Contents", or "All".

**Requirement 36 /req/eowcs/getCapabilities-response-datasetSeriesSummary-section:**
If a *GetCapabilities* request contains a sections parameter then a successful response **shall** contain eowcs:DatasetSeriesSummary elements if and only if the section parameter list contains one of the values "DatasetSeriesSummary", "Contents", or "All".

The coverage subtype shall indicate the specific type of the coverage returned, in case of an EO Coverage.

**Requirement 37 /req/eowcs/getCapabilities-response-coverageSubtype:**
In the response to a successful *GetCapabilities* request, each EO Coverage listed **shall** contain in its WCS::CoverageSubtype element the value given in Table 8 corresponding to its type.

**Table 8 — Values for CoverageSubtype elements of EO Coverages**

| Type of coverage identified by **CoverageIdentifier** | **CoverageSubtype** value |
|---|---|
| EOWCS::RectifiedDataset | RectifiedDataset |
| EOWCS::ReferenceableDataset | ReferenceableDataset |
| EOWCS::RectifiedStitchedMosaic | RectifiedStitchedMosaic |
| EOWCS::ReferenceableStitchedMosaic | ReferenceableStitchedMosaic |

**Requirement 38 /req/eowcs/getCapabilities-response-countDefault:**
If the response to a successful *GetCapabilities* request contains an ows:Constraint ele-

 

ment in its `ows:OperationsMetadata` element then its name attribute **shall** hold a value as defined in Table 9 and the XML Schema being part of this standard.

**Table 9 — Values for `ows:Constraint` elements**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| CountDefault | Default value for the count parameter defined for *DescribeEOCoverageSet* requests. | `Integer` greater than or equal to zero | zero or one (optional) |

NOTE Servers are strongly encouraged to specify a value for CountDefault as means of self defence, so that a request may not clog the server.

Example The following XML excerpt shows a possible `Contents` section containing Dataset Series information:

```
<wcs:Contents>
  <wcs:CoverageSummary>
    <wcs:CoverageId>someEOCoverage</wcs:CoverageId>
    <wcs:CoverageSubtype>RectifiedDataset</wcs:CoverageSubtype>
  </wcs:CoverageSummary>
  <wcs:Extension>
    <wcseo:DatasetSeriesSummary>
      <ows:WGS84BoundingBox>
        <ows:LowerCorner>-180 -90</ows:LowerCorner>
        <ows:UpperCorner>180 90</ows:UpperCorner>
      </ows:WGS84BoundingBox>
      <wcseo:DatasetSeriesId>someDatasetSeries</wcseo:DatasetSeriesId>
      <gml:TimePeriod gml:id="someDatasetSeries_timeperiod">
        <gml:beginPosition>2010-01-01T00:00:00.000</gml:beginPosition>
        <gml:endPosition>2010-12-31T23:59:59.999</gml:endPosition>
      </gml:TimePeriod>
    </wcseo:DatasetSeriesSummary>
  </wcs:Extension>
</wcs:Contents>
```

Example The following XML excerpt shows a possible `Constraint` section containing a CountDefault value:

```
<ows:Constraint name="CountDefault">
  <ows:NoValues />
  <ows:DefaultValue>100</ows:DefaultValue>
</ows:Constraint>
```

### 7.3 *DescribeCoverage* operation

#### 7.3.1 *DescribeCoverage request*

The *DescribeCoverage* request is unchanged over WCS Core [OGC 09-110r4]. In particular, identifiers of EO Coverages can be passed as input parameters.

NOTE A *DescribeCoverage* request is possible on the identifiers of EO Coverages offered by the server even if these are not listed in a *GetCapabilities* response.

 

### 7.3.2 *DescribeCoverage* response

In a *DescribeCoverage* response, EO Coverage descriptions additionally contain the EO Metadata record.

**Requirement 39 /req/eowcs/describeCoverage-response-eo-metadata:**
In the response to a successful *DescribeCoverage* request on an EO Coverage, one `EOWCS::EOMetadata` element **shall** be present containing the EO Metadata component of the coverage addressed.

The coverage subtype shall indicate the specific type of the coverage returned, in case of an EO Coverage.

**Requirement 40 /req/eowcs/describeCoverage-response-coverageSubtype:**
In the response to a successful *DescribeCoverage* request addressing an EO Coverage, each EO Coverage listed **shall** contain in its `WCS::CoverageSubtype` element the value given in Table 8 corresponding to its type.

Example The following XML fragment shows parts of a possible *DescribeCoverage* response on an EO Coverage:

```
<wcs:CoverageDescriptions>
  <wcs:CoverageDescription gml:id="c1">
    <gml:boundedBy>
      <gml:Envelope axisLabels="lat long" srsDimension="2"
srsName="http://www.opengis.net/def/crs/EPSG/0/4326" uomLabels="deg deg">
        <gml:lowerCorner>42.862778 1.896944</gml:lowerCorner>
        <gml:upperCorner>43.516667 2.861667</gml:upperCorner>
      </gml:Envelope>
    </gml:boundedBy>
    <wcs:CoverageId>c1</wcs:CoverageId>
    <gmlcov:metadata>
      <gmlcov:Extension>
        <wcseo:EOMetadata>
          <eop:EarthObservation gml:id="eop_c1">
            <om:phenomenonTime>
              <gml:TimePeriod gml:id="tp_c1">
                <gml:beginPosition>2008-03-13T10:00:06.000</gml:beginPosition>
                <gml:endPosition>2008-03-13T10:20:26.000</gml:endPosition>
              </gml:TimePeriod>
            </om:phenomenonTime>
            <om:resultTime>
              <gml:TimeInstant gml:id="archivingdate_c1">
                <gml:timePosition>2001-08-13T11:02:47.999</gml:timePosition>
              </gml:TimeInstant>
            </om:resultTime>
            <om:procedure />
            <om:observedProperty />
            <om:featureOfInterest>
              <eop:Footprint gml:id="footprint_c1">
                <eop:multiExtentOf>
                  <gml:MultiSurface gml:id="multisurface_c1"
srsName="EPSG:4326">
                    <gml:surfaceMember>
                      <gml:Polygon gml:id="polygon_c1">
                        <gml:exterior>
                          <gml:LinearRing>
                            <gml:posList>
```

 

```
                                43.516667 2.1025 43.381667 2.861667
                                42.862778 2.65 42.996389 1.896944
                                43.516667 2.1025
                              </gml:posList>
                            </gml:LinearRing>
                          </gml:exterior>
                        </gml:Polygon>
                      </gml:surfaceMember>
                    </gml:MultiSurface>
                  </eop:multiExtentOf>
                  <eop:centerOf>
                    <gml:Point gml:id="c1_p" srsName="EPSG:4326">
                      <gml:pos>43.190833 2.374167</gml:pos>
                    </gml:Point>
                  </eop:centerOf>
                </eop:Footprint>
              </om:featureOfInterest>
              <om:result />
              <eop:metaDataProperty>
                <eop:EarthObservationMetaData>
                  <eop:identifier>c1</eop:identifier>
                  <eop:acquisitionType>NOMINAL</eop:acquisitionType>
                  <eop:status>ARCHIVED</eop:status>
                </eop:EarthObservationMetaData>
              </eop:metaDataProperty>
            </eop:EarthObservation>
          </wcseo:EOMetadata>
        </gmlcov:Extension>
      </gmlcov:metadata>
      <gml:domainSet>
        <gml:RectifiedGrid dimension="2" gml:id="c1_grid">
          ...
        </gml:RectifiedGrid>
      </gml:domainSet>
      <gmlcov:rangeType>
          ...
      </gmlcov:rangeType>
      <wcs:ServiceParameters>
        <wcs:CoverageSubtype>RectifiedDataset</wcs:CoverageSubtype>
        <wcs:nativeFormat>image/tiff</wcs:nativeFormat>
      </wcs:ServiceParameters>
    </wcs:CoverageDescription>
</wcs:CoverageDescriptions>
```

NOTE The complete example is provided with the schema files being part of this standard.

### 7.4 *GetCoverage* operation

#### 7.4.1 *GetCoverage* request

The *GetCoverage* request is unchanged over WCS Core [OGC 09-110r4], except that for EO Coverages slicing is disallowed as it would leave the EO Metadata undefined.

NOTE A *GetCoverage* request is possible on the identifiers of EO Coverages offered by the server even if these are not listed in a *GetCapabilities* response.

**Requirement 41 /req/eowcs/getCoverage-request-no-slicing:**
A *GetCoverage* request on EO Coverages **shall** not contain a slicing operation.

 

### 7.4.2 *GetCoverage* response

The *GetCoverage* response is as defined in the WCS Core [OGC 09-110r4], however extended in two respects:

- The coverage returned contains exactly one metadata element holding the EO Metadata record (it may contain further metadata elements in addition);
- The lineage component of the EO Metadata record returned consists of the pre-existing lineage sequence plus one element appended which describes the *GetCoverage* request on hand.

NOTE As always, whether all these elements will be available to a client depends on the degree of support for the information items by the requested coverage encoding.

On EO Coverages, a *GetCoverage* request shall produce a coverage of the type corresponding to the coverage inspected.

**Requirement 42 /req/eowcs/getCoverage-response-coverage-type:**
The response to a successful *GetCoverage* request
- on a Rectified Stitched Mosaic **shall** be of type RectifiedStitchedMosaic,
- on a Rectified Dataset **shall** be of type RectifiedDataset,
- on a Referenceable Stitched Mosaic **shall** be of type ReferenceableStitchedMosaic, and
- on a Referenceable Dataset **shall** be of type ReferenceableDataset,.

The EO Metadata, including the extended lineage record, shall be delivered alongside with the coverage data, adjusted according to the operations executed during *GetCoverage* evaluation.

**Requirement 43 /req/eowcs/getCoverage-response-eo-metadata:**
In the response to a successful *GetCoverage* request on an EO Coverage, the `EOWCS::EOMetadata` of the coverage returned **shall** contain the complete `EOWCS::EOMetadata` of the coverage addressed, adjusted as specified in Requirement 44, Requirement 45, and Requirement 46.

**Requirement 44 /req/eowcs/getCoverage-response-eo-metadata-in-stitched-mosaic:**
In the response to a successful *GetCoverage* request on a Stitched Mosaic, the `EOWCS::EOMetadata` of the coverage returned **shall** contain the original Stitched Mosaic's references to those Datasets which have a non-empty intersection with the effective spatio-temporal request trim interval, and no other ones.

**Requirement 45 /req/eowcs/getCoverage-response-footprint-in-eo-metadata:**
If, in a successful *GetCoverage* request on an EO Coverage, trimming along spatial coordinates is specified then the footprint of the `EOWCS::EOMetadata` in the coverage returned **shall** be given by the intersection of the spatial request interval and the footprint of the coverage requested. Otherwise, the footprint in the result coverage **shall** be given by the footprint of the coverage requested.

The lineage record shall be extended by a reproducible description of the *GetCoverage* request originating this output.

 

**Requirement 46 /req/eowcs/getCoverage-response-lineage-in-eo-metadata:**
In the response to a successful *GetCoverage* request, the Lineage component **shall** consist of the Lineage component of the coverage requested with one record appended containing the complete, verbatim *GetCoverage* request leading to this response.

NOTE This content is dependent on the protocol used by the requestor. In case of a GET/KVP request, this will be the request URL with parameters. In case of an XML or SOAP request this will be an XML snippet.

Example The following XML fragment shows parts of a possible *GetCoverage* response for an EO Coverage:

```
<wcseo:RectifiedDataset xmlns:ows="http://www.opengis.net/ows/2.0"
xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:gmlcov="http://www.opengis.net/gmlcov/1.0"
xmlns:swe="http://www.opengis.net/swe/2.0"
xmlns:wcs="http://www.opengis.net/wcs/2.0"
xmlns:wcseo="http://www.opengis.net/wcs/wcseo/1.0"
xmlns:eop="http://www.opengis.net/eop/2.0"
xmlns:om="http://www.opengis.net/om/2.0"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/wcs/wcseo/1.0
http://schemas.opengis.net/wcs/wcseo/1.0/wcsEOGetCoverage.xsd" gml:id="c1">
  <gml:boundedBy>
    ...
  </gml:boundedBy>
  <gml:domainSet>
    ...
  </gml:domainSet>
  <gml:rangeSet>
    ...
  </gml:rangeSet>
  <gmlcov:rangeType>
    ...
  </gmlcov:rangeType>
  <gmlcov:metadata>
    <gmlcov:Extension>
      <wcseo:EOMetadata>
        <eop:EarthObservation gml:id="eop_c1">
          <om:phenomenonTime>
            <gml:TimePeriod gml:id="tp_c1">
              <gml:beginPosition>2008-03-13T10:00:06.000</gml:beginPosition>
              <gml:endPosition>2008-03-13T10:20:26.000</gml:endPosition>
            </gml:TimePeriod>
          </om:phenomenonTime>
          <om:resultTime>
            <gml:TimeInstant gml:id="archivingdate_c1">
              <gml:timePosition>2008-03-13T11:02:47.999</gml:timePosition>
            </gml:TimeInstant>
          </om:resultTime>
          <om:procedure>
            ...
          </om:procedure>
          <om:observedProperty />
          <om:featureOfInterest>
            ...
          </om:featureOfInterest>
          <om:result>
            ...
          </om:result>
          <eop:metaDataProperty>
```

 

```
            ...
          </eop:metaDataProperty>
        </eop:EarthObservation>
        <wcseo:lineage>
          <!-- GetCoverage request via KVP -->
          <wcseo:referenceGetCoverage>
            <ows:Reference
xlink:href="http://www.someWCS.org?SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCover-
age&amp;COVERAGEID=c1&amp;FORMAT=application/gml+xml&amp;MEDIATYPE=multipart/related" />
          </wcseo:referenceGetCoverage>
          <gml:timePosition>2011-02-04T15:45:52Z</gml:timePosition>
        </wcseo:lineage>
        <wcseo:lineage>
          <!-- GetCoverage request via POST -->
          <wcseo:referenceGetCoverage>
            <ows:ServiceReference xlink:href="http://www.someWCS.org">
              <ows:RequestMessage>
                <wcs:GetCoverage xmlns:wcs="http://www.opengis.net/wcs/2.0"
xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/wcs/2.0

http://schemas.opengis.net/wcs/2.0/wcsAll.xsd" service="WCS" version="2.0.1">
                  <wcs:CoverageId>c1</wcs:CoverageId>
                  <wcs:format>application/gml+xml</wcs:format>
                  <wcs:mediaType>multipart/related</wcs:mediaType>
                </wcs:GetCoverage>
              </ows:RequestMessage>
            </ows:ServiceReference>
          </wcseo:referenceGetCoverage>
          <gml:timePosition>2011-02-04T15:45:52Z</gml:timePosition>
        </wcseo:lineage>
      </wcseo:EOMetadata>
    </gmlcov:Extension>
  </gmlcov:metadata>
</wcseo:RectifiedDataset>
```

### 7.5 *DescribeEOCoverageSet* operation

#### 7.5.1 Overview

A *DescribeEOCoverageSet* request submits one or more Dataset Series, Stitched Mosaic, or Dataset identifiers together with a spatio-temporal subsetting criterion ("bounding box"). The spatial constraint is expressed in WGS84 [4], the temporal constraint in ISO 8601 [2].

The response to a successful request on a Dataset Series consists of a (possibly empty) set of descriptions of Datasets and Stitched Mosaics and a (possibly empty) set of descriptions of Dataset Series. The response to a successful request on a Stitched Mosaic consists of a (possibly empty) set of descriptions of Datasets. In any case, the result items are those ones which are (i) referred to directly or via Dataset Series by the object submitted and (ii) matched by the bounding box. The type of matching – `contains` or `overlaps` – is specified in the request.

 

### 7.5.2 *DescribeEOCoverageSet* request

**Requirement 47 /req/eowcs/describeEOCoverageSet-request-structure:**
A *DescribeEOCoverageSet* request **shall** consist of a structure as defined in Figure 8, Table 10 and the XML schema being part of this standard.

The *DescribeEOCoverageSet* request type contains two sections (cf. [OGC 06-121r9] Clause 7.3.3) whose appearance in the response can be controlled by the client through the optional `sections` parameter.

**Requirement 48 /req/eowcs/describeEOCoverageSet-request-sections:**
If a *DescribeEOCoverageSet* request contains an ows:`Sections` element then this element **shall** contain one of the values "CoverageDescriptions", "DatasetSeriesDescriptions", or "All".
**Dependency:** [OGC 06-121r9] clause 7.3.3

NOTE This use of the sections parameters is similar to its use in *GetCapabilities* as defined in OWS Common [OGC 06-121r9].

NOTE Future versions of the EO-WCS are likely to use the `DimensionTrim` element defined in the forthcoming *Predefined CRSs* Extension instead of `WCS::DimensionTrim`.

**Requirement 49 /req/eowcs/describeEOCoverageSet-request-eoId:**
Each `eoId` parameter value in a *DescribeEOCoverageSet* request **shall** be equal to the identifier of a Dataset, a Stitched Mosaic, or a Dataset Series offered by the server addressed.

NOTE A *DescribeEOCoverageSet* request is possible on the identifiers of objects offered by the server even if these are not listed in a *GetCapabilities* response.

**Requirement 50 /req/eowcs/describeEOCoverageSet-request-containment:**
If a *DescribeEOCoverageSet* request contains a `containment` parameter then this parameter **shall** have one of the values "contains" or "overlaps".

**Requirement 51 /req/eowcs/describeEOCoverageSet-request-dimensions:**
If a *DescribeEOCoverageSet* request contains `dimensionTrim` elements with `dimension` parameters then each such `dimension` parameter **shall** have one of the values "lat", "long", or "phenomenonTime", Each of these values shall appear at most once in a given request.

**Requirement 52 /req/eowcs/describeEOCoverageSet-request-crs:**
A *DescribeEOCoverageSet* request **shall** use WGS84 [4] as spatial and ISO 8601 [2] as temporal CRS for the coordinates in trim requests.

NOTE Trim coordinates are not required to lie within the boundaries of the EO Coverage inquired.

 

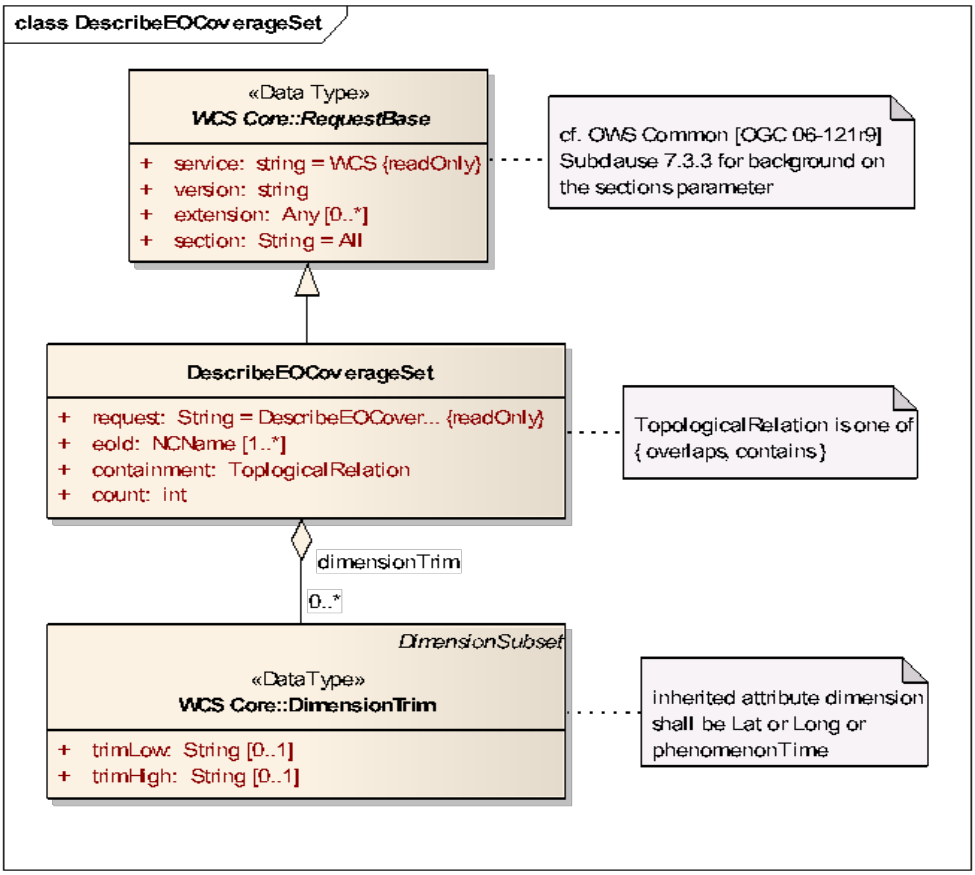


**Figure 8 — *DescribeEOCoverageSet* request UML diagram**

**Table 10 — Components of `DescribeEOCoverageSet` operation request**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| `request` | Request name | `String`, fixed to "DescribeEOCoverageSet" | one (mandatory) |
| `eoId` | Identifier of Dataset Series, Stitched Mosaic, or Dataset to be evaluated | `NCName` | one or more (mandatory) |
| `containment` | Intersection mode for evaluation of object bounding box against request parameters | `String` | zero or one (optional) |
| `count` | Maximum number of `CoverageDescription` and `DatasetSeriesDescription` elements to be included in the response | `Integer` greater than zero | zero or one (optional) |
| `sections` | Unordered list of zero or more names of the XML elements that shall be returned | `String` | zero or one (optional) |

 

| | | | |
|---|---|---|---|
| dimensionTrim | trim specification, as per WCS Core [OGC 09-110r4] Subclause 8.4.1 | WCS::DimensionTrim | zero or more (optional) |

Example The following XML instance shows a possible DescribeEOCoverageSet operation request:

```
<wcseo:DescribeEOCoverageSet xmlns:wcseo="http://www.opengis.net/wcs/wcseo/1.0"
xmlns:wcs="http://www.opengis.net/wcs/2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/wcs/wcseo/1.0
http://schemas.opengis.net/wcs/wcseo/1.0/wcsEOAll.xsd" service="WCS" ver-
sion="2.0.1" count="100">
  <wcseo:eoId>DS1</wcseo:eoId>
  <wcseo:containment>overlaps</wcseo:containment>
  <wcseo:sections>
    <wcseo:section>All</wcseo:section>
  </wcseo:sections>
  <wcs:DimensionTrim>
    <wcs:Dimension>long</wcs:Dimension>
    <wcs:TrimLow>16</wcs:TrimLow>
    <wcs:TrimHigh>18</wcs:TrimHigh>
  </wcs:DimensionTrim>
  <wcs:DimensionTrim>
    <wcs:Dimension>lat</wcs:Dimension>
    <wcs:TrimLow>40</wcs:TrimLow>
    <wcs:TrimHigh>42</wcs:TrimHigh>
  </wcs:DimensionTrim>
  <wcs:DimensionTrim>
    <wcs:Dimension>phenomenonTime</wcs:Dimension>
    <wcs:TrimLow>2008-03-13T10:10:00Z</wcs:TrimLow>
    <wcs:TrimHigh>2008-03-13T10:11:00Z</wcs:TrimHigh>
  </wcs:DimensionTrim>
</wcseo:DescribeEOCoverageSet>
```

### 7.5.3 *DescribeEOCoverageSet* response

The response to a successful *DescribeEOCoverageSet* request consists of a (possibly empty) set of EO Coverage descriptions and a (possibly empty) set of Dataset Series descriptions (cf. Figure 9).

**Requirement 53 /req/eowcs/describeEOCoverageSet-response-structure:**
The response to a successful *DescribeEOCoverageSet* request **shall** consist of a EOWCS::EOCoverageSetDescription structure as defined in Table 11, Figure 9 and the XML Schema being part of this standard.
**Dependency:** [OGC 09-110r4] Subclause 8.3.2
(http://www.opengis.net/doc/IS/WCS/2.0/clause/8)

**Table 11 — Components of EOCoverageSetDescription structure**

| Name | Definition | Data type | Multiplicity |
|---|---|---|---|
| datasetSeries-Descriptions | Unordered sequence of Dataset Series descriptions | DatasetSeries-Descriptions | zero or more (optional) |
| coverage-Descriptions | Unordered sequence of coverage descriptions | WCS::Coverage-Descriptions | zero or more (optional) |

 

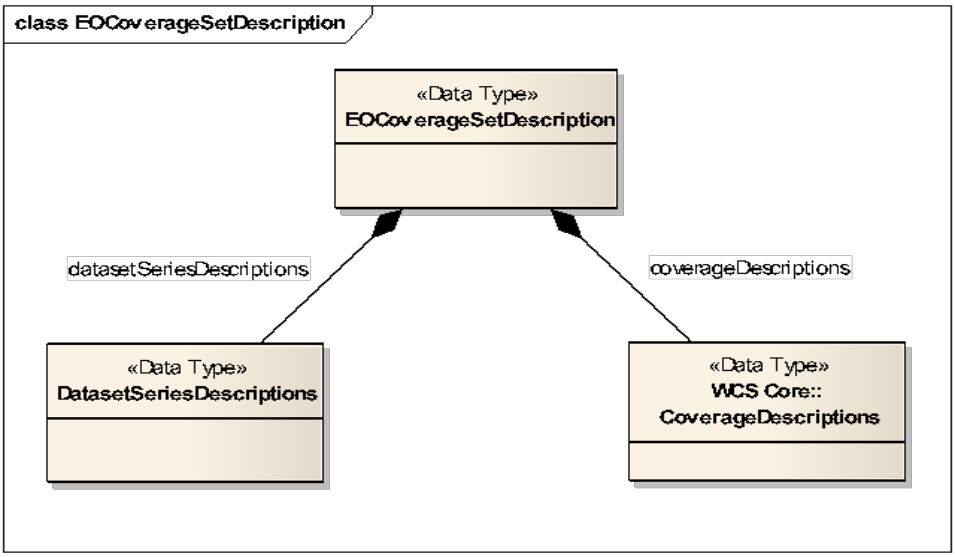


**Figure 9 — *DescribeEOCoverageSet* response UML diagram**

**Requirement 54 /req/eowcs/describeEOCoverageSet-response-eo-metadata:**
Each `WCS::CoverageDescription` listed in the response to a successful *DescribeEOCoverageSet* request **shall** contain one `EOWCS::EOMetadata` element containing the EO Metadata component of the EO Coverage to be described.

The response shall respect the `sections` request parameter.

**Requirement 55 /req/eowcs/describeEOCoverageSet-response-section-coverageDescriptions:**
If a *DescribeEOCoverageSet* request contains a `sections` parameter then a successful response **shall** contain a `wcs:CoverageDescriptions` element if and only if the section parameter list contains one of the values "CoverageDescriptions" or "All".

**Requirement 56 /req/eowcs/describeEOCoverageSet-response-section-datasetSeriesDescriptions:**
If a *DescribeEOCoverageSet* request contains a `sections` parameter then a successful response **shall** contain a `eowcs:DatasetSeriesDescriptions` element if and only if the section parameter list contains one of the values "DatasetSeriesDescriptions" or "All".

Such a response contains only EO Coverages directly referred to by the object(s) addressed in the request or via referred Dataset Series.

**Requirement 57 /req/eowcs/describeEOCoverageSet-response-eoId:**
In the response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescription` section, each EO Coverage referred to by one of the objects identified in the `eoId` request parameter **shall** appear at most once.

**Requirement 58 /req/eowcs/describeEOCoverageSet-response-referred:**
The response to a successful *DescribeEOCoverageSet* request containing a `wcs:Cover-`

 

ageDescription section **shall** contain the descriptions of exactly those EO Coverages referred to directly or indirectly via Dataset Series by one of the objects identified in the eoId request parameter, without any duplicates.

NOTE A Dataset referred to by a Dataset Series referred to by another Dataset Series is implicitly referred to by the later Dataset Series and thus always reported by a *DescribeEOCoverageSet* request against the later Dataset Series. However, it is allowed that such a Dataset is also referred to by the first Dataset Series but it is only reported once.

NOTE A Dataset referred to by a Stitched Mosaic referred to by a Dataset Series is not per se referred to by that Dataset Series and thus not reported by a *DescribeEOCoverageSet* request against the Dataset Series. However, it is allowed that such a Dataset is also referred to by the enclosing Dataset Series.

Spatial subsetting is evaluated against the eop:Footprint element contained in the EOMetadata element of an EO Coverage.

**Requirement 59 /req/eowcs/describeEOCoverageSet-response-containment:**
The response to a successful *DescribeEOCoverageSet* request containing a wcs:CoverageDescription section **shall** contain only descriptions of those EO Coverages whose spatial footprint defined by its eop:EarthObservation/om:featureOfInterest/eop:Footprint
- overlaps with the spatial request extent, and the request parameter containment is of value overlaps or is omitted,
- is completely contained within the spatial request extent, and the request parameter containment is of value contains
whereby all spatial coordinates are expressed in WGS84 [2].

Temporal subsetting is evaluated against the temporal validity of an EO Coverage.

**Requirement 60 /req/eowcs/describeEOCoverageSet-response-phenomenonTime:**
The response to a successful *DescribeEOCoverageSet* request containing a wcs:CoverageDescription section **shall** contain only descriptions of EO Coverages whose time interval defined by its eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition and eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition elements in eowcs:EOMetadata
- overlaps with the request time extent,and the request parameter containment is of value overlaps or is omitted,
- is completely contained within the request time extent, and the request parameter containment is of value contains,
whereby all temporal coordinates are expressed in ISO 8601 [2].

Boundary values omitted are substituted by the actual boundary value of the object inquired.

**Requirement 61 /req/eowcs/describeEOCoverageSet-response-trim-omitted:**
In a *DescribeEOCoverageSet* request, a trim specification omitted **shall** be interpreted as the actual boundary of the objects requested in the axis omitted.

 

**Requirement 62 /req/eowcs/describeEOCoverageSet-response-bound-omitted:**
In a *DescribeEOCoverageSet* request, a lower or upper bound omitted **shall** be interpreted as indicating the actual lower or upper bound of the objects requested in the axis omitted.

NOTE This trim semantics is analogous to trimming in *GetCoverage*.

**Requirement 63 /req/eowcs/describeEOCoverageSet-response-coverageSubtype:**
In the response to a successful *DescribeEOCoverageSet* request, each EO Coverage listed **shall** contain in its `WCS::CoverageSubtype` element the corresponding value given in Table 8 according to its type.

**Requirement 64 /req/eowcs/describeEOCoverageSet-response-count:**
In the response to a successful *DescribeEOCoverageSet* request the sum of `CoverageDescription` and `DatasetSeriesDescription` elements **shall** be less or equal to the minimum of the value of the `CountDefault` element and the `count` parameter if present in the request. If none of both are present all matching elements **shall** be reported.

**Requirement 65 /req/eowcs/describeEOCoverageSet-response-numberMatched:**
The response to a successful *DescribeEOCoverageSet* request **shall** report in its `numberMatched` attribute the sum of all matching `CoverageDescription` and `DatasetSeriesDescription` elements.

**Requirement 66 /req/eowcs/describeEOCoverageSet-response-numberReturned:**
The response to a successful *DescribeEOCoverageSet* request **shall** report in its `numberReturned` attribute the sum of all `CoverageDescription` and `DatasetSeriesDescription` elements included in the response.

Example The following XML fragment shows parts of a possible `DescribeEOCoverageSet` operation response:

```
<wcseo:EOCoverageSetDescription numberMatched="2" numberReturned="2">
  <wcs:CoverageDescriptions>
    <wcs:CoverageDescription gml:id="c1">
      <gml:boundedBy>
        ...
      </gml:boundedBy>
      <wcs:CoverageId>c1</wcs:CoverageId>
      <gmlcov:metadata>
        <gmlcov:Extension>
          <wcseo:EOMetadata>
            <eop:EarthObservation gml:id="c1_metadata">
              ...
            </eop:EarthObservation>
          </wcseo:EOMetadata>
        </gmlcov:Extension>
      </gmlcov:metadata>
      <gml:domainSet>
        ...
      </gml:domainSet>
      <gmlcov:rangeType>
        ...
      </gmlcov:rangeType>
      <wcs:ServiceParameters>
        <wcs:CoverageSubtype>RectifiedStitchedMosaic</wcs:CoverageSubtype>
        <wcseo:dataset>
          <wcs:CoverageId>c3</wcs:CoverageId>
```

 

```
        </wcseo:dataset>
      </wcs:ServiceParameters>
    </wcs:CoverageDescription>
  </wcs:CoverageDescriptions>
  <wcseo:DatasetSeriesDescriptions>
    <wcseo:DatasetSeriesDescription gml:id="ds2">
      <gml:boundedBy>
        <gml:Envelope axisLabels="lat long" srsDimension="2"
srsName="http://www.opengis.net/def/crs/EPSG/0/4326" uomLabels="deg deg">
          <gml:lowerCorner>46 16</gml:lowerCorner>
          <gml:upperCorner>48 18</gml:upperCorner>
        </gml:Envelope>
      </gml:boundedBy>
      <wcseo:DatasetSeriesId>ds2</wcseo:DatasetSeriesId>
      <gml:TimePeriod gml:id="ds2_timeperiod">
        <gml:beginPosition>2010-01-01T00:00:00.000</gml:beginPosition>
        <gml:endPosition>2010-12-31T23:59:59.999</gml:endPosition>
      </gml:TimePeriod>
    </wcseo:DatasetSeriesDescription>
  </wcseo:DatasetSeriesDescriptions>
</wcseo:EOCoverageSetDescription>
```

### 7.5.4 DescribeEOCoverageSet exceptions

**Table 12 — Exception codes for `DescribeEOCoverageSet` operation**

| `exceptionCode` value | HTTP code | Meaning of exception code | `locator` value |
|---|---|---|---|
| `NoSuch-DatasetSeries-OrCoverage` | 404 | The identifier passed does not match with any of the Dataset Series or EO Coverage offered by this server | List of violating Data-set Series and/or EO Coverage identifiers |

## 8 WCS extensions

### 8.1 Overview

Requirements class *eowcs* normatively depends on the WCS Extension specifications listed in this Clause. In other words, any implementation claiming to conform to this requirements class must also implement the specifications required in this Clause.

### 8.2 Band subsetting

**Requirement 67 /req/eowcs/band-subsetting:**
Implementations of this EO-WCS **shall** support the WCS 2.0 Range Subsetting Extension [OGC 12-040].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_range-subsetting/1.0/conf/record-subsetting

### 8.3 Scaling & interpolation

**Requirement 68 /req/eowcs/scaling:**
Implementations of this EO-WCS **shall** support the WCS 2.0 Scaling Extension [OGC 12-

 

039].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_scaling/1.0/conf/scaling

**Requirement 69 /req/eowcs/interpolation:**
Implementations of this EO-WCS **shall** support the WCS 2.0 Interpolation Extension [OGC 12-049].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_interpolation/1.0/conf/interpolation

### 8.4 CRSs

**Requirement 70 /req/eowcs/crs:**
Implementations of this EO-WCS **shall** support the WCS 2.0 CRS Extension [OGC 11-053].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_crs/1.0/conf/crs

### 8.5 Coverage format encodings

**Requirement 71 /req/eowcs/encodings:**
Implementations of this EO-WCS **shall** support at least one of the WCS 2.0 coverage format encodings GeoTIFF [OGC12-100r1], NetCDF [OGC 11-010], and JPEG2000 [OGC 11-011].
**Dependency:** http://www.opengis.net/spec/GMLCOV_geotiff-coverages/1.0/conf/geotiff-coverage, http://www.opengis.net/spec/WCS_encoding_netcdf/1.0/conf/netcdf, http://www.opengis.net/spec/WCS_encoding_jpeg2000/1.0/conf/jpeg2000

## 9 Protocol Bindings

### 9.1 Protocol choices

At least one of the protocols, GET/KVP and SOAP shall be supported by an implementation. This choice is represented in this specification by two separate conformance classes, *eowcs_get-kvp* and *eowcs_soap* defined in the Subclauses below.

**Requirement 72 /req/eowcs/protocol-bindings:**
Implementations of this EO-WCS **shall** support at least one of the requirements classes *eowcs_get-kvp* and *eowcs_soap*.
Dependency: http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_get-kvp, http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_soap

### 9.2 GET-KVP protocol conformance class

#### 9.2.1 WCS GET/KVP encoding

**Requirement 73 /req/eowcs_get-kvp/mandatory:**
Implementations of this EO-WCS which support the *eowcs_get-kvp* requirements class **shall** support the WCS 2.0 protocol extension GET/KVP [OGC 09-147r3].
**Dependency:** http://www.opengis.net/spec/WCS_protocol-binding_get-kvp/1.0/conf/get-kvp

**Requirement 74 /req/eowcs_get-kvp/conformance-class-in-profile:**
Implementations of this EO-WCS which support the *eowcs_get-kvp* requirements class **shall**

 

include the following URI in a `Profile` element in the `ServiceIdentification` in a *GetCapabilities* response:
`http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_get-kvp`

### 9.2.2 *DescribeEOCoverageSet* GET/KVP encoding

**Requirement 75 /req/eowcs_get-kvp/describeEOCoverageSet-request:**
The `request` parameter in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows:

`request=DescribeEOCoverageSet`

**Requirement 76 /req/eowcs_get-kvp/describeEOCoverageSet-eoid:**
The `eoId` parameter in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows, for parameter values $v_1$, …, $v_n$:

`eoid=`$v_1$`,…,`$v_n$

**Requirement 77 /req/eowcs_get-kvp/describeEOCoverageSet-containment:**
The `containment` parameter in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows:

`containment=overlaps`
or `containment=contains`

**Requirement 78 /req/eowcs_get-kvp/describeEOCoverageSet-subset:**
The trim parameters in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated through a possibly empty set of subset specifications, each one with key "`subset`" and value specification given by a `SubsetSpec` adhering to this EBNF syntax [3] and the resp. XML definitions [6]:

```
SubsetSpec:    dimension ( interval )
dimension:     long | lat | phenomenonTime
interval:      low , high
low:           point | *
high:          point | *
point:         number| " token "     // " = ASCII 0x42
```

Syntax follow the http standard [3]: underlined tokens represent literals which appear "as is" ("terminal symbols"), other tokens represent sub-expressions to be substituted ("non-terminals"). A vertical bar ("|") denotes alternatives, items in brackets ("[ ]") are optional. Non-terminals *NCName*, *number*, *token*, and *anyURI* follow the resp. XML definitions [6].

NOTE 1 Allowed values for points are determined by the CRS used. This ranges from "2009-11-06" for time to "-41.5" and "41°5' " for lat/long whereby non-numeric values have to be enclosed in double quotes.

NOTE 2 CRSs are fixed to WGS84 for space and ISO 8601 for time; still they need to be indicated in the request syntax to keep it in sync with WCS Core trimming.

NOTE 3 As per http [3], keys are case insensitive whereas values are case sensitive.

Example The following KVP-encoded *DescribeEOCoverageSet* request addresses service `path` on server `www.myservice.org` at port `port` requests coverage `C0002` in the domain specified by the bounding box with longitude (-71,47) and latitude (-66,51), expressed in spatial CRS WGS84-2D and temporal CRS ISO:8601 (which are assumed to be supported for the coverage):

 

```
http://www.myserver.org:port/path?
service=WCS
&version=2.0.1
&request=DescribeEOCoverageSet
&eoid=C0002
&containment=overlaps
&subset=long(-71,47)
&subset=lat(-66,51)
&subset=phenomenonTime("2009-11-06T23:20:52Z","2009-11-
13T23:20:52Z")
```

### 9.3 SOAP protocol conformance class

#### 9.3.1 WCS SOAP encoding

**Requirement 79 /req/eowcs_soap/mandatory:**
Implementations of this EO-WCS which support the *eowcs_soap* requirements class **shall** support the WCS 2.0 protocol extension SOAP [OGC 09-149r1].
**Dependency:** http://www.opengis.net/spec/WCS_protocol-binding_soap/1.0/conf/soap

**Requirement 80 /req/eowcs_soap/conformance-class-in-profile:**
Implementations of this EO-WCS which support the *eowcs_soap* requirements class **shall** include the following URI in a `Profile` element in the `ServiceIdentification` in a *GetCapabilities* response:
`http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_soap`

#### 9.3.2 *DescribeEOCoverageSet* SOAP encoding

**Requirement 81 /req/eowcs_soap/describeEOCoverageSet-request-structure:**
A *DescribeEOCoverageSet* request **shall** contain exactly one `Body` element containing exactly one `DescribeEOCoverageSet` element.

**Requirement 82 /req/eowcs_soap/describeEOCoverageSet-response-structure:**
In the response to a successful *DescribeEOCoverageSet* request, the SOAP `Envelope` **shall** contain exactly one `Body` element which contains a `EOWCS::EOCoverageSetDescription` as its single element.

Example See files wcseo_requestDescribeEOCoverageSet.sxml and wcseo_responseDescribeEOCoverageSet.xml being part of this standard.

#### 9.3.3 *DescribeEOCoverageSet* WSDL

**Requirement 83 /req/eowcs_soap/wsdl:**
Publication of a WCS SOAP service endpoint **shall** use the binding as defined in file `wsdl/wcs-soap-binding.wsdl` of the EO-WCS package.

NOTE A sample service description relying on this binding is provided in file `example-soap-endpoint.wsdl`.

 

# Bibliography

[1] OGC 09-153, *WCS 2.0 Overview: Core and Extensions*, version 1.0.0
[2] ISO 8601:2004(E) *Data elements and interchange formats — Information interchange — Representation of dates and time*
[3] IETF RFC 2616, *Hypertext Transfer Protocol -- HTTP/1.1*. IETF, 1999
[4] www.epsg.org
[5] W3C Note 11, *SOAP Messages with Attachments*. W3C Note 11, 2000
[6] XML Schema Part 2: Datatypes Second Edition, W3C Recommendation, 2004

 

# Annex A
# (normative)

# Abstract test suite

A WCS implementation must satisfy the following system characteristics to be conformant with this specification.

## A.1 Conformance Test Class: eowcs

The OGC URI identifier of this conformance class is:
http://www.opengis.net/spec/WCS/2.0/conf/WCS_application-profile_eowcs/1.0/conf/eowcs.

Tests identifiers below are relative to
http://www.opengis.net/spec/WCS/2.0/WCS_application-profile_eowcs/1.0/.

### A.1.1 EO Metadata

**Test id:** **/conf/eowcs/eo-metadata-structure**

**Test Purpose:** **Requirement /req/eowcs/eo-metadata-structure:**
A `EOWCS::EOMetadata` instance **shall** conform to Table 2, Figure 2, Figure 3, and the XML schema being part of this standard.

**Test method:** For each EO Coverage offered by the server under test:
- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
- Check that the responses contain a `EOWCS::EOMetadata` corresponding to the definition and that all responses contain the same information.

Test passes if all individual tests pass.

### A.1.2 Footprint in EO Metadata

**Test id:** **/conf/eowcs/footprint-in-eo-metadata**

**Test Purpose:** **Requirement /req/eowcs/footprint-in-eo-metadata:**
The `EOWCS::EOMetadata` element of `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain an `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element.

**Test method:** For each EO Coverage offered by the server under test:
- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
- Check that the responses contain an `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element in the `EOWCS::EOMetadata` and that all responses contain the same information.

Test passes if all individual tests pass.

 

### A.1.3 EO Coverage

**Test id:** **/conf/eowcs/eo-coverage-structure**

**Test Purpose:** **Requirement /req/eowcs/eo-coverage-structure:**
`EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEO-Coverage` instances **shall** conform to Figure 2, Figure 3, and the XML schema being part of this standard.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *GetCoverage* operation.
- Check that all responses consist of an XML document as defined in the places referenced.

Test passes if all individual tests pass.

### A.1.4 EO Metadata in EO Coverage

**Test id:** **/conf/eowcs/eo-metadata-in-eo-coverage**

**Test Purpose:** **Requirement /req/eowcs/eo-metadata-in-eo-coverage:**
`EOWCS::ReferenceableEOCoverage` and `EOWCS::Rectified-EOCoverage` instances **shall** contain one metadata element of type `EOWCS::EOMetadata`.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCov-erageSet*, and *GetCoverage* operations.
- Check that the responses contain a `EOWCS::EOMetadata` and that all responses contain the same information.

Test passes if all individual tests pass.

### A.1.5 EOP Identifier in EO Metadata

**Test id:** **/conf/eowcs/eop-identifier-in-eo-metadata**

**Test Purpose:** **Requirement /req/eowcs/eop-identifier-in-eo-metadata:**
The `EOWCS::EOMetadata` element of `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain an element `eop:EarthObservation/eop:metadata-Property/eop:EarthObservationMetaData/eop:identifier` whose first word (NCNAME type substring i.e. starting from it's first character up to and excluding the first character which is not allowed in an NCName) is identical to the EO Coverage identifier.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCov-*

 

*erageSet*, and *GetCoverage* operations.

- Check that the responses contain an `eop:EarthObservation/eop:metadataProperty/eop:EarthObservationMetaData/eop:identifier` whose first word is identical to the EO Coverage identifier.

Test passes if all individual tests pass.

### A.1.6 Footprint inside BoundedBy

**Test id:** **/conf/eowcs/footprint-inside-boundedBy**

**Test Purpose:** **Requirement /req/eowcs/footprint-inside-boundedBy:**
In `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances, all polygons listed in `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element **shall** be geometrically contained in the bounding box of the `gml:boundedBy` element of the `gml:Envelope`.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

- Check that all polygons listed in `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element are contained in the bounding box of the `gml:boundedBy` element of the `gml:Envelope`.

Test passes if all individual tests pass.

### A.1.7 PhenomenonTime in EO Metadata

**Test id:** **/conf/eowcs/phenomenonTime-in-eo-metadata**

**Test Purpose:** **Requirement /req/eowcs/phenomenonTime-in-eo-metadata:**
The `EOWCS::EOMetadata` element of a `EOWCS::ReferenceableEOCoverage` or `EOWCS::RectifiedEOCoverage` instance **shall** contain elements `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` where `beginPosition` ≤ `endPosition`.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

- Check that the responses contain elements `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:begin-`

 

`Position` and `eop:EarthObservation/om:phenomenon-Time/gml:TimePeriod/gml:endPosition` where `beginPosition` ≤ `endPosition`.

Test passes if all individual tests pass.

### A.1.8 PhenomenonTime ISO9891

**Test id:** **/conf/eowcs/phenomenonTime-iso8601**

**Test Purpose:** **Requirement /req/eowcs/phenomenonTime-iso8601:**
For any given EO Coverage, its temporal validity values **shall** be expressed in ISO 8601 [2].

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
- Check that the temporal validity values are expressed in ISO 8601.

Test passes if all individual tests pass.

### A.1.9 Rangeset of Coverage

**Test id:** **/conf/eowcs/range-set-of-eo-coverage**

**Test Purpose:** **Requirement /req/eowcs/range-set-of-eo-coverage:**
In `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances, all cells whose locations are outside the EO Metadata footprint when both are evaluated in WGS84, **shall** contain nil values as defined in the bounding EO Coverage's range type.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve coverage information via *GetCoverage* operation.
- Check that all cells, whose locations are outside the EO Metadata footprint when both are evaluated in WGS84, contain some nil value as defined in the bounding EO Coverage's range type.

Test passes if all individual tests pass.

### A.1.10 Dataset Structure

**Test id:** **/conf/eowcs/dataset-structure**

**Test Purpose:** **Requirement /req/eowcs/dataset-structure:**
A `EOWCS::ReferenceableDataset` and a `EOWCS::RectifiedDataset` **shall** conform to Figure 2, Figure 3, and the XML schema being part of this standard.

 

**Test method:** For each EO Dataset offered by the server under test:

- retrieve coverage information via *GetCoverage* operation.
- Check that all responses consist of an XML document as defined in the places referenced.

Test passes if all individual tests pass.

### A.1.11 Referenceable Stitched Mosaic-structure

**Test id:** **/conf/eowcs/referenceableStitchedMosaic-structure**

**Test Purpose:** **Requirement /req/eowcs/referenceableStitcheMosaic-structure:** `EOWCS::ReferenceableStitchedMosaic` instances **shall** conform to Figure 2, Figure 3, Table 3, Table 5, and the XML schema being part of this standard.

**Test method:** For each `EOWCS::ReferenceableStitchedMosaic` offered by the server under test:

- retrieve coverage information via *GetCoverage* operation.
- Check that all responses consist of an XML document of type `EOWCS::ReferenceableStitchedMosaic` as described in the references stated by the requirement.

Test passes if all individual tests pass.

### A.1.12 Rectified Stitched Mosaic-structure

**Test id:** **/conf/eowcs/rectifiedStitchedMosaic-structure**

**Test Purpose:** **Requirement /req/eowcs/rectifiedStitchedMosaic-structure:** `EOWCS::RectifiedStitchedMosaic` instances **shall** conform to Figure 2, Figure 3, Table 4, Table 5, and the XML schema being part of this standard.

**Test method:** For each `EOWCS::RectifiedStitchedMosaic` offered by the server under test:

- retrieve coverage information via *GetCoverage* operation.
- Check that all responses consist of an XML document of type `EOWCS::RectifiedStitchedMosaic` as described in the references stated by the requirement.

Test passes if all individual tests pass.

 

### A.1.13 Composed-of in Stitched mosaic

**Test id:** **/conf/eowcs/composedOf-in-stitched-mosaic**

**Test Purpose:** **Requirement /req/eowcs/composedOf-in-stitched-mosaic:**
In `EOWCS::ReferenceableStitchedMosaic` and `EOWCS::RectifiedStitchedMosaic` instances with at least one `eop:EarthObservation/eop:metaDataProperty/eop:EarthObservationMetaData/eop:composedOf`, the set of these elements **shall** be equal to the set of `dataset` identifiers of the Stitched Mosaic.

**Test method:** For each `EOWCS::RectifiedStitchedMosaic` and `EOWCS::RectifiedStitchedMosaic` offered by the server under test:

- Obtain the set of `dataset` identifiers contained in `eop:EarthObservation/eop:metaDataProperty/eop:EarthObservationMetaData/eop:composedOf` via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
- Check that all responses contain the same identifier information.
- Obtain the contained set of dataset identifiers of the Stitched Mosaic. Check that all responses contain the same identifier information.
- If the `eop:composedOf` element is present then check that the contained set of `dataset` identifiers in `eop:EarthObservation/eop:metaDataProperty/eop:EarthObservationMetaData/eop:composedOf` is equal to the set of `dataset` identifiers of the Stitched Mosaic.

Test passes if all individual tests pass.

### A.1.14 Contributing Footprint inside Footprint

**Test id:** **/conf/eowcs/contributingFootprint-inside-footprint**

**Test Purpose:** **Requirement /req/eowcs/contributingFootprint-inside-footprint:**
For all Stitched Mosaics *sm* referring to some Datasets *d* with an associated `contributingFootprint`, this `contributingFootprint` **shall** be geographically contained in the footprint of *d*.

**Test method:** For each Stitched Mosaic offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
- For each obtained `dataset` *d* :
    - obtain the contributingFootprint associated with the reference to *d* and check that all responses contain the same contributing-

 

Footprint information with the reference to *d*.

- obtain the footprint of *d* coverage via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations, and check that all responses contain the same footprint information.

- Check that the contributingFootprint associated with the reference to *d* is contained in the footprint of d.

Test passes if all individual tests pass.

### A.1.15 Contributing Footprint-pairwise-disjoint

**Test id:** **/conf/eowcs/contributinFootprint-pairwise-disjoint**

**Test Purpose:** **Requirement /req/eowcs/contributingFootprint-pairwise-disjoint:** For all Stitched Mosaics *sm* referring to Datasets $d_1$ and $d_2$, with an associated `contributingFootprint`, the `contributingFootprints` of the $d_1$ and $d_2$ references **shall** be pair-wise disjoint.

**Test method:** For each Stitched Mosaic offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations. Check that all responses contain the same contributingFootprint information.

- Check that the contributingFootprints are pair-wise disjoint.

Test passes if all individual tests pass.

### A.1.16 Contributing Footprint-union-of-footprints

**Test id:** **/conf/eowcs/contributingFootprint-union-of-footprints**

**Test Purpose:** **Requirement /req/eowcs/contributingFootprint-union-of-footprints:** The footprint of a Stitched Mosaic **shall** be given by the union of the `contributingFootprints` of the Datasets this Stitched Mosaic refers to.

**Test method:** For each Stitched Mosaic offered by the server under test:

- retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

- Check that there is a contributingFootprint for each dataset of the Stitched Mosaic.

Test passes if all individual tests pass.

### A.1.17 Dataset Domain Set in Set in Stitched Mosaic Domain Set

**Test id:** **/conf/eowcs/dataset-domain-set-in-stitched-mosaic-domain-set**

 

**Test Purpose:** **Requirement /req/eowcs/dataset-domain-set-in-stitched-mosaic-domain-set:**
For all Datasets *d* referred to by some Stitched Mosaics *sm*, all cells of *d* as defined by the domain set of *d* **shall** be contained in the set of cells of *sm* as defined by the domain set of *sm*.

**Test method:** For each Stitched Mosaic offered by the server under test:

- Obtain all cells of *s* as defined by domain set of *s* via *GetCoverage* operation.
- For each obtained `dataset` *d* :
  - Obtain all cells of *d* as defined by domain set of *d* via *GetCoverage* operation.
  - Check that all cells of *d* as defined by domain set of *d* are included in the set of all cells of *s* as defined by domain set of *s*.

Test passes if all individual tests pass.

### A.1.18 Datasets in Rectified Stitched Mosaic Same Offset Vector

**Test id:** **/conf/eowcs/datasets-in-rectifiedStitcheMosaic-same-offsetVector**

**Test Purpose:** **Requirement /req/eowcs/datasets-in-rectifiedStitcheMosaic-same-offsetVector:**
All Datasets referred to by a Rectified Stitched Mosaic **shall** have identical values in the `gml:offsetVector` elements of their domain sets.

**Test method:** For each Rectified Stitched Mosaic offered by the server under test:

- For each obtained `dataset` *d* :
  - retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
  - Check that all responses contain the same `gml:offsetVector` information in their domain sets.
- Check that all Datasets have identical values in the `gml:offsetVector` elements of their domain sets.

Test passes if all individual tests pass.

### A.1.19 Rectified Stitched Mosaic OffsetVector

**Test id:** **/conf/eowcs/rectifiedStitchedMosaic-offsetVector**

**Test Purpose:** **Requirement /req/eowcs/rectifiedStitchedMosaic-offsetVector:**
In a Rectified Stitched Mosaic instance, the value of the `gml:offsetVector` elements of the domain set **shall** be given by the correspond-

 

ing values of the Rectified Datasets the Rectified Stitched Mosaic refers to.

**Test method:** For each Rectified Stitched Mosaic offered by the server under test:

- retrieve the value of the `gml:offsetVector` elements of the domain set via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
- Check that all responses contain the same `offsetVector` information.
- For each obtained `dataset` *d* :
  - retrieve coverage information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.
  - Check that all responses contain the same `gml:offsetVector` information in their domain sets.
- Check that both the Rectified Stitched Mosaic and the Datasets the Rectified Stitched Mosaic refers to have identical values in the `gml:offsetVector` elements of their domain sets.

Test passes if all individual tests pass.

### A.1.20 Referenceable Stitched Mosaic Domainset

**Test id:** **/conf/eowcs/referenceableStitchedMosaic-domain-set**

**Test Purpose:** **Requirement /req/eowcs/referenceableStitchedMosaic-domain-set:**
For any pair $d_1$ and $d_2$ of Datasets referred to by a given Stitched Mosaic, the set of point locations in the geographic overlap of the $d_1$ and $d_2$ domain set **shall** be identical.

**Test method:** For each Referenceable Stitched Mosaic offered by the server under test:

- For any pair $d_1$ and $d_2$ of Datasets referred to by the given Stitched Mosaic:
  - Check that the set of point locations in the geographic overlap of the $d_1$ and $d_2$ domain set are identical.

Test passes if all individual tests pass.

### A.1.21 Temporal Validity Stitched Mosaic

**Test id:** **/conf/eowcs/temporal-validity-stitched-mosaic**

**Test Purpose:** **Requirement /req/eowcs/temporal-validity-stitched-mosaic:**
For any given Stitched Mosaic, its temporal validity given by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:Earth-`

 

`Observation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata` **shall** be defined as the minimal time interval containing the temporal validities of all Datasets the Stitched Mosaic refers to.

**Test method:** For each Stitched Mosaic offered by the server under test:

- retrieve the time interval *t* of the Stitched Mosaic given by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata` via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

- Check that all responses contain the same time interval information.

  For each obtained `dataset` *d* :

  - retrieve the time interval $t_i$ of `dataset` *d* given by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata` via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

  - Check that all responses contain the same time interval information.

- Check that *t* is the minimal time interval containing the temporal validities of all Datasets the Stitched Mosaic refers to.

Test passes if all individual tests pass.

### A.1.22 Datasets in Stitched Mosaic Same Rangetype

**Test id:** **/conf/eowcs/datasets-in-stitched-mosaic-same-range-type**

**Test Purpose:** **Requirement /req/eowcs/datasets-in-stitched-mosaic-same-range-type:** For all Datasets *d* some Stitched Mosaic *sm* refers to the following **shall** hold: The range type of *d* is identical to the range type of *sm*.

**Test method:** For each Stitched Mosaic offered by the server under test:

- Obtain range type via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations. Check that all responses contain the same range type information *s*.

- For each obtained `dataset`:

 

- Obtain range type via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

- Check that all responses contain the same range type *d,* and check that *d* is identical to the range type of *s*.

Test passes if all individual tests pass.

### A.1.23 Nil Values in Stitched Mosaic

**Test id:** **/conf/eowcs/nil-values-in-stitched-mosaic**

**Test Purpose:** **Requirement /req/eowcs/nil-values-in-stitched-mosaic:**
If the domain set of a Stitched Mosaic contains locations which are not inside any contributingFootprint of any Dataset the Stitched Mosaic refers to then the nil value set of that Stitched Mosaic **shall** not be empty.

**Test method:** For each Stitched Mosaic offered by the server under test:

- Obtain the domain set via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations.

- Check that all responses contain the same domain set information.

- Check that if the domain set contains locations which are not inside any contributingFootprint the Stitched Mosaic refers to then the nil value set of that Stitched Mosaic are not empty.

Test passes if all individual tests pass.

### A.1.24 Range Values of Stitched Mosaic

**Test id:** **/conf/eowcs/range-values-of-stitched-mosaic**

**Test Purpose:** **Requirement /req/eowcs/range-values-of-stitched-mosaic:**
For a Stitched Mosaic *sm* its range values of cells with location *p*, expressed in any of the CRSs supported by *sm*, **shall** be given as follows:
- if *p* is located within the contributingFootprint of some Dataset *d* referred to by *sm* then it is the range value of *d* at *p*;
- if *p* is not located within the contributingFootprint of any Dataset *d* referred to by *sm* then it is one of the range values contained in the nil value set of *sm*.

**Test method:** For each Stitched Mosaic offered by the server under test:

- Obtain the contained cells via *GetCoverage* operation.

- For each obtained cell with location *p* check that:

  - if *p* is located within the contributingFootprint of some Dataset *d* referred to by *s* then it is the range value of *d* at *p*;
  - if *p* is not located within the contributingFootprint of any Dataset

 

*d* referred to by *s* then it is one of the range values contained in the nil value set of *s*.

Test passes if all individual tests pass.

### A.1.25 Dataset Series Structure

**Test id:** **/conf/eowcs/datasetSeries-structure**

**Test Purpose:** **Requirement /req/eowcs/datasetSeries-structure:**
A `EOWCS::DatasetSeries` **shall** conform to Figure 2, Figure 3, Table 6, and the XML schema being part of this standard.

**Test method:** For each `EOWCS::DatasetSeries` offered by the server under test:

Obtain the `EOWCS::DatasetSeries` via *DescribeEOCoverageSet*. Check that all responses consist of an XML document as defined in the places referenced.

Test passes if all individual tests pass.

### A.1.26 Footprint in Dataset Series

**Test id:** **/conf/eowcs/footprint-in-datasetSeries**

**Test Purpose:** **Requirement /req/eowcs/footprint-in-datasetSeries:**
The `footprint` of a Dataset Series instance **shall** enclose the union of the footprints of all Stitched Mosaics, Datasets, and Dataset Series the Dataset Series refers to, expressed in WGS84.

**Test method:** For each `EOWCS::DatasetSeries` offered by the server under test:

- Obtain the `footprint` of `EOWCS::DatasetSeries` via *DescribeEOCoverageSet*.
- Check that the locations of the `footprint` are expressed in WGS84.
- Obtain the footprints of all Stitched Mosaics and Datasets the Dataset Series refers to.
- Check that these footprints are enclosed in the `footprint` of `EOWCS::DatasetSeries.`

Test passes if all individual tests pass.

### A.1.27 TimePeriod in DatasetSeries

**Test id:** **/conf/eowcs/timePeriod-in-datasetSeries**

**Test Purpose:** **Requirement /req/eowcs/timePeriod-in-datasetSeries:**
For any given Dataset Series, the `timePeriod` element **shall** enclose the temporal validities of all Stitched Mosaics, Datasets, and Dataset Series the

 

Dataset Series refers to, expressed in ISO 8601 [2].

**Test method:** For each `EOWCS::DatasetSeries` offered by the server under test:

- Obtain the `timePeriod` element *s* of `EOWCS::DatasetSeries` via *DescribeEOCoverageSet*. Check that *s* is expressed in ISO 8601and that:
- For each Stitched Mosaics and Datasets the Dataset Series refers to:
  - retrieve the time interval *d* via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations. Check that all responses contain the same time interval information.
  - Check that *d* is enclosed by the temporal validities of *s*.

Test passes if all individual tests pass.

### A.1.28 No circular references of Dataset Series

**Test id:** **/conf/eowcs/nocircularreference-of-datasetSeries**

**Test Purpose:** **Requirement /req/eowcs/nocircularreference-of-datasetSeries:**
A Dataset Series **shall** only refer to Dataset Series that do not refer to the Dataset Series at hand either directly or via other Dataset Series.

**Test method:** For each `EOWCS::DatasetSeries` offered by the server under test:

- Obtain the `EOWCS::DatasetSeries` via *DescribeEOCoverageSet*. Check that all `EOWCS::DatasetSeries` it refferes to do not refer to the `EOWCS::DatasetSeries` at hand.

Test passes if all individual tests pass.

### A.1.29 GetCapabilities Request Sections

**Test id:** **/conf/eowcs/getCapabilities-request-sections**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-request-sections:**
If a *GetCapabilities* request contains an ows:`Sections` element then this element **shall** contain ows:`Section` elements with the values defined in OWS Common, or “DatasetSeriesSummary”, or “CoverageSummary”.
**Dependency:** [OGC 06-121r9] clause 7.3.3

**Test method:** Send a valid *GetCapabilities* request contains a `sections` element and this element contains `section` elements with the values defined in OWS Common, or “DatasetSeriesSummary”, or “CoverageSummary” to the server under test, check the result consists of an XML document of type `Capabilities` and the appropriate components, as defined in the places referenced.

 

### A.1.30 GetCapabilities Response Conformance Class in Profile

**Test id:** **/conf/eowcs/getCapabilities-response-conformance-class-in-profile**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-conformance-class-in-profile:**
A WCS service implementing this extension **shall** include the following URI in a `Profile` element in the `ServiceIdentification` in a *GetCapabilities* response:
`http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs`

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.1.31 GetCapabilities Response Structure

**Test id:** **/conf/eowcs/getCapabilities-response-structure**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-structure:**
The response to a successful *GetCapabilities* request **shall** consist of a data structure as defined in Figure 7, Table 7, and the XML Schema being part of this standard.
**Dependency:** [OGC 09-110r4] Clause 8 (http://www.opengis.net/doc/IS/wcs-core-2.0.1/clause/8)

**Test method:** Send a valid *GetCapabilities* request to the server under test, check the result consists of an XML document of type `Capabilities` and the appropriate components, as defined in the places referenced.

### A.1.32 GetCapabilities Response DatasetSeriesSummary

**Test id:** **/conf/eowcs/getCapabilities-response- datasetSeriesSummary**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-datasetSeriesSummary:**
In the response to a successful *GetCapabilities* request containing a `EOWCS::DatasetSeriesSummary` section, each Dataset Series identifier listed **shall** refer to a Dataset Series offered by the server.

**Test method:** Send a valid *GetCapabilities* request to the service under test. If a `EOWCS::DatasetSeriesSummary` section is contained in the response then send, for each *DatasetSeriesId*, a valid *DescribeEOCoverageSet* request. Check that none of these requests results in an exception. Test passes if all checks are successful.

### A.1.33 GetCapabilities Response DatasetSeriesSummary no-duplicates

**Test id:** **/conf/eowcs/ getCapabilities-response-datasetSeriesSummary-no-duplicates**

 

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-datasetSeriesSummary-no-duplicates:**
A response to a successful *GetCapabilities* request containing a `EOWCS::DatasetSeriesSummary` section **shall** not contain any duplicate Dataset Series identifier.

**Test method:** Send a valid *GetCapabilities* request to the service under test. If a `EOWCS::DatasetSeriesSummary` section is contained in the response check that it does not contain any duplicate Dataset Series identifier.

### A.1.34 GetCapabilities Response Coverage Summary

**Test id:** **/conf/eowcs/getCapabilities-response-coverageSummary**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-coverageSummary:**
In the response to a successful *GetCapabilities* request containing an EO Coverage in a `WCS::CoverageSummary` section, each coverage identifier listed as EO Coverage **shall** refer to an EO Coverage offered by the server.

**Test method:** Send a valid *GetCapabilities* request to the service under test. If a `WCS::CoverageSummary` section is contained in the response then send, for each coverage identifier, a valid *DescribeCoverage* and a valid *DescribeEOCoverageSet* request. Check that none of these requests results in an exception. Test passes if all individual tests pass.

### A.1.35 GetCapabilities Response Coverage Summary Section

**Test id:** **/conf/eowcs /getCapabilities-response-coverageSummary-section**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-coverageSummary-section:**
If a *GetCapabilities* request contains a `sections` parameter then a successful response **shall** contain `wcs:CoverageSummary` elements if and only if the section parameter list contains one of the values "CoverageSummary", "Contents", or "All".

**Test method:** Send valid *GetCapabilities* requests contains a `sections` parameter and the section parameter list contains one of the values "CoverageSummary", "Contents", or "All" to the service under test. Check that the response contains `wcs:CoverageSummary` elements.Test passes if all individual tests pass.

### A.1.36 GetCapabilities Response DatasetSeries Summary Section

**Test id:** **/conf/eowcs/getCapabilities-response-datasetSeriesSummary-section**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-datasetSeriesSummary-section:**
If a *GetCapabilities* request contains a `sections` parameter then a successful response **shall** contain `eowcs:DatasetSeriesSummary` elements if and only if the section parameter list contains one of the values "DatasetSeriesSummary", "Contents", or "All".

 

**Test method:** Send valid *GetCapabilities* requests contains a `sections` parameter and the section parameter list contains one of the values "DatasetSeriesSummary" or "All" to the service under test. Check that the response contains a `eowcs:DatasetSeriesSummary`.Test passes if all individual tests pass.

### A.1.37 GetCapabilities Response Coverage Subtype

**Test id:** **/conf/eowcs/getCapabilities-response-coverageSubtype**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-coverageSubtype:** In the response to a successful *GetCapabilities* request, each EO Coverage listed **shall** contain in its `WCS::CoverageSubtype` element the value given in Table 8 corresponding to its type.

**Test method:** Send a valid *GetCapabilities* request to the server under test, check that each EO Coverage listed contains the corresponding value in its `WCS::CoverageSubtype` element.

### A.1.38 GetCapabilities Response countDefault

**Test id:** **/conf/eowcs/getCapabilities-response-countDefault**

**Test Purpose:** **Requirement /req/eowcs/getCapabilities-response-countDefault:** If the response to a successful *GetCapabilities* request contains an `ows:Constraint` element in its `ows:OperationsMetadata` element then its name attribute **shall** hold a value as defined in Table 9 and the XML Schema being part of this standard.

**Test method:** Send a valid *GetCapabilities* request to the server under test, check that its `ows:OperationsMetadata` element contains an `ows:Constraint` element, as defined in the places referenced.

### A.1.39 Describe Coverage Response EO Metadata

**Test id:** **/conf/eowcs/describeCoverage-response-eo-metadata**

**Test Purpose:** **Requirement /req/eowcs/describeCoverage-response-eo-metadata:** In the response to a successful *DescribeCoverage* request on an EO Coverage, one `EOWCS::EOMetadata` element **shall** be present containing the EO Metadata component of the coverage addressed.

**Test method:** For each EO Coverage offered by the server, send a valid *DescribeCoverage* request to server under test. Check that the result contains an `EOMetadata element`. Test passes if all individual tests pass.

### A.1.40 Describe Coverage Response Coverage Subtype

**Test id:** **/conf/eowcs/describeCoverage-response-coverageSubtype**

**Test Purpose:** **Requirement /req/eowcs/describeCoverage-response-coverageSubtype:** In the response to a successful *DescribeCoverage* request addressing an EO Coverage, each EO Coverage listed **shall** contain in its

 

`WCS::CoverageSubtype` element the value given in Table 8 corresponding to its type.

**Test method:** Send a valid *DescribeCoverage* request to the server under test, check that each EO Coverage listed contains the corresponding value in its `WCS::CoverageSubtype` element.

### A.1.41 GetCoverage Request no Slicing

**Test id:** **/conf/eowcs/getCoverage-request-no-slicing**

**Test Purpose:** **Requirement /req/eowcs/getCoverage-request-no-slicing:**
A *GetCoverage* request on EO Coverages **shall** not contain a slicing operation.

**Test method:** For each EO Coverage offered by the server:

- send otherwise *GetCoverage* requests with and without a slicing operation.
- Check whether appropriate valid results or exceptions, resp., are delivered.

Test passes if all individual tests pass.

### A.1.42 GetCoverage Response Coverage Type

**Test id:** **/conf/eowcs/getCoverage-response-coverage-type**

**Test Purpose:** **Requirement /req/eowcs/getCoverage-response-coverage-type:**
The response to a successful *GetCoverage* request
- on a Rectified Stitched Mosaic **shall** be of type RectifiedStitchedMosaic,
- on a Rectified Dataset **shall** be of type RectifiedDataset,
- on a Referenceable Stitched Mosaic **shall** be of type ReferenceableStitchedMosaic, and
- on a Referenceable Dataset **shall** be of type ReferenceableDataset,.

**Test method:** For each Rectified EO Coverage offered by the server:

- send a valid *GetCoverage* request to server under test.
- Check that the result is Coverage of correct type.

Test passes if all individual tests pass.

### A.1.43 GetCoverage Response EO Metadata

**Test id:** **/conf/eowcs/getCoverage-response-eo-metedata**

**Test Purpose:** **Requirement /req/eowcs/getCoverage-response-eo-metadata:**
In the response to a successful *GetCoverage* request on an EO Coverage, the `EOWCS::EOMetadata` of the coverage returned **shall** contain the complete `EOWCS::EOMetadata` of the coverage addressed, adjusted as

 

specified in Requirement 44, Requirement 45, and Requirement 46.

**Test method:** For each EO Coverage offered by the server:

- send a valid *GetCoverage* request to server under test.
- Check that the responses contain a EOWCS::EOMetadata.

Test passes if all individual tests pass.

### A.1.44 GetCoverage Response EO Metadata in Stitched Mosaic

**Test id:** **/conf/eowcs/getCoverage-response-eo-metedata-in-stitched-mosaic**

**Test Purpose:** **Requirement /req/eowcs/getCoverage-response-eo-metadata-in-stitched-mosaic:**
In the response to a successful *GetCoverage* request on a Stitched Mosaic, the `EOWCS::EOMetadata` of the coverage returned **shall** contain the original Stitched Mosaic's references to those Datasets which have a non-empty intersection with the effective spatio-temporal request trim interval, and no other ones.

**Test method:** For each Stitched Mosaic offered by the server:

- send a valid *GetCoverage* request with an effective spatio-temporal request trim interval to server under test.
- Check that the `EOWCS::EOMetadata` of the coverage returned contains the original Stitched Mosaic's references to those Datasets which have a non-empty intersection with the effective spatio-temporal request trim interval.

Test passes if all individual tests pass.

### A.1.45 GetCoverage Response Footprint in EO Metadata

**Test id:** **/conf/eowcs/getCoverage-response-footprint-in-eo-metedata**

**Test Purpose:** **Requirement /req/eowcs/getCoverage-response-footprint-in-eo-metadata:**
If, in a successful *GetCoverage* request on an EO Coverage, trimming along spatial coordinates is specified then the footprint of the `EOWCS::EOMetadata` in the coverage returned **shall** be given by the intersection of the spatial request interval and the footprint of the coverage requested. Otherwise, the footprint in the result coverage **shall** be given by the footprint of the coverage requested.

**Test method:** For each EO Coverage offered by the server:

- Send a valid *GetCoverage* request with a spatial request trim interval to server under test. Check that the footprint of the `EOWCS::EOMetadata` in the coverage returned is given by the intersection of the spatial

 

request interval and the footprint of the coverage requested.

- Send a valid *GetCoverage* request without a trimming interval to server under test. Check that the footprint in the result coverage is given by the footprint of the coverage requested.

Test passes if all individual tests pass.

### A.1.46 GetCoverage Response Lineage in EO Metadata

**Test id:** **/conf/eowcs/getCoverage-response-lineage-in-eo-metedata**

**Test Purpose:** **Requirement /req/eowcs/getCoverage-response-lineage-in-eo-metadata:** In the response to a successful *GetCoverage* request, the Lineage component **shall** consist of the Lineage component of the coverage requested with one record appended containing the complete, verbatim *GetCoverage* request leading to this response.

**Test method:** For each EO Coverage offered by the server under test:

- retrieve Lineage component information via *DescribeCoverage*, *DescribeEOCoverageSet*, and *GetCoverage* operations. Check that all responses contain the same information.

- Send a valid *GetCoverage* request to server under test. Check that the Lineage component consists of the Lineage component of the coverage requested with one record appended containing the complete, verbatim *GetCoverage* request leading to this response.

Test passes if all individual tests pass.

### A.1.47 DescribeEOCoverageSet Request Structure

**Test id:** **/conf/eowcs/describeEOCoverageSet-request-structure**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-request-structure:** A *DescribeEOCoverageSet* request **shall** consist of a structure as defined in Figure 8, Table 10 and the XML schema being part of this standard.

**Test method:** Send *DescribeEOCoverageSet* requests with valid and invalid request structure.

Pass test if appropriate valid results or exceptions, resp., are delivered.

### A.1.48 DescribeEOCoverageSet Request Sections

**Test id:** **/conf/eowcs/describeEOCoverageSet-request-sections**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-request-sections:** If a *DescribeEOCoverageSet* request contains an ows:`Sections` element then this element **shall** contain one of the values “CoverageDescriptions”, “DatasetSeriesDescriptions”, or “All”.

 

**Dependency:** [OGC 06-121r9] clause 7.3.3

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requets contain a `sections` element and this element contains one of the values:

- “CoverageDescription”
- “DatasetSeriesDescriptions”
- “All”
- invalid values

Pass test if appropriate valid results or exceptions, resp., are delivered.

### A.1.49 DescribeEOCoverageSet Request eoId

**Test id:** **/conf/eowcs/describeEOCoverageSet-request-eoId**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-request-eoId:**
Each `eoId` parameter value in a *DescribeEOCoverageSet* request **shall** be equal to the identifier of a Dataset, a Stitched Mosaic, or a Dataset Series offered by the server addressed.

**Test method:** For each Dataset, Stitched Mosaic, and Dataset Series offered by the server under test, sends a valid *DescribeEOCoverageSet* request to server under test. Check that the identifier of a Dataset, a Stitched Mosaic, or a Dataset Series is equal to the eoId parameter value in the request. Test passes if all individual tests pass.

### A.1.50 DescribeEOCoverageSet Request Containment

**Test id:** **/conf/eowcs/describeEOCoverageSet-request-containment**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-request-containment:**
If a *DescribeEOCoverageSet* request contains a `containment` parameter then this parameter **shall** have one of the values “contains” or “overlaps”.

**Test method:** Send otherwise *DescribeEOCoverageSet* requests contain a containment parameter and this parameter has one of the values:

- “contains”
- “overlaps”
- invalid values

Pass test if appropriate valid results or exceptions, resp., are delivered.

 

### A.1.51 DescribeEOCoverageSet Request Dimension

**Test id:** **/conf/eowcs/describeEOCoverageSet-request-dimension**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-request-dimensions:** If a *DescribeEOCoverageSet* request contains `dimensionTrim` elements with `dimension` parameters then each such `dimension` parameter **shall** have one of the values "lat", "long", or "phenomenonTime", Each of these values shall appear at most once in a given request.

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requests to server under test which contain duplicate, and send requests which contain no duplicate dimension parameters. Do so for requests with single,and multiple `dimensionTrim`. Verify that, whenever at least one duplicate dimension occurs, an exception is returned and a normal response otherwise.

### A.1.52 DescribeEOCoverageSet Request CRS

**Test id:** **/conf/eowcs/describeEOCoverageSet-request-crs**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-request-crs:** A *DescribeEOCoverageSet* request **shall** use WGS84 [4] as spatial and ISO 8601 [2] as temporal CRS for the coordinates in trim requests.

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requests to server under test which contain:

- WGS84 [4] as spatial and ISO 8601 [2] as temporal CRS for the coordinates in trim request
- Other CRS for the coordinates in trim requests

Pass test if appropriate valid results or exceptions, resp., are delivered.

### A.1.53 DescribeEOCoverageSet Response Structure

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-structure**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-structure:** The response to a successful *DescribeEOCoverageSet* request **shall** consist of a `EOWCS::EOCoverageSetDescription` structure as defined in Table 11, Figure 9 and the XML Schema being part of this standard.
**Dependency:** [OGC 09-110r4] Subclause 8.3.2 (http://www.opengis.net/doc/IS/WCS/2.0/clause/8)

**Test method:** Send a *DescribeEOCoverageSet* request to server under test, check the result consist of a `EOWCS::EOCoverageSetDescription` structure.

### A.1.54 DescribeEOCoverageSet Response EO Metadata

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-eo-metadata**

 

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-eo-metadata:**
Each `WCS::CoverageDescription` listed in the response to a successful *DescribeEOCoverageSet* request **shall** contain one `EOWCS::EOMetadata` element containing the EO Metadata component of the EO Coverage to be described.

**Test method:** Send a valid *DescribeEOCoverageSet* requests to server under test, check that each `WCS::CoverageDescription` listed in the response contains one `EOWCS::EOMetadata` element and this element contains the EO Metadata component of the EO Coverage to be described.

### A.1.55 DescribeEOCoverageSet Response EO Section CoverageDescriptions

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-section-coverageDescriptions**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-section-coverageDescriptions:**
If a *DescribeEOCoverageSet* request contains a `sections` parameter then a successful response **shall** contain a `wcs:CoverageDescriptions` element if and only if the section parameter list contains one of the values "CoverageDescriptions" or "All".

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requets contain a `sections` element and this element contains one of the section parameter values:

- "CoverageDescription"
- "All"
- invalid values

Pass test if appropriate valid results or exceptions, resp., are delivered.

### A.1.56 DescribeEOCoverageSet Response EO Section DatasetSeriesDescriptions

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-section-datasetSeriesDescriptions**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-section-datasetSeriesDescriptions:**
If a *DescribeEOCoverageSet* request contains a `sections` parameter then a successful response **shall** contain a `eowcs:DatasetSeriesDescriptions` element if and only if the section parameter list contains one of the values "DatasetSeriesDescriptions" or "All".

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requets contain a `sections` element and this element contains one of the section parameter val-

 

ues:

- “DatasetSeriesDescriptions”
- “All”
- invalid values

Pass test if appropriate valid results or exceptions, resp., are delivered.

### A.1.57 DescribeEOCoverageSet Response eoId

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-eoId**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-eoId:** In the response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescription` section, each EO Coverage referred to by one of the objects identified in the `eoId` request parameter **shall** appear at most once.

**Test method:** Send a valid *DescribeEOCoverageSet* request containing a wcs:CoverageDescription section to server under test. Check that each EO Coverage referred to by one of the objects identified in the eoId request parameter appears at most once.

### A.1.58 DescribeEOCoverageSet Response Reffered

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-referred**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-referred:** The response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescription` section **shall** contain the descriptions of exactly those EO Coverages referred to directly or indirectly via Dataset Series by one of the objects identified in the `eoId` request parameter, without any duplicates.

**Test method:** For each Send a valid *DescribeEOCoverageSet* requests to server under test, check that each `WCS::CoverageDescription` listed in the response is at least contained in one of the `EOWCS::EOMetadata` element and that this element contains the EO Metadata component of the EO Coverage to be described.

For each `EOWCS::DatasetSeries` offered by the server under test:

- Send a valid *DescribeEOCoverageSet* request. Check that each `WCS::CoverageDescription` listed in the response is at least referred to by one `EOWCS::DatasetSeries` also contained in the response.

Test passes if all individual tests pass.

 

### A.1.59 DescribeEOCoverageSet Response Containment

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-containment**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-containment:**
The response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescription` section **shall** contain only descriptions of those EO Coverages whose spatial footprint defined by its `eop:EarthObservation/om:featureOfInterest/eop:Footprint`
- overlaps with the spatial request extent, and the request parameter `containment` is of value `overlaps` or is omitted,
- is completely contained within the spatial request extent, and the request parameter `containment` is of value `contains`
whereby all spatial coordinates are expressed in WGS84 [2].

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requests containing a `wcs:CoverageDescription` section and a spatial trim to server under test. Check that:

- if the request parameter containment is of value `overlaps` or is omitted, the response contains only descriptions of those EO Coverages whose spatial footprint defined by its `eop:EarthObservation/om:featureOfInterest/eop:Footprint` overlaps with the spatial request extent;

- if the request parameter containment is of value `contains`, the response contains only descriptions of those EO Coverages whose spatial footprint defined by its `eop:EarthObservation/om:featureOfInterest/eop:Footprint` is completely contained within the spatial request extent.

Pass test if both checks succeed.

### A.1.60 DescribeEOCoverageSet Response PhenomenonTime

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-phenomenonTime**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-phenomenonTime:**
The response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescription` section **shall** contain only descriptions of EO Coverages whose time interval defined by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata`
- overlaps with the request time extent,and the request parameter `containment` is of value `overlaps` or is omitted,
- is completely contained within the request time extent, and the request

 

parameter `containment` is of value `contains`,
whereby all temporal coordinates are expressed in ISO 8601 [2].

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requests containing a `wcs:CoverageDescription` section and a time interval to server under test. Check that:

- if the request parameter containment is of value `overlaps` or is omitted, the response contains only descriptions of EO Coverages whose time interval defined by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata` overlaps with the request time extent;

- if request parameter containment is of value `contains`, the response contains only descriptions of EO Coverages whose time interval defined by its `eop:EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:beginPosition` and `eop: EarthObservation/om:phenomenonTime/gml:TimePeriod/gml:endPosition` elements in `eowcs:EOMetadata` is completely contained within the request time extent;

Pass test if both checks succeed.

### A.1.61 DescribeEOCoverageSet Response Trim Omitted

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-trim-omitted**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-trim-omitted:**
In a *DescribeEOCoverageSet* request, a trim specification omitted **shall** be interpreted as the actual boundary of the objects requested in the axis omitted.

**Test method:** Send otherwise valid *DescribeEOCoverageSet* with a trimming in actual boundary of the object and without a trimming to server under test. Check that both responses are not exceptions and equal.

### A.1.62 DescribeEOCoverageSet Response Bound Omitted

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-bound-omitted**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-bound-omitted:**
In a *DescribeEOCoverageSet* request, a lower or upper bound omitted **shall** be interpreted as indicating the actual lower or upper bound of the objects requested in the axis omitted.

**Test method:** Send otherwise valid *DescribeEOCoverageSet* requests with a lower or upper bound omitted to server under test. Check that the responses are the same when they are indicated in actual lower or upper bound of the objects.

 

### A.1.63 DescribeEOCoverageSet Response CoverageSubtype

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-coverageSubtype**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-coverageSubtype:**
In the response to a successful *DescribeEOCoverageSet* request, each EO Coverage listed **shall** contain in its `WCS::CoverageSubtype` element the corresponding value given in Table 8 according to its type.

**Test method:** Send a valid *DescribeEOCoverageSet* request to server under test. Check that each Coverage listed contains the corresponding value in its `WCS::CoverageSubtype` element.

### A.1.64 DescribeEOCoverageSet Response Count

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-count**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-count:**
In the response to a successful *DescribeEOCoverageSet* request the sum of `CoverageDescription` and `DatasetSeriesDescription` elements **shall** be less or equal to the minimum of the value of the `CountDefault` element and the `count` parameter if present in the request. If none of both are present all matching elements **shall** be reported.

**Test method:** Send a valid *DescribeEOCoverageSet* request containing a `count` parameter with a value lower than the value of the `CountDefault` element to server under test. Check that the sum of the numbers of `CoverageDescription` and `DatasetSeriesDescription` elements is less or equal to the value of the `count` parameter.

### A.1.65 DescribeEOCoverageSet Response numberMatched

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-numberMatched**

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-numberMatched:**
The response to a successful *DescribeEOCoverageSet* request **shall** report in its `numberMatched` attribute the sum of all matching `CoverageDescription` and `DatasetSeriesDescription` elements.

**Test method:** Send a valid *DescribeEOCoverageSet* request containing a `count` parameter with a value lower than the value of the `CountDefault` element to server under test. Check that the sum of the numbers of `CoverageDescription` and `DatasetSeriesDescription` elements is higher or equal to the value of the reported `numberMatched` parameter.

### A.1.66 DescribeEOCoverageSet Response numberReturned

**Test id:** **/conf/eowcs/describeEOCoverageSet-response-numberReturned**

 

**Test Purpose:** **Requirement /req/eowcs/describeEOCoverageSet-response-numberReturned:**
The response to a successful *DescribeEOCoverageSet* request **shall** report in its `numberReturned` attribute the sum of all `CoverageDescription` and `DatasetSeriesDescription` elements included in the response.

**Test method:** Send a valid *DescribeEOCoverageSet* request containing a `count` parameter with a value lower than the value of the `CountDefault` element to server under test. Check that the sum of the numbers of `CoverageDescription` and `DatasetSeriesDescription` elements is equal to the value of the reported `numberReturned` parameter.

### A.1.67 Band Subsetting

**Test id:** **/conf/eowcs/band-subsetting**

**Test Purpose:** **Requirement /req/eowcs/band-subsetting:**
Implementations of this EO-WCS **shall** support the WCS 2.0 Range Subsetting Extension [OGC 12-040].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_range-subsetting/1.0/conf/record-subsetting

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.1.68 Scaling

**Test id:** **/conf/eowcs/scaling+interpolation**

**Test Purpose:** **Requirement /req/eowcs/scaling:**
Implementations of this EO-WCS **shall** support the WCS 2.0 Scaling Extension [OGC 12-039].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_scaling/1.0/conf/scaling

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.1.69 Interpolation

**Test id:** **/conf/eowcs/interpolation**

**Test Purpose:** **Requirement /req/eowcs/interpolation:**
Implementations of this EO-WCS **shall** support the WCS 2.0 Interpolation Extension [OGC 12-049].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_interpolation/1.0/conf/interpolation

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

 

### A.1.70 CRS-predefined

**Test id:** **/conf/eowcs/crs-predefined**

**Test Purpose:** **Requirement /req/eowcs/crs:**
Implementations of this EO-WCS **shall** support the WCS 2.0 CRS Extension [OGC 11-053].
**Dependency:** http://www.opengis.net/spec/WCS_service-extension_crs/1.0/conf/crs

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.1.71 Encodings

**Test id:** **/conf/eowcs/encodings**

**Test Purpose:** **Requirement /req/eowcs/encodings:**
Implementations of this EO-WCS **shall** support at least one of the WCS 2.0 coverage format encodings GeoTIFF [OGC12-100r1], NetCDF [OGC 11-010], and JPEG2000 [OGC 11-011].
**Dependency:** http://www.opengis.net/spec/GMLCOV_geotiff-coverages/1.0/conf/geotiff-coverage,
http://www.opengis.net/spec/WCS_encoding_netcdf/1.0/conf/netcdf,
http://www.opengis.net/spec/WCS_encoding_jpeg2000/1.0/conf/jpeg2000

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.1.72 Protocol-bindings

**Test id:** **/conf/eowcs/protocol-bindings**

**Test Purpose:** **Requirement /req/eowcs/protocol-bindings:**
Implementations of this EO-WCS **shall** support at least one of the requirements classes *eowcs_get-kvp* and *eowcs_soap*.

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

## A.2 Conformance Test Class: eowcs_get-kvp

### A.2.1 Eowcs_get-kvp/Mandatory

**Test id:** **/conf/eowcs/eowcs_get-kvp/mandatory**

**Test Purpose:** **Requirement /req/eowcs_get-kvp/mandatory:**
Implementations of this EO-WCS which support the *eowcs_get-kvp* requirements class **shall** support the WCS 2.0 protocol extension GET/KVP [OGC 09-147r3].
**Dependency:** http://www.opengis.net/spec/WCS_protocol-binding_get-kvp/1.0/conf/get-kvp

 

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.2.2 Eowcs_get-kvp/Conformance Class in Profile

**Test id:** **/conf/eowcs/eowcs_get-kvp/conformance-class-in-profile**

**Test Purpose:** **Requirement /req/eowcs_get-kvp/conformance-class-in-profile:**
Implementations of this EO-WCS which support the *eowcs_get-kvp* requirements class **shall** include the following URI in a `Profile` element in the `ServiceIdentification` in a *GetCapabilities* response:
`http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_get-kvp`

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.2.3 Eowcs_get-kvp/describeEOCoverageSet Request

**Test id:** **/conf/eowcs/eowcs_get-kvp/describeEOCoverageSet-request**

**Test Purpose:** **Requirement /req/eowcs_get-kvp/describeEOCoverageSet-request:**
The `request` parameter in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows:
`request=DescribeEOCoverageSet`

**Test method:** Send a valid get-kvp *DescribeEOCoverageSet* request as defined. Check that the response is not an exception.

### A.2.4 Eowcs_get-kvp/describeEOCoverageSet eoid

**Test id:** **/conf/eowcs/eowcs_get-kvp/describeEOCoverageSet-eoid**

**Test Purpose:** **Requirement /req/eowcs_get-kvp/describeEOCoverageSet-eoid:**
The `eoId` parameter in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows, for parameter values $v_1$, …, $v_n$:
`eoid=`$v_1$`,…,`$v_n$

**Test method:** Send a valid get-kvp *DescribeEOCoverageSet* request as defined. Check that the response is not an exception.

### A.2.5 Eowcs_get-kvp/describeEOCoverageSet Containment

**Test id:** **/conf/eowcs/eowcs_get-kvp/describeEOCoverageSet-containment**

**Test Purpose:** **Requirement /req/eowcs_get-kvp/describeEOCoverageSet-containment:**
The `containment` parameter in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows:
`containment=overlaps`
or `containment=contains`

 

**Test method:** Send a valid get-kvp *DescribeEOCoverageSet* request as defined. Check that the response is not an exception.

### A.2.6 Eowcs_get-kvp/describeEOCoverageSet Subset

**Test id:** **/conf/eowcs/eowcs_get-kvp/describeEOCoverageSet-subset**

**Test Purpose:** **Requirement /req/eowcs_get-kvp/describeEOCoverageSet-subset:**
The trim parameters in the `DescribeEOCoverageSet` request parameter of a *DescribeEOCoverageSet* request **shall** be indicated through a possibly empty set of subset specifications, each one with key "`subset`" and value specification given by a `SubsetSpec` adhering to this EBNF syntax [3] and the resp. XML definitions [6]:

```
SubsetSpec:     dimension ( interval )
dimension:      long | lat | phenomenonTime
interval:    low , high
low:            point | *
high:        point | *
point:       number| "token"     // " = ASCII 0x42
```

**Test method:** Send a valid get-kvp *DescribeEOCoverageSet* request as defined. Check that the response is not an exception.

## A.3 Conformance Test Class: eowcs_soap

### A.3.1 Eowcs_soap/Mandatory

**Test id:** **/conf/eowcs/eowcs_soap/mandatory**

**Test Purpose:** **Requirement /req/eowcs_soap/mandatory:**
Implementations of this EO-WCS which support the *eowcs_soap* requirements class **shall** support the WCS 2.0 protocol extension SOAP [OGC 09-149r1].
**Dependency:** http://www.opengis.net/spec/WCS_protocol-binding_soap/1.0/conf/soap

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

### A.3.2 Eowcs_soap/Conformance Class in Profile

**Test id:** **/conf/eowcs/eowcs_soap/conformance-class-in-profile**

**Test Purpose:** **Requirement /req/eowcs_soap/conformance-class-in-profile:**
Implementations of this EO-WCS which support the *eowcs_soap* requirements class **shall** include the following URI in a `Profile` element in the `ServiceIdentification` in a *GetCapabilities* response:
`http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.0/conf/eowcs_soap`

**Test method:** Determine the list of supported extensions via a valid *GetCapabilities* request; check that the extension required is listed.

 

### A.3.3 Eowcs_soap/describeEOCoverageSet Request Structure

**Test id:** **/conf/eowcs/eowcs_soap/describeEOCoverageSet-request-structure**

**Test Purpose:** **Requirement /req/eowcs_soap/describeEOCoverageSet-request-structure:**
A *DescribeEOCoverageSet* request **shall** contain exactly one `Body` element containing exactly one `DescribeEOCoverageSet` element.

**Test method:** Send otherwise soap *DescribeEOCoverageSet* requests contain:

- exactly one Body element containing exactly one DescribeEOCoverageSet element;
- exactly one Body element containing more than one DescribeEOCoverageSet element;
- exactly one Body element containing no DescribeEOCoverageSet element;
- more than one Body element;
- without a Body elment;

Pass test if appropriate valid results or exceptions, resp., are delivered.

### A.3.4 Eowcs_soap/describeEOCoverageSet Request Structure

**Test id:** **/conf/eowcs/eowcs_soap/describeEOCoverageSet-request-structure**

**Test Purpose:** **Requirement /req/eowcs_soap/describeEOCoverageSet-response-structure:**
In the response to a successful *DescribeEOCoverageSet* request, the SOAP `Envelope` **shall** contain exactly one `Body` element which contains a `EOWCS::EOCoverageSetDescription` as its single element.

**Test method:** Send a valid soap *DescribeEOCoverageSet* request to sever under test. Check response whether the condition is fulfilled.

### A.3.5 Eowcs_soap/wsdl

**Test id:** **/conf/eowcs/eowcs_soap/wsdl**

**Test Purpose:** **Requirement /req/eowcs_soap/wsdl:**
Publication of a WCS SOAP service endpoint **shall** use the binding as defined in file `wsdl/wcs-soap-binding.wsdl` of the EO-WCS package.

**Test method:** For the service under test, retrieve the WSDL description and issue requests which make use of this service definition. Check that the service can be addressed and that queries can be retrieved properly.

 

-- end of ATS –

 

# Annex B
# (normative)

## Transitional provisions

Clause 2 of this specification normatively references specifications under development and, hence, not yet available. For each such specification, therefore, WCS 1.1 Corrigendum 2 [OGC 07-065r7] **shall** apply until the respective specification gets adopted as an official OGC document.

NOTE This requirement is not subject to conformance testing as WCS 1.1 does not follow OGC's core/extension paradigm.

 

# Annex C
# (informative)

## Use Case examples

In the following two Use Cases are presented to illustrate possible application scenarios of EO-WCS in the domain of earth observation and remote sensing.

## C.1 Use Case 1

Provider offers, through an EO-WCS service, one Dataset Series containing Sea Surface Temperature (SST) and another Dataset Series containg Ocean Color (OC).

User wants to compare the timely development and distribution of some algal bloom in relationship to ocean currents indicated by the changes in SST. User, therefore, plans to analyze a timeseries of OC and SST imageries over a certain period of time (TOI) in the Area of Interest (AOI).

User first addresses the EO-WCS service by issuing a *GetCapabilities* request.The resulting response contains information about available `DatasetSeriesIds`, their spatial extent (as `WGS84BoundingBox`), as well as their temporal validity (as `beginPosition` and `endPosition`).

Based on this information, User can issue a *DescribeEOCoverageSet* request, using the received `DatasetSerieId` (as `eoId`) to obtain detail information on the content of the two offered DatasetSeries of interest. Since User is only interested in a limited period of time and a certain area, the *DescribeEOCoverageSet* request contains parameters for spatial and temporat subsetting, for example:

```
subset=lat(32,47)&
subset=long(11,33)&
subset=phenomenonTime("2006-08-01","2006-08-22T19:22:00Z")
```

User will receive a response containing the `CoverageIds` of the datasets available within this spatio-temporal bounding box provided; notably, this set will be empty if no item is contained within the area and time queried.

User subsequently decides about which of the coverages identified are of interest and issues a *GetCoverage* request for each `CoverageId` received in the *DescribeEOCoverageSet* response. Again, User can select an AOI (via the subset parameter); additionally, specific bands (via range subsetting), output coverage format, output CRS, interpolation method, etc. can be selected depending on the WCS extensions implemented by the server; the Capabilities document contains pertinent information.

Following download via *GetCoverage*, the SST and OC coverages can be analyzed and processed on User's local workstation.

 

## C.2 Use Case 2

Provider offers, during harvesting seasons (e.g., March through August), three 2-monthly Stitched Mosaics for a certain area. Whenever new images are available in this area they are included in the respective (time-slot) Stitched Mosaic, possibly replacing older datasets or parts thereof. The providers applies a "least cloud cover/newest on top" approach to feed into the respective mosaics. At the end of each 2-month period the next mosaic is initiated. Stitched Mosaics enable Provider to offer the full metadata set for each dataset participating in a mosaic for any time instance, down to pixel-level accuracy.

User wants to assess crop yield for an AOI contained within the providers Stitched Mosaics. For doing so, User needs data about the same AOI for at least 2 points in time. Further, User requires the full metadata recorded (including possible lineage data) together with the actual imagery.

User addresses the EO-WCS by issuing a *GetCapabilities* request.The response contains the `coverageId`s for all Stitched Mosaics available.

Futher information – i.e., metadata – can be obtained through a *DescribeCoverage* request on the `coverageId`s received. This yields bounding box, footprint, bands, as well as timestamp information (e.g., oldest and youngest image) of the datasets participating in the Stitched Mosaic. Alternatively, if User needs details about those datasets comprising a particular Stitched Mosaic, a *DescribeEOCoverageSet* request using the `CoverageId` as `eoId` can be issued. This results in detailed information (time, footprint, bands, etc.) about each dataset participating in the object queried.

For accessing the image data, User issues a *GetCoverage* request providing the identifier of the object to be retrieved. In addition to the mandatory request parameters, further optional parameters allow specifying output format, geographic subset, and further details; availability of this functionality depends on the extensions the EO-WCS implements, as indicated in its Capabilities document. The coverages retrieved finally can be analyzed and processed further in User's local workstation environment.

 

## Annex D: Revision History

| Date | Release | Author | Paragraph modified | Description |
|---|---|---|---|---|
| 2010-10-27 | 0.1.0 | Peter Baumann, Stephan Meissl | All | Created |
| 2011-01-19 | 0.2.0 | Peter Baumann, Stephan Meissl | All | Various updates |
| 2011-01-19 | 0.3.0 | Jinsongdi Yu | Annex A | Added ATS |
| 2011-06-10 | 0.4.0 | Peter Baumann, Stephan Meissl | All | Incorporated OAB comments |
| 2013-06-19 | 0.5.2 | Peter Baumann, Stephan Meissl | All | Thorough review and adjustments to WCS and GMLCOV corrigenda |
| 2014-03-05 | 0.6.0 | **Peter Baumann, Stephan Meissl** Jinsongdi Yu | **Clause 9.2.2**, Footer | **Corrected example and copyright year in footer** |