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

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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.

Keywords

ogcdoc, wcs, profile, eo, earth observation, dataset, dataset series, stitched mosaic

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.

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.

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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.

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

Introduction

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

Chapter 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.

Chapter 2. Conformance

This document establishes the following requirements and conformance classes:

- *eowcs*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/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/1.1/conf/eowcs.
- *eowcs_geteocoverageset*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/req/eowcs_geteocoverageset, defining the GetEOCoverageSet request of EO-WCS in Clause 7 where stated, particularly subclause 7.6; the corresponding conformance class is *eowcs_geteocoverageset*, with URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/conf/eowcs_geteocoverageset.
- *eowcs_get-kvp*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/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/1.1/conf/eowcs_get-kvp.
- *eowcs_soap*, of URI http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/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/1.1/conf/eowcs_soap.

Standardization 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/1.1/.

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

Chapter 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/1.1, the document has OGC URI http://www.opengis.net/doc/IS/WCS_application-profile_earth-observation/1.1.

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/1.1 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

TBD OGC 09-146r2, *Coverages Implementation Schema / GML 3.2.1 Application Schema for Coverages*, version 1.1
Conformance classes used: *gml-coverage*

TBD OGC 09-110r4, OGC® *Web Coverage Service 2.1 Interface Standard Core*, version 2.1
Conformance classes used: *core*

OGC 11-053r1, *OGC® Web Coverage Service Interface Standard - CRS Extension*, version 1.0
Conformance classes used: *crs*, *crs-gridded-coverage*

OGC 12-039, *OGC® Web Coverage Service Interface Standard - Scaling Extension*, version 1.0
Conformance classes used: *scaling*

OGC 12-040, *OGC® Web Coverage Service Interface Standard - Range Subsetting Extension*, version 1.0
Conformance classes used: *record-subsetting*

OGC 12-049, *OGC® Web Coverage Service Interface Standard - Interpolation 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 14-100r2, *OGC® CF-netCDF 3.0 encoding using GML Coverage Application*, version 2.0
Conformance classes used: *CF-netCDF-1.6 GML encoding*, *CF-netCDF-1.6 data format*, *CF-netCDF-1.6 multipart data encoding*

OGC 12-108, *OGC® GML Application Schema - Coverages JPEG2000 Coverage Encoding Extension*, version 1.0
Conformance classes used: *jpeg2000-coverage*

OGC 10-157r4, *Earth Observation Metadata Profile of Observations and Measurements*, version 1.1.0
Conformance classes used: *eop*, *sar*, *opt*

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

Chapter 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

4.2. Dataset

2-D → EO Coverage

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. EO Product

An EO Product contains one or more related → EO Product Datasets plus metadata and optionally auxiliary data like → EO Product Quicklooks.

4.8. EO Product Dataset

One or more files each containing one or more → EO Coverages.

4.9. EO Product Quicklook

A visual representation of a usually reduced → EO Product Dataset encoded in an image format. The → EO Product Dataset may combine different bands.

4.10. Lineage record

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

4.11. refers to

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

Chapter 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/1.1	Coverages Implementation Schema 1.1
wcs	http://www.opengis.net/wcs/2.1	WCS 2.1
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/1.1	WCS Application Profile - Earth Observation 1.1

Prefix	Namespace URI	Description
scal	http://www.opengis.net/wcs/scaling/1.0 (schema uses http://www.opengis.net/WCS_service-extension_scaling/1.0)	WCS Scaling Extension
int	http://www.opengis.net/wcs/interpolation/1.0 (schema uses http://www.opengis.net/WCS_service-extension_interpolation/1.0	WCS Interpolation Extension
crs	http://www.opengis.net/wcs/crs/1.0	WCS CRS Extension
gmd	http://www.isotc211.org/2005/gmd	ISO 19139 Metadata
gmi	http://standards.iso.org/iso/19115/-2/gmi/1.0	ISO 19139-2 Metadata
mdb	http://standards.iso.org/iso/19115/-3/mdb/1.0	ISO 19115-3 Metadata

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.

Chapter 6. EO data model

6.1. Overview

This Clause 6, together with Clauses 7 and 8, establishes the EO-WCS core requirements class, *eowcs* as well as the *eowcs_geteocoverageset* one where stated, particularly subclause 7.6.

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 `GMLCOV::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.

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

Although named *Dataset Series* technically speaking it is a heterogeneous grouping of coverages and/or Dataset Series and can thus be used for any other concept like an EO Product containing multiple coverages with different resolutions as well.

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.

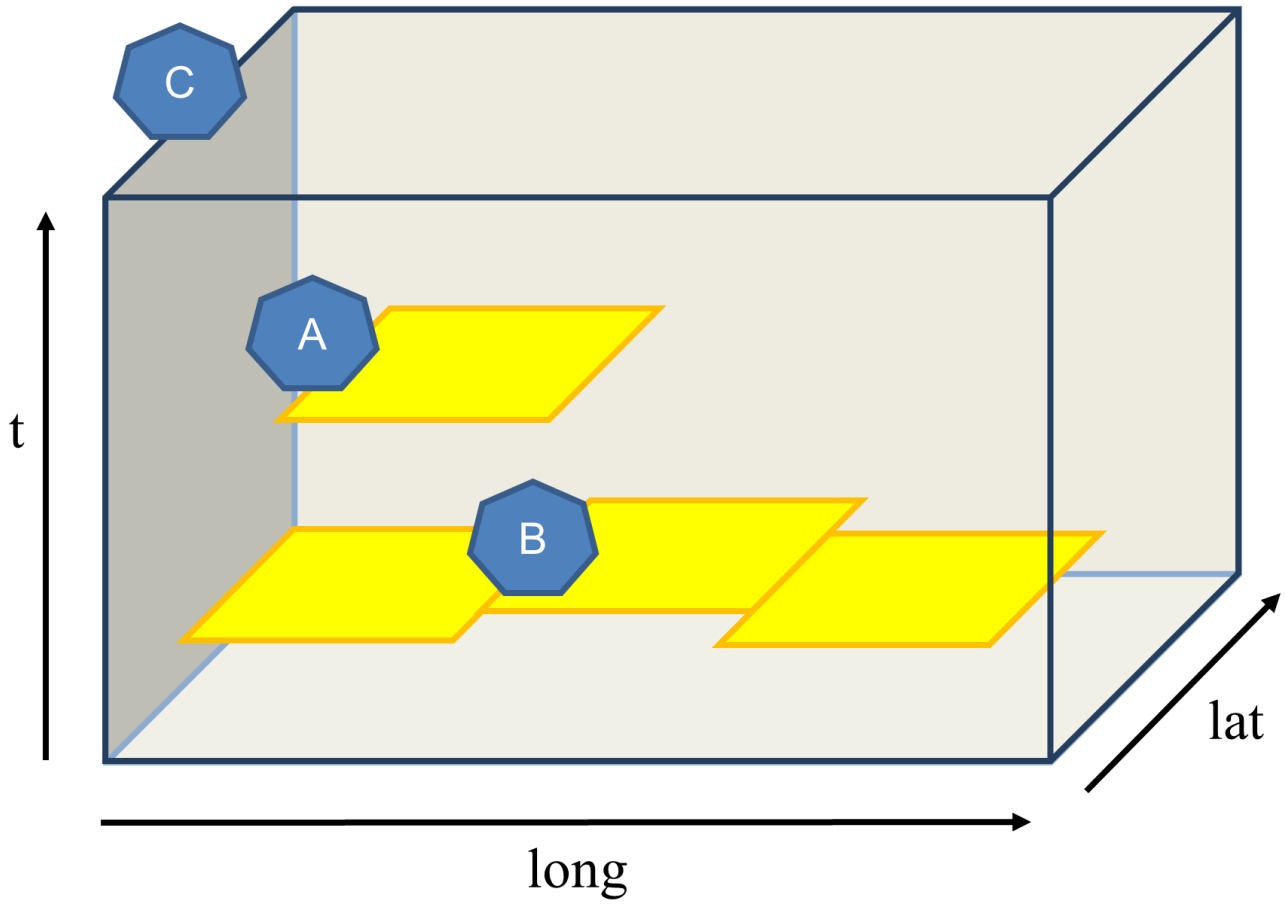

Figure 1. Conceptual view of a Dataset Series with Stitched Mosaic and Dataset

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.

> 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)

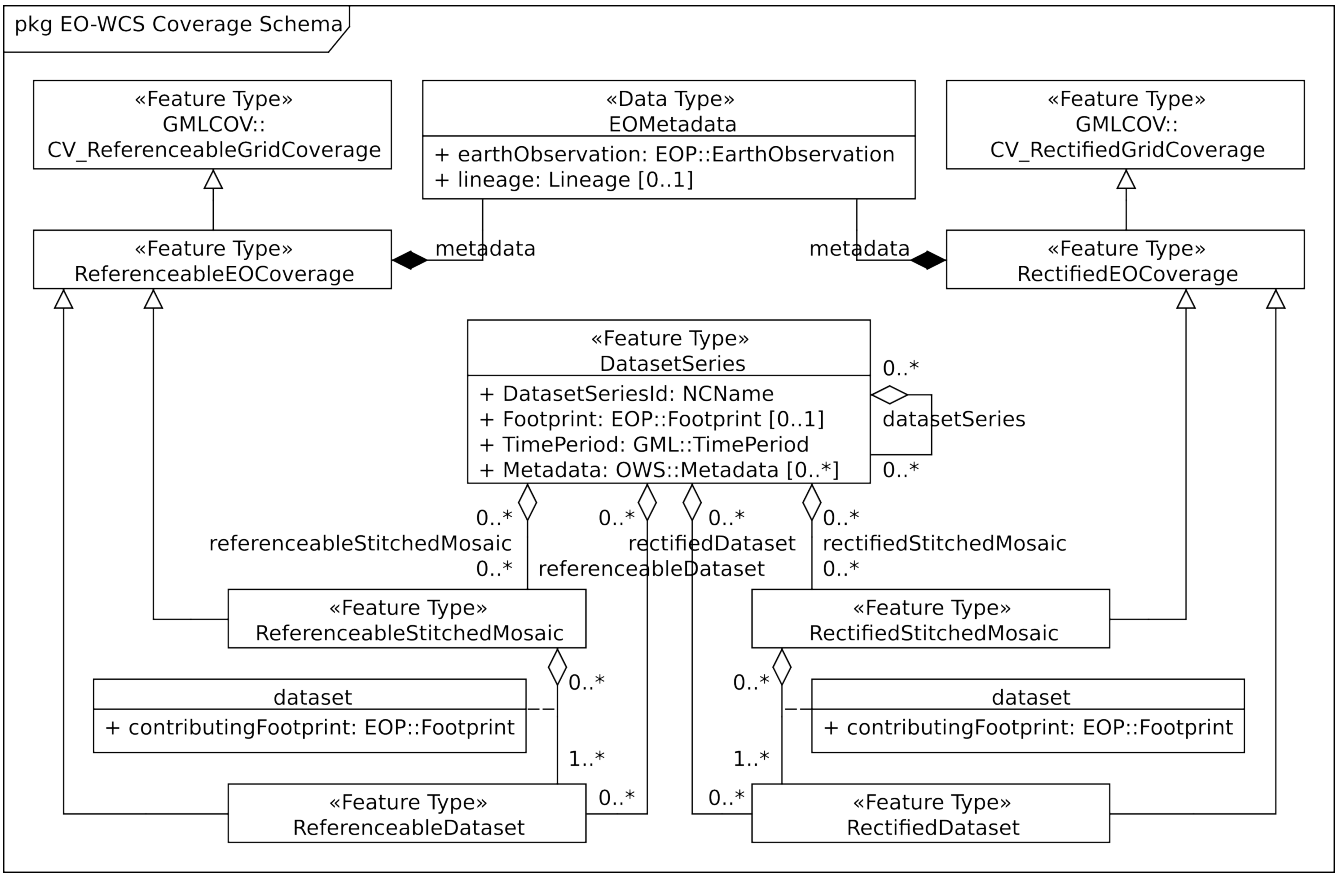

Figure 2. UML Model of WCS EO Application Profile Schema

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`.

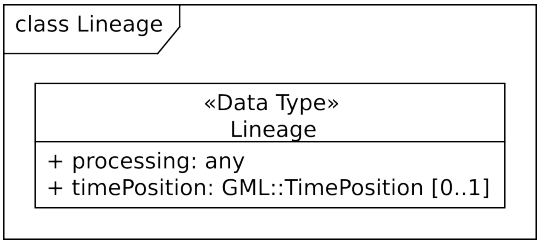

Figure 3. UML Lineage class diagram

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 52 /req/eowcs/getCoverage-response-lineage-in-eo-metadata).

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].

> The `EOWCS::EOMetadata` element of `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain an `eop:EarthObservation/om:featureOfInterest/eop:Footprint` element.

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].

> `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.

> `EOWCS::ReferenceableEOCoverage` and `EOWCS::RectifiedEOCoverage` instances **shall** contain one metadata element of type `EOWCS::EOMetadata`.

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

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.

> 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.

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.

> 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`.

By definition, the footprint is expressed in WGS84.

An EO Coverage has a time period of validity associated.

> 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`.

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

> For any given EO Coverage, its temporal validity values **shall** be expressed in ISO 8601 [2].

6.3.4. Range set

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.

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

A `EOWCS::ReferenceableDataset` and a `EOWCS::RectifiedDataset` **shall** conform to Figure 2, Figure 3, and the XML Schema being part of this standard.

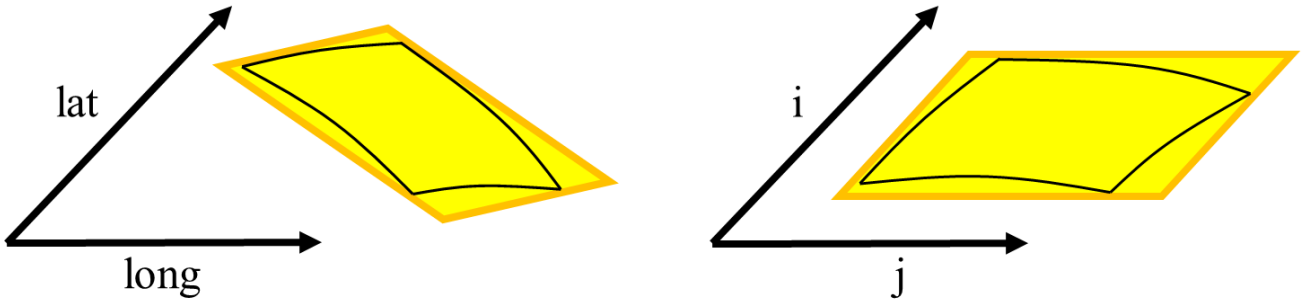

Figure 4. Conceptual view of a Dataset as a 2-D coverage: in referenced (left) and unreferenced coordinates (right)

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.

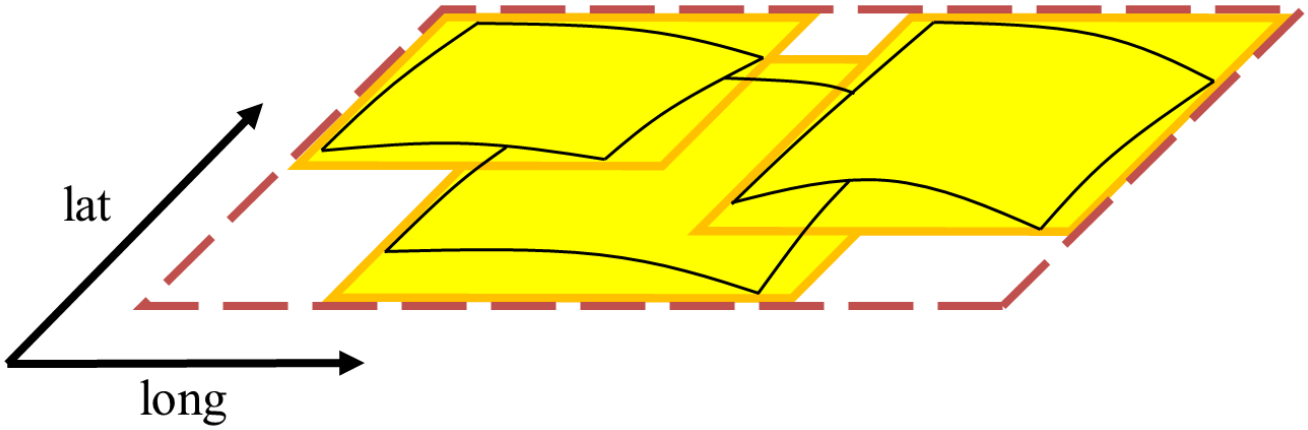

Figure 5. Conceptual view of a Stitched Mosaic as a 2-D coverage: composed from Datasets (Stitched Mosaic bounding box dashed)

> `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)

> `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.

> 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.

> 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*.

> For all Stitched Mosaics *sm* referring to Datasets d_1 and d_2, with an associated `contributingFootprint`, the `contributingFootprint`s of the d_1 and d_2 references **shall** be pair-wise disjoint.

> The footprint of a Stitched Mosaic **shall** be given by the union of the `contributingFootprint`s of the Datasets this Stitched Mosaic refers to.

> 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.

> All Datasets referred to by a Rectified Stitched Mosaic **shall** have identical values in the `gml:offsetVector` elements of their domain sets.

> 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.

> 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.

> 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.

> 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).

> 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.

> 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.

Although named *Dataset Series* technically speaking it is a heterogeneous grouping of coverages and/or Dataset Series and can thus be used for any other concept like an EO Product containing multiple coverages with different resolutions as well.

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.

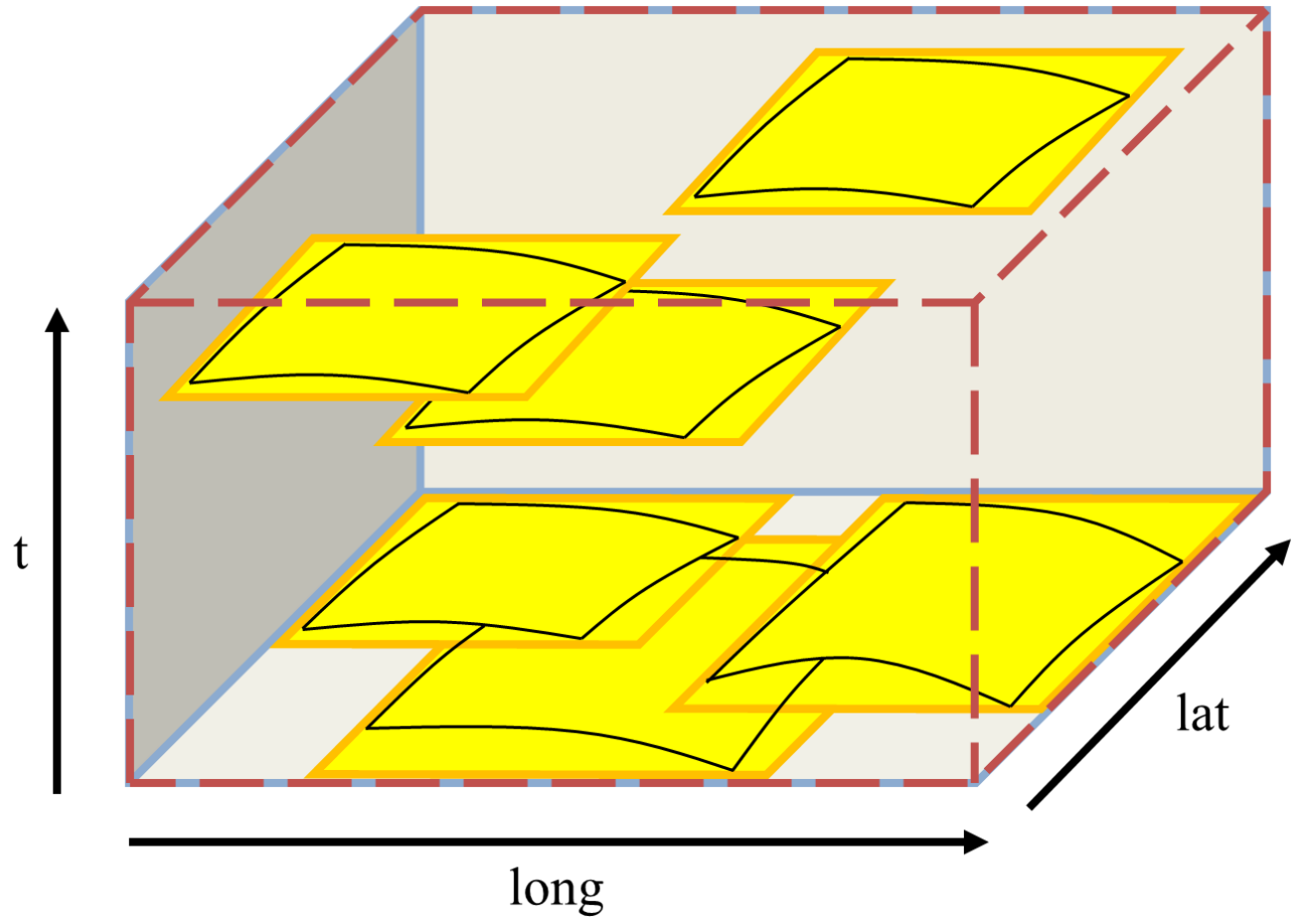

Figure 6. Conceptual view of a Dataset Series referring to Datasets and Stitched

Mosaics (Dataset Series domain boundary dashed)

> 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)
metadata	EO Metadata of the Dataset Series on hand	`ows:Metadata`	zero or more (optional)
referenceableStitchedMosaic	Referenceable Stitched Mosaic to which the Dataset Series on hand refers	`WCS::CoverageId`	zero or more (optional)
rectifiedStitchedMosaic	Rectified Stitched Mosaic to which the Dataset Series on hand refers	`WCS::CoverageId`	zero or more (optional)
referenceableDataset	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)

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.

> 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.

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.

> 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 has an EO Metadata record associated.

> A Dataset Series instance **shall** contain one metadata element of type `EOWCS::EOMetadata`.

A Dataset Series may contain multiple metadata elements holding the metadata in different formats. Explicitly supported metadata elements are `eop:EarthObservation`, `gmd:MD_Metadata`, `gmi:MI_Metadata`, `mdb:MD_Metadata`, or `ows:Reference` or any element in the substitutionGroup of any of these.

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.

> 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.

Example: The following XML fragment shows a DatasetSeries instance.

```
<?xml version="1.0" encoding="UTF-8"?>
<wcseo:DatasetSeries xmlns:ows="http://www.opengis.net/ows/2.0" xmlns:gml=
"http://www.opengis.net/gml/3.2" xmlns:wcs="http://www.opengis.net/wcs/2.0"
xmlns:wcseo="http://www.opengis.net/wcs/wcseo/1.1" 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/1.1
http://schemas.opengis.net/wcs/wcseo/1.1/wcsEOAll.xsd">
  <wcseo:DatasetSeriesId>someDatasetSeries1</wcseo:DatasetSeriesId>
  <eop:Footprint gml:id="footprint_someDatasetSeries1">
    <eop:multiExtentOf>
      <gml:MultiSurface gml:id="multisurface_someDatasetSeries1" srsName=
"EPSG:4326">
        <gml:surfaceMembers>
          <gml:Polygon gml:id="polygon_someDatasetSeries1">
            <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:surfaceMembers>
      </gml:MultiSurface>
    </eop:multiExtentOf>
  </eop:Footprint>
  <gml:TimePeriod gml:id="someDatasetSeries1_timeperiod">
    <gml:beginPosition>2008-03-13T00:00:00.000</gml:beginPosition>
    <gml:endPosition>2008-03-13T23:59:59.999</gml:endPosition>
  </gml:TimePeriod>
  <ows:Metadata>
    <wcseo:EOMetadata>
      <ows:Reference xlink:href="http://www.someCatalogue.org/eop-metadata-
from-someDatasetSeries1" xlink:role="http://standards.iso.org/iso/19115/-
3/mdb/1.0" xlink:title="ISO 19115-3 Metadata" />
    </wcseo:EOMetadata>
  </ows:Metadata>
  <wcseo:rectifiedDataset>
    <wcs:CoverageId>someEOCoverage1</wcs:CoverageId>
  </wcseo:rectifiedDataset>
</wcseo:DatasetSeries>
```

Chapter 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.EO data model

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].

> 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` specifying the maximum number of `CoverageDescription` and `DatasetSeriesDescription` elements reported in a `DescribeEOCoverageSet` response.
- For the *eowcs_geteocoverageset* conformance class there is an additional `<wcseo:wcseoMetadata` element inside the `wcs:Extension` element of the `wcs:ServiceMetadata` element to specify default and supported package formats for the *GetEOCoverageSet* operation.

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.

> 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/1.1/conf/eowcs`

> A WCS service implementing the *eowcs_geteocoverageset* conformance class of 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/1.1/conf/eowcs_geteocoverageset`

> 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)

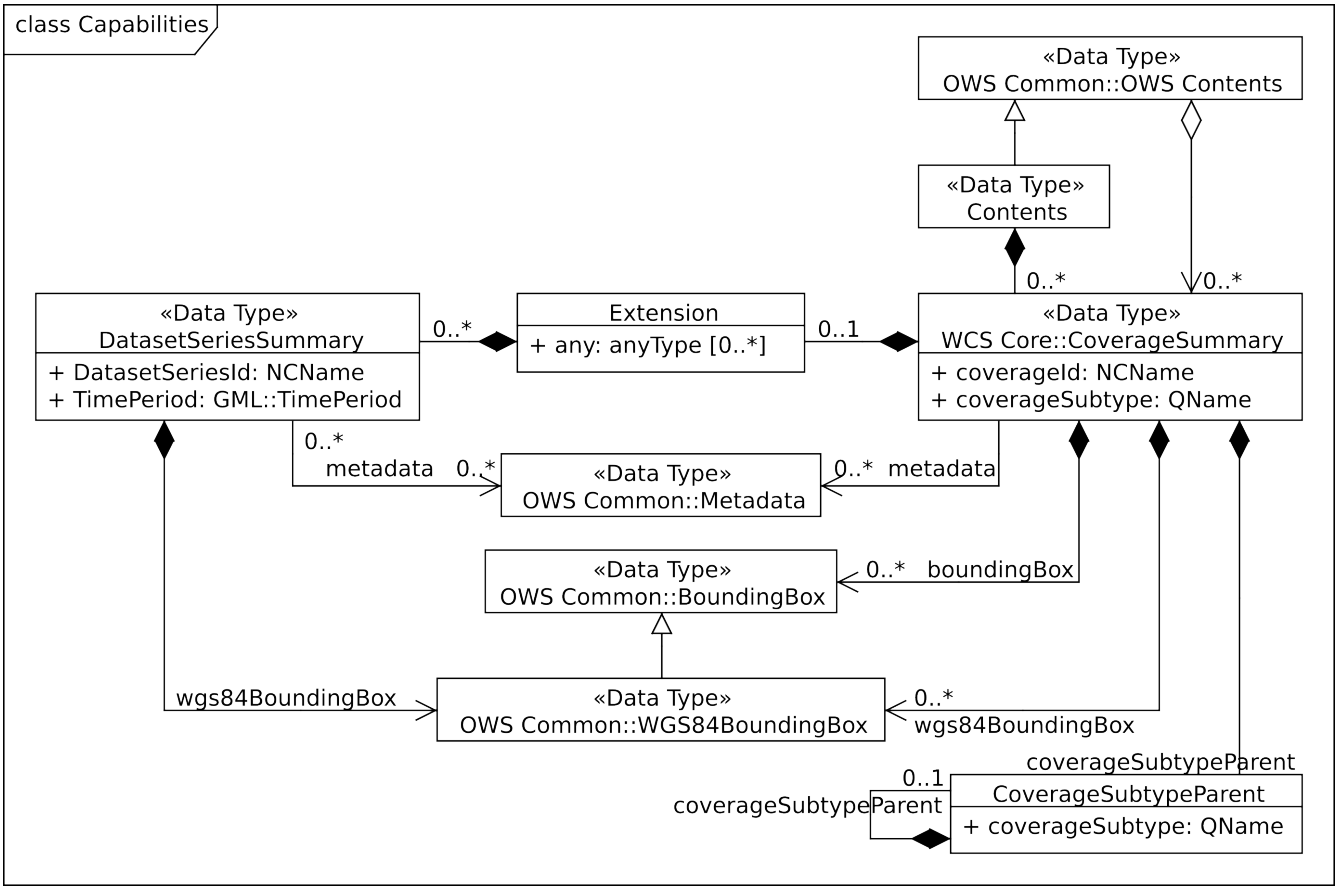

Figure 7. *GetCapabilities* response UML class diagram

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)
wgs84BoundingBox	Spatial extent of the Dataset Series	OWS Common::WGS84BoundingBox	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)

> 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.

> A response to a successful *GetCapabilities* request containing a EOWCS::DatasetSeriesSummary section **shall** not contain any duplicate Dataset Series identifier.

> 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.

> 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".

> 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.

> 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`

> 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.

Table 9. Values for `ows:Constraint` elements

Name	Definition	Data type	Multiplicity
CountDefault	Default value for the count parameter defined for *DescribeEOCoverageSet* and *GetEOCoverageSet* requests.	`Integer` greater than or equal to zero	zero or one (optional)
ImplementsResultPaging	Indicates if the server supports the ability to page through a result set responding with `count` features at a time.	`Boolean`; either `TRUE` or `FALSE`	zero or one (optional)

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

> The response to a successful *GetCapabilities* request to an EO-WCS supporting paging **shall** contain `ows:Contraint` elements with name attribute values of `ImplementsResultPaging` and `CountDefault`. The `ImplementsResultPaging` constraint **shall** have a value of "TRUE".

> The response to a successful *GetCapabilities* request to an EO-WCS supporting the *eowcs_geteocoverageset* conformance class **shall** contain a `wcseo:wcseoMetadata` element in the `wcs:Extension` element of `wcs:ServiceMetadata` including at least a `wcseo:defaultPackageFormat` element.

> The `wcseo:defaultPackageFormat` element delivered in the `wcseo:wcseoMetadata` element of the response to a successful *GetCapabilities* request **shall** specify the default format used for *GetEOCoverageSet* responses.

> The `wcseo:packageFormatSupported` element(s) delivered in the `wcseo:wcseoMetadata` element of the response to a successful *GetCapabilities* request **shall** list one to one the MIME type identifiers of all supported packaging formats for the *GetEOCoverageSet* operation.

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:OperationsMetadata>
  ...
  <ows:Constraint name="CountDefault">
    <ows:NoValues />
    <ows:DefaultValue>100</ows:DefaultValue>
  </ows:Constraint>
  <ows:Constraint name="ImplementsResultPaging">
    <ows:NoValues/>
    <ows:DefaultValue>TRUE</ows:DefaultValue>
  </ows:Constraint>
</ows:OperationsMetadata>
```

Example: The following XML excerpt shows a possible `wcs:ServiceMetadata` section containing valid `wcseo:packageFormatSupported` elements:

```
<wcs:ServiceMetadata>
  <wcs:formatSupported>application/gml+xml</wcs:formatSupported>
  <wcs:formatSupported>image/tiff</wcs:formatSupported>
  <wcs:Extension>
    <wcseo:wcseoMetadata>
      <wcseo:defaultPackageFormat>
application/metalink4+xml</wcseo:defaultPackageFormat>
      <wcseo:packageFormatSupported>application/x-
gzip</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>
application/gzip</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>
application/bzip</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>application/x-
bzip</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>
application/tar</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>application/x-
tar</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>
application/zip</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>
application/metalink4+xml</wcseo:packageFormatSupported>
      <wcseo:packageFormatSupported>
application/metalink+xml</wcseo:packageFormatSupported>
    </wcseo:wcseoMetadata>
  </wcs:Extension>
</wcs:ServiceMetadata>
```

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.

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.

> 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.

> 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">
            <gmlcovl: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>
```

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.

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.

> 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 preexisting lineage sequence plus one element appended which describes the

GetCoverage request on hand.

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.

> 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.

> 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 50 /req/eowcs/getCoverage-response-eo-metadata-in-stitched-mosaic, Requirement 51 /req/eowcs/getCoverage-response-footprint-in-eo-metadata, and Requirement 52 /req/eowcs/getCoverage-response-lineage-in-eo-metadata.

> 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.

> 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.

> 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.

This content is dependent on the protocol used by the requester. 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/1.1"
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/1.1
http://schemas.opengis.net/wcs/wcseo/1.1/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=GetCoverage&amp;COVERAGEID=c1&amp;FORMAT=applica
tion/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

> A *DescribeEOCoverageSet* request **shall** consist of a structure as defined in Figure 8, Table 10 and the XML Schema being part of this standard.

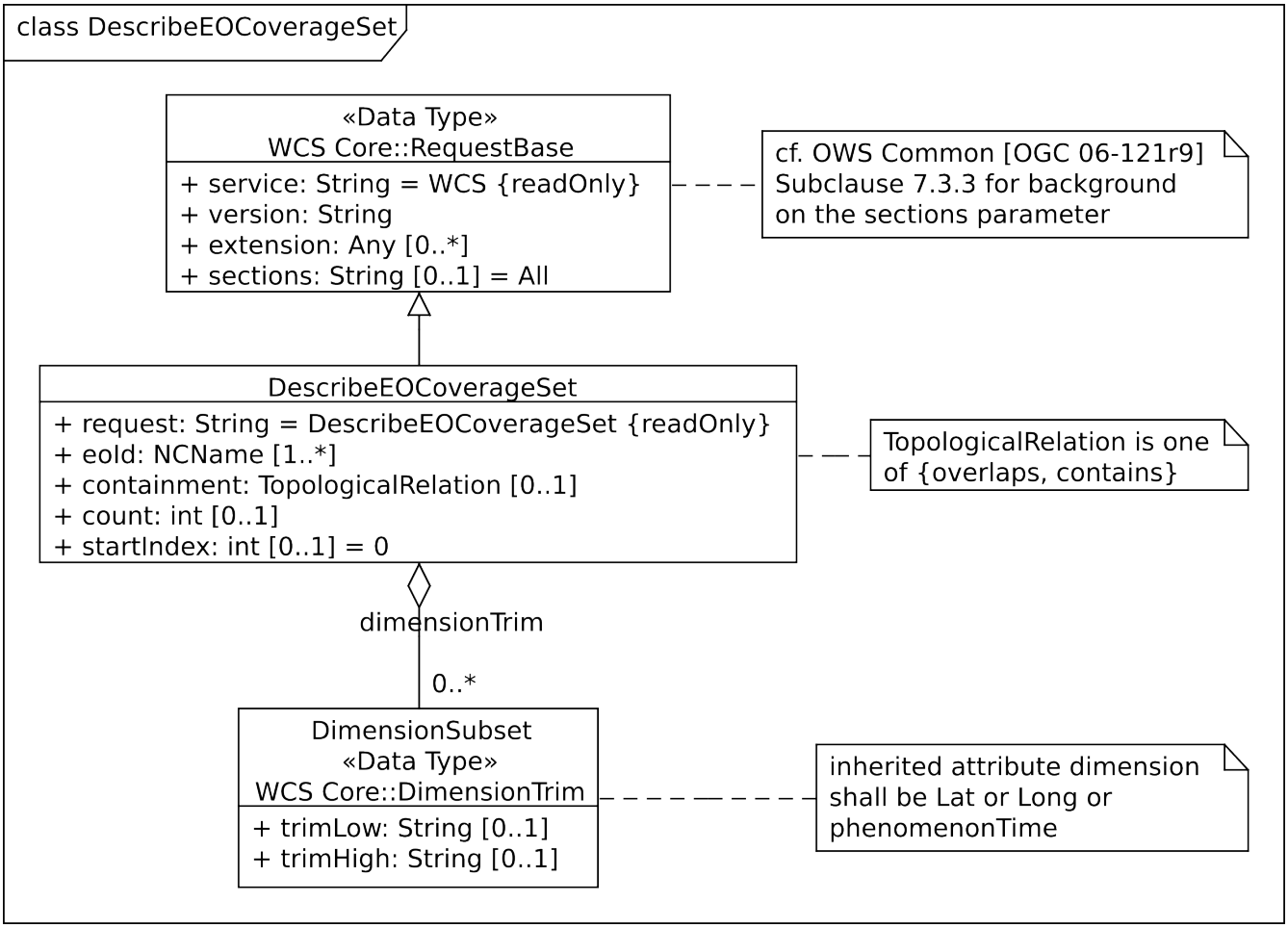

Figure 8. *DescribeEOCoverageSet* **request UML diagram**

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)

Name	Definition	Data type	Multiplicity
`startIndex`	Index within the result set from which the server shall begin presenting results in the response	`Integer` greater than or equal to zero. Default `0`	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)

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.

> 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

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

> 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.

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

> If a *DescribeEOCoverageSet* request contains a `containment` parameter then this parameter **shall** have one of the values "contains" or "overlaps".

> 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.

> A *DescribeEOCoverageSet* request **shall** use WGS84 [4] as spatial and ISO 8601 [2] as temporal CRS for the coordinates in trim requests.

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

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

```
<wcseo:DescribeEOCoverageSet xmlns:wcseo="http://www.opengis.net/wcs/wcseo/1.1"
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/1.1
http://schemas.opengis.net/wcs/wcseo/1.1/wcsEOAll.xsd" service="WCS" version=
"2.0.1" count="100" startIndex="1">
  <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).

> 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
`datasetSeriesDescriptions`	Unordered sequence of DatasetSeries descriptions	`DatasetSeriesDescriptions`	zero or one (optional)
`coverageDescriptions`	Unordered sequence of coverage descriptions	`WCS::CoverageDescriptions`	zero or one (optional)

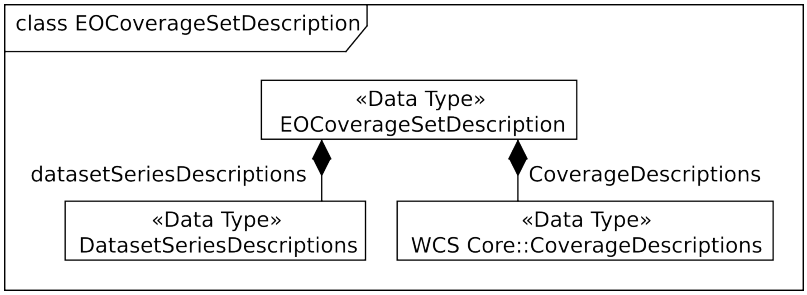

Figure 9. *DescribeEOCoverageSet* response UML diagram

> 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.

> 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".

> 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.

> In the response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescriptions` section, each EO Coverage referred to by one of the objects identified in the `eoId` request parameter **shall** appear at most once.

> The response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescriptions` 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.

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.

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.

> The response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescriptions` 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 [4].

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

> The response to a successful *DescribeEOCoverageSet* request containing a `wcs:CoverageDescriptions` 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.

> In a *DescribeEOCoverageSet* request, a trim specification omitted **shall** be interpreted as the actual boundary of the objects requested in the axis 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.

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

> 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.

> 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.

The `count` parameter is used in the same ways as the `itemsPerPage` element in the OpenSearch Specification [7].

> If a *DescribeEOCoverageSet* request contains a `wcs:startIndex` parameter then a successful response **shall** contain only those `CoverageDescription` and `DatasetSeriesDescription` elements whose index in the result set is equal or higher than the value of the `startIndex` parameter.

A server is assumed to apply a consistent ordering to the result set.

> The response to a successful *DescribeEOCoverageSet* request **shall** report in its `numberMatched` attribute the sum of all matching `CoverageDescription` and `DatasetSeriesDescription` elements.

> 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.

> The response to a successful *DescribeEOCoverageSet* request **shall** report in its `startIndex` attribute the lowest index in the result set of all `CoverageDescription` and `DatasetSeriesDescription` elements returned.

> The response to a successful *DescribeEOCoverageSet* request **shall** report in its `next` attribute the URI to retrieve the next page of results as specified by the `count` and `startIndex` parameters. The `next` attribute **shall** only be present if elements with a higher index in the result set than the returned ones are available.

> The response to a successful *DescribeEOCoverageSet* request **shall** report in its `previous` attribute the URI to retrieve the previous page of results as specified by the `count` and `startIndex` parameters. The `previous` attribute **shall** only be present if elements with a lower index in the result set than the returned ones are available.

The specific format of the next and previous URIs is implementation dependent as are the details of how or if the server caches the results of an operation in order to be able to present them to the client one subset at a time.

The `count`, `startIndex`, `next`, and `previous` parameters used for paging are defined in the same way as in the OpenGIS Web Feature Service 2.0 Interface Standard [8].

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

```
<wcseo:EOCoverageSetDescription numberMatched="2" numberReturned="2"
startIndex="1">
  <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
`NoSuchDatasetSeriesOrCoverage`	404	The identifier passed does not match with any of the DatasetSeries or EO Coverages offered by this server	List of violating Dataset Series and/or EO Coverage identifiers

7.6. *GetEOCoverageSet* operation

7.6.1. Overview

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

Additionally, the *GetEOCoverageSet* request allows to submit simple processing like scaling, interpolation, output CRS, format, and actually applying the subsetting.

The response to a successful request on a Dataset Series consists of a (possibly empty) set of coverages of Datasets and Stitched Mosaics. The response to a successful request on a Stitched Mosaic consists of a (possibly empty) set of coverages 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.

Using the *GetEOCoverageSet* operation allows to retrieve entire or subsetted coverages in their native or any given format with limited processing like subsetting or scaling applied. To request advanced processing the *GetCoverage* operation may be used.

7.6.2. *GetEOCoverageSet* request

> A *GetEOCoverageSet* request **shall** consist of a structure as defined in Figure 10, Table 13 and the XML Schema being part of this standard.

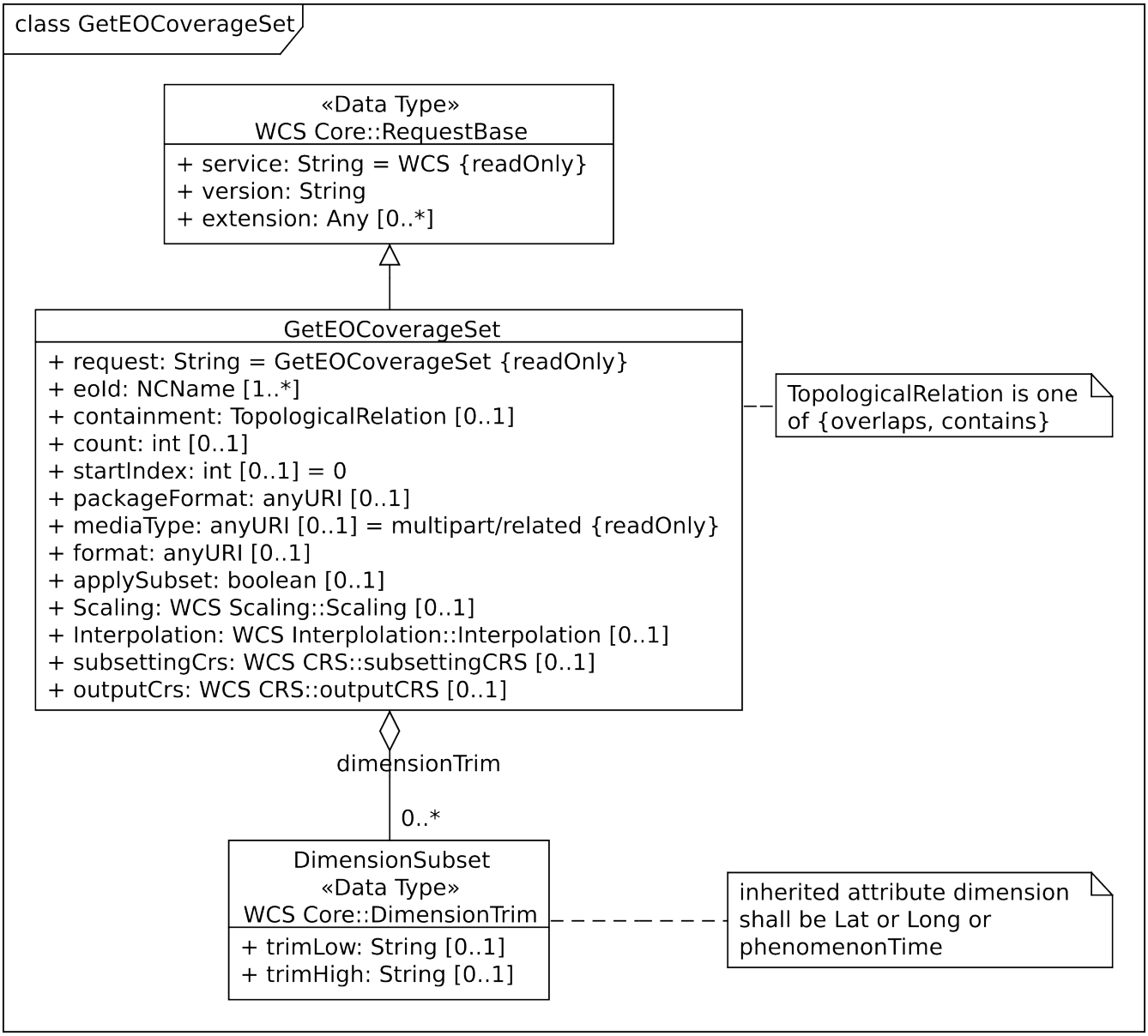

Figure 10. *GetEOCoverageSet* **request UML diagram**

Table 13. Components of `GetEOCoverageSet` operation request

Name	Definition	Data type	Multiplicity
`request`	Request name	`String` , fixed to "GetEOCoverageSet"	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)

Name	Definition	Data type	Multiplicity
`count`	Maximum number of `WCS::Coverage` elements to be included in the response	`Integer` greater than zero	zero or one (optional)
`startIndex`	Index within the result set from which the server shall begin presenting results in the response	`Integer` greater than or equal to zero. Default `0`	zero or one (optional)
`dimensionTrim`	trim specification, as per WCS Core [OGC 09-110r4] Subclause 8.4.1	`WCS::DimensionTrim`	zero or more (optional)
`packageFormat`	MIME type identifier of the format in which the coverages returned are to be packaged e.g., `application/x-gzip`	`anyURI`	zero or one (optional)
`mediaType`	If present, enforces a multipart encoding	`anyURI`, fixed to "`multipart/related`"	zero or one (optional)
`format`	MIME type identifier of the format in which the coverages returned are to be encoded	`anyURI`	zero or one (optional)
`applySubset`	Determining if the given subset should be applied to the coverages returned	`boolean`	zero or one (optional)
`Scaling`	Scaling to be applied to coverages returned	`scal:Scaling`	zero or one (optional)
`Interpolation`	Interpolation method to be applied on all axes during *GetEOCoverageSet* result preparation	`int:Interpolation`	zero or one (optional)
`subsettingCrs`	CRS Identifier indicating the CRS in which the request subsetting coordinates are expressed	`crs:subsettingCrs`	zero or one (optional)
`outputCrs`	CRS Identifier indicating the CRS of the result coverages	`crs:outputCrs`	zero or one (optional)

> Each `eoId` parameter value in a *GetEOCoverageSet* request **shall** be equal to the identifier of a Dataset, a Stitched Mosaic, or a Dataset Series offered by the server addressed.

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

> If a *GetEOCoverageSet* request contains a `containment` parameter then this parameter **shall** have one of the values "contains" or "overlaps".

The subsetting is interpreted similar to the *DescribeEOCoverageSet* operation. In addition alternative subsetting is allowed using the `subsettingCrs` parameter as defined by the WCS CRS Extension [OGC 11-053r1].

> If a *GetEOCoverageSet* request contains `dimensionTrim` elements with `dimension` parameters and no `subsettingCrs` element 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.

> A *GetEOCoverageSet* request **shall** use WGS84 [4] as spatial and ISO 8601 [2] as temporal CRS for the coordinates in trim requests if no `subsettingCrs` element is present.

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

The package encoding format in which the coverages are returned is specified by the combination of the `packageFormat` and `mediaType` parameters. Admissible values (i.e, package formats supported) are those listed in the server's Capabilities document. The default is the also reported in the server's Capabilities document.

> If a *GetCoverage* request contains a `packageFormat` parameter then this parameter **shall** contain a MIME type identifier occurring in some `wcseo:packageFormatSupported` element of the response to a successful *GetCapabilities* request to this server.

> If a *GetCoverage* request contains a `mediaType` parameter then this parameter shall contain a MIME type identifier of fixed value "`multipart/related`".

The encoding format in which the coverages themselves are returned is specified by the `format` parameter. Admissible values (i.e, formats supported) are those listed in the server's Capabilities document. Note that only one format applicable for all coverages

to be returned can be specified. Default is the coverage's Native Format of each coverage to be returned.

> If a *GetCoverage* request contains a `format` parameter then this parameter **shall** contain a MIME type identifier occurring in some `wcs:formatSupported` element of the response to a successful *GetCapabilities* request to this server.

A general scaling and interpolation can be requested that is equally applied to all coverages returned.

> If a *GetCoverage* request contains a `Scaling` parameter then this parameter **shall** follow the specification given in the WCS Scaling Extension [OGC 12-039].

> If a *GetCoverage* request contains a `Interpolation` parameter then this parameter **shall** follow the specification given in the WCS Interpolation Extension [OGC 12-049].

A general output CRS as well as CRS for subsetting can be requested that is equally applied to all coverages returned.

> If a *GetCoverage* request contains a `subsettingCrs` and/or `outputCrs` parameter then this parameter(s) **shall** follow the specification given in the WCS CRS Extension [OGC 11-053r1].

Example: The following XML instance shows a possible *GetEOCoverageSet* operation request:

```
<?xml version="1.0" encoding="UTF-8"?>
<wcseo:GetEOCoverageSet xmlns:wcseo="http://www.opengis.net/wcs/wcseo/1.1"
xmlns:wcs="http://www.opengis.net/wcs/2.0" xmlns:int=
"http://www.opengis.net/wcs/interpolation/1.0" xmlns:scal=
"http://www.opengis.net/wcs/scaling/1.0" xmlns:crs=
"http://www.opengis.net/wcs/crs/1.0" xmlns:xsi=
"http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation=
"http://www.opengis.net/wcs/wcseo/1.1
http://schemas.opengis.net/wcs/wcseo/1.1/wcsEOAll.xsd" service="WCS" version=
"2.0.1" count="100" startIndex="1">
  <wcseo:eoId>someDatasetSeries1</wcseo:eoId>
  <wcseo:containment>OVERLAPS</wcseo:containment>
  <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:packageFormat>application/x-gzip</wcseo:packageFormat>
  <wcseo:mediaType>multipart/related</wcseo:mediaType>
  <wcseo:format>image/tiff</wcseo:format>
  <wcseo:applySubset>true</wcseo:applySubset>
  <int:Interpolation>

<int:globalInterpolation>http://www.opengis.net/def/interpolation/OGC/1/nearest
-neighbor</int:globalInterpolation>
  </int:Interpolation>
  <scal:Scaling>
    <scal:ScaleByFactor>
      <scal:scaleFactor>2.0</scal:scaleFactor>
    </scal:ScaleByFactor>
  </scal:Scaling>
  <wcscrs:subsettingCrs>
http://www.opengis.net/def/crs/EPSG/0/4326</wcscrs:subsettingCrs>
  <wcscrs:outputCrs>
http://www.opengis.net/def/crs/EPSG/0/4326</wcscrs:outputCrs>
</wcseo:GetEOCoverageSet>
```

7.6.3. *GetEOCoverageSet* response

The response to a successful *GetEOCoverageSet* request consists of a (possibly empty) packaged set of EO Coverages. Each individual coverage itself is structured the same way as resulting from a *GetCoverage* request.

> The contents of the response to a successful *GetEOCoverageSet* request **shall** be encoded as specified by the `packageFormat` parameter, if this parameter is present in the request, and in the service's default package format as reported in the `wcseo:defaultPackageFormat` element of the Capabilities if this parameter is not present.

> The response to a successful *GetEOCoverageSet* request containing a `mediaType` parameter with value `multipart/related` **shall** consist of a `wcseo:EOCoverageSet` structure as defined in the XML Schema being part of this standard. The second part of the multipart response **shall** be encoded as specified by [/req/eowcs_geteocoverageset /getEOCoverageSet-packageFormat].

> The EO Coverages contained in the response to a successful *GetEOCoverageSet* request **shall** be encoded as specified by the `format` parameter, if this parameter is present, and in the coverage's Native Format if this parameter is not present.

The requirements defined for the *GetCoverage* response like containing EO Metadata or adding a lineage component apply to each EO Coverage included in a *GetEOCoverageSet* response package.

> Each EO Coverage contained in the response to a successful *GetEOCoverageSet* request **shall** adhere to the requirements defined for the *GetCoverage* response in subclause *GetCoverage* response.

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

> In the response to a successful *GetEOCoverageSet* request each EO Coverage referred to by one of the objects identified in the `eoId` request parameter **shall** appear at most once.

> The response to a successful *GetEOCoverageSet* request **shall** contain 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.

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 *GetEOCoverageSet* 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.

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 *GetEOCoverageSet* 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.

> The response to a successful *GetEOCoverageSet* request **shall** contain only 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 [4] if no `subsettingCrs` parameter is present.

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

> The response to a successful *GetEOCoverageSet* request **shall** contain only 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] if no `subsettingCrs` parameter is present.

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

> In a *GetEOCoverageSet* request, a trim specification omitted **shall** be interpreted as the actual boundary of the objects requested in the axis omitted.

> In a *GetEOCoverageSet* 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.

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

> In the response to a successful *GetEOCoverageSet* request the sum of `RectifiedDataset`, `ReferenceableDataset`, `RectifiedStitchedMosaic`, `ReferenceableStitchedMosaic`, and `DatasetSeries` 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.

The `count` parameter is used in the same ways as the `itemsPerPage` element in the OpenSearch Specification [7].

If a *GetEOCoverageSet* request contains a `wcs:startIndex` parameter then a successful response **shall** contain only those `RectifiedDataset`, `ReferenceableDataset`, `RectifiedStitchedMosaic`, `ReferenceableStitchedMosaic`, and `DatasetSeries` elements whose index in the result set is equal or higher than the value of the `startIndex` parameter.

A server is assumed to apply a consistent ordering to the result set.

The response to a successful *GetEOCoverageSet* request **shall** report in its `numberMatched` attribute the sum of all matching `RectifiedDataset`, `ReferenceableDataset`, `RectifiedStitchedMosaic`, `ReferenceableStitchedMosaic`, and `DatasetSeries` elements.

The response to a successful *GetEOCoverageSet* request **shall** report in its `numberReturned` attribute the sum of all `RectifiedDataset`, `ReferenceableDataset`, `RectifiedStitchedMosaic`, `ReferenceableStitchedMosaic`, and `DatasetSeries` elements included in the response.

The response to a successful *GetEOCoverageSet* request **shall** report in its `startIndex` attribute the lowest index in the result set of all `RectifiedDataset`, `ReferenceableDataset`, `RectifiedStitchedMosaic`, `ReferenceableStitchedMosaic`, and `DatasetSeries` elements returned.

The response to a successful *GetEOCoverageSet* request **shall** report in its `next` attribute the URI to retrieve the next page of results as specified by the `count` and `startIndex` parameters. The `next` attribute **shall** only be present if elements with a higher index in the result set than the returned ones are available.

The response to a successful *GetEOCoverageSet* request **shall** report in its `previous` attribute the URI to retrieve the previous page of results as specified by the `count` and `startIndex` parameters. The `previous` attribute **shall** only be present if elements with a lower index in the result set than the returned ones are available.

The specific format of the next and previous URIs is implementation dependent as are the details of how or if the server caches the results of an operation in order to be able to present them to the client one subset at a time.

The `count`, `startIndex`, `next`, and `previous` parameters used for paging are defined in the same way as in the OpenGIS Web Feature Service 2.0 Interface Standard [8].

The spatial subsetting requested may be applied to the EO Coverages to be returned. Default is to respond with entire coverages.

> Each EO Coverage contained in the response to a successful *GetEOCoverageSet* request containing an `applySubset` parameter with value `true` **shall** be subsetted as specified by the *crs-gridded-coverage* conformance class of the WCS CRS Extension [OGC 11-053r1].

A requested general scaling and interpolation is equally applied to all coverages returned.

> If a *GetCoverage* request contains a `Scaling` parameter then this parameter **shall** be applied individually to each EO Coverage to be returned as specified by the WCS Scaling Extension [OGC 12-039].

> If a *GetCoverage* request contains a `Interpolation` parameter then this parameter **shall** be applied individually to each EO Coverage to be returned as specified by the WCS Interpolation Extension [OGC 12-049].

A requested general output CRS as well as CRS for subsetting is equally applied to all coverages returned.

> If a *GetCoverage* request contains a `subsettingCrs` and/or `outputCrs` parameter then this parameter(s) **shall** be applied individually to each EO Coverage to be returned as specified by the WCS CRS Extension [OGC 11-053r1].

Example: The following XML fragment shows parts of the first part of a possible `GetEOCoverageSet` operation multipart response:

```
<?xml version="1.0" encoding="UTF-8"?>
<wcseo:EOCoverageSet numberMatched="3" numberReturned="3" startIndex="1"
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/1.1" 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/1.1
```

```
http://schemas.opengis.net/wcs/wcseo/1.1/wcsEOAll.xsd">
  <wcseo:RectifiedDataset gml:id="someEOCoverage1">
    <gml:boundedBy>
      ...
    </gml:boundedBy>
    <gml:domainSet>
      ...
    </gml:domainSet>
    <gml:rangeSet>
      <gml:File>
        <gml:rangeParameters xlink:arcrole="fileReference" xlink:href=
"cid:coverage/someEOCoverage1.tif" xlink:role=
"http://www.opengis.net/spec/GMLCOV_geotiff-coverages/1.0/conf/geotiff-
coverage" />
        <gml:fileReference>cid:coverage/someEOCoverage1.tif</gml:fileReference>
        <gml:fileStructure />
        <gml:mimeType>image/tiff</gml:mimeType>
      </gml:File>
    </gml:rangeSet>
    <gmlcov:rangeType>
      ...
    </gmlcov:rangeType>
    <gmlcov:metadata>
      <gmlcov:Extension>
        <wcseo:EOMetadata>
          <eop:EarthObservation gml:id="eop_someEOCoverage1">
            ...
          </eop:EarthObservation>
          <wcseo:lineage>
            <wcseo:referenceGetEOCoverageSet>
              <ows:Reference xlink:href="
http://www.someWCS.org?SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetEOCoverageS
et&amp;EOID=someDatasetSeries1&amp;PACKAGEFORMAT=application/metalink4+xml&amp;
MEDIATYPE=multipart/related" />
            </wcseo:referenceGetEOCoverageSet>
            <gml:timePosition>2016-05-17T12:25:40Z</gml:timePosition>
          </wcseo:lineage>
        </wcseo:EOMetadata>
      </gmlcov:Extension>
    </gmlcov:metadata>
  </wcseo:RectifiedDataset>
  <wcseo:RectifiedDataset gml:id="someEOCoverage2">
    <gml:boundedBy>
      ...
    </gml:boundedBy>
    <gml:domainSet>
      ...
```

```
    </gml:domainSet>
    <gml:rangeSet>
      <gml:File>
        <gml:rangeParameters xlink:arcrole="fileReference" xlink:href=
"cid:coverage/someEOCoverage2.tif" xlink:role=
"http://www.opengis.net/spec/GMLCOV_geotiff-coverages/1.0/conf/geotiff-
coverage" />
        <gml:fileReference>cid:coverage/someEOCoverage2.tif</gml:fileReference>
        <gml:fileStructure />
        <gml:mimeType>image/tiff</gml:mimeType>
      </gml:File>
    </gml:rangeSet>
    <gmlcov:rangeType>
      ...
    </gmlcov:rangeType>
    <gmlcov:metadata>
      <gmlcov:Extension>
        <wcseo:EOMetadata>
          <eop:EarthObservation gml:id="eop_someEOCoverage2">
            ...
          </eop:EarthObservation>
          <wcseo:lineage>
            <wcseo:referenceGetEOCoverageSet>
              <ows:Reference xlink:href="
http://www.someWCS.org?SERVICE=WCS&amp;amp;VERSION=2.0.1&amp;amp;REQUEST=GetEOCoverageS
et&amp;amp;EOID=someDatasetSeries1&amp;amp;PACKAGEFORMAT=application/metalink4+xml&amp;amp;
MEDIATYPE=multipart/related" />
            </wcseo:referenceGetEOCoverageSet>
            <gml:timePosition>2016-05-17T12:25:40Z</gml:timePosition>
          </wcseo:lineage>
        </wcseo:EOMetadata>
      </gmlcov:Extension>
    </gmlcov:metadata>
  </wcseo:RectifiedDataset>
  <wcseo:DatasetSeries>
    <wcseo:DatasetSeriesId>someDatasetSeries1</wcseo:DatasetSeriesId>
    <eop:Footprint gml:id="footprint_someDatasetSeries1">
      ...
    </eop:Footprint>
    <gml:TimePeriod gml:id="someDatasetSeries1_timeperiod">
      ...
    </gml:TimePeriod>
    <ows:Metadata>
      <wcseo:EOMetadata>
        <ows:Reference xlink:href="http://www.someCatalogue.org/eop-metadata-
from-someDatasetSeries1" xlink:role="http://standards.iso.org/iso/19115/-
3/mdb/1.0" xlink:title="ISO 19115-3 Metadata" />
```

```
        <wcseo:lineage>
          <wcseo:referenceGetEOCoverageSet>
            <ows:Reference xlink:href="http://www.someWCS.org?SERVICE=WCS
&amp;VERSION=2.0.1&amp;REQUEST=GetEOCoverageSet&amp;EOID=someDatasetSeries1&amp
;PACKAGEFORMAT=application/metalink4+xml&amp;MEDIATYPE=multipart/related" />
          </wcseo:referenceGetEOCoverageSet>
          <gml:timePosition>2016-05-17T12:25:40Z</gml:timePosition>
        </wcseo:lineage>
      </wcseo:EOMetadata>
    </ows:Metadata>
    <wcseo:rectifiedDataset>
      <wcs:CoverageId>someEOCoverage1</wcs:CoverageId>
    </wcseo:rectifiedDataset>
    <wcseo:rectifiedDataset>
      <wcs:CoverageId>someEOCoverage2</wcs:CoverageId>
    </wcseo:rectifiedDataset>
  </wcseo:DatasetSeries>
</wcseo:EOCoverageSet>
```

7.6.4. *GetEOCoverageSet* exceptions

Table 14. Exception codes for GetEOCoverageSet operation

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

Chapter 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

> Implementations of this EO-WCS **shall** support the OGC® Web Coverage Service Interface Standard - 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

> Implementations of this EO-WCS **shall** support the OGC® Web Coverage Service Interface Standard - Scaling Extension [OGC 12-039].
> **Dependency**: http://www.opengis.net/spec/WCS_service-extension_scaling/1.0/conf/scaling

8.4. Interpolation

> Implementations of this EO-WCS **shall** support the OGC® Web Coverage Service Interface Standard - Interpolation Extension [OGC 12-049].
> **Dependency**: http://www.opengis.net/spec/WCS_service-extension_interpolation/1.0/conf/interpolation

8.5. CRSs

> Implementations of this EO-WCS **shall** support the OGC® Web Coverage Service Interface Standard - CRS Extension [OGC 11-053r1].
> **Dependency**: http://www.opengis.net/spec/WCS_service-extension_crs/1.0/conf/crs

8.6. Coverage format encodings

Implementations of this EO-WCS **shall** support at least one of the coverage format encodings GeoTIFF [OGC 12-100r1], NetCDF [OGC 14-100r2], and JPEG2000 [OGC 12-108].
Dependency: http://www.opengis.net/spec/GMLCOV_geotiff-coverages/1.0/conf/geotiff-coverage, http://www.opengis.net/spec/netCDF_data-model/conf/CF-netCDF-1.6-GML-encoding, http://www.opengis.net/spec/netCDF_data-model/conf/CF-netCDF-1.6-Data-format, http://www.opengis.net/spec/netCDF_data-model/conf/CF-netCDF-1.6-Multipart-encoding, http://www.opengis.net/spec/gmlcov_jpeg2000-coverages/1.0/conf/jpeg2000-coverage

Chapter 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.

> 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/1.1/conf/eowcs_get-kvp, http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/conf/eowcs_soap

9.2. GET-KVP protocol conformance class

9.2.1. WCS GET/KVP encoding

> 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

> 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/1.1/conf/eowcs_get-kvp

9.2.2. *DescribeEOCoverageSet* GET/KVP encoding

> The `request` parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows:
> `request=DescribeEOCoverageSet`

> The `eoId` parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows, for parameter values v_1, ..., v_n:
> $\texttt{eoid=}v_1\texttt{,}\cdots\texttt{,}v_n$

> The `containment` parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows:
> `containment=overlaps`
> or
> `containment=contains`

> The `count` parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows, for positive integer value *x*:
> `count=x`

> The `startIndex` parameter of a *DescribeEOCoverageSet* request **shall** be indicated as follows, for positive integer value *x*:
> `startindex=x`

> The `trim` parameters 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 follows 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].

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.

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")
```

9.2.3. *GetEOCoverageSet* GET/KVP encoding

> The `request` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows:
> `request=GetEOCoverageSet`

> The `eoId` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows, for parameter values v_1, ..., v_n:
> `eoid=`v_1`,⋯,`v_n

> The `containment` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows:
> `containment=overlaps`
> or
> `containment=contains`

> The `count` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows, for positive integer value *x*:
> `count=x`

> The `startIndex` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows, for positive integer value *x*:
> `startindex=x`

> The `packageFormat` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows, for parameter value v_1:
> `packageformat=`v_1

> The `mediaType` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows:
> `mediatype=multipart/related`

> The `format` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows, for parameter value v_1:
> `format=`v_1

> The `applySubset` parameter of a *GetEOCoverageSet* request **shall** be indicated as follows:
> `applysubset=true`
> or
> `applysubset=false`

> The `Scaling`, `Interpolation`, `subsettingCrs`, and `outputCrs` parameters of a *GetEOCoverageSet* request **shall** be indicated as defined in the respective WCS extension.

> The `trim` parameters of a *GetEOCoverageSet* 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 follows 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].

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.

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

9.3. SOAP protocol conformance class

9.3.1. WCS SOAP encoding

> 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

> 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/1.1/conf/eowcs_soap

9.3.2. *DescribeEOCoverageSet* SOAP encoding

> A *DescribeEOCoverageSet* request **shall** contain exactly one `Body` element containing exactly one `DescribeEOCoverageSet` element.

> 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.xml` and `wcseo_responseDescribeEOCoverageSet.xml` being part of this standard.

9.3.3. *DescribeEOCoverageSet* 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.

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

9.3.4. *GetEOCoverageSet* SOAP encoding

> A *GetEOCoverageSet* request **shall** contain exactly one `Body` element containing exactly one `GetEOCoverageSet` element.

> In the response to a successful *GetEOCoverageSet* request, the SOAP `Envelope` **shall** contain exactly one `Body` element which contains a `EOWCS::EOCoverageSet` as its single element.

Example: See files `wcseo_requestGetEOCoverageSet.xml` and `wcseo_responseGetEOCoverageSet.xml` being part of this standard.

9.3.5. *GetEOCoverageSet* 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.

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
- [7] OpenSearch Specification, 1.1, Draft 5
- [8] OGC 09-025r2, OpenGIS Web Feature Service 2.0 Interface Standard - With Corrigendum, version 2.0.2

Annex A: (normative) Abstract test suite

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

Tests identifiers below are relative to: http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/

A.1. Conformance Test Classes: eowcs & eowcs_geteocoverageset

The OGC URI identifier of this conformance classes are:
http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/conf/eowcs
http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/conf/eowcs_geteocoverageset

A.1.1. EO Metadata

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

Test Purpose: Requirement 1 /req/eowcs/eo-metadata-structure

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 2 /req/eowcs/footprint-in-eo-metadata

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 3 /req/eowcs/eo-coverage-structure

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 4 /req/eowcs/eo-metadata-in-eo-coverage

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` 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 5 /req/eowcs/eop-identifier-in-eo-metadata

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/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 6 /req/eowcs/footprint-inside-boundedBy

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 7 /req/eowcs/phenomenonTime-in-eo-metadata

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:beginPosition` and `eop:EarthObservation/om:phenomenonTime/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 8 /req/eowcs/phenomenonTime-iso8601**

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 9 /req/eowcs/range-set-of-eo-coverage**

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 10 /req/eowcs/dataset-structure**

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 11 /req/eowcs/referenceableStitchedMosaic-structure**

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 12 /req/eowcs/rectifiedStitchedMosaic-structure**

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 13 /req/eowcs/composedOf-in-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 14 /req/eowcs/contributingFootprint-inside-footprint

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 contributingFootprint 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/contributingFootprint-pairwise-disjoint

Test Purpose: Requirement 15 /req/eowcs/contributingFootprint-pairwise-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 16 /req/eowcs/contributingFootprint-union-of-footprints

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 17 /req/eowcs/dataset-domain-set-in-stitched-mosaic-domain-set

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 18 /req/eowcs/datasets-in-rectifiedStitcheMosaic-same-offsetVector

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 19 /req/eowcs/rectifiedStitchedMosaic-offsetVector

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 20 /req/eowcs/referenceableStitchedMosaic-domain-set

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 21 /req/eowcs/temporal-validity-stitched-mosaic

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 22 /req/eowcs/datasets-in-stitched-mosaic-same-range-type

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 23 /req/eowcs/nil-values-in-stitched-mosaic

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 24 /req/eowcs/range-values-of-stitched-mosaic

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 25 /req/eowcs/datasetSeries-structure

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 26 /req/eowcs/footprint-in-datasetSeries

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 27 /req/eowcs/timePeriod-in-datasetSeries

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. Metadata in DatasetSeries

Test id: /conf/eowcs/metadata-in-datasetSeries

Test Purpose: Requirement 28 /req/eowcs/metadata-in-datasetSeries

Test method:

TODO

A.1.29. No circular references of Dataset Series

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

Test Purpose: Requirement 29 /req/eowcs/nocircularreference-of-datasetSeries

Test method:

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

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

Test passes if all individual tests pass.

A.1.30. GetCapabilities Request Sections

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

Test Purpose: Requirement 30 /req/eowcs/getCapabilities-request-sections

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.1.31. GetCapabilities Response *eowcs* Conformance Class in Profile

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

Test Purpose: **Requirement 31 /req/eowcs/getCapabilities-response-conformance-class-in-profile**

Test method:

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

A.1.32. GetCapabilities Response *eowcs_geteocoverageset* Conformance Class in Profile

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

Test Purpose: **Requirement 32 /req/eowcs_geteocoverageset/getCapabilities-response-conformance-class-in-profile**

Test method:

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

A.1.33. GetCapabilities Response Structure

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

Test Purpose: **Requirement 33 /req/eowcs/getCapabilities-response-structure**

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.1.34. GetCapabilities Response DatasetSeriesSummary

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

Test Purpose: **Requirement 34 /req/eowcs/getCapabilities-response-datasetSeriesSummary**

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.1.35. GetCapabilities Response DatasetSeriesSummary no-duplicates

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

Test Purpose: Requirement 35 /req/eowcs/getCapabilities-response-datasetSeriesSummary-no-duplicates

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.1.36. GetCapabilities Response Coverage Summary

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

Test Purpose: Requirement 36 /req/eowcs/getCapabilities-response-coverageSummary

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.1.37. GetCapabilities Response Coverage Summary Section

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

Test Purpose: Requirement 37 /req/eowcs/getCapabilities-response-coverageSummary-section

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.1.38. GetCapabilities Response DatasetSeries Summary Section

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

Test Purpose: Requirement 38 /req/eowcs/getCapabilities-response-datasetSeriesSummary-section

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.1.39. GetCapabilities Response Coverage Subtype

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

Test Purpose: Requirement 39 /req/eowcs/getCapabilities-response-coverageSubtype

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.1.40. GetCapabilities Response countDefault

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

Test Purpose: Requirement 40 /req/eowcs/getCapabilities-response-countDefault

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.1.41. GetCapabilities Response pagingSupported

Test id: /conf/eowcs/getCapabilities-response-paging-supported

Test Purpose: Requirement 41 /req/eowcs/getCapabilities-response-paging-supported

Test method:

TODO

A.1.42. GetCapabilities Response wcseoMetadata

Test id: /conf/eowcs_geteocorageset/getCapabilities-response-wcseoMetadata

Test Purpose: Requirement 42 /req/eowcs_geteocorageset/getCapabilities-response-wcseoMetadata

Test method:

TODO

A.1.43. DescribeEOCoverageSet Response defaultPackageFormat

Test id: /conf/eowcs_geteocoverageset/getCapabilities-response-defaultPackageFormat

Test Purpose: Requirement 43 /req/eowcs_geteocoverageset/getCapabilities-response-defaultPackageFormat

Test method:

TODO

A.1.44. GetCapabilities Response packageFormatSupported

Test id: /conf/eowcs_geteocoverageset/getCapabilities-response-packageFormatSupported

Test Purpose: Requirement 44 /req/eowcs_geteocoverageset/getCapabilities-response-packageFormatSupported

Test method:

TODO

A.1.45. Describe Coverage Response EO Metadata

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

Test Purpose: Requirement 45 /req/eowcs/describeCoverage-response-eo-metadata

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.1.46. Describe Coverage Response Coverage Subtype

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

Test Purpose: Requirement 46 /req/eowcs/describeCoverage-response-coverageSubtype

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.1.47. GetCoverage Request no Slicing

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

Test Purpose: Requirement 47 /req/eowcs/getCoverage-request-no-slicing

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.1.48. GetCoverage Response Coverage Type

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

Test Purpose: Requirement 48 /req/eowcs/getCoverage-response-coverage-type

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.1.49. GetCoverage Response EO Metadata

Test id: /conf/eowcs/getCoverage-response-eo-metadata

Test Purpose: Requirement 49 /req/eowcs/getCoverage-response-eo-metadata

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.1.50. GetCoverage Response EO Metadata in Stitched Mosaic

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

Test Purpose: Requirement 50 /req/eowcs/getCoverage-response-eo-metadata-in-stitched-mosaic

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.1.51. GetCoverage Response Footprint in EO Metadata

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

Test Purpose: Requirement 51 /req/eowcs/getCoverage-response-footprint-in-eo-metadata

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.1.52. GetCoverage Response Lineage in EO Metadata

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

Test Purpose: Requirement 52 /req/eowcs/getCoverage-response-lineage-in-eo-metadata

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.1.53. DescribeEOCoverageSet Request Structure

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

Test Purpose: Requirement 53 /req/eowcs/describeEOCoverageSet-request-structure

Test method:

Send *DescribeEOCoverageSet* requests with valid and invalid request structure.

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

A.1.54. DescribeEOCoverageSet Request Sections

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

Test Purpose: Requirement 54 /req/eowcs/describeEOCoverageSet-request-sections

Test method:

Send otherwise valid *DescribeEOCoverageSet* requests containing a `sections` element and this element containing one of the values:

- "CoverageDescription"
- "DatasetSeriesDescriptions"
- "All"
- invalid values

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

A.1.55. DescribeEOCoverageSet Request eoId

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

Test Purpose: **Requirement 55 /req/eowcs/describeEOCoverageSet-request-eoId**

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.1.56. DescribeEOCoverageSet Request Containment

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

Test Purpose: **Requirement 56 /req/eowcs/describeEOCoverageSet-request-containment**

Test method:

Send otherwise valid *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.1.57. DescribeEOCoverageSet Request Dimension

Test id: /conf/eowcs/describeEOCoverageSet-request-dimensions

Test Purpose: **Requirement 57 /req/eowcs/describeEOCoverageSet-request-dimensions**

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.1.58. DescribeEOCoverageSet Request CRS

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

Test Purpose: **Requirement 58 /req/eowcs/describeEOCoverageSet-request-crs**

Test method:

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

- WGS84 [4] as spatial and ISO8601 [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.1.59. DescribeEOCoverageSet Response Structure

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

Test Purpose: Requirement 59 /req/eowcs/describeEOCoverageSet-response-structure

Test method:

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

A.1.60. DescribeEOCoverageSet Response EO Metadata

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

Test Purpose: Requirement 60 /req/eowcs/describeEOCoverageSet-response-eo-metadata

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.1.61. DescribeEOCoverageSet Response EO Section CoverageDescriptions

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

Test Purpose: Requirement 61 /req/eowcs/describeEOCoverageSet-response-section-coverageDescriptions

Test method:

Send otherwise valid *DescribeEOCoverageSet* requests 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.1.62. DescribeEOCoverageSet Response EO Section DatasetSeriesDescriptions

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

Test Purpose: Requirement 62 /req/eowcs/describeEOCoverageSet-response-section-datasetSeriesDescriptions

Test method:

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

- "DatasetSeriesDescriptions"
- "All"
- invalid values

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

A.1.63. DescribeEOCoverageSet Response eoId

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

Test Purpose: Requirement 63 /req/eowcs/describeEOCoverageSet-response-eoId

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.1.64. DescribeEOCoverageSet Response Referred

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

Test Purpose: Requirement 64 /req/eowcs/describeEOCoverageSet-response-referred

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 elements 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.1.65. DescribeEOCoverageSet Response Containment

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

Test Purpose: Requirement 65 /req/eowcs/describeEOCoverageSet-response-containment

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.1.66. DescribeEOCoverageSet Response PhenomenonTime

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

Test Purpose: Requirement 66 /req/eowcs/describeEOCoverageSet-response-phenomenonTime

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.1.67. DescribeEOCoverageSet Response Trim Omitted

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

Test Purpose: Requirement 67 /req/eowcs/describeEOCoverageSet-response-trim-omitted

Test method:

Send otherwise valid *DescribeEOCoverageSet* requests 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.1.68. DescribeEOCoverageSet Response Bound Omitted

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

Test Purpose: Requirement 68 /req/eowcs/describeEOCoverageSet-response-bound-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.1.69. DescribeEOCoverageSet Response CoverageSubtype

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

Test Purpose: Requirement 69 /req/eowcs/describeEOCoverageSet-response-coverageSubtype

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.1.70. DescribeEOCoverageSet Response Count

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

Test Purpose: Requirement 70 /req/eowcs/describeEOCoverageSet-response-count

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.1.71. DescribeEOCoverageSet Response startIndex

Test id: /conf/eowcs/describeEOCoverageSet-response-startIndex

Test Purpose: Requirement 71 /req/eowcs/describeEOCoverageSet-response-startIndex

Test method:

TODO

A.1.72. DescribeEOCoverageSet Response numberMatched attribute

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

Test Purpose: Requirement 72 /req/eowcs/describeEOCoverageSet-response-numberMatched

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.1.73. DescribeEOCoverageSet Response numberReturned attribute

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

Test Purpose: Requirement 73 /req/eowcs/describeEOCoverageSet-response-numberReturned

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.1.74. DescribeEOCoverageSet Response startIndex attribute

Test id: /conf/eowcs/describeEOCoverageSet-response-startIndex-attr

Test Purpose: Requirement 74 /req/eowcs/describeEOCoverageSet-response-startIndex-attr

Test method:

TODO

A.1.75. DescribeEOCoverageSet Response next attribute

Test id: /conf/eowcs/describeEOCoverageSet-response-next

Test Purpose: Requirement 75 /req/eowcs/describeEOCoverageSet-response-next

Test method:

TODO

A.1.76. DescribeEOCoverageSet Response previous attribute

Test id: /conf/eowcs/describeEOCoverageSet-response-previous

Test Purpose: Requirement 76 /req/eowcs/describeEOCoverageSet-response-previous

Test method:

TODO

A.1.77. GetEOCoverageSet Request Structure

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-request-structure

Test Purpose: Requirement 77 /req/eowcs_geteocoverageset/getEOCoverageSet-request-structure

Test method:

TODO

A.1.78. GetEOCoverageSet Request eoId

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-request-eoId

Test Purpose: Requirement 78 /req/eowcs_geteocoverageset/getEOCoverageSet-request-eoId

Test method:

TODO

A.1.79. GetEOCoverageSet Request Containment

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-request-containment

Test Purpose: Requirement 79 /req/eowcs_geteocoverageset/getEOCoverageSet-request-containment

Test method:

TODO

A.1.80. GetEOCoverageSet Request Dimensions

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-request-dimensions

Test Purpose: Requirement 80 /req/eowcs_geteocoverageset/getEOCoverageSet-request-dimensions

Test method:

TODO

A.1.81. GetEOCoverageSet Request CRS

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-request-crs

Test Purpose: Requirement 81 /req/eowcs_geteocoverageset/getEOCoverageSet-request-crs

Test method:

TODO

A.1.82. GetEOCoverageSet Request packageFormat

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-acceptable-packageFormat

Test Purpose: Requirement 82 /req/eowcs_geteocoverageset/getEOCoverageSet-

acceptable-packageFormat

Test method:

TODO

A.1.83. GetEOCoverageSet Request mediaType

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-acceptable-mediaType

Test Purpose: Requirement 83 /req/eowcs_geteocorageset/getEOCoverageSet-acceptable-mediaType

Test method:

TODO

A.1.84. GetEOCoverageSet Request Format

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-acceptable-format

Test Purpose: Requirement 84 /req/eowcs_geteocorageset/getEOCoverageSet-acceptable-format

Test method:

TODO

A.1.85. GetEOCoverageSet Request Scaling

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-acceptable-scaling

Test Purpose: Requirement 85 /req/eowcs_geteocorageset/getEOCoverageSet-acceptable-scaling

Test method:

TODO

A.1.86. GetEOCoverageSet Request Interpolation

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-acceptable-interpolation

Test Purpose: Requirement 86 /req/eowcs_geteocorageset/getEOCoverageSet-acceptable-interpolation

Test method:

TODO

A.1.87. GetEOCoverageSet Request CRSs

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-acceptable-crss

Test Purpose: Requirement 87 /req/eowcs_geteocoverageset/getEOCoverageSet-acceptable-crss

Test method:

TODO

A.1.88. GetEOCoverageSet Response packageFormat

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-packageFormat

Test Purpose: Requirement 88 /req/eowcs_geteocoverageset/getEOCoverageSet-packageFormat

Test method:

TODO

A.1.89. GetEOCoverageSet Response mediaType

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-mediaType

Test Purpose: Requirement 89 /req/eowcs_geteocoverageset/getEOCoverageSet-mediaType

Test method:

TODO

A.1.90. GetEOCoverageSet Response Format

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-format

Test Purpose: Requirement 90 /req/eowcs_geteocoverageset/getEOCoverageSet-format

Test method:

TODO

A.1.91. GetEOCoverageSet Response GetCoverage Applicable

Test id: /conf/eowcs_geteocoverageset/getEOCoverageSet-getCoverage

Test Purpose: Requirement 91 /req/eowcs_geteocoverageset/getEOCoverageSet-getCoverage

Test method:

TODO

A.1.92. GetEOCoverageSet Response eoId

Test id: /conf/eowcs/getEOCoverageSet-response-eoId

Test Purpose: Requirement 92 /req/eowcs/getEOCoverageSet-response-eoId

Test method:

TODO

A.1.93. GetEOCoverageSet Response Referred

Test id: /conf/eowcs/getEOCoverageSet-response-referred

Test Purpose: Requirement 93 /req/eowcs/getEOCoverageSet-response-referred

Test method:

TODO

A.1.94. GetEOCoverageSet Response Containment

Test id: /conf/eowcs/getEOCoverageSet-response-containment

Test Purpose: Requirement 94 /req/eowcs/getEOCoverageSet-response-containment

Test method:

TODO

A.1.95. GetEOCoverageSet Response phenomenonTime

Test id: /conf/eowcs/getEOCoverageSet-response-phenomenonTime

Test Purpose: Requirement 95 /req/eowcs/getEOCoverageSet-response-phenomenonTime

Test method:

TODO

A.1.96. GetEOCoverageSet Response Trim Omitted

Test id: /conf/eowcs/getEOCoverageSet-response-trim-omitted

Test Purpose: Requirement 96 /req/eowcs/getEOCoverageSet-response-trim-omitted

Test method:

TODO

A.1.97. GetEOCoverageSet Response Bound Omitted

Test id: /conf/eowcs/getEOCoverageSet-response-bound-omitted

Test Purpose: Requirement 97 /req/eowcs/getEOCoverageSet-response-bound-omitted

Test method:

TODO

A.1.98. GetEOCoverageSet Response Count

Test id: /conf/eowcs/getEOCoverageSet-response-count

Test Purpose: Requirement 98 /req/eowcs/getEOCoverageSet-response-count

Test method:

TODO

A.1.99. GetEOCoverageSet Response startIndex

Test id: /conf/eowcs/getEOCoverageSet-response-startIndex

Test Purpose: Requirement 99 /req/eowcs/getEOCoverageSet-response-startIndex

Test method:

TODO

A.1.100. GetEOCoverageSet Response numberMatched attribute

Test id: /conf/eowcs/getEOCoverageSet-response-numberMatched

Test Purpose: Requirement 100 /req/eowcs/getEOCoverageSet-response-numberMatched

Test method:

TODO

A.1.101. GetEOCoverageSet Response numberReturned attribute

Test id: /conf/eowcs/getEOCoverageSet-response-numberReturned

Test Purpose: Requirement 101 /req/eowcs/getEOCoverageSet-response-numberReturned

Test method:

TODO

A.1.102. GetEOCoverageSet Response startIndex attribute

Test id: /conf/eowcs/getEOCoverageSet-response-startIndex-attr

Test Purpose: Requirement 102 /req/eowcs/getEOCoverageSet-response-startIndex-attr

Test method:

TODO

A.1.103. GetEOCoverageSet Response next attribute

Test id: /conf/eowcs/getEOCoverageSet-response-next

Test Purpose: Requirement 103 /req/eowcs/getEOCoverageSet-response-next

Test method:

TODO

A.1.104. GetEOCoverageSet Response previous attribute

Test id: /conf/eowcs/getEOCoverageSet-response-previous

Test Purpose: Requirement 104 /req/eowcs/getEOCoverageSet-response-previous

Test method:

TODO

A.1.105. GetEOCoverageSet Response applySubset

Test id: /conf/eowcs/getEOCoverageSet-response-applySubset

Test Purpose: Requirement 105 /req/eowcs/getEOCoverageSet-response-applySubset

Test method:

TODO

A.1.106. GetEOCoverageSet Response Scaling

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-scaling

Test Purpose: Requirement 106 /req/eowcs_geteocorageset/getEOCoverageSet-scaling

Test method:

TODO

A.1.107. GetEOCoverageSet Response Interpolation

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-interpolation

Test Purpose: Requirement 107 /req/eowcs_geteocorageset/getEOCoverageSet-interpolation

Test method:

TODO

A.1.108. GetEOCoverageSet Response CRSs

Test id: /conf/eowcs_geteocorageset/getEOCoverageSet-crss

Test Purpose: Requirement 108 /req/eowcs_geteocorageset/getEOCoverageSet-crss

Test method:

TODO

A.1.109. Band Subsetting

Test id: /conf/eowcs/band-subsetting

Test Purpose: Requirement 109 /req/eowcs/band-subsetting

Test method:

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

A.1.110. Scaling

Test id: /conf/eowcs/scaling

Test Purpose: **Requirement 110 /req/eowcs/scaling**

Test method:

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

A.1.111. Interpolation

Test id: /conf/eowcs/interpolation

Test Purpose: **Requirement 111 /req/eowcs/interpolation**

Test method:

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

A.1.112. CRS

Test id: /conf/eowcs/crs

Test Purpose: **Requirement 112 /req/eowcs/crs**

Test method:

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

A.1.113. Encodings

Test id: /conf/eowcs/encodings

Test Purpose: **Requirement 113 /req/eowcs/encodings**

Test method:

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

A.1.114. Protocol-bindings

Test id: /conf/eowcs/protocol-bindings

Test Purpose: **Requirement 114 /req/eowcs/protocol-bindings**

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

The OGC URI identifier of this conformance class is: http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/conf/eowcs_get-kvp

A.2.1. eowcs_get-kvp/Mandatory

Test id: /conf/eowcs_get-kvp/mandatory

Test Purpose: Requirement 115 /req/eowcs_get-kvp/mandatory

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_get-kvp/conformance-class-in-profile

Test Purpose: Requirement 116 /req/eowcs_get-kvp/conformance-class-in-profile

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_get-kvp/describeEOCoverageSet-request

Test Purpose: Requirement 117 /req/eowcs_get-kvp/describeEOCoverageSet-request

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_get-kvp/describeEOCoverageSet-eoid

Test Purpose: Requirement 118 /req/eowcs_get-kvp/describeEOCoverageSet-eoid

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_get-kvp/describeEOCoverageSet-containment

Test Purpose: Requirement 119 /req/eowcs_get-kvp/describeEOCoverageSet-containment

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 count

Test id: /conf/eowcs_get-kvp/describeEOCoverageSet-count

Test Purpose: Requirement 120 /req/eowcs_get-kvp/describeEOCoverageSet-count

Test method:

TODO

A.2.7. eowcs_get-kvp/describeEOCoverageSet startIndex

Test id: /conf/eowcs_get-kvp/describeEOCoverageSet-startIndex

Test Purpose: Requirement 121 /req/eowcs_get-kvp/describeEOCoverageSet-startIndex

Test method:

TODO

A.2.8. eowcs_get-kvp/describeEOCoverageSet Subset

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

Test Purpose: Requirement 122 /req/eowcs_get-kvp/describeEOCoverageSet-subset

Test method:

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

A.2.9. eowcs_get-kvp/getEOCoverageSet request

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-request

Test Purpose: Requirement 123 /req/eowcs_get-kvp/getEOCoverageSet-request

Test method:

Send a valid get-kvp *GetEOCoverageSet* request as defined. Check that the response is not an exception.

A.2.10. eowcs_get-kvp/getEOCoverageSet eoid

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-eoid

Test Purpose: Requirement 124 /req/eowcs_get-kvp/getEOCoverageSet-eoid

Test method:

Send a valid get-kvp *GetEOCoverageSet* request as defined. Check that the response is not an exception.

A.2.11. eowcs_get-kvp/getEOCoverageSet containment

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-containment

Test Purpose: Requirement 125 /req/eowcs_get-kvp/getEOCoverageSet-containment

Test method:

Send a valid get-kvp *GetEOCoverageSet* request as defined. Check that the response is not an exception.

A.2.12. eowcs_get-kvp/getEOCoverageSet count

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-count

Test Purpose: Requirement 126 /req/eowcs_get-kvp/getEOCoverageSet-count

Test method:

TODO

A.2.13. eowcs_get-kvp/getEOCoverageSet startIndex

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-startIndex

Test Purpose: Requirement 127 /req/eowcs_get-kvp/getEOCoverageSet-startIndex

Test method:

TODO

A.2.14. eowcs_get-kvp/getEOCoverageSet packageFormat

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-packageFormat

Test Purpose: Requirement 128 /req/eowcs_get-kvp/getEOCoverageSet-packageFormat

Test method:

TODO

A.2.15. eowcs_get-kvp/getEOCoverageSet mediaType

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-mediaType

Test Purpose: Requirement 129 /req/eowcs_get-kvp/getEOCoverageSet-mediaType

Test method:

TODO

A.2.16. eowcs_get-kvp/getEOCoverageSet format

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-format

Test Purpose: Requirement 130 /req/eowcs_get-kvp/getEOCoverageSet-format

Test method:

TODO

A.2.17. eowcs_get-kvp/getEOCoverageSet applySubset

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-applySubset

Test Purpose: Requirement 131 /req/eowcs_get-kvp/getEOCoverageSet-applySubset

Test method:

TODO

A.2.18. eowcs_get-kvp/getEOCoverageSet parameters

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-parameters

Test Purpose: Requirement 132 /req/eowcs_get-kvp/getEOCoverageSet-parameters

Test method:

TODO

A.2.19. eowcs_get-kvp/getEOCoverageSet Subset

Test id: /conf/eowcs_get-kvp/getEOCoverageSet-subset

Test Purpose: Requirement 133 /req/eowcs_get-kvp/getEOCoverageSet-subset

Test method:

Send a valid get-kvp *GetEOCoverageSet* request as defined. Check that the response is not an exception.

A.3. Conformance Test Class: eowcs_soap

The OGC URI identifier of this conformance class is: http://www.opengis.net/spec/WCS_application-profile_earth-observation/1.1/conf/eowcs_soap

A.3.1. eowcs_soap/Mandatory

Test id: /conf/eowcs_soap/mandatory

Test Purpose: Requirement 134 /req/eowcs_soap/mandatory

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_soap/conformance-class-in-profile

Test Purpose: Requirement 135 /req/eowcs_soap/conformance-class-in-profile

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_soap/describeEOCoverageSet-request-structure

Test Purpose: Requirement 136 /req/eowcs_soap/describeEOCoverageSet-request-structure

Test method:

Send otherwise valid soap *DescribeEOCoverageSet* requests containing:

- 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 element;

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

A.3.4. eowcs_soap/describeEOCoverageSet Response Structure

Test id: /conf/eowcs_soap/describeEOCoverageSet-response-structure

Test Purpose: Requirement 137 /req/eowcs_soap/describeEOCoverageSet-response-structure

Test method:

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

A.3.5. eowcs_soap/describeEOCoverageSet-wsdl

Test id: /conf/eowcs_soap/describeEOCoverageSet-wsdl

Test Purpose: Requirement 138 /req/eowcs_soap/describeEOCoverageSet-wsdl

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.

A.3.6. eowcs_soap/getEOCoverageSet Request Structure

Test id: /conf/eowcs_soap/getEOCoverageSet-request-structure

Test Purpose: Requirement 139 /req/eowcs_soap/getEOCoverageSet-request-structure

Test method:

Send otherwise valid soap *GetEOCoverageSet* requests containing:

- exactly one Body element containing exactly one GetEOCoverageSet element;
- exactly one Body element containing more than one GetEOCoverageSet element;
- exactly one Body element containing no GetEOCoverageSet element;

- more than one Body element;
- without a Body element;

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

A.3.7. eowcs_soap/getEOCoverageSet Response Structure

Test id: /conf/eowcs_soap/getEOCoverageSet-response-structure

Test Purpose: **Requirement 140 /req/eowcs_soap/getEOCoverageSet-response-structure**

Test method:

Send a valid soap *GetEOCoverageSet* request to sever under test. Check response whether the condition is fulfilled.

A.3.8. eowcs_soap/getEOCoverageSet-wsdl

Test id: /conf/eowcs_soap/getEOCoverageSet-wsdl

Test Purpose: **Requirement 141 /req/eowcs_soap/getEOCoverageSet-wsdl**

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 3 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.

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 containing 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 `DatasetSeriesId`s, 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 temporal 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 `CoverageId`s 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.

Further 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	1.0	Peter Baumann, Stephan Meissl, Jinsongdi Yu	Clause 9.2.2, Footer	Corrected example and copyright year in
2016-05-10	1.0	Stephan Meissl	None	Made an Asciidoc copy and published it on GitHub (https://github.com/EOX-A/eo-wcs, https://eox-a.github.io/eo-wcs)
TBD	TBD	Stephan Meissl	TBD	Proposal from ESA project EVO-ODAS